THE

Shipbuilder's Repoſitory;

OR, A TREATISE ON

MARINE ARCHITECTURE.

WHEREIN ARE CONTAINED,

The PRINCIPLES of the ART,

With the THEORY and PRACTICAL PARTS fully explained;

And every Inſtruction required in the building and completing a Ship, of every Claſs, from the forming of the Draught, to the launching into the Water.

CALCULATED TO THE CAPACITY OF

YOUNG BEGINNERS:

Compiled and digeſted in a Manner ENTIRELY NEW,

And laid down different from what has hitherto appaered on the Subject.

The Whole being intended as

A Complete Companion for thoſe Naval Architects,

Deſirous of attaining a Competent Knowledge of

THAT IMPORTANT ART.

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TO THE

RIGHT HONOURABLE

LORD VISCOUNT HOWE,

First Lord Commiſſioner of the Admiralty.

MY LORD,

WITH the moſt reſpectful Submiſſion, I have ventured to lay the following Treatiſe at your Feet: And as your Lordſhip is univerſally known to be the diſtinguiſhed Patron of every Effort which may contribute to the Improvement of His Majeſty's Navy, I flatter myſelf that the preſent Undertaking, as it relates to the important Art of Shipbuilding, and is chiefly intended for the

Benefit

Benefit and Inſtruction of the Artiſts in His Majeſty's Yards, will prove of the greateſt Utility, and as ſuch, be honoured with your Lordſhip's Patronage and Protection.

In which

I am,

With the greateſt Submiſſion and Reſpect,

MY LORD,

Your Lordſhip's

Moſt obedient,

And devoted

Humble Servant,

THE AUTHOR.

PREFACE.

AT a Time like this, when the Public are loaded with ſuch a Number of Publications, it is humbly preſumed no Apology is neceſſary for an Undertaking of this Kind, as it is univerſally allowed to be an Object of the greateſt Importance, and moſt extenſive Utility, to the Nation, and Public in general.

On the Preſumption therefore, that a Work ſo highly beneficial in its Conſequences, cannot fail of being honoured with that generous Encouragement, which an indulgent Public ſeem ever ready to beſtow upon Productions of real Merit, the Author has been induced to exert his utmoſt Abilities in compiling a New Treatiſe upon Shipbuilding; and being executed with Propriety and Attention, he flatters himſelf will ſtand a fair Chance for public Favour.

And further, being urged from the Conſideration, that a Work of this Kind was very much wanting, was one great Inducement to the Attempt: Though notwithſtanding there are many very good Authors upon the Subject in our Language, yet ſome of them are ſo intricate, that they are beyond the Capacity of the greater Number of Artiſts, and others have ſeemed to beſtow all their Pains on a Conciſeneſs, which deprives them of that neceſſary Branch of Knowledge required in the Explanation of the important Art. But ſtill it muſt be allowed that all their Works and Labours have their Merit; yet at the ſame Time, grantng them every Qualification neceſſary for Inſtruction, the

the Expence of obtaining them is ſo large, that it is far beyond the Power of the greater Number of Artiſts to obtain ; and none of them have been calculated and completed with that peculiar Attention, ſo as to make them both cheap and inſtructive, but on the contrary, thoſe that have appeared clear in the Deſcription, have been ſwelled to the utmoſt bounds of Extravagancy in Price, ſo as to exceed the Abilities of Thouſands to purchaſe.

I am not inſenſible that ſeveral Authors conſider it as an eſſential Part of the Prefaces to their reſpective Works, partially to repreſent their own Performances in the brighteſt Colours, and treat thoſe of others with the greateſt Severity; but as this is not the preſent Caſe, I ſhould wiſh every Reader to entertain the Idea, that my Opinion is founded upon Impartiality and Candour, and ariſes from a ſincere Endeavour of promoting that which is the moſt eſſential towards obtaining the noble purſuit.

My Care therefore, has been to avoid the before-mentioned Miſcarriages by an unneceſſary Prolixity, or an abſtruce Brevity. Long and uncertain Rules, which ſerve only to amuſe and exerciſe the Skilful, rather than teach the Rudiments of Shipbuilding, are omitted ; obſolete Rules are entirely rejected ; and by ſuch Means, and a preciſe Attention to the moſt ſignificant Ideas conveyed by an attentive Study, I have been able to include a complete and compendious Treatiſe on Marine Architecture, which will come within the Reach of every one's Ability to purchaſe, and at the ſame Time it is hoped will be found calculated to convey an Underſtanding of that uſeful Science, without puzzling or perplexing the enquiring Artiſt.

I have alſo, in the Execution of this Plan, conſulted the beſt Authors upon the Subject, both in the Theory and practical Part ; and the Reader will therefore find many Things which are to be met with in Books on the ſame

Subject,

Subject, but so disposed as to be much more practicable and useful, than they appeared to be in the Form originally given to them.

And in order to make this Treatise as complete as possible, I have divided it into several Books, or Parts, and those into Chapters, by which the Reader will be led progressively on, till he arrives to a Degree of Perfection. In the first Book, I have considered the different Forms which may be given to Solids, in order to make them best calculated for dividing the Fluids, with general Observations tending thereto; and have also sufficiently treated on the Center of Gravity, all of which is necessary to be understood by the Student, before he attempts the Construction of Ships' Bodies.

I have then proceeded, in consequence of the foregoing Observations, to lay down some general Proportions for Ships of every Class, whereby the Artist will be led to a thorough Knowledge required in the Formation of a Draught, in regard to the right proportioning of its Parts: I have likewise given some Dimensions, from which I have laid down Instructions for the drawing or delineating a Draught therefrom, and by those Means the Student may, with a proper Attention, be fitly qualified in that part of his Business.

The Student being thus instructed in the drawing Part, I have then given him a complete Set of Dimensions, whereby he may be able to construct the Bodies of Ships of every Class in the Navy, from the first Rate down to a Vessel of the smallest Size, all of which are of the latest Establishment, and all selected for their superior Qualifications: And I have also given the principal Dimensions and Scantlings of each, from which the whole Draught may be completely drawn, and the Ship likewise built.

In the next place, I have laid down Rules whereby the true Weight of any Ship may be ascertained, which will be essentially necessary to the Student, when he conſtructs a Draught from his own Fancy, in giving him the true Place of the Load Water-line, which will enable him to determine on the Heights of the lower Tier of Ports, Decks, &c.

I have alſo, in a particular Manner, explained the Buſineſs of the Mold Loft, with the Methods practiſed in laying down and diſpoſing of every Part of the Ship, and have likewiſe treated on the Meaſurement of Timber.

I have likewiſe laid down an exact and accurate Method, whereby the true Tonnage of all Ships may be found, either in ſharp or full Bodies, and have given the Method alſo that is practiſed for all Ships in general, belonging to His Majeſty's Service. And in order to make this Work ſtill more complete, I have introduced an Explanation of all the Technical Terms made uſe of in Shipbuilding, and which are peculiar to that Art.

The Treatiſe is concluded with general Obſervations upon the Maſting of Ships, and a complete Set of Dimenſions of the Maſts and Yards for thoſe Ships which are before ſpoken of in this Work.

But though I have taken all the Care in my power to render the following Sheets correct, as well as uſeful, I make no doubt but ſome unavoidable Errors have eſcaped my utmoſt Attention, either in the Preſs, or otherwiſe (an Errata of which ſhall be given as ſoon as diſcovered); for my own Experience confirms the Truth of what Mr. POPE aſſerts in the following Words:

> "Whoever thinks a faultleſs piece to ſee,
> "Thinks what ne'er was, nor is, nor e'er ſhall be."

However, if upon a candid and impartial Examination, the preſent ſhould be found to be a well-conducted Undertaking, I am not without Hopes that my involuntary Errors will be favoured with the Reader's Indulgence; my View being never to find Fault with others, but of endeavouring, as far as lies in my Power, to promote the Zeal of every young Student.

A TREA-

A

TREATISE

ON

MARINE ARCHITECTURE.

BOOK I.

CHAP. I.

Containing an INTRODUCTION *to the* WORK.

ALL ſhips, at their firſt appearance in the world, were of the ſame form, whatever uſe they were deſigned for; but the various ends of navigation, ſome of which were better anſwered by one form, ſome by another, ſoon gave occaſion to build and fit out ſhips, not only different in bigneſs, but alſo in their conſtruction and rigging; but it would be needleſs, as well as endleſs to the preſent deſign, to enumerate every little alteration: they were chiefly of three ſorts, ſhips of war, ſhips of burthen, and ſhips of paſſage.

In the northern parts of the world, the art advanced towards perfection but by ſlow degrees; for when Cæſar invaded Britain, we find that the inhabitants oppoſed him in veſſels of an odd form, or rather large tubs; the ſails were compoſed of leather, and iron chains ſupplied the place of a cable. When the Saxons had

had for ſome time been ſettled in this iſland, they became ſenſible that the beſt defence was a powerful navy. Accordingly, they applied themſelves vigorouſly to build ſhips of war; and ſome hiſtorians tell us, that in the reign of Edgar, they poſſeſſed a very formidable fleet; and in order to keep the navy in that condition, Etheldred made a law, "that whoever poſſeſſed three hundred and ten hides of land, ſhould build and man one ſhip for the defence of the country."

But although the Britons were not the firſt inventors of ſhipbuilding, the art owes, in a great meaſure, its preſent perfection to their diſcoveries, and accordingly, The navy of England excels all others in beauty, ſtrength, and ſafety; for beauty, our ſhips of war are ſo many floating palaces; for ſtrength, ſo many moving caſtles; and for ſafety, they are the moſt defenſive walls of the land: and as our naval power gains us authority in the moſt diſtant nations, ſo the ſuperiority of our fleet renders the Britiſh Monarch maſter of the ſea.

Trade firſt gave occaſion to the fitting out large fleets of ſhips; and upon the increaſe of trade, ſhips of war became neceſſary in all nations, to preſerve it to the juſt proprietors.

The firſt thing to be thought of, in order to the building of a ſhip, is to conſtruct a draught for that purpoſe, in which muſt be delineated (by a proper and convenient ſcale adapted to that uſe) the ſize and ſhape of the principal parts therein contained, as conſiſting of lengths, breadths, depths, heights, &c. and likewiſe muſt be ſhewn the true ſhape of the ſhip, at certain diſtances, from the fore to the after part, which is termed the body, and muſt differ in all ſhips according to their ſize, and purpoſe for which they are deſigned.

For inſtance, merchant ſhips, or veſſels intended to carry large burthens, the ſhape of their bodies muſt be made very full, in order to make them convenient for ſtowage; but ſhips of war, and all veſſels chiefly deſigned for ſailing

faſt,

faſt, their bodies require to be leſs full, ſo that they may be conſtructed in a ſuitable manner for adapting them to divide the fluid, through which they are to paſs, with more eaſe and facilily.

When thoſe things are fixed upon, a draught may be formed, by which the artiſt will be enabled to lay down the ſhape of the ſhip in its proper ſize on the mold loft floor, and then may proceed to the converting of his timber, which will put him in a fair road towards erecting the fabric.

But as many things are to be conſidered before ſuch determinations can be made, in order to form a draught, I ſhall make ſome obſervations tending towards the aſcertainment thereof, by which the artiſt may be led to a clear underſtanding of the nature of reſiſtance and dividing of the fluids, with the propereſt form for ſolids adapted to that purpoſe, before he attempts to conſtruct a draught: for although there certainly is ſome fixed rule for forming a ſolid of the leaſt reſiſtance, yet it never became general, as almoſt every perſon I ever converſed with on the ſubject entertained a different idea from each other.

However, be that as it will, I ſhall lay down my own ideas with thoſe of the beſt authors that I have conſulted, by which I ſhall endeavour to throw a ſtriking light upon the whole; and in ſo doing, may bring the artiſt to ſuch a degree of perfection in the ſtudy thereof, that his ideas may be enlightened ſo far as to enable him to make ſome uſeful obſervations therefrom, and be able to form a body which may poſſeſs the wiſhed-for qualifications.

The principles therefore, on which I ſhall proceed, I hope will be found both certain and evident, and the remarks drawn from them no leſs clear and practicable.

CHAP.

CHAP. II.

Wherein is confidered the folid of leaft refiftance, fo far as relates to the formation of a fhip's body, with other obfervations.

PLATO examined the cutting of a fphere or globe, and reduced the dividing of it into five regular bodies, from which feveral mathematicians have obferved, there can be no more than five regular bodies produced from the fame folid.

He alfo tells us, that regular curves are fuch as the circumference of the conic fection; but irregular curves, fuch as have points of inflection, or the curve reverted; and that befides fuch regular bodies that agree to rule, there are no others that will correfpond to the definition.

Sir Ifaac Newton has demonftrated a folid, which he calls the folid of leaft refiftance, and hints that it may be very ufeful in conftructing of fhips' bodies. 'Tis produced by the rotation of a crooked line about its axis, and is round or blunt at bottom, and flat at top; but being formed by one rotation, the water equally affects it, and every particle of water paffes direct, without being confufed or divided into irregular fhapes.

We may be very much helped by obferving how nature difplays herfelf, in forming of creatures fuitable to their various actions in their feveral elements, and we may derive various inftructions, and a fund of knowledge therefrom.

See

See the formation of fiſh in general, examine them, and you will find them perfectly convex without inflexion; their fins are placed perpendicular from the center of the body, or line of direction, and keeps them ſteady in their moving, making a perpetual and uniform motion, according to their natural tendency.

A duck in the next place deſerves our attention, obſerve the manner of her ſwimming, ſee how ſhe makes her ſtroke with only two feet, and drives her body ſwiftly along.

The bodies of thoſe creatures conſidered, may be of great ſervice to us in laying down rules for bodies contrived by art to move in fluids, they being mathematically formed according to their lengths, breadths and depths; and to mend their ſhape is almoſt impoſſible.

We are informed by hydroſtatics, that the weight of a floating body is equal to the weight of water diſplaced by its immerſed part; ſo that we find from that, that a whole ſhip, and all her equipping, and every thing in her, and whatever preſſes upon her, preſſes neither more nor leſs upon the bottom ſhe ſwims over, than as much water as is equal in bulk to the immerſed part of the ſhip, or that part which is under the ſurface of the water.

Some exact rules may be drawn from theſe principles, by which we may equip, load and trim every ſhip, both for conveniency and motion, and in conſequence may know what advantage or diſadvantage will accrue to ſhipping in general; but this will only be found in regular bodies, that are formed by ſome known line between a cone and a cylinder, where every intermediate line will be applicable toward regularly forming any ſhip's body.

Therefore the abſolute ſhape requiſite for forming any ſhip's body, may be exactly known, although there may be a great many lines drawn between a cone and a cylinder, or tranverſe lines between half the length and half the breadth

breadth of any ſhip; for ſince the body of any ſhip regularly formed is no other than a hanging coniod, theſe lines will be reciprocal to ſuch a figure.

However, as the main point is to find that form for a ſolid, which ſhall meet with the leaſt reſiſtance in paſſing through the fluids, I ſhall proceed to treat on the ſubject of the nature of fluids; and then be as brief as poſſible in deſcribing the propereſt form for a ſhip's body, which ſhall divide the fluids with the greateſt eaſe and velocity.

CHAP. III.

Of the nature of fluids conſidered, with the different kinds of reſiſtance to be met with in paſſing through them, and likewiſe the form of a ſhip's body which is moſt likely to meet with the leaſt reſiſtance in dividing them.

IT is ſufficiently proved by daily experience, that the fluids, by their motion, attack the ſolids that oppoſe them, as mills, bridges, &c. with ſuch violence, as very often to carry all before them, and which is agreeable to the very nature of fluids: for all fluids are an aſſemblage of a prodigious number of ſmall ſolid bodies of a globular form, each of which being eaſily put in motion, will act upon any ſurface with the ſame force that any other ſolid body of the like maſs would do.

But as theſe particles have but a very ſmall connection with each other, fluids cannot act with the ſame force as ſolids, which have their parts united.

For

For ſuppoſe a pier or bridge was to oppoſe a maſs of water of ſixty cubick feet, and likewiſe a maſs of ice of the ſame dimenſions, the water would not act with the ſame force upon the pier or bridge as the ice would; for reaſon, that the whole maſs of ice having its parts ſo united together, that it is impoſſible for one to advance without the other, the blow is given with all the parts at once, united in one; where the maſs of water, having the parts that compoſe it but ſlightly united, they cannot act jointly in a body, and their force is exerted one after another; they indeed ſucceed one another immediately, and are a little united by their equal preſſure, but as every part has a peculiar velocity, it makes it's effort ſingly by itſelf, and being eaſily put in motion, it will as eaſily be put out of its direction, the parts being only retained together by the weight of thoſe that come next to them.

Fluids have a continual effort, becauſe when a certain number have produced their effect, they are ſucceeded by others as long as the current laſts; by which it is certain, that a veſſel left to the current of a river, can receive no more velocity than the current has, and conſequently it's velocity will be accelerated till it is equal to that of the current. But on the contrary, if any floating body receives a motion, in an oppoſite direction to that of the current, it will be continually obſtructed till it has none, and then it will change its direction to follow that of the current.

I ſhall here remark, that it is indifferent whether the motion be aſcribed to the ſolid, or to the fluid, for the water's impreſſion upon the ſhip's ſtem is the ſame when under ſail, as when at anchor, provided the motion of the current be equal to that which the ſhip acquires by ſailing.

The effort of fluids is as the ſquare of the velocity of the current; as it is very evident, that the more rapid the current is, the greater will be the impreſſion of the fluid, for the ſolid will be ſhocked with greater force than when it runs ſlowly; ſo that in proportion to the velocity the force is augmented.

Again,

Again, the number of parts of the fluid that ſtrike the ſolid in any ſpace of time, is in proportion to the velocity of the current; for the faſter it runs the greater will be the number of parts that ſtrike the ſolid in a ſpace of time, ſo that not only the effort of the fluid, but likewiſe the number of parts that attack the ſolid, is augmented in proportion to the velocity of the current, and when theſe two are united, the effort of the fluid will be in a duplicate ratio of the velocity; ſo that if the velocity be doubled, the ſhock will be quadrupled or four-fold: by which, the faſter a ſhip goes through the water, the greater will be the reſiſtance ſhe meets with, and this will be augmented in a duplicate ratio of the velocity with which ſhe ſails.

The impreſſion of a fluid increaſes as the ſurfaces which oppoſe its current. If one ſurface is double another, it will receive double the number of the parts of the fluid, and the impreſſion will be double on the ſurface, whoſe area is double the area of another ſurface.

In conſequence, it is found that thoſe ſhips whoſe midſhip bend or ſection, have the greateſt capacity, or greateſt area, meet with the moſt reſiſtance. Alſo the efforts of fluids will be leſs when the ſurfaces are in an oblique poſition to the current, than when in a perpendicular poſition.

I have hitherto conſidered the ſhock of a ſolid body in different directions upon the ſurface of another ſolid, but will readily grant, that fluids do not act in the ſhock in the ſame manner that ſolids do. It is very probable, that when a fluid falls perpendicular upon a ſurvace, there is a maſs of water that reſts immoveable before the ſurface, which occupies the place of a ſolid body, and has nearly the ſame effect as if the ſurface was round, ſo that the fluid does not attack the body that oppoſes it in a direction perpendicular to its courſe; beſides, the particles of water which attack a ſurface, whether obliquely or not, may rebound and change their direction, ſo that the laws of fluids are quite different from the laws

of

of ſolids, in the ſhock. The oblique direction of a particle of water may be reſolved into one that is perpendicular to the body which oppoſes its courſes, and one that is parallel to it.

If two equal ſurfaces, expoſed to the ſame current, receive its ſhock in different obliquities, the impreſſions will be to one another as the ſquares of the ſines of the angle of incidence.*

A ſurface parallel to the current can receive no ſhock, becauſe there is no angle of incidence: alſo if two unequal ſurfaces are expoſed to the ſame current, the impreſſions they receive by the ſhock in different obliquities, are to one another as the products of the ſquares of the ſines of the angles of incidence, and of the ſurfaces that receive the ſhock.

And if two equal ſurfaces receive the ſhock of two unequal currents, the impreſſions will be to one another as the products of the ſquares of the velocities, and of the ſquares of the angle of incidence.

Likewiſe, if two unequal ſurfaces are expoſed to two unequal currents, which ſtrike them with different obliquities, the impreſſions will be to one another as the products of the ſquares of their velocities, of the ſquares of the ſines of the angle of incidence, and of the ſurfaces.

Hence it appears, that by placing the midſhip bend, or broadeſt part of the ſhip, much nearer to one end than to the other, the end unto which it is neareſt being put foremoſt, it will then give the form that will paſs through the fluid with the greateſt velocity.

And although it is plain, that by ſo doing the entrance of the ſhip doth make a more ſudden, or is of more abſolute force againſt the current of the

E water,

* Incidence denotes the direction in which one body ſtrikes or falls upon another, and the angle made by the line of direction upon the plane of the receiving body, is called the angle of incidence.

water, than when it is placed nearer to the middle of the ſhip, yet by moving the midſhip bend ſo near the fore end of the ſhip, the body thereby declines ſo much the ſooner, and takes off part of the friction cauſed by the lateral preſſure of the water, which muſt certainly be of more ſervice to the velocity than what is loſt by making the fore part of the ſhip ſomewhat fuller, and ſeems to promiſe the connection of capacity and velocity the two great objects to be purſued in the conſtructions of ſhips' bodies.

It might alſo be maintained by a philoſophical diſcuſſion, that this diſpoſition of the midſhip bend is clearly pointed out by nature, in her formation of the faſteſt ſwimming fiſhes, which are likewiſe deſtined to move in the water; and as the form of a fiſh is beſt calculated for velocity, that form, when given to a ſhip's body, hath generally been experienced with ſucceſs: from which it may be made a general rule, that ſo far as other conſiderations will admit, the lines that form the bodies of ſhips ſhould be ſimilar to thoſe which are proved to have the greateſt velocity.

And in order to prove the advantages in velocity ariſing from the placing of dead flat, or the midſhip bend, neareſt to forward, I ſhall in the next chapter illuſtrate it with ſome experiments, which I found in a famous French author, and put them in execution myſelf, and whereby the reader will have an opportunity of practiſing them alſo, and of convincing himſelf of the great propriety of ſo diſpoſing of the midſhip bend.

CHAP. IV.

Relating to experiments, which were made for the purpose of knowing the lines of least resistance.

I Provided a ciſtern about thirty feet long, and filled it with water, I put a partition in the middle, dividing it in halves lengthways, in order that the motion of the water in one part ſhould not diſturb that in the other; and as the leaſt blowing of the wind would likewiſe have diſturbed the ſurface, I took care to place it under cover in a ſhed which I had convenient.

In the next place, I fixed two braſs pullies or rollers at the end, one in each diviſion, for the purpoſe of a line paſſing over to draw the blocks. I made two blocks, or models, each from a different draught, the midſhip bend of one was at one-third of the length from forward, and the midſhip bend of the other was exactly in the middle: I then weighed them, and found the one which had the midſhip bend neareſt to the forepart, was much heavier than the other, I then reduced it by taking wood out of the middle, till I made them both of equal weight.

I next proceeded to place them in the water at the furtheſt end of the ciſtern, in order to the drawing of them; but leſt they ſhould not keep in a direct courſe, I ſtrained a line over the middle of each, and faſtened it to each end of the ciſtern, and fixed upright wires in the blocks, and turned the ends back over each line.

I fitted

I fitted a ſmall ſtaple in the end of each block, by which I faſtened a ſilk line with a hook, and letting them paſs over the braſs pullies or rollers, I faſtened a weight to the end of each, which was equal to the weight of each block.

EXPERIMENTS.

I then proceeded to the experiments; and in order to make a diſtinction, I ſhall call that which has the midſhip bend or extreme breadth neareſt to forward, A, and the other, B.

I now ſet them in motion, by letting them feel the weights ſuſpended, and found that the block A reached the oppoſite end of the water ſooner than the block B; but in order to take away every poſſible advantage they might have over each other, I changed their ſituations, putting one into the place of the other, for if either of the braſs pullies or rollers had not been exact, it might have affected the motion; as for juſt the ſame reaſon we change the weights to try the ſcales. But there was ſtill the ſame difference in velocity; I therefore calculated it, and found that A gained in velocity 1–9th againſt B.

A hath the greateſt velocity, becauſe the breadth declines nearer the head than it does in B, which eaſes the latteral preſſure ſooner than B; the midſhip bend or extreme breadth of B being nearer the middle, it breaks open the water ſooner, but the breadth being further aft, the friction is not eaſed by the declining of the ſides ſo ſoon as in A, which therefore accounts for the difference in velocity, as has been before mentioned.

I proceeded in the next place to experiments upon other blocks which I formed; I ſhall diſtinguiſh them by C, D, and E.

C and D are two blocks, the extreme breadth of each is in the middle, they are equal in quantity, equal in length, and equal in weight, but not equal in

breadth.

breadth; the block D is narrower in the middle, and fuller towards the ends; the block C is broader at the middle, and narrower towards the ends; I drawed them, and found that D had more velocity than C by 1–40th part.

E is the ſame length, ſame breadth, and ſame quantity as C; the extreme breadth of this is removed from the middle to one third of the length from one end, by which means one end is fuller, and the other end juſt ſo much the ſharper, and the floor ſharper; this I likewiſe drawed, the full end foremoſt againſt C, and found it gained in velocity 1–9th part.

Doth not this ſhew, that if a ſhip was built with the lines that form the body ſimilar to the block whoſe breadth is in the middle, and if another was built with the lines that form the body ſimilar to the block whoſe breadth is 1–3d from the ſtern, the latter would loſe of the former 1–9th part of the velocity?

If another ſhip was built whoſe lines that form the body were ſimilar to the block whoſe breadth lay at 1–3d from the head, it would outſail the ſhip whoſe breadth lay in the middle, by 1–9th part. Alſo, that the ſhip whoſe breadth lay at 1–3d from the head would outſail the ſhip whoſe breadth lay at 2–3ds diſtance from the head, 2–9th parts of the diſtance run.

But as the midſhip bend, or extreme breadth, may be placed in the middle, or further aft, or further forward, and the quantity of the bulk remain the ſame in the whole, ſo by moving the midſhip bend further aft, the lines that form the fore end of the ſhip thereby run nearer a parallel to the keel, and conſequently have the leſs abſolute reſiſtance to the current of water; but this accounts but for one part only, that is, the reſiſtance of the current from the ſtem to the middle of the ſhip; yet there is a friction from the lateral preſſure of the water againſt the ſides and bottom of the ſhip that muſt be conſidered alſo, which I therefore ſhall endeavour to explain.

 Water,

Water, according to its depth, is by its own weight compreſſed together againſt the ends, ſides, and bottom, in all directions; if the body placed therein be not ſpecifically heavier, the water will bear it up, and in proportion as the body is lighter, the more it will float out of the water; this is familiarly known, but the applying of it to the preſent purpoſe may be underſtood as follows:

Water, or any liquid, placed in a box or veſſel of any figure, preſſes againſt all the ſides with a force equal to its depth, and at the ſame time the whole weight on the bottom; on the contrary, when a veſſel is placed in the water, the water preſſes the ſides and ends inwards, and upwards under the bottom, with a force to bear up the veſſel, ſhip, or any other figure whatever, that is not ſpecifically heavier than the water.

The moving this body, as it is thus circumſtanced, with the water preſſing againſt it in all directions, muſt put all the parts of the water that are near it in a ruffle, or ſort of confuſion; the particles at the fore end of the ſhip, near the bottom plank, appear to be conſtantly removed by freſh particles of the current preſſing in and impelling againſt them, and ſo one after another; but when we come to a more ſtraight part of the ſhip's ſides, and the declining part of the ſhip's bottom, the particles next to the plank are not ſo ſoon diſplaced; this appears from obſerving the graſs that grows on the ſides of the ſhip's bottom; it ſhall be ſeen to grow right out, and wave backwards and forwards from the ſides of the ſhip's bottom, as if the water had no motion, when at the ſame time the ſhip may be ſailing four or five knots an hour, or more; this is in part the caſe when the ſhip's bottom is clean, but much more ſo when the bottom is foul: this atmoſphere, or carrying part of the water along with the ſhip, is what I have called friction, and is to be conſidered, and muſt be taken with the account of the reſiſtance.

Now

Now it is plain, that the placing of the midſhip bend is of the utmoſt conſequence in the conſtruction of a ſhip's body, and it appears very clear from what has been ſaid, that a ſhip with the midſhip bend placed near to forward, which conſequently will make the fore body full, will beſt anſwer every purpoſe which is required, eſpecially that of velocity.

For ſuppoſe a ſhip had all the perfections in her dimenſions, and the midſhip bend placed near to the middle, and built ſharp at the ends, conſider the weight of the foremaſt, rigging, and ſails, the anchor at the bows, which, with the preſſure of the wind in the ſails, all unſupported, but from the body further aft, and united to preſs down into the hollow of every ſea; ſuch a ſhip, for want of more body further forward, muſt plunge deep, and hinder the velocity; but this is not the caſe with the hinder part of the ſhip. Another conſideration is, the ſide reſiſtance of the bottom muſt not be equally forward to that abaft, for if it was, the ſhip muſt be trimmed greatly by the ſtern, or her rudder would not command her, to bear up in a gale of wind: when a ſhip is preſſed with ſail, the water is forced up at the bow, a little above a level, and the ſhip is preſſed a little down, which amounts to the ſame with reſpect to her helm, as if the ſhip was trimmed by the head; then ſhips that carry their tiller near the middle in light winds, require it more a-weather when it blows.

I may therefore now venture to aſſert, that by carrying the midſhip frame, or bend, forward, as in the preceding experiments, we ſhall gain not only in point of velocity, but likewiſe in point of ſteerage, which will be a double advantage.

Having now ſufficiently treated upon the different ſubjects, tending to the knowledge of the greateſt velocity that can be poſſeſſed by a floating body, I ſhall in the next chapter, proceed to lay down ſome obſervations, as an introduction towards finding the center of gravity.

CHAP.

CHAP. V.

Of the center of gravity, wherein is explained the nature of, and methods of finding it in different surfaces and solids.

THE principle on which to fix the ſtability or ſtiffneſs of a ſhip, is the proper fixing the center of gravity of the whole body, including, as well the maſts, yards, guns, &c. that are above the water, as the ammunition, ballaſt, &c. that are below the water; and in order to give a diſtinct idea of that term, the center of gravity, we muſt proceed as follows:

It is eaſy to conceive that the ſame quantity of any matter may be put into different forms, but it will ſtill be the ſame weight; for a piece of lead in form of a globe of one inch diameter, may be extended ſo as to cover a circle of one foot or more diameter, but it is plain the lead will be the ſame weight in both forms; and if it were poſſible to preſs it ſo as to become a globe of one eighth of an inch diameter, or leſs, this ſmall globe would weigh as much as the other great one, but becauſe the parts of matter cannot penetrate into one another, this cannot be effected. Let us then ſuppoſe the whole weight of a globe to be united into one point, or exact center of itſelf, and we ſhall then have an idea of what is called the center of gravity.

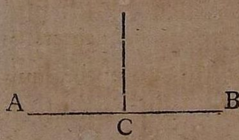
The center of gravity then of any body, is that point, whether it be within or without that body by which, if it was ſuſpended, or upon which, if it was ſupported;

ſupported, it would reſt immoveable in any ſituation, as if the weight of the whole body was united in that ſingle point. Hence, to find the center of gravity of any body, is to find that point, upon which, if the body reſted, all the other parts would be in equilibrium; it is therefore neceſſary to ſay ſomething of the equilibrium, for then the reader will be able eaſily to underſtand what will be ſaid on the center of gravity.

In treating of the equilibrium, I ſhall explain the balance, becauſe the uſe and conſtruction of the balance, and of the equilibrium, are founded on the ſame laws.

The balance conſiſts of a beam, and a fulcrum or point of ſupport, the center on which the beam moves, and if this be the center on which the beam reſts in equilibrio, it is the center of gravity of the beam; but as this point may be conſidered as one of thoſe that form a line, it may be conſidered as the axis of the equilibrium, that is to ſay, as if formed by a line paſſing through the center of gravity. If we imagine a plane croſſing the beam in the point, we ſhall then have an idea of the plane of the equilibrium; that is to ſay, of a plane in which the center of gravity is to be found.

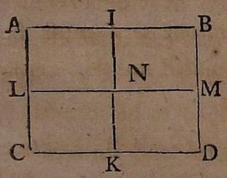
In order to make the beam of a balance true, the two arms muſt be exactly of the ſame length, and likewiſe the weight of one arm muſt be equal to that of the other, and the fulcrum muſt be applied to the center of gravity.



Let us conſider the line A B, abſtracted from breadth and thickneſs, and, ſuppoſing all its parts to be homogenous, they will all have an equal tendency to the center of the earth, and if there be the ſame diſtance betwixt C and A, as there is betwixt C and B, the line will then reſt in equilibrio on the middle, or C, which will point out the center of gravity for the

the ſaid line. The arm A C and the arm B C being equally diſtant from the point C, and having an equal tendency towards the center of the earth, reciprocally deſtroys the weight of each other; and there being, by ſuppoſition, the ſame number of elementary parts betwixt A and C, as betwixt B and C, each will deſtroy the force of its oppoſite, and the line will reſt in equilibrio, becauſe the line is ſuppoſed to have neither breadth nor thickneſs, the point C will be in the center of gravity; but if the fulcrum be moved towards A, or towards B, it is plain the equilibrium will then be broke, becauſe there being more elementary parts on the one ſide than on the other, there will be a preponderating force, which will cauſe the line to incline. So we may perceive that the center of gravity of a line, every where of equal thickneſs and breadth, and all its parts of equal weight, will be exactly in the middle of the ſaid line.

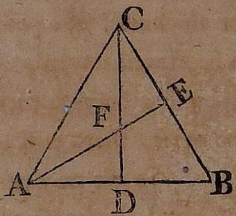
It will not be amiſs here to remark, that in finding the centers of gravity of lines, or ſurfaces, we need only conſider their extent, becauſe as the matter of which they are formed is ſuppoſed homogeneous, all the parts will be equally affected with that tendency they have towards the earth's center, or that force which makes bodies deſcend, effects all the parts equally.



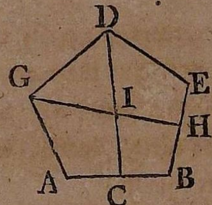
It is eaſy proved that the center of a parallelogram is in N, for, ſuppoſing the parallelogram to be formed by elementary lines parallel to A B, as we have already proved, that the center of gravity of a line is in the middle of it, if the line I K be drawn through the centers of gravity, of the elementary lines parallel to A B, it will be the axis of the equilibrium in which the center of gravity of the whole figure muſt certainly be found. Let us then ſuppoſe other elementary lines parallel to B D, we ſhall have L M another axis of the equilibrium, in which likewiſe the center of gravity muſt be, and becauſe the point N is the only one, common to both

axis,

axis, it must be the center of gravity; hence, the center of gravity of a parallelogram must be in the center of the figure; for the same reasons the center of gravity of circles, ellipses, and polygons, of any even number of sides, will be in the centers of the figure, as is evident by a bare inspection of the figures.



It will be as easy to find the center of gravity of any triangle, for, supposing it formed by the elementary lines A B, we have C D one axis of the equilibrium; again, supposing it formed by the elementary lines B C, we have A E the other axis of the equilibrium, so shall F, the point of their intersection, be the center of gravity of the triangle; hence the center of gravity of any triangle will be in the point of intersection of two lines bisecting any two sides.



If we suppose a regular pentagon, formed by elementary lines A B, we shall have the axis D C; again, supposing it formed by the elementary lines B E, we shall have the other axis G H, so shall I, their point of intersection, be the center of gravity of the pentagon.

As by supposing all surfaces to be formed by lines, we have discovered an easy method to find the centers of gravity of regular surfaces; so if we consider surfaces as the elements of solids, we may as easily find the centers of gravity of solids; for if we conceive the parallelopiped to be formed by an infinite number of parallelograms, parallel to A B, the center of gravity of all the parallelograms will be in the center of the figures, as before proved; and if we draw a line C D through all the centers of gravity, we shall have the axis of the equilibrium, in which the center of gravity of the parallelopiped is to be found, and as all the parallelograms are equal, we may conclude that the center of gravity of the parallelopiped is in the

the middle of the axis C D, which is E F; and for the ſame reaſon, the centers of gravity of a cylinder, of a ſphere, or of an ellipſoid, are exactly in the center of theſe ſolids.

As any priſm may be conſidered as compoſed of ſurfaces, or thin ſlices, equal and ſimilar to their baſes, and that a ſtraight line drawn from the center of gravity of one baſe to that of its oppoſite, paſſes through all the elementary ſlices, the center of gravity of all priſms, or cylinders, will be in the middle of that line, which is the axis of the equilibrium.

As to the center of gravity of a triangular pyramid, it is plain it muſt be in a ſtraight line drawn from the vertex to the center of gravity of the baſe; for let the pyramid be divided into elementary ſlices parallel to the baſe, the centers of gravity of all theſe ſurfaces will be ſimilarly placed, and uſing the ſame operation on all the ſides of the pyramid, we ſhall have different axis of the equilibrium; their point of interſection, which will be one fourth of the length from the baſe, will be the center of gravity, and as a cone may be conſidered as a priſm of an infinite number of ſides, its center of gravity will be likewiſe in the one fourth part of its axis from the baſe.

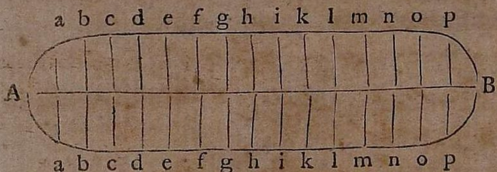
The center of gravity being now ſufficiently explained, ſo as to give the reader a perfect idea of the nature of it, I ſhall not enter into a further detail upon that part of the ſubject, but ſhall in the next chapter proceed to treat of the method of finding it in ſhips, and ſhall confine myſelf to what is directly applicable thereto, and juſt ſo far as is conſiſtent with our preſent deſign.

CHAP.

CHAP. VI.

Containing the Method of finding the center of gravity in a ſhip, with further obſervations on the ſubject.

TO find the center of gravity in a ſhip, we muſt conſider the principles upon which the center of gravity is founded, as before explained, and then may begin with the operation.



I ſhall propoſe at firſt to find the center of gravity of the area of a ſection of a ſhip taken at the load water line, which is repreſented by A B. Firſt, the two ſides of a ſhip being equal and ſimilar, the line A B may be conſidered as the axis of the equilibrium, in which the center of gravity of that ſurface is to be found.

Secondly, the curves that form the ſides of that ſurface being very irregular, muſt be reduced as near as poſſible to regular ones, by dividing the ſurface with the ordinates a a, b b, c c, d d, &c. obſerving to place them at equal diſtances from one another, and likewiſe the diſtances muſt be ſo ſmall, that the portion of the curves intercepted betwixt them may be conſidered as ſtraight lines, which will be near enough for practice.

Thirdly, These ordinates will divide the surface into a number of parallelograms, such as b d, d b, which may be considered as such, on account of their being so very small, it is plain, the center of gravity of the parallelogram b d, d b, is at the point where the line c c, intersects the line A B; and it will be so with all the rest, so the centers of gravity of all the parallelograms will form a system distributed on the line A B.

And fourthly, To find the center of gravity of the system, in respect of A, which is assumed for the first term of the * momenta; we must multiply the surface of each parallelogram by the distance of its center of gravity from the point A, and so having the sum of all the momenta, we may divide that sum, by the sum of the surfaces of all the parallelograms, or by the whole surface A B, and the quotient will be the center of gravity from the point A, the axis of the momenta.

But I will abbreviate this operation, and we must have the area of the whole surface A B, before we can obtain a solution, we shall therefore find that by the method that follows.

First, Divide the whole length in several equal parts, a a, b b, c c, &c.

Secondly, Measure all the ordinates, a a, b b, c c, &c. and add them together, except the first and the last, of which only one half must be taken of each.

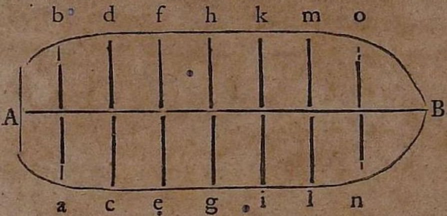
And thirdly, Multiply that sum by the distance betwixt the ordinates, and the product will be the area of the section A B.

The second thing to be had is the sum of the momenta of all the elementary parts of the surface, which must be done by multiplying each ordinate into

* The momenta of any heavy body, or of any extent considered as a heavy body, is the product of that weight, or of that extent multiplied by the distance of its center of gravity from a certain point assumed at pleasure, which is called the center of the momentum, or from a line which is called the axis of the momentum.

into its diſtance, from the point A; then take the ſum of all theſe products, except the firſt and laſt, of which take only one half of each; and by multiplying that ſum by the diſtance betwixt the ordinates, is produced the ſum of all the momenta of the elementary parts of the ſurface, which divided by the area of the ſurface before found, the quotient gives the diſtance of the center of gravity of the whole ſurface from the point A.

However, to make it the more clear, I ſhall illuſtrate it by an example.



Therefore ſuppoſe a ſurface A B, let it be required to find the center of gravity of that ſurface, ſuppoſing it to be 104 feet long; firſt divide the ſurface by the ordinates a b, c d, e f, which are here 13 feet diſtant from each other. Secondly, omitting the line A, which repreſents one of the tranſoms, becauſe we aſſume it for the axis of the momenta, it is 12 feet long.

OPERATION.

	Ft.	Inch.		Diſtant from A.		Product. Ft.	Inch.
Half of A is equal to	6	0					
a b ———	25	0	multiplied by	1	is equal to	25	0
c d ———	28	0	———	2	———	56	0
e f ———	29	2	———	3	———	87	6
g h ———	29	6	———	4	———	118	0
i k ———	29	6	———	5	———	147	6
l m ———	29	2	———	6	———	175	0
n o ———	27	10	———	7	———	194	10
Half B ———	0	6	———	8	———	4	0
	204	8	Sum of all the products			807	10
			Diſtance betwixt the ordinates			13	0
			Sum of the ordinates		204)	10501	10(51

By which the center of gravity of the ſurface is found to be 51 feet from A B.

We

We may next proceed to find the centers of gravity of the ſurface of each ſection, contained betwixt the load water line and the keel, by the ſame method; we ſhall then have a ſyſtem of heavy bodies, which will have their centers of gravity in a plane erected perpendicular to the keel, at their ſeveral diſtances from the line A B, which is aſſumed for the axis of the momenta.

O P E R A T I O N S.

The ſecond or next under the load water line is found to be 102 feet 8 inches long, and the diſtance betwixt the ordinates 12 feet 10 inches.

	Ft.	Inch.			Ft.	Inch.
Half of A is equal to	2	0				
a b ———	21	0	multiplied by 1	is equal to	21	0
c d ———	27	11	——— 2	———	55	10
e f ———	28	6	——— 3	———	85	6
g h ———	28	10	——— 4	———	115	4
i k ———	28	10	——— 5	———	144	2
l m ———	28	8	——— 6	———	172	0
n o ———	27	10	——— 7	———	194	10
Half of B ———	0	5	——— 8	———	3	4
	194	0			792	0
					12	10
				194)10164	(52	4

By which the center of gravity of this ſurface is found to be 52 feet 4 inches from A B.

The

The third water line is 100 feet long, and the diſtance betwixt the ordinates 12 feet 6 inches.

	Ft.	Inch.				Ft.	Inch.
Half of A is equal to	0	6					
a b ———	14	8	multiplied by	1	is equal to	14	8
c d ———	24	8	———	2	———	49	4
e f ———	27	9	———	3	———	83	3
g h ———	28	0	———	4	———	112	0
i k ———	28	0	———	5	———	140	0
l m ———	28	0	———	6	———	168	0
n o ———	26	0	———	7	———	182	0
Half of B ———	0	5	———	8	———	3	4
	178	0				752	7
						12	6
					178)9407	(52	10

By which the center of gravity of this ſurface is found to be 52 feet 10 inches from A B.

The fourth water line is 97 feet 4 inches long, and the diſtance betwixt the ordinates 12 feet 2 inches.

	Ft.	Inch.				Ft.	Inch.
Half of A is equal to	0	$3\frac{1}{2}$					
a b ———	4	6	multiplied by	1	is equal to	4	6
c d ———	16	8	———	2	———	33	4
e f ———	22	10	———	3	———	68	6
g h ———	24	4	———	4	———	97	4
i k ———	24	8	———	5	———	123	4
l m ———	24	8	———	6	———	148	0
n o ———	21	8	———	7	———	151	8
Half of B ———	0	$4\frac{1}{2}$	———	8	———	3	0
	140	0				629	8
						12	2
					140) 7660	(54	8

By which the center of gravity of this ſurface is found to be 54 feet 8 inches from A B.

 The

The next is the keel, which is 96 feet long, and the diſtance betwixt the ordinates 12 feet.

	Ft.	Inch.				Ft.	Inch.
Half of A is equal to	0	$3\frac{1}{2}$					
a b ———	0	11	multiplied by	1	is equal to	0	11
c d ———	1	0	———	2	———	2	0
e f ———	1	2	———	3	———	3	6
g h ———	1	2	———	4	———	4	8
i k ———	1	2	———	5	———	5	10
l m ———	1	1	———	6	———	6	6
n o ———	0	10	———	7	———	5	10
Half of B ———	0	$4\frac{1}{2}$	———	8	———	3	0
	8	0				32	3
						12	0
					8)	387	(48 4

By which the center of gravity of the keel is found to be 48 feet 4 inches from A B.

Having now by the foregoing operations, found the centers of gravity of all the ſurfaces, we muſt proceed to find the poſition of the center of gravity of the hull, in reſpect to the length, by finding the poſition of the center of gravity of the ſyſtem, with reſpect to the line A B, which we aſſume for the axis of the momenta, or for the firſt term.

Therefore, we need only multiply the area of each ſection by the diſtance of its center of gravity from the line A B, and add all the products, except that of the firſt and laſt, of which we muſt only take one half of each, and then divide the ſum of all the products by the ſum of all the areas, obſerving to take only half the firſt and laſt, and the quotient will give the diſtance of the center of gravity of the whole ſyſtem from the line A B, the axis of the momenta.

OPE-

OPERATION.

Sum of the ordinates Ft.	Inch.		Distance between Ft.	Inch.		Ft.	Inch.	
204	8	multiplied by	13	0	is equal to	2660	8.	— Area of the load water line.
194	0	———	12	10	———	2489	8.	— Area of the second water line.
178	0	———	12	6	———	2225	0.	— Area of the third water line.
140	0	———	12	2	———	1703	4.	— Area of the fourth water line.
8	0	———	12	0	———	96	0.	— Area of the keel.

	Ft.	Inch.		Centers of gravity from A B.			Products. Ft.	Inch.
Half of Load water line —	1330	4	multiplied by	51	5	is equal to	68401	$3\frac{1}{2}$
Second water line —	2489	8	———	52	4	———	130292	$6\frac{1}{2}$
Third water line —	2225	0	———	52	10	———	117554	2
Fourth water line —	1703	4	———	54	8	———	93115	$6\frac{1}{2}$
Half of Keel — — — —	48	0	———	48	4	———	2320	0
	7796	4					) 401683	$6\frac{1}{2}$(51 6

Having divided 401683, the sum of the momenta, by 7796, the sum of the surfaces, we have 51 feet 6 inches, which is the distance of the center of gravity of the system from the vertical line A B*.

But it yet remains to find at what height above the keel the center of gravity of the hull will be found; in order to which, we will take the upper side of the keel for the axis of the momenta, or first term, and then it is only finding the momentum of each surface with respect to the keel, (the distances betwixt each section being three feet) and then divide the sum of all the products by 7796, the sum of all the surfaces.

* By the line A B, is meant a line at the fore end of the load water line, and perpendicular to the keel, and which is the axis of the momenta.

OPE-

OPERATION.

	Ft.	Inch.				Ft.	Inch.
Fourth water line –	1703	4	multiplied by	1	is equal to	1703	4
Third water line –	2225	0	———	2	———	4450	0
Second water line –	2489	8	———	3	———	7469	0
Half load water line	1330	4	———	2	———	2660	8
						16283	0
					Distance betwixt	3	0
					7796)	48849	(6 3

By which the center of gravity of the hull is found to be 6 feet 3 inches above the keel.

In the preceeding calculations we have supposed the hull to be composed of an homogenous matter, all parts of which in bulk will be of equal weight, now this is a case that seldom happens in a ship, yet it will be so far useful, since all ships of the same rate having the different weights placed nearly similar to their lengths, they may find the center of gravity as above; and comparing it with the center of gravity of a ship which is known by experience to have all the good qualities that can be expected, it may be discovered if the center of gravity of the ship that is going to be built be properly placed.

It has been before observed, that the whole weight of any body may be considered as united in its center of gravity, and that if it was suspended by a line fastened to its center of gravity, that line would rest in a vertical position, and its direction would pass through the center of gravity, and the center of the earth; but a body which floats in a fluid is not supported by its center of gravity, but by the pressure of the environing filaments of water, which being considered as infinitely small, each will act upon an infinitely small portion of the

surface

ſurface of the floating body, relative to the ſpecific gravity, and in proportion to the height of theſe filaments, conform to a principle applicable to all fluids; namely, that the weight of a column of any fluid will be in proportion to the ſpecific gravity of the fluid, and the height of the column multiplied by its baſe. The preſſure of the fluid acting upon all the ſubmerged parts of the ſolid body, in the ſame manner that gravity acts upon all the parts of the matter, the effect of ſuch preſſure will be united in a ſphere of wax, of the ſame ſpecific gravity with the fluid, and which is entirely ſubmerged, preciſely to the ſame point as the center of gravity of the ſphere of wax; we muſt then conceive that the preſſure of the fluid acts immediately on the ſurface of the ſubmerged body, but its action is united in its center of gravity juſt as if it exerted itſelf upon every part of the ſolid body.

Wax is nearly the ſame weight with water, and if one ſinks a ſphere or ball of that matter, its preſſure on the fluid will be united preciſely in its center, or in the ſame point in which the whole weight of the ball does act, ſo in that ſuppoſition the center of the preſſure of the fluid coincides with the center of gravity, the action of each being united in the center of the ſphere.

But this is not all, for as heavy bodies by their gravity, endeavour to approach the center of the earth in a vertical line paſſing through their center of gravity, tending directly towards the center of the earth, ſo the preſſure of fluids endeavours to carry bodies in a vertical tending from the center of the earth towards their ſurface, and paſſing through the center of gravity of the ſubmerged part which forces them towards the ſurface; ſo in any ſubmerged body at reſt, theſe two oppoſite forces coincide in the ſame vertical, acting in a quite contrary direction to one another.

I have now ſufficiently treated on this ſubject, but cannot omit mentioning a mechanical way of finding the center of gravity, as it is a method that may be eaſily executed; and in order that thoſe perſons not diſpoſed to give themſelves the trouble of finding it by the calculations, may have a knowledge of the ſame by this ſimple and eaſy method, I ſhall therefore give it in the next chapter.

CHAP. VII.

Wherein is contained a mechanical Method to find the center of gravity in a ſhip.

IT is only required to make a block exactly ſimilar to the parts of the draught or ſhip, by a ſcale of $\frac{1}{4}$ of an inch to one foot of the correſponding parts on the ſhip; and care muſt be taken to provide the wood as light as poſſible.

The block being thus prepared, may be ſuſpended by a thin line or ſilk in different ſituations, till it will point out the center of gravity, which will be found when the block hangs in a ſtate of equilibrium: this practice is doubtleſs very ſimple, but it will be found very convenient on many occaſions.

Many uſeful diſcoveries may be made by models or blocks, and with as great certainty as by the niceſt calculations; for it muſt be allowed, that in calculating from a draught by a quarter ſcale, it will be liable to many errors which are impoſſible to ſhun, by reaſon of various little alterations which muſt be made in laying the ſhip down in the mold loft, and conſequently the draught and the ſhip will in thoſe points diſagree. And likewiſe, upon ſtrict examination, we ſhall be able to find, that there are very few ſhips that have both their ſides

exactly

exactly equal in every reſpect; and in order to prove our block, we may ſuſpend it by a line faſtened to a hook in any part of a ſtraight line drawn from the middle line of the ſtem to that of the poſt; this hook may be moved forward and aft to different places in the middle line, and a weight may be ſuſpended from the upper part of the middle line on the ſtem, and another from the upper part of the middle line on the poſt, and if the two ſides be exactly of equal dimenſions, and homogene, they will then be of equal weight: a plane paſſing through theſe three lines, whatever part of the middle line the hook be in will likewiſe paſs through the middle line of the keel, ſtem, and poſt. Therefore, if our block will ſtand this proof, it will be as true to work from as from the niceſt calculations.

The block being thus provided, and ſuſpended by the hook, the lines hanging at the ſtem and poſt correſponding to their middle lines, and to that which ſuſpends the block, we may hold a batten out of winding with the line that ſuſpends the block, and with a pencil draw a line on the block; a plane paſſing through this pencil line, at right angles to the keel, and paſſing likewiſe through the line that ſuſpends the block, will likewiſe paſs through the center of gravity, which therefore muſt be ſomewhere in this plane; again, move the hook to ſome other part in the middle line, and let the block be ſuſpended from that point; draw alſo another pencil line out of winding with this laſt line of ſuſpenſion, the interſection of the two pencil lines will give the height of the center of gravity above the keel, and likewiſe its diſtance from the poſt and ſtem; and if the hook be moved to any other parts in the middle line, and a pencil line drawn as before, it will likewiſe interſect in the ſame point, or let there be ever ſo many points aſſumed in the middle line, and the block ſuſpended by each, and pencil lines drawn, they will all interſect in the ſame point, and as the center of gravity will always be in that plane which paſſes through the middle line of the keel, ſtem, and poſt, it may with certainty be marked on the draught.

This

This will certainly require the utmoſt nicety, and if well executed, will agree with that found by calculation, provided the dimenſions be taken very exact, and likewiſe from a very true ſcale of all equal parts.

Having now inveſtigated the center of gravity as far as is conſiſtent with the preſent purpoſe, and laid down whatever is uſeful on that ſubject relative to the conſtruction of ſhips' bodies, and likewiſe ſhewn what is directly applicable to practiſe therein; I ſhall next proceed to make ſome obſervations on the nature and conſtruction of ſhips' bodies, and ſhall treat in as conciſe a manner as poſſible of the different properties required in them.

CHAP. VIII.

Of ſhips' bodies conſidered, with their nature and conſtruction, and likewiſe the different properties which are required in the conſtruction of them.

THE chief point to be purſued in conſtructing of a ſhip's body, is to find out ſuch a ſhape, that when given, it may beſt anſwer the different purpoſes for which ſuch ſhip is deſigned.

But this is a very difficult matter, as the properties which we often wiſh a ſhip to poſſeſs, are in a manner in oppoſition to each other, as I ſhall ſhew hereafter. However, the whole art chiefly conſiſts in ſo forming of the body, that none of the wiſhed-for qualities ſhall be deſtroyed, but to give the

preference

preference to that which is moſt required in the principal deſign; and as the different qualities required in a ſhip are ſo various, I ſhall only mention the moſt principal of them, or thoſe which are of the greateſt conſequence.

It muſt firſt be obſerved that a ſhip of war ſhould carry her lower tier of guns of a ſufficient height from the water, or elſe they will be rendered entirely uſeleſs.

A merchant ſhip ſhould be able to ſtow a good cargo; and both of them ſhould be made to go well; which qualities are the principal ones belonging to thoſe two claſſes of ſhips; but thoſe that follow are applicable to all ſhips in general.

A ſhip ſhould ſteer well, and feel the leaſt motion of her helm.

A ſhip ſhould likewiſe be duly poiſed, ſo as not to pitch hard, but go ſmooth and eaſy through the water, riſing to the ſea when it runs high and ſhe under her courſes, or lying-to under a main ſail, otherwiſe ſhe will be in great danger of carrying away her maſts.

A ſhip ſhould be able to carry a good ſail, not only becauſe in forming the body the water lines are all ſuppoſed to be deſcribed when a ſhip is upright in the water, but likewiſe for doubling a cape, or getting off from a lee ſhore, which will be impoſſible to be done when a ſhip lies over in the water; this will likewiſe render her lower tier of guns entirely uſeleſs.

A ſhip, as I before obſerved, ſhould carry her lower tier of guns a ſufficient height from the water, which in large ſhips ſhould be at leaſt five feet and a half or ſix feet, and in the ſmalleſt two deckers four feet and a half in midſhips; otherwiſe a ſeventy-four gun ſhip that cannot open her lower tier of ports upon a wind, but only in ſmooth water, may be eaſily taken by a thirty-eight gun frigate that can make uſe of all her guns, becauſe it is evident that then the frigate is the moſt formidable.

A ſhip ſhould likewiſe ſail well before the wind, large, but chiefly cloſe hauled, keep a good wind, and not fall off to the leeward.

It ſeems to be very probable, that the firſt deſign of floating veſſels was to carry goods from one place to another; and the propereſt veſſels for that purpoſe would be ſuch as could contain the greateſt quantity of goods, and carry them in the ſhorteſt time to the intended port; ſo that capacity and velocity ſeem to be the two moſt eſſential qualifications.

To unite ſo many different qualities in one ſhip, is a matter of impoſſibility; we ſhould therefore be the moſt particular in that quality which is the main point of our whole deſign, and endeavour if poſſible to inherit all the others in ſome degree, ſo that they ſhall not be entirely loſt; in order to which, it will be neceſſary to know what form will give a ſhip one of theſe qualities, conſidering it as abſtracted from the reſt.

I ſhall therefore proceed to lay down in the next chapter, ſome principles which will anſwer the before mentioned purpoſes.

C H A P. IX.

Wherein is conſidered the beſt form that can be given a ſhip, ſo as to make her anſwer each of the beforementioned qualities, as conſidering one abſtractedly from the reſt.

FIRST, in order to make a ſhip ſteer well, and quickly anſwer her helm, the wing tranſom ſhould be carried pretty high, and the faſhion pieces well formed and not full below the load water line; the midſhip frame ſhould be carried pretty forward, the ſhip to draw more water abaft than afore, by

two

two feet at leaſt; to have a raking bow, and ſtern poſt to rake about two inches in a foot; the quarter deck and forecaſtle, and all the upper works, to be kept as low as poſſible, all of which will certainly make a ſhip go well, and quickly anſwer her helm; for a ſhip that goes well will always ſteer well.

Secondly, to make a ſhip go ſmoothly through the water without pitching hard, will be to give her a long keel, a long floor with little riſing afore and abaft, the area or contents of the fore body to be duly proportioned to that of the after body; all of which will be neceſſary to make a ſhip go ſmoothly through the water.

Thirdly, to make a ſhip carry a good ſail, ſhe muſt have a flat floor and pretty long, the lower futtock pretty full, upper futtock near a ſtraight, and the breadth to be thrown out aloft; to carry her main breadth pretty high, upper works as light as poſſible, and ſo conſtructed as to keep the center of gravity as low as poſſible; ſuch a ſhip will certainly carry a good ſail.

Fourthly, to make a ſhip carry her guns well above the water, a long floor timber will be neceſſary, and not much riſing, the midſhip frame to be very full, and upper works to be very light, with a wing tranſom not too high, all of which will combine to make a ſhip carry her guns well out of the water.

And fifthly, to make a ſhip keep a good wind, you muſt give her a good length of keel, not too broad, to have a good depth in the hold which will occaſion her having a ſhort floor and a great riſing. But ſuch a ſhip will meet with great reſiſtance in the water, going over the broadſide, and little when going a head, ſhe will not fall much to leeward.

It may be urged that it is not poſſible to make a ſhip carry her guns well above water, carry a good ſail, and to be a faſt ſailer; becauſe it would require a very full bottom to gain the two firſt qualities, and a ſharp one to gain the latter;

latter; but if we conſider that a full ſhip will carry a great deal more ſail than a ſharp one, we may ſo form the body as to poſſeſs theſe three qualities, and likewiſe ſteer well, in order for which we muſt take great care to give a good length. By what I have ſaid on this head, the reader will find that it is not impoſſible to unite theſe four qualities in one ſhip, ſo that each of them may be diſcerned in ſome degree of eminence. But all of them cannot poſſibly be poſſeſſed in one body to any degree of perfection; we therefore ſhould adopt that which is the moſt uſeful to our deſign, and according to what our veſſel is intended for. Indeed, ſome very eminent geometricians have endeavoured to find the form of a ſolid, which might anſwer all theſe qualities, and meet with the leaſt reſiſtance in dividing the fluids; but have not been able to reduce their theory to practice, by reaſon of the different poſitions a ſhip is obliged to be in when under ſail. Many having deſpaired of eſtabliſhing theſe points by mathematical rules, have applied themſelves wholly to their own obſervations and experience, which may indeed ſupply the deficiencies of art; but though they may thereby diſcover that a ſhip has ſeveral bad qualities, it will not be eaſy to determine where the fault lies, for it may be owing to the rigging, and though the fault be not there, yet they cannot be certain in what particular part of the ſhip it is. But if their obſervations be aſſiſted by principles drawn from theory, it may conduce very much towards the attainment of their end.

There has been ſeveral ſhips in our navy which have ſeemed to anſwer the ſervices for which they were deſigned; our builders therefore, and thoſe concerned in the conſtructing of draughts for the navy, have made it a rule to copy ſhips which have gained the applauſe of the ſeamen; and this method they have very improperly obſerved in reſpect to building, which may be proved to be very erroneous. For even ſuppoſe it were poſſible to find ſuch a body as would give entire ſatisfaction, and have all the good qualities that ſhould be

neceſſary

neceſſary to anſwer the ſervices propoſed, yet this could by no means be eſtabliſhed as a ſtandard by which other ſhips of different dimenſions may be built; for if we have a firſt rate of one hundred guns, which by experience has been found to be a very good ſhip in all reſpects, yet we ſhould find ourſelves very much deceived, if we were to build a fifth rate of twenty guns by making all the parts have the ſame proportion to one another, that they have in a firſt rate of one hundred guns.

However, it would be needleſs, as well as uſeleſs, to give any further account of the methods uſed by builders to form the figure of their ſhips' bodies, as they all prove that they have not yet found out a fixed rule.

Experience certainly would have proved the beſt means of bringing naval architecture to perfection, if the thing had been poſſible; but it is plain, that practice alone is inſufficient in many caſes; for though ſome points may be determined thereby, yet with reſpect to many others, it ſtands much in need of the theory.

But as we are thus engaged in purſuing the art to perfection, I ſhall not fail to take proper notice of what is good in the common rules, and ſhall ſupport them by the ſtrongeſt arguments that ariſes in their favour; I ſhall therefore in the next chapter lay down ſome general obſervations upon the conſtruction and forming of ſhips' bodies.

CHAP. X.

Containing general remarks to be conſidered in the conſtructing of ſhips' bodies.

IT has been before proved, that the midſhip frame ſhould always be kept well forward, and the forepart of the ſhip will thereby become fuller than the aft part, which will therefore occaſion the immerged part to have more the form of a fiſh. And conſequently a ſhip ſo formed, after having once opened a column of water, would meet with little or no reſiſtance in paſſing through it.

The extreme breadth ſhould always be higher abaft than in midſhips, by about one ſixth part of the load draught of water, which in conſequence will make the ſhip draw more water abaft than afore, as the fore part cannot ſo readily divide the water, when the keel is parallel to the ſurface, as when it is inclined to the ſtern. The ſeamen no doubt, always tried to find the beſt ſailing trim when at ſea, as they frequently remarked, that it was neceſſary to make her draw more water abaft than afore, whereby we ſhall at leaſt gain this advantage, that the ſhip will anſwer her helm better; but it will occaſion the decks to be raiſed conſiderably higher abaft than afore.

The extreme breadth ſhould alſo be raiſed conſiderably more afore than abaft, and for this reaſon, when a ſhip is cloſe hauled by the wind, and lays much over the weather ſide, it will loſe much of the breadth; whereas on the contrary, the lee ſide will gain conſiderably; the ſhip then diſplaces a great deal more water on the lee ſide, and according to the manner in which

fluids

fluids act, should be supported with greater force, and of consequence be able to carry the greater sail. Hence it is plain, that by raising the breadths we keep them as a reserve, to be used when a ship stands most in need of relief; that is, when she lays most over.

It may be remarked, that the flat floored ships, do not require their breadths to be risen so high afore and abaft, for carrying all the weight of their cargo so low, they are thereby made capable of carrying a greater stress of sail.

A ship may be built to a precise draught of water, by which the construction will be founded upon true principles, but when a ship is not built to one precise draught more than another, it will be a very difficult, and one of the most complex questions in naval architecture, to determine this precise point. Some would imagine there is no more to be done but to make the ship swim in the water, so as to be capable of carrying the greatest sail; but when a ship is very deep in the water, it will greatly increase the resistance, and of consequence be very prejudicial to her sailing, and when a ship has but little hold in the water, she can carry but little sail, and therefore cannot go so fast through the water; the resistance then must be calculated, not absolutely, but relatively, and in proportion to the sail that she spreads.

There have been several mathematicians who have endeavoured to investigate that form for a ship's body, which should meet with the least resistance in passing through the water, but they have not drawn any practicable rules from thence, to determine the certain form for a ship; and should they be so fortunate, after a tedious calculation, as to find out that particular form, it will be of little use in forming the body of a ship: for it is supposed that the ship is to continue in the same position in the water, otherwise the immerged part will alter its form as often as it alters its position, unless it be like the solid of Sir Isaac Newton, formed by the revolution of a curve round its axis.

Hence we may conclude, that the particular form of a ship cannot be determined by rules that will admit of a mathematical demonstration. The builders and others, finding

finding they could have very little aſſiſtance from the mathematicians, have, as I obſerved before, applied themſelves to experience; and although they have not found any particular form which may be a ſtandard for all ſhips of the ſame burthen, and deſigned for the ſame ſervice, yet in ſome points they ſeem to agree. Hence it is, that in ſhips of war, of the ſame rate, the principal dimenſions are nearly the ſame; and in all ſhips the midſhip frame is nearer the fore part than the after part.

It is to be wiſhed we could proceed in a manner ſo as to lay down ſome certain and poſitive rules, but I never yet found that any who have treated on the ſubject of ſhipbuilding, could give us any fixed or invariable method for ſettling theſe points; and indeed, conſidering the infinite number of properties, and in ſome caſes, ſo oppoſite to one another, that if any of them be purſued to too great a degree, it will deſtroy another that may be very eſſential. I ſay, conſidering all theſe things, it will be a very difficult taſk, or in ſhort a mere impoſſibility, to unite them all in one body; add to this, that the different ſeas, and different ſervices, in which they are to be employed, will require as different forms, ſo that theory alone, without actual experiment, ſeems inſufficient to reduce this complicated art to a regular ſyſtem.

M. Bouguer, and after him M. Dahaſnel, two very eminent French authors, have both purſued this ſubject as far as the nature of theory is capable; from thence they deduced ſeveral uſeful practical inferences, but have ſtill left theſe points undetermined, and have at laſt referred us to the general practice of the moſt experienced builders. However, I ſhall in the next book, proceed to lay down ſome proportions for ſhips of every claſs, which I have calculated from the before mentioned conſiderations, and as far as circumſtances will admit, to anſwer the qualities before ſpoken of, or ſo that every quality may be conſpicuous at leaſt in a ſmall degree, and at the ſame time the principal objects, which are the moſt important, may be poſſeſſed to the greateſt degree of perfection.

END OF THE FIRST BOOK.

A TREATISE ON MARINE ARCHITECTURE.

BOOK II.

CHAP. I.

Containing general obſervations and remarks on the proportioning of ſhips.

THIS part of naval architecture being very extenſive, requires the greateſt ſtudy and time to bring it to any degree of perfection. For to lay down principles for the conſtructing of a draught, which ſhall be ſo proportional and agreeable in every reſpect, that each part may anſwer its end; as firſt, to form the hull of the ſhip, ſo as to be capable of the ſwifteſt motion, then to equip her by the trueſt and moſt exact method, that all her maſts, yards, ſails and rigging may equally affect the hull, and likewiſe to trim or load her anſwerable to the reſt, is a very difficult taſk. Therefore to have the proportions whereby we might build ſuch a ſhip, with all theſe properties, as to ſail ſwift, to be eaſy and ſteady in the ſea, to ride well at anchor, and to carry a good ſail, would be a very valuable acquiſition.

But before I proceed to lay down ſuch proportions, I ſhall make a few obſervations, tending to the proportioning of ſhips in general, and ſhall point out ſome cauſes whereby many ſhips do not poſſeſs the qualities that was intended in the conſtruction of them.

One very retarding faculty in ſome ſhips is the overweighing them with timber, ſince 'tis allowed that the gravity of the body, and reſiſtance of the medium, cauſes a ceſſation.

A ſhip of eight hundred tons equally as ſtrong as one of one hundred tons, ſhould have ſixteen times as much timber. A firſt rate ſhip of war to a ſixth rate, is as eight to one, for which reaſon ſhe has eight times as much timber; but according to the above proportion ſhe ſhould have ſixteen times as much, ſo that either the firſt rate is under ſcantled, or the ſixth rate over timbered. But finding the largeſt ſhips to be ſufficiently ſtrong, it therefore naturally follows that the ſmall ones muſt be over timbered.

And further, the ſections, or midſhip bends of theſe ſhips, being but as four to one, and their length as two to one, their bodies in the water is as eight to one, it may therefore be reaſonably allowed, that the abſolute reſiſtance of thoſe ſhips is as ſix or ſeven to one, as well as the weight of the timber; it therefore follows, that either the firſt rate has but half the ſail, or the ſixth rate twice the timber ſhe ought to have, to make them proportionable to each other.

A ſhip alſo ſhould not be too long for her breadth, or too ſhort for her depth, as it is certainly very inconvenient, where the breadth and depth are not agreeable or in proportion to the length, for if a ſhip be made as ſerviceable with thirty feet of breadth as with thirty two, then the latter will have a foot more on each ſide to reſiſt her motion than it need to have.

Length

Length, beyond a due proportion, will alſo be as prejudicial; although it has been a general opinion that it was expedient to increaſe motion, yet it has very ſeldom anſwered; for when ſhips are extreme long, they ought to have an extra allowance of timber to make them equal in ſtrength to ſhort ſhips, which is one very great ſtep towards impeding their motion.

The wales alſo are a very principal part, and therefore comes next under conſideration; they ſhould be placed on the greateſt breadth, as that is the place conſidered to have the greateſt ſtrain, being the part which makes a diviſion of the water, as the impulſe of wind forces againſt the ſails, and ſhould likewiſe be contrived ſo as to be bolted through the deck knees, in order to bind and ſtrengthen the deck.

Theſe therefore are the principal points in the proportioning of a ſhip, and other parts may be differently extended, according to the uſe for which the ſhip is deſigned, and when the depth in hold is required deeper than the given proportions, it muſt be ſpared out of the heights between the decks, as it is of the greateſt importance to keep the ſhip as much as poſſible from being lofty above water, as far as other conſiderations will allow.

The proportioning the heights afore and abaft, in regard to the ſhip's ſheer, is alſo of ſome importance, as the body of the ſhip under water is no other than a hanging conoid, and is not ſupported by her body afore and abaft, as ſhe is in midſhips or the fulleſt part of her. From whence therefore the weight of the extremes will cauſe an alteration in the ſheer, even ſo ſoon as ſhe is launched and in the water; ſo that if a ſhip was too near a ſtraight, or not properly proportioned in that part, the ſtrength thereby would be greatly diminiſhed, and the ſhip always be ſtraining, till the ſheer would be entirely broke.

From

From whence it appears that the quicker the ſheer is, the more it contributes to the ſtrength of the ſhip; it alſo makes more room for accommodations, with regard to the heights afore and abaft. But this property of quick laying the ſheer is moſt ſuitable to large ſhips, which carry a great many officers, and require the moſt accommodations. And in ſmall ſhips, that are chiefly built for running, and have but few officers, and conſequently require no round-houſe abaft, their ſheers may be not ſo quick, but kept as ſnug as poſſible, as far as ſtrength will admit of.

Having now made thoſe few obſervations, I ſhall in the following chapters of this book lay down proportions for ſhips of every claſs, from the firſt rate down to a ſhip of the ſmalleſt dimenſions.

C H A P. II.

In which are given proportions for a firſt rate of an hundred guns, and likewiſe for a ſecond rate of ninety guns.

IN order to fix upon the proportions for a ſhip of any claſs, it will be neceſſary to determine on the length of the gun deck, as when that determination is once fixed upon, it is made a ſtandard, and of conſequence all the proportions are calculated therefrom.

PRO-

PROPORTIONS.	SHIP OF 100 guns.	SHIP OF 90 guns.
Breadths. Main breadth to the length on the gun deck as 15 is to	55,07	55,01
Breadth of the wing transom, of the main breadth —	,6553	,6661
Ditto of toptimber line at dead flat of the main breadth	,7447	,7057
Ditto, at beakheak, of what it is at dead flat —	,8888	,8302
Ditto, at perpendicular abaft, ditto — —	,6670	,6501
Breadth of the stern at toptimber line, of top breadth at dead flat — — —	,5835	,5695
Lengths. Length from the foremost perpendicular of the gun deck, to the middle of dead flat of the length on the gun deck — — —	,35	,3888
Length of the lower breadth sweep at dead flat of the main half breadth — — —	,7318	,7142
Length of the upper breadth sweep* of the main half breadth — — —	,7894	,7495
Length of the floor sweep at dead flat, of the length of the lower breadth sweep — —	,6512	,6813
Half breadth of the floor sweep at dead flat, of the length of it — — —	,9323	,8822
Heights. Height of the toptimber line at dead flat, of the main breadth — — —	,8502	,8588
Height of the toptimber line abaft, or at the after perpendicular of the gun deck, of what it is at dead flat —	1,187	1,168
Height of the top timber line afore, or at the foremost perpendicular of the gun deck, of what it is abaft —	,8995	,9056
Height of the gun deck at foremost perpendicular of the height of the load water line at that place —	1,277	1,238
Height of the gun deck at after perpendicular of the height of the load water line at that place —	1,214	1,212
Height of the wing transom of toptimber line in midships — — —	,6837	,6808

* The upper breadth sweep for dead flat, sweeps all the timbers in the body above the breadth, and likewise the floor sweep for dead flat serves for all the other timbers that are swept.

	SHIP OF	
	100 guns.	90 guns.
Heights. Height of breadth (lower) in midſhips of toptimber line	,4204	,4255
Ditto (upper) ditto ditto	,5454	,5299
Height of the dead riſing in midſhips of length of floor ſweep	,027	,0341
Height of the cutting down in midſhips, to the riſing as 21 is to	2,926	3, 75
Height of the lower edge of main wales at ⊕ of toptimber line	,4696	,4758
Ditto, at after perpendicular of ditto	,6774	,6266
Ditto, at foremoſt perpendicular of ditto	,5795	,5628
Depths. Depth in the hold of the main breadth	,4315	,4335
Draught of water (load) in midſhips of toptimber line	,3030	,3094
Ditto, afore of what it is abaft	,9333	,9545
Lower deck ports from water in midſhips, of draught of water	,3937	,3125
Depth in the waſte in midſhips of top timber line	,1060	,1044
Scantlings, &c. Room and ſpace of timbers of the length on gun deck	,0154	,0154
Siding of the floor timber in midſhips of the room and ſpace	,4571	,4264
Ditto, afore and abaft of them in midſhips	,9062	,8620
Siding of the lower futtocks in midſhips of the floor	1,0625	1,0689
Ditto, afore and abaft of them in midſhips	,9117	,9032
Siding of the ſecond futtocks in midſhips of the lower futtocks	,8823	,9032
Ditto, afore and abaft of them in midſhips	,9666	,9642
Siding of the third futtocks in midſhips of the ſecond futtocks	,9666	,9642
Ditto, afore and abaft of them in midſhips	,9655	,9629

Scant-

	SHIP OF 100 guns.	SHIP OF 90 guns.
Scantlings, &c. Siding of the fourth futtocks in midſhips of the third futtocks — — —	,9655	,9814
Ditto, afore and abaft of them in midſhips —	,9642	,9811
Siding of the toptimbers in midſhips of the fourth futtocks — — —	,9642	,9811
Ditto, afore and abaft of them in midſhips —	,9629	,9615
Timbers moulded at the floor heads of ſiding of floor timbers — — —	,9062	,9655
Timbers moulded at firſt futtock heads of the floor heads — — —	,9741	,9821
Ditto, at ſecond futtock heads, of firſt futtock heads —	,9734	,9727
Ditto, at third futtock heads, of ſecond futtock heads —	,9545	,9532
Ditto, at fourth futtock heads of third futtock heads —	,9428	,9411
Ditto, at top line of fourth futtock heads —	,5666	,5416
Floorheads (in midſhips) above the bearing of the body of main breadth — —	,0386	,0382
Second futtocks (in midſhips) length of the main breadth	,2898	,2940
Firſt futtocks (in midſhips) to ſcarph to ſecond futtocks, of the ſecond futtocks length —	,5333	,5084
Third futtocks (in midſhips) to ſcarph to fourth futtocks of the ſecond futtocks length —	,5333	,5084
Fourth futtocks in length to be governed by ports &c.		
Main keel ſquare in midſhips of main breadth —	,0346	,0332
Ditto, ſided at foremoſt end of what it is in midſhips	,8372	,7750
Ditto, at after end of ditto — —	,6511	,6500
Falſe keel thick, of main keel in midſhips —	,3255	,325
Sternpoſt ſquare at the head, of breadth at wing tranſom	,0638	,0623
Ditto fore and aft on the keel including the falſe poſt, of length on gun deck — —	,0166	,0167
Siding of the wing tranſom of its length — —	,0380	,0362

Scant-

	SHIP OF	
	100 guns.	90 guns.
Scantlings, &c. Siding of the deck tranſom of lower deck beam	,7671	,8059
Other tranſoms ſided of the wing tranſom —	,7741	,8475
Tranſoms below the deck in number —	6	7
Stem to be ſided at the head, of the main breadth — and at the lower part the ſame as the keel.	,0483	,0481
Keelſon to be ſquare, of the main breadth —	,0330	,0332
Stemſon to be ſquare, of the keelſon —	,6341	6
Thickneſſes of the plank on the outſide.		
Plank of the bottom thick, of the main half breadth —	,0144	,0148
Main wales in thickneſs, of the main half breadth —	,0338	,0315
Strake under ditto in thickneſs, of the main wales —	,8095	,7894
And the following planks to diminiſh regularly downwards till they are of the thickneſs of the bottom which may be in ſtrakes in Number — —	7	7
Channel wales in thickneſs of the molding of the timber at that place — —	,5106	,4888
Black ſtrake in thickneſs, of the main wales —	,8095	,7894
Plank between black ſtrake and channel wales of black ſtrake — — —	,5882	,6333
Sheer wales in thickneſs, of the moulding of the timber at that place — — —	,5555	,4927
Plank between ſheer and channel wales, of channel wales — — —	,6666	,6363
Sheer ſtrake in thickneſs, of the main wales —	,4077	,3947
Plank between ſheer ſtrake and ſheer wales of ſheer ſtrake — — —	,8235	,8000
Ditto above the ſheer ſtrake in thickneſs of ditto —	,7058	,6666
Thickneſſes of the plank on the inſide.		
Thickſtuff at floorheads of the moulding of the floorhead	,6896	,6428
Ditto, at firſt futtock heads, of moulding of the firſt futtock head — — -	,6017	,5818

Thick-

	SHIP OF	
Thickneſs of the inſide plank continued.	100 guns.	90 guns.
Limber ſtrake of the depth of the keelſon — —	,8095	,8000
Footwaling, or plank which comes between the aforementioned places, the ſame as the thickneſs of the bottom.		
Orlop clamps, of the length of orlop deck beam in midſhips —— —— —	,0144	,0145
Strake above orlop clamps, which comes on the ends of the orlop beams, of the orlop clamps —	,9411	,9375
Plank between that, and gun deck clamps, of the ſaid ſtrake —— —— —	,5000	,4666
Gun deck clamps, of the length of midſhip gun deck beam —— —— —	,0151	,0147
Ditto ſpirketting, of the gun deck clamps —	,5555	,5294
Middle deck clamps, of the length of midſhip middle deck beam —— —— —	,0124	,0125
Ditto ſpirketting, of the middle deck clamps —	,6428	,6153
Upper deck clamps, of the length of midſhip upper deck beam —— —— —	,0122	,0122
Upper deck ſpirketting, of the upper deck clamps —	,6666	,6818
String in the waiſt, of the ſheer ſtrake — —	1,058	1,
Quarter deck and forecaſtle clamps, of the length of their reſpective longeſt beams —— —	,0410	,0401
Ditto ſpirketting, of their reſpective clamps —	,7777	,75
Round houſe clamps, of the longeſt round houſe beam	,0442	,0470
Beams and knees. Gun or lower deck beams moulded, of main breadth —— —— —	,0293	,0278
Thoſe beams in the narrowing of the ſhip, afore and abaft, to be leſs —— —	,0666	,0625
Gun deck knees to be ſided, of the gun deck beam moulded —— —— —	,6301	,6567

	SHIP OF	
	100 guns.	90 guns.
Beams and knees. Thwartſhip arms of the knees, of the length of the beam	,0907	,0867
Orlop beams to be ſquare, of the moulding of gun deck beam	,9315	,9850
Standard knees to orlop, to be ſided, of the ſize of its beam	,6176	,6060
Thwartſhip arms of the knees, of length of its reſpective beam	,0917	,0190
Middle deck beams to be moulded, of the length of midſhip beam	,0236	,0236
Thoſe afore and abaft, to be leſs than thoſe in the bearing of the ſhip	,0666	,0265
The knees to be ſided, of the moulding of its reſpective beam	,7547	,7755
Thwartſhip arms in length, of length of its reſpective beam	,0909	,0927
Upper deck beams to be moulded, of length of midſhip beam	,0230	,0238
Thoſe afore and abaft, to be leſs than thoſe in the bearing of the ſhip	,0666	,0625
The knees to be ſided, of the moulding of their reſpective beams	,8000	,7674
Thwartſhip arms in length, of length of its reſpective beam	,0942	,0977
Quarter deck and forecaſtle beams to be moulded, of the length of their reſpective longeſt beams	,0191	,0192
Their knees to be ſided, of the moulding of their reſpective beams	,8235	,8253
And the thwartſhip arms in length, of length of beams	,0945	,0869
Round houſe beams to be moulded, of quarter deck beam	,6470	,6349
Knees ſided, of the moulded of the beams.	,9545	,95

Beams

	SHIP OF	
	100 guns.	90 guns.
Beams and knees continued.		
And thwartship arms in length, of length of their beams	,0833	,0882
Beams of every deck to be sided, of the moulding —	1,0621	1,0631
Centers of masts places.		
Centers of the main mast, from the foremost perpendicular of the gun deck, of the length of the gun deck	,5434	,5389
To rake aft in every yard in length.		
Center of the foremast, from the foremost perpendicular of the gun deck, of the length of the gun deck —	,1087	,1091
To rake aft in every yard in length.		
Center of the mizen mast, from the center of main mast, of the distance from after perpendicular to main mast	,6099	,6041
To rake aft in every yard in length.		
Note: The lengths from the centers of the masts must be set off on the gun deck.		
The bowsprit should steeve up in a yard in length and step against the second beam from forward on middle deck		
Rother. The rother to be fore and aft at the lower part, of the main breadth ——— —	,1256	,1096
And at the lower hance, (which should be one foot above the load water line) of what it is at the lower part ——— ——— —	,6538	,6969
To be square at the head, of the head of the stern post	1,153	1,120
Knee of the head, &c. The knee of the head, at the height of the breast of the figure, in distance from the stem, of length on gun deck ——— —	1,	,0978
And distance from the stem, at load water line, of what it is at breast of the figure ——— —	,2894	,25
The gripe in the broadest place, of the distance of knee from stem at breast of the figure — —	,2368	,2222

	SHIP OF	
	100 guns.	90 guns.
The lower cheek muſt be kept well on the upper edge of the main wales, in conſequence of the hawſeholes coming between the cheeks, which are on the lower deck, the main rail alſo keeping it as low as poſſible in the bag, cannot be any lower than the ſurface of the upper deck; there will then be ſo great a diſtance between the upper rail and the lower cheek, by reaſon of this claſs of ſhips having three decks, that the form of Head. the head and rails will be the moſt diſtant from good proportion; or ſo as to make it ſnug and beautiful. But in order to help the ſame as much as poſſible I have given the proportion for the length of the head ſomewhat more than has been generally given to them, which will take off ſomething of the great depth, and the means whereby we may take off ſtill more, will be to let the diſtance between the cheeks be more than in general. Therefore the diſtance from the lower edge of the lower cheek, on the ſtem, to the lower edge of the upper cheek on the ſtem, muſt be, of the diſtance from lower edge of lower cheek to lower edge of main rail on the ſtem ——— ——— —	,7692	,7222
The breadth of the block or figure, from the breaſt to the back of the hair bracket, to be of the length of the whole head, which is from the breaſt of the figure, to a perpendicular let-fall at the aft ſide of cat-head ——— ——— —	,1803	,1551

The

	SHIP OF	
	100 guns.	90 guns.
The heel of the figure may be diſtant from the breaſt, on an horizontal, of the diſtance from breſt to ſtem –	,4561	,4259
The timbers of the head which ſupport the rails, and keeps them together, are always three in number afore the ſtem, and one abaft it, the foremoſt ſhould be placed to range with the heel of the figure, one ſhould be placed againſt the ſtem, and the other exactly in the middle between; that abaſt the ſtem, may be in diſtance from the ſtem timber the ſame diſtance as is between the cheeks.		
The intermediate rails between the upper cheek, and main rail, may be equally ſpaced at every head timber, obſerving to let the middle rail form a curve with the ſupporter of the cat-head.		

A TABLE, ſhewing the Number of Ports to be on each Deck, with their Dimenſions each Way, for this Firſt Claſs of Ships.

	PORTS on the													
	Gun Deck			Middle Deck			Upper Deck			Quarter Deck			Forecaſtle	
Ship of	In N°.	Deep.	Fore and aft	In N°.	Deep.	Fore and aft	In N°.	Deep.	Fore and aft	In N°.	Deep.	Fore and aft	In N°.	Fore and aft
		Ft. In.	Ft. In		Ft. In.	Ft. In.		Ft. In.	Ft. In.		Ft. In.	Ft. In		Ft. In.
100 Guns	30	2 9	3 5	28	2 9	3 3	30	2 8	3 0	10	2 6	2 9	2	2 9
90 Guns	28	2 8	3 5	30	2 8	3 4	30	2 7	2 9		——	——	2	2 8

A TABLE, ſhewing the Heights between each Deck, from the upper Side of one Plank, to the under Side of the other.

	HEIGHTS between the																					
	Orlop and Gun Deck						Gun and Middle Deck		Middle and upper Deck		Upper Deck and Quarter Deck				Upper Deck and Forecaſtle				Quarter Deck and Roundhouſe			
Ship of	Afore		Midſhips		Abaft		Afore, Midſhips and Abaft		Afore, Midſhips and Abaft		Afore		Abaft		Afore		Abaft		Afore		Abaft	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
100 Guns	7	2	7	0	7	2	7	0	6	10	6	10	7	2	6	6	6	5	6	4	6	8
90 Guns	7	0	6	10	7	0	6	11	6	9	6	8	6	11	6	4	6	4	6	3	6	6

I have now completed the proportions for the firſt claſs of ſhips, the firſt and ſecond rates, and have been as nice as poſſible in the calculations thereof, in which I have conſidered every object, both with reſpect to ſtrength and due proportion.

In the firſt place, I have conſidered ſtrength, in calculating the ſcantlings of timbers, thickneſſes of plank, &c. but have confined myſelf ſtrictly in the proportioning of them, juſt ſo far as is conſiſtent with ſtrength, and no farther; by which means the ſhip will not be loaded with unneceſſary weight of over ſcantling the timbers, &c.

And, ſecondly, I have conſidered due proportion in every part, ſo as to render the ſhip beautiful, and with that ſymmetry in its parts, as to make it agreeable to the view; but have conſulted it no farther than to that degree of conſiſtency, by which it may be no detriment to the other good properties.

I ſhall therefore, in the next place, proceed to the proportions for a ſhip of eighty guns, and likewiſe for a ſhip of ſeventy-four guns, which I ſhall bring under the ſecond claſs of ſhips of war.

CHAP.

CHAP. III.

Containing proportions for conſtructing of the ſecond claſs of ſhips, viz. a ſhip of eighty guns, and a ſhip of ſeventy-four guns.

EIGHTY-gun ſhips have always been conſtructed in that form as to carry their guns upon three decks, which made them the moſt diſtant from good proportion that poſſible could be, and in conſequence thereof, the moſt uſeleſs ſhips in the navy. In the firſt place, their top ſide muſt be ſo very high above the water, to admit of their having three tier of guns, that it muſt be beyond all proportion for the length and breadth; and after all, the lower tier of guns cannot be ſufficiently placed above the water, to admit of their being uſed when the weather is a little foul. And likewiſe, admitting the heights between the decks, and the depth in the waiſt cannot be much leſs than a ſhip of one hundred or ninety guns, it cannot be expected that ſuch a ſhip can be duly proportioned in the water; that is, ſhe cannot be brought down to that proportional depth in the water, which would be found to be the beſt ſailing trim for ſuch a ſhip, if conſtructed ſuitable thereto.

Therefore, ſhips of eighty guns ſo conſtructed, muſt labour under many diſadvantages, on account of their diſproportional height above the water, even if their principal dimenſions were ſimilar in every other reſpect to thoſe of ſhips in general.

For

For ſuppoſing the eighty gun ſhips to be conſtructed under water, exactly ſimilar to thoſe of ſeventy-four guns, it would be found a matter of mere impoſſibility for the eighty gun ſhip to ſucceed in engaging with the ſhip of ſeventy-four guns, for though the eighty gun ſhip has the advantage in number and weight of metal, yet if the wind ſhould blow, ſhe would be unable to uſe her lower tier of guns, which will be much nearer the water than thoſe of the ſeventy-four, when at the ſame time the ſeventy-four gun ſhip would have the advantage entirely in every reſpect, and therefore it is beyond a doubt, that the latter would obtain the victory.

However, it would be entirely uſeleſs to enumerate all the diſadvantages that thoſe kind of ſhips labour under, I ſhall only ſuffice to ſay, that as they have always been found to be ſuch a uſeleſs ſet of ſhips, I ſhall take no more notice of them, but ſhall propoſe and lay down proportions for a ſhip of eighty guns, to carry them upon two decks, whereby, on the contrary, will make them become the moſt uſeful, and moſt formidable ſhips in the whole navy.

Therefore the ſhips of eighty, and ſeventy-four guns, will form the ſecond claſs of ſhipping, and I ſhall proceed accordingly.

PROPORTIONS.		SHIP OF	
		80 guns.	74 guns.
Lengths.	Length from the foremoſt perpendicular of the gun deck to the middle of dead flat, of the length on the gun deck — — —	,3516	,3792
	Length of lower breadth ſweep at dead flat, of main half breadth — — —	,7836	,7673
	Ditto, of upper ditto, ditto, ditto — —	,6201	,6319
	Ditto, of floor ſweep ditto, of lower breadth ſweep —	,5955	,6018
	Room and ſpace of the timbers, of length on gun deck	,0149	,0156
Breadths.	Main breadth to the length on the gun deck, a 141is to — — —	52,09	51,33

Breadths.

		SHIP OF	
		80 guns.	74 guns.
Breadths.	Breadth at aftermoſt part of wing tranſom, of main breadth — — —	,7018	,6805
	Ditto, of toptimber line at dead flat, of the main breadth	,8552	,8576
	Ditto, at beakhead, of what it is at dead flat —	,8087	,7854
	Ditto, at ſtern timber, of ditto — —	,5976	,5829
	Ditto, at after perpendicular, of ditto — —	,6932	,6842
	Half breadth of the floor, of the length of floor ſweeps	,7518	,7669
Heights.	Height of the toptimber line at dead flat, of the main breadth — — —	,7649	,7395
	Ditto, at after perpendicular, of ditto — —	,8790	,8489
	Ditto, at foremoſt ditto, of ditto — —	,8449	,7968
	Upper height of breadth at dead flat, of toptimber line	,6659	,6619
	Lower ditto, ditto ditto — —	,6085	,6032
	Height of the wing tranſom, of toptimber line at dead flat — — —	,7572	,7464
	Ditto of the gun deck at dead flat, of load draught of water — — —	1,163	1,098
	Ditto, at after perpendicular, of what it is at dead flat	1,094	1,089
	Ditto, at foremoſt ditto, of what it is ditto —	1,094	1,089
	Height of the riſing in midſhips, of the length of floor ſweep — — —	,0583	,0375
	Ditto of the cutting down in midſhips, to the riſing as 17 is to — — —	4,955	3,777
	Height of lower edge of wales at dead flat, of toptimber line — — —	,5345	,5328
	Ditto, at after perpendicular, of ditto — —	,7082	,6948
	Ditto, at foremoſt ditto, of ditto — —	,6547	,6338
Depths.	Depth in the waiſt in midſhips, of the toptimber line	,1826	,1924
	Depth in the hold, of the main breadth — —	,4293	,4062

	SHIP OF	
	80 guns.	74 guns.
Depths. Lower deck ports from the water, in midſhips of draught of water — — –	,2897	,2213
Draught of water (load) abaft, of the toptimber line in midſhips — — –	,5456	,5729
Ditto afore the ſame as abaft.		
Centers of the maſts places. The center of the main maſt, from the foremoſt perpendicular of the gun deck, of the length of the gun deck — –	,5668	,5719
and to rake aft, in every yard, in length –	1-8 in.	1-8 in.
Centers of the foremaſt, from the foremoſt perpendicular of the gun deck, of the length on the gun deck	,1121	,1245
and to rake aft, in every yard in length –	1-16 in.	0
Center of the mizen maſt, from the center of the main maſt, of the diſtance between main and fore maſt –	,6082	,6105
and to rake aft, in every yard in length — –	1 in.	1 in.
The center of the bowſprit, at the heel, to be in diſtance from the foremoſt perpendicular of gun deck, of the length on gun deck — –	,0934	,0937
And exactly in the middle between lower and upper deck,		
To ſteeve up in every yard in length — –	1ft.4in.	1f.$3\frac{3}{4}$ in
Scantlings of timbers, &c. Firſt floor timbers ſided in the bearing of the ſhip, of the room and ſpace — –	,4271	,4090
Ditto, ſided, afore and abaft, of what they are in midſhips — — –	,8571	,8703
Ditto, moulded at the head, of the ſiding in midſhips	,9821	1,
Lower futtocks ſided in the bearing of the ſhip of the floor timbers — — –	1,071	1,092
Ditto, ſided, afore and abaft, of what they are in midſhips — — –	,9166	,8813
Ditto, moulded at the heads, of the ſiding in midſhips	,8666	,9017

Scant-

Scantlings of timbers, &c. continued.	SHIP OF 80 guns.	SHIP OF 74 guns.
Second futtocks ſided in midſhips, of the firſt futtocks	,9166	,9152
Ditto, ſided, afore and abaft, of them in midſhips –	,9636	,9629
Ditto, moulded at the heads, of the ſiding in midſhips	,9528	,9423
Third futtocks, ſided in midſhips, of the ſecond futtocks	,9818	,9814
Ditto, ſided afore and abaft, of them in midſhips –	,9629	,9622
Ditto, moulded at the heads, of the ſiding in midſhips	,8888	,8679
Fourth futtocks, ſided in midſhips, of the third futtocks	,9814	,9811
Ditto, ſided afore and abaft, of them in midſhips –	,9622	,9615
Ditto, moulded at the heads, of the ſiding in midſhips	,8301	,8076
Toptimbers, ſided in midſhips, of the fourth futtocks	1,	1,019
Ditto, ſided afore and abaft, of them in midſhips –	,9811	,9811
Ditto, moulded at the toptimber line, of ſiding in midſhips —— —— –	,4528	,4339
Main keel ſquare in midſhips, of main breadth –	,0357	,0329
Ditto, ſided at foremoſt end, of what it is in midſhips	,8809	,8421
Ditto, ſided at after end, of ditto —— –	,6666	,7105
Falſe keel thick, of the main keel in midſhips –	,3333	,3421
Stern poſt ſquare at the head, of the length of wing tranſom —— —— –	,2378	,2398
Ditto, fore and aft on the keel, including the falſe poſt, of length on gun deck —— –	,0169	,0165
Ditto thwartſhips at the heel, the ſame as the keel.		
Wing tranſom ſided, of its length — –	,0351	,0357
Deck tranſom ſided, of lower deck beam moulded –	,7353	,7575
Tranſoms below the deck, in number — –	7	6
Ditto, ſided, of the wing tranſom —— –	,7586	,75
Diſtance between them, of their ſiding — –	,2727	,2727

Scant-

	SHIP OF	
	80 guns.	74 guns.
Scantlings of timbers, &c. continued.		
Stem to be ſided at the head, of the main breadth —	,0459	,0434
Stemſon to be ſquare, of the keelſon — —	,6184	,6111
Keelſon to be ſquare, of the main breadth — —	,0323	,0312
Scarphing of timbers, &c. Floorheads in midſhips, to be above the bearing of the body, of the main breadth —	,0374	,0373
Second futtocks in midſhips, to be in length of main breadth — — —	,2862	,2872
And all the futtocks to give ſcarph to each other half the length of the ſecond futtocks.		
Thickneſſes of the outſide plank.		
Main wales in thickneſs, of the main half breadth —	,0238	,0312
Black ſtrake in thickneſs, of the main wales —	,7631	,75
Strake under main wales in thickneſs, of ditto —	,7894	,7777
And the following ſtrakes to diminiſh in thickneſs regularly downwards to the ſixth ſtrake, which may be in thickneſs the ſame as the bottom.		
Channel wales in thickneſs, of the main wales —	,5789	,6111
Plank between ditto and black ſtrake in thickneſs, of black ſtrake — — —	,6206	,6296
Sheer ſtrake in thickneſs of the channel wales —	,7727	,7272
Plank between ditto, and channel wales in thickneſs, of channel wales — — —	,5454	,5454
Ditto, above the ſheer ſtrake in thickneſs, of ſheer ſtrake	,5882	,5625
Plank of the bottom thick, of the main half breadth —	,0153	,0136
Thickneſſes of the inſide plank.		
Limber ſtrake in thickneſs, of the depth in the hold —	,0337	,0341
Plank at the floorheads, of the moulding of timbers at floorheads — — —	,6363	,6111

Thick-

	SHIP OF 80 guns.	SHIP OF 74 guns.
Thickneſſes of the inſide plank continued.		
Plank at the firſt futtock heads, of moulding of timbers at that place — — –	,5961	,5544
Footwaling, of the thickneſs of the bottom –	1,	1,
Orlop clamps, of the length of midſhip orlop beam –	,0139	,0137
Strake on the ends of orlop beams, of the orlop clamps	,9333	,8965
Gun deck clamps, of length of midſhip gun deck beam	,0155	,0148
Ditto, ſpirketting of the clamps — –	,5142	,4848
Upper deck clamps, of the length of midſhip upper deck beam — — –	,0112	,0103
Ditto ſpirketting of the clamps — –	,5833	,5909
Quarter deck and forecaſtle clamps, of the length of their reſpective longeſt beams — –	,0390	,0372
Ditto ſpirkettings, of their reſpective clamps –	,7222	,7056
Roundhouſe clamps, of the longeſt roundhouſe beam –	,0104	,0098
Beams. Gun deck beams to be moulded, of the main breadth	,0289	,0286
Orlop deck ditto, ditto of the gun deck beam –	,9411	,9545
Upper deck beams moulded, of length of midſhip beam	,0262	,0245
Quarter deck and forecaſtle beams to be moulded, of their reſpective longeſt beams — –	,0195	,0184
Roundhouſe beams moulded, of length of longeſt beam	,0127	,0116
The beams on every deck from 20 feet aft, and 12 feet from forward, that comes within thoſe lengths, either forward or aft, may be leſs than the other beams –	,9411	,9411
And all beams (except the orlop beams, which may be ſquare) to be ſided, of what they are the moulding way — — — –	1,058	1,058
Knees. Lodging knees on the gun and orlop deck to be ſided, of the moulding of their reſpective beams –	,6617	,6363

	SHIP OF	
	80 guns.	74 guns.
Knees. Their thwartſhip arms to be long, of the length of their reſpective beams — — —	,0888	,0866
Hanging knees on the gun and orlop deck to be ſided, of the lodging knees ſiding — —	,9876	,9872
Thwartſhip arms the ſame length as lodging knees.		
Standard knees on the gun and orlop deck to be ſided, of the ſiding of their reſpective beams — —	,5833	,5714
Up and down arm to reach 6 inches on the clamps above.		
Lodging and hanging knees on the upper deck to be ſided, of the moulding of their reſpective beams —	,6071	,6346
Thwartſhip arms in length, of their reſpective beams —	,0842	,0754
Hanging arms to reach 4 inches on the ſpirketting below.		
Standard knees on the upper deck to be ſided, of the ſiding of the upper deck beams — —	,5931	,5922
Their up and down arms to reach 6 inch. on clamps above		
Lodging and hanging knees of the quarter deck, forecaſtle and roundhouſe, to be ſided, of the moulding of their reſpective beams — —	,6123	,6201
Thwartſhip arms in length, of length of reſpective beams	,0801	,0810
Rother. The rother to be broad, at the lower hance, (which ſhould be one foot above the load water line) of what it is at the lower part — —	,6865	,6818
To be at the lower part, of the main breadth —	,1141	,1145
To be ſquare at the head, of the head of ſternpoſt —	1,102	1,106
Knee of the head, &c. The knee of the head, at the height of the breaſt of the figure, in diſtance from the ſtem, of length on gun deck — —	,0851	,0852
And diſtant from the ſtem, at the load water line, of what it is at the breaſt of figure — —	,2204	,2443
The gripe to be in the broadeſt place, in diſtance from the ſtem on a ſquare, of the main breadth —	,0919	,0850

Cheeks

	SHIP OF	
	80 guns.	74 guns.
Cheeks and rails. This clafs of fhips having only two decks, and in confequence thereof having a fnug topfide, we fhall not find ourfelves fo much at a lofs to form a handfome and proportionate head, as we were in the firft clafs of fhips.		
Therefore, let the upper edge of the main wales determine the upper edge of the lower cheek, and the cheek to be in depth on the ftem, of the diftance of the knee from the ftem, at that place — —	,1037	,0980
The main rail in the bag, or in wake of the ftem, to be on a level with the upper part of the beakhead, which may be above the upper deck ——— —	2ft.0in.	1ft. 8in.
The main rail to be deep at that place, of the lower cheek ——— ——— —	,9090	,9090
The upper cheek at the ftem may be exactly in the middle between the main rail and lower cheek, and to be in depth at that place, of the lower cheek —	,9126	,9123
The breadth of the figure, from the breaft to the back of the hair bracket, of the diftance of the breaft from the ftem ——— ——— —	,2795	,2888
The remaining parts may be formed juft agreeable to fancy, only obferving always to keep the forepart of the rails and head well up, fo as to form an agreeable flight to the fheer of the fhip, and as the fpaceing of the rails, the number of them, and likewife the ftem timbers, are juft the fame as before defcribed for fhips of the firft clafs, it will be unneceffary to give another defcription. I fhall only proceed to lay down a few neceffary tables, with which I fhall conclude the proportions for this clafs of fhips.		

A TABLE, ſhewing the Number of Ports to be on each Deck, their Dimenſions, Height from the Deck, and Diſtance between them, in this Second Claſs of Ships.

	PORTS on the														
	Gun or Lower Deck				Upper Deck				Quarter Deck				Forecaſtle		
Ship of	In N°.	Deep.	Fore and aft	Lower edge of port from the deck.	In N°.	Deep.	Fore and aft	Lower edge of port from the deck.	In N°.	Deep.	Fore and aft	Lower edge of port from the deck.	In N°.	Fore and aft	Lower edge of port from the deck.
		Ft. In.	Ft. In.	Ft. In.		Ft. In.	Ft. In.	Ft. In.		Ft. In.	Ft. In.	Ft. In.		Ft. In.	Ft. In.
80 Guns	30	2 11	3 $4\frac{1}{2}$	2 4	32	2 10	2 11	2 0	14	2 6	2 8	1 10	4	2 6	1 10
74 Guns	28	2 9	3 $4\frac{1}{2}$	2 4	30	2 8	2 10	1 11	12	2 6	2 8	1 $9\frac{1}{2}$	4	2 5	1 8

N. B. The diſtance between the lower deck ports in eighty gun ſhips, is 7 ft. 6 inch. and in ſeventy-four gun ſhips, 7 ft. $7\frac{1}{2}$ inch. by which diſtances all the ports above them muſt be governed.

A TA-

A TABLE, ſhewing the Heights between each Deck, from the upper Side of one Plank, to the under Side of the other.

	HEIGHTS between the									
	Orlop and Gun Deck			Gun and upper Deck	Upper Deck and Quarter Deck		Upper Deck and Forecaſtle		Quarter Deck and Roundhouſe	
Ship of	Afore	Mid-ſhips	Abaft	Afore, Midſhips and Abaft	Afore	Abaft	Afore	Abaft	Afore	Abaft
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
80 Guns	7 0	6 10	7 0	7 0	6 10	6 10	6 6	6 6	6 9	6 9
74 Guns	6 10	6 10	6 10	7 0	6 7	6 9	6 4	6 3	6 5	6 8

CHAP. IV.

In which are laid down the proportions for ſhips of the third claſs, viz. thoſe of ſixty-four, fifty, and forty-four guns.

IN the third claſs of ſhips, I ſhall include thoſe of ſixty-four, fifty, and of forty-four guns, as all of them are to carry their guns upon two decks.

Thoſe of ſixty-four guns are a very uſeful ſet of ſhips, for when it happens that ſo great a force as a ſeventy-four or an eighty is not wanted, then a ſixty-four may be equipped at a much eaſier expence, the number of men, and conſequently, the quantity of proviſions, being conſiderably leſs than in thoſe ſhips before mentioned.

The fifty gun ſhips are alſo very uſeful in ſome points, but in conſequence of their guns being carried upon two decks, they are obliged to have a diſproportional height and breadth for their length, which makes them poſſeſs a much leſs ſhare of good qualities than might be required of them.

And the forty-four gun ſhips are ſtill more diſproportional, as all their parts bear the leaſt good proportion to each other of any ſhip in the navy, in order to make them ſomewhat uſeful. They are upon the ſame principles as the eighty gun ſhips upon three decks; and as what has been ſaid upon thoſe ſhips in the foregoing chapter is directly applicable to thoſe of forty-four guns upon two decks, I ſhall not enter into a detail upon that ſubject here; but as forty-four gun ſhips upon two decks are rendered of ſome uſe in the navy, I ſhall, in order to make this treatiſe as complete as poſſible, proceed to give the reader the proportions for them, with thoſe of ſixty-four and fifty guns.

PROPORTIONS.	SHIP OF		
	64 guns.	50 guns.	44 guns.
Lengths. Length from the perpendicular forward to the center of dead flat, of the length on the gun deck — — —	,3536	,3733	,3714
Length of lower breadth ſweep at dead flat, of main half breadth — —	,7111	,7142	,7280
Ditto of upper ditto, ditto, ditto — —	,6370	,6388	,6578
Ditto of floor ſweep, ditto, of ditto —	,4518	,4325	,4473
Room and ſpace of the timbers, of length on the gun deck — — —	,0167	,0183	,0166
Breadths. Main breadth to the length on the gun deck, as 13 is to — — —	,2743	,28	,2714
Breadth at aftermoſt part of wing tranſom, of the main breadth — —	,6444	,6369	,6799
Breadth at toptimber line at dead flat, of the main breadth — — —	,8	,7619	,7236

	SHIP OF		
	64 guns.	50 guns.	44 guns.
Breadths. Breadth at toptimber line at beakhead, of what it is at dead flat —	,7777	,7812	,8
Ditto at ditto at after perpendicular, of ditto —	,6111	,625	,6818
Ditto at ditto at ſtern timber, of ditto —	,5416	,5625	,6090
Half breadth of the floor ſweep at dead flat, of the length of it — — —	,7786	,7889	,8137
Depths. Depth in the hold, of the main breadth —	,4222	,4285	,4342
Draught of water, (load) of the toptimber line in midſhips — — —	,5686	,5859	,5666
Lower deck ports from the water in midſhips' of draught of water — —	,2155	,2133	,2107
Heights. Height of the toptimber line at dead flat, of the main breadth — —	,7555	,7619	,7894
Ditto at after perpendicular, of ditto —	,9181	,9146	,9605
Ditto at beakhead, of ditto — —	,8074	,8035	,8508
Upper height of breadth at dead flat, of toptimber line — — —	,6102	,5588	,6
Lower ditto, ditto, of upper height of breadth —	,8192	,8421	,8333
Height of the wing tranſom, of the main breadth — — —	,5777	,5811	,6074
Ditto of the gun deck at foremoſt perpendicular, of draught of water — —	1,202	1,153	1,176
Ditto at after ditto, of height of wing tranſom	,9134	,9010	,9097
Height of the riſing in midſhips, of length of floor ſweep — — —	,0614	,0825	,0784
Ditto of the cutting down in midſhips, to the riſing, as 15 is to — —	5,357	6,923	6,315
Centers of the maſts places. The center of the main maſt from the foremoſt perpendicular, of the length of gun deck — —	,5579	,5566	,5595
And to rake aft in every yard in length —	½ inch	¾ inch	½ inch

Centers

	SHIP OF		
	64 guns.	50 guns.	44 guns.
Centers of maſts places continued.			
Center of the fore maſt from the foremoſt perpendicular, of the length between foremoſt perpendicular and center of main maſt —	,2021	,2095	,1978
And to rake aft in every yard in length —	$\frac{1}{8}$ inch		$\frac{1}{8}$ inch
Center of the mizen maſt from the center of the main maſt, of the length between main and fore maſt — — —	,6164	,6212	,6312
And to rake aft in every yard in length —	$\frac{3}{4}$ inch	$\frac{3}{4}$ inch	1 inch
Center of the bowſprit at the heel, to be in diſtance from the foremoſt perpendicular, of the length on the gun deck — —	,0853	,0859	,0856
And to ſtep in the middle between upper and gun deck.			
To ſteeve up in every yard in length —	1ft.$4\frac{1}{2}$in	1ft. 4in.	1ft. $3\frac{3}{4}$in
Scantlings of timbers, &c.			
Floor timbers ſided in the bearing of the ſhip, of the room and ſpace — —	,4099	,3939	,4642
Ditto ſided afore and abaft, of them in midſhips	,8148	,8461	,8269
Ditto moulded at the head, of the ſiding in midſhips — — —	,9629	,9423	,9230
Lower futtocks ſided in the bearing of the ſhip, of the floor timbers — —	1,111	1,115	1,076
Ditto ſided afore and abaft, of them in midſhips	,9	,8965	,9285
Ditto moulded at the heads, of the ſiding in midſhips — — —	,8333	,7931	,7857
Second futtocks ſided in midſhips, of the firſt futtocks — — —	,9	,8965	,8571
Ditto ſided afore and abaft, of them in midſhips	,8888	,9230	,9375
Ditto moulded at the heads, of the ſiding in midſhips — — —	,8518	,8076	,8333

Third

Scantlings of timbers, &c. continued.	SHIP OF 64 guns.	50 guns.	44 guns.
Third futtocks ſided in midſhips, of the ſecond futtocks — — —	,9629	,8076	,9166
Ditto ſided afore and abaft, of what they are in midſhips — — —	,9	,8965	,9285
Ditto moulded at the heads, of the ſiding in midſhips — — —	,8076	,8333	,8863
Fourth futtocks ſided in midſhips, of the third futtocks — — —	,9629	,9076	,9122
Ditto ſided afore and abaft, of them in midſhips	,9	,8999	,91
Ditto moulded at the heads, of the ſiding in midſhips — — —	,6923	,7083	,7272
Toptimbers ſided in midſhips, of the fourth futtocks — — —	,9987	,9958	,9967
Ditto ſided afore and abaft, of them in midſhips	,9230	,9143	,9119
Ditto moulded at top line, of the ſiding in midſhips — — —	,4166	,4212	,4167
Main keel ſquare in midſhips, of the main breadth — — —	,0333	,0337	,0350
Ditto ſided at after end, of the ſquare in midſhips — — —	,6666	,6461	,625
Ditto ſided at foremoſt end, of ditto —	,8333	,8235	,8125
Falſe keel thick, of the main keel in midſhips —	,3333	,3456	,3467
Stern poſt ſquare at the head, of the length of wing tranſom — —	,0643	,0654	,0645
Wing tranſom ſided, of its length — —	,0373	,0389	,0387
Deck tranſom ſided, of the lower deck beam moulded — — —	,7741	,7712	,7641
Tranſoms below the deck, in number —	5	4	3
Ditto ſided, of the ſiding of wing tranſom —	,7096	,7901	,8012

	SHIP OF		
	64 guns.	50 guns.	44 guns.
Scantlings of timbers, &c. continued.			
Diſtance between them, of their ſiding —	,2727	,2617	,2517
Stem to be ſided at the head, of the main breadth	,0444	,0421	,0451
Keelſon to be ſquare, of the main breadth —	,0314	,0314	,0412
Stemſon to be ſquare, of the keelſon —	,6177	,6176	,6178
Scarphing of the timbers, &c.			
Floorheads in midſhips to be above the bearing of the body, of the main breadth —	,0387	,0386	,0381
Second futtocks in midſhips to be in length, of main breadth ——— —	,2988	,2941	,2982
And all the futtocks to give ſcarph to each other, of the length of ſecond futtocks — —	½ inch	½ inch	½ inch
Thickneſſes of the outſide plank.			
Main wales in thickneſs, of the main half breadth ——— ——— —	,0296	,0297	,0285
Black ſtrake in thickneſs, of the main wales —	,8125	,8333	,7692
Strake under the main wales in thickneſs, of the black ſtrake ——— ——— —	,9876	,9901	,9898
And the following ſtrakes to diminiſh in thickneſs regularly downwards, to the thickneſs of the bottom, which may be at ſtrake the	5th	5th	4th
Channel wales in thickneſs, of the main wales	,6375	,6666	,6923
Plank between ditto and black ſtrake in thickneſs, of black ſtrake — —	,5891	,6111	,5921
Sheer ſtrake in thickneſs, of the main wales —	,5	,5333	,5384
Plank between ditto and channel wales in thickneſs, of ſheer ſtrake ——— —	,8231	,832	,81
Ditto above the ſheer ſtrake in thickneſs, of ſheer ſtrake ——— — —	,7041	,7021	,6912
Plank of the bottom thick, of the main half breadth ——— ——— —	,0148	,0158	,0153

Thick-

	SHIP OF		
	64 guns.	50 guns.	44 guns.
Thickneſſes of the inſide plank.			
Limber ſtrake in thickneſs, of the depth in the hold — — —	,0328	,0324	,0328
Plank at the floorheads, of the moulding of the timbers at floorhead — —	,6895	,6912	,6310
Ditto at the firſt futtock heads, of moulding of timber at that place — —	,6018	,6017	,5916
Footwaling, of the thickneſs of the bottom —	,9988	,9989	,9999
Orlop clamps, of the length of midſhip orlop beam — — —	,0143	,0144	,0139
Strake on the ends of orlop beams, of the orlop clamps — — —	,9212	,9213	,9191
Gun deck clamps, of length of midſhip beam —	,0151	,0149	,0148
Ditto ſpirketting, of the clamps — —	,5549	,5548	,5539
Upper deck clamps, of the length of midſhip beam — — —	,0121	,0122	,0121
Ditto ſpirketting, of the clamps — —	,6761	,6691	,6689
Quarter deck and forecaſtle clamps, of the length of their reſpective longeſt beams —	,0410	,0421	,0431
Ditto ſpirkettings, of their reſpective clamps —	,7796	,7769	,7781
Roundhouſe clamps, of the length of foremoſt beam — — —	,0439	0439	——
Beams. Gun deck beams to be moulded, of the main breadth — — —	,0287	,0288	,0281
Orlop deck beams ditto, of the gun deck beam	,9314	,9412	,9421
Upper deck beams ditto, of the length of midſhip beam — — —	,0236	,0237	,0238
Quarter deck, forecaſtle, and roundhouſe beams to be moulded, of the lengths of their reſpective longeſt beams — —	,0199	,0199	,0198

		SHIP OF		
		64 guns.	50 guns.	44 guns.
Beams.	All the beams (except the orlop beams, which are to be ſquare) to be ſided, of what they are the moulding way — —	1,072	1,071	1,069
	The beams on every deck within fourteen feet from aft, and within eight feet from forward, to be leſs than the other beams — —	,0667	,0678	,0612
Knees.	Lodging knees on the gun and orlop deck to be ſided, of the moulding of their reſpective beams — — —	,6774	,7450	,6892
	Their thwartſhip arms long, of the length of reſpective beams — —	,0917	,0986	,0915
	Hanging knees on the gun and orlop deck to be ſided, of the ſiding of the lodging knees —	,9712	,9711	,9741
	Thwartſhip arms the ſame length as their reſpective lodging knees.			
	Standard knees on the gun and orlop deck to be ſided, of the ſiding of their reſpective beams	,6178	,6212	,6312
	Up and down arm to reach 6 inches on the clamps above.			
	Lodging and hanging knees on the upper deck to be ſided, of the moulding of their reſpective beams — — —	,6956	,6965	,6954
	Thwartſhip arms in length, of the length of their reſpective beams — —	,0941	,0981	,0923
	Hanging arms to reach 4 inches on the ſpirketting below.			
	Standard knees on the upper deck to be ſided, of the ſiding of the upper deck beams —	,6941	,6981	,6923
	Their up and down arms to reach 6 inches on the clamps above.			
	Lodging and hanging knees of the quarter deck, forecaſtle and roundhouſe, to be ſided, of the moulding of their reſpective beams —	,7333	,7412	,7312

	SHIP OF		
	64 guns.	50 guns.	44 guns.
Knees. Their thwartſhip arms in length, of the length of their reſpective beams.	,0842	,0811	,0812
Knee of the head, &c. The knee of the head, at the height of the breaſt of the figure, in diſtance from the ſtem, of the length on deck —	,0853	,0866	,0857
And broad, or diſtant from the ſtem, at the load water line, of what it is at breaſt of the figure	,2380	,2435	,25
The gripe to be in the broadeſt place, in diſtance from the ſtem on a ſquare, of the main breadth — — —	,0911	,1071	,1053
Cheeks and rails. This claſs of ſhips hath not ſo ſnug a topſide as thoſe in the laſt chapter, for the number of guns being conſiderably leſs, in conſequence makes the length of the ſhip much leſs; but their being carried upon two decks makes theſe ſhips require a topſide almoſt as high as the former claſs, by which it is much higher in proportion to the length than the ſhips above mentioned; but in order to make the head appear as handſome as poſſible, will be to keep the cheeks up high Therefore, let the lower edge of the lower cheek be upon the upper edge of the main wales, and the cheek to be moulded on the ſtem; of the breadth of the knee at that place	,1034	,1043	,1044
The main rail in the bag, or in wake of the ſtem, to be on a level with the upper part of the beakhead, which is to be above the upper deck — — —	1ft.6in.	1ft. 5in.	1ft. 4in.
The main rail to be moulded at that place, of the lower cheek — —	,8121	,8012	,8012
The upper cheek at the ſtem to lie in the middle, between the lower cheek and main rail, and to be moulded at that place, of the lower cheek — — —	,8921	,8943	,8912

	SHIP OF		
	64 guns.	50 guns.	44 guns.
Cheeks and rails. The rails between the main rail and upper cheek to be two in number, and equally ſpaced between, letting the middle rail form a curve to break in fair with the ſupporter of cat-head.			
The breadth of the block or figure, from the breaſt to the back of the hair bracket, of the diſtance of the breaſt from the ſtem —	,2976	,3076	,3194
Rother. The rother to be ſquare at the head, of the head of ſtern poſt —— —	1,136	1,095	1,05
And the lower hance to be above the load water line —— —— —	10 inch	9 inch	10 inch
To be broad, or fore and aft, at the keel, of the main breadth —— —— —	,1166	,1190	,1359
To be broad at the lower hance, of what it is at the lower part —— —	,6984	,6833	,6933

A TABLE, in which is ſhewn the Number of Ports to be on each Deck, their Dimenſions, and likewiſe the Height from the Deck, for this Third Claſs of Ships.

	PORTS on the														
	Gun or Lower Deck				Upper Deck				Quarter Deck				Forecaſtle		
Ship of	In N°.	Deep.	Fore and aft	Lower edge of port from the deck.	In N°.	Deep.	Fore and aft	Lower edge of portfrom the deck,	In N°	Deep.	Fore and aft	Lower edge of port from the deck.	In N°.	Fore and aft	Lower edge of portfrom the deck.
		Ft. In.	Ft. In.	Ft. In.		Ft. In.	Ft. In.	Ft. In.		Ft. In.	Ft. In.	Ft. In.		Ft. In.	Ft. In.
64 Guns	26	2 8	3 4	2 3	26	2 8	2 10	1 11	10	2 4	2 6	1 6	2	2 6	1 4
50 Guns	22	2 7	3 3	2 3	22	2 7	2 8	1 9	6	2 4	2 5	1 5	2	2 5	1 4
44 Guns	2	2 6	2 11	2 1	22	2 4	2 5	1 8					2	2 4	1 4

A TA-

A TABLE, ſhewing the Heights between each Deck, from the upper Side of one Plank, to the under Side of the other.

	HEIGHTS between the									
	Orlop and Gun Deck			Gun and upper Deck	Upper Deck and Quarter Deck		Upper Deck and Forecaſtle		Quarter Deck and Roundhouſe	
Ship of	Afore	Mid-ſhips	Abaft	Afore, Midſhips and Abaft	Afore	Abaft	Afore	Abaft	Afore	Abaft
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
64 Guns	6 10	6 9	6 10	6 10	6 8	6 8	6 5	6 3	6 6	6 8
50 Guns	6 9	6 7	6 6	6 9	6 6	6 8	6 2	6 0	6 3	6 4
44 Guns	6 7	6 4	6 0	6 8	6 5	6 8	5 10	5 10		

C H A P. V.

Wherein is contained the proportions for conſtructing the fourth claſs of ſhips, viz. thoſe of forty-four, thirty-eight, and thirty-ſix guns, carrying their guns upon one deck.

HAVING in the foregoing chapter laid down the proportions for a forty four gun ſhip upon two decks, I ſhall now begin the fourth claſs with the proportions for a forty-four gun ſhip upon one deck; and proceed with thoſe of thirty-eight and thirty-ſix guns. The forty-four gun ſhip upon one deck, may be ſo conſtructed as to have all the qualities that can be poſſibly united

united in one ſhip, as having but one deck, the height may be in due proportion to the length, and in conſequence thereof will be required no more than a proportionable breadth, by which ſhe may be brought down in the water to that depth, which is allowed to be the beſt ſailing trim for ſhips in general, and therefore there is no obſtacle in the proportioning part to prevent her being duly qualified in point of velocity. And likewiſe the dimenſions being more extenſive than thoſe of a forty four upon two decks, ſhe will thereby be enabled to carry very heavy metal, and conſequently will be a very formidable ſhip.

Therefore upon only thoſe two conſiderations the forty-four gun ſhip upon one deck, may rank with thoſe ſhips which are found to be of the greateſt utility in the navy.

The thirty-eight and thirty-ſix gun ſhips alſo upon one deck, are very little inferior in point of proportion to the forty-four gun ſhips, and are likewiſe very uſeful ſhips, for their force is leſſened, whereby they require a leſs number of men, and leſs quantity of proviſions, and conſequently the expence becomes more eaſy in equipping them.

PROPORTIONS.	SHIP OF		
	44 guns.	38 guns.	36 guns.
Lengths. Length from the perpendicular forward, to the center of dead flat, of the length on gun deck — — —	,3698	,3687	,3642
Room and ſpace, of the length on the gun-deck	,0165	,0206	,0182
Length of the lower breadth ſweep at dead flat, of main half breadth — —	,6974	,7	,7022
Ditto of the upper ditto, at ditto — —	,6051	,5914	,5823
Ditto of the floor ſweep at dead flat, ditto —	,5546	,5652	,5777

Breadths.

		SHIP OF		
		44 guns.	38 guns.	36 guns.
Breadths.	Main breadth, to the length of lower deck, as 12 is to	44,16	44,13	43,84
	Breadth at the aftermoſt part of the wing tranſom, of main breadth	,6555	,6131	,6
	Top breadth at dead flat, of the main breadth	,9295	,9086	,8933
	Ditto at after perpendicular, of what it is at dead flat	,6515	,6651	,6417
	Ditto of ſtern timber at toptimber line, of what it is at after perpendicular	,875	,8777	,8837
	Half breadth of the floor ſweep at dead flat, of the length of it	,5	,4769	,4769
Depths.	Depth in the hold, of the main breadth	,3529	,3566	,3556
	Draught of water (load) of toptimber line in midſhips	,6171	,6191	,6363
	Deeper abaft than afore by	6 inch.	6 inch.	1 ft.
Heights.	Height of the toptimber line at dead flat, of main breadth	,7353	,7479	,7334
	Ditto, at after perpendicular, of dead flat	1,155	1,152	1,170
	Ditto at foremoſt perpendicular, of ditto	1,087	1,082	1,088
	Upper height of breadth at dead flat, of toptimber line	,6743	,6716	,6607
	Lower height of breadth at ditto, of upper height of breadth	,8263	,8962	,8808
	Height of the wing tranſom, of the main breadth	,5673	,5739	,5756
	Height of the riſing in midſhips, of the length of floor ſweep	,0985	,0999	,0923
	Height of the lower deck at foremoſt perpendicular, of load water line at that place	,9859	,9715	,9706
	Ditto at after perpendicular, of ditto	1,014	1,023	,9723
	Height of the cutting down in midſhips to the riſing, as 13 is to	7,348	7,682	8,029

	SHIP OF		
	44 guns.	38 guns.	36 guns.
Centers of the masts places.			
The center of the main mast, from the foremost perpendicular of the gun deck, of the length on gun deck — —	,5891	,5898	,5621
And to rake aft in every yard in length —	$\frac{1}{8}$ inch	$\frac{1}{8}$ inch	$\frac{1}{4}$ inch
Center of the fore mast, from the center of the main mast, of the length between main mast and foremost perpendicular — —	,8139	,8139	,8042
And to rake aft in every yard in length —			$\frac{1}{8}$ inch
Center of the mizen mast, from the center of the main mast, of the distance between main mast, and after perpendicular — —	,35	,3775	,3473
And to rake aft in every yard in length —	1 inch	1 inch	1 inch
Center of the bowsprit at the heel, to be in distance from the foremost perpendicular, of the length on the lower deck — —	,0822	,0829	,0825
And to steeve up in every yard in length —	1 ft $2\frac{1}{2}$ in	1 ft $2\frac{1}{4}$ in	1 ft. 2 in.
Scantlings of timbers, &c.			
Floor timbers sided in the bearing of the ship, of the room and space — —	,4827	,4695	,45
Ditto sided afore and abaft, of what they are in midships — — —	,8147	,8419	,8521
Ditto moulded at the heads, of the siding in midships — — —	,8215	,8334	,8334
Lower futtocks sided in the bearing of the ship, of the floor timbers — —	1,	,9631	,9631
Ditto sided afore and abaft, of what they are in midships — — —	,9	,8959	,9012
Ditto moulded at the heads, of the siding in midships — — —	,75	,7885	,7885

Scantlings

	SHIP OF		
	44 guns.	38 guns.	36 guns.
Scantlings of timbers, &c. continued.			
Second futtocks ſided in midſhips, of the firſt futtocks — — —	,9	,8956	,8956
Ditto ſided afore and abaft, of them in midſhips	,8891	,8941	,8922
Ditto moulded at the heads, of ſiding in midſhips — — —	,7692	,8125	,8125
Third futtocks ſided in midſhips, of the ſecond futtocks — — —	,9231	,9176	,8961
Ditto ſided afore and abaft, of thoſe in midſhips	,9421	,9123	,9614
Ditto moulded at the heads, of the ſiding in midſhips — — —	,7917	,841	,861
Fourth futtocks ſided in midſhips, of the third futtocks — — —	,9167	,9545	,9535
Ditto ſided afore and abaft, of them in midſhips	,9091	,9181	,9101
Ditto moulded at the heads, of the ſiding in midſhips — — —	,6818	,6191	,6342
Toptimbers ſided in midſhips, of the fourth futtocks — — —	1,046	1,048	1,073
Ditto ſided afore and abaft, of thoſe in midſhips	,9101	,9019	,9109
Ditto moulded at top line, of ſiding in midſhips — — —	,4783	,4546	,4546
Main keel ſquare in midſhips, of the main breadth — — —	,0359	,0348	,0345
Ditto ſided at foremoſt end, of what it is in midſhips — — —	,7941	,8125	,8334
Ditto ſided at after end, of ditto —	,5883	,6094	,7
Falſe keel thick, of the main keel — —	,4705	,4375	,4516
Stern poſt ſquare at the head, of the length of wing tranſom — —	,0609	,0657	,0667
Wing tranſom ſided, of its length — —	,0417	,0444	,9445

Scantlings

	SHIP OF		
	44 guns.	38 guns.	36 guns.
Scantlings of timbers, &c. continued.			
Other tranſoms ſided, of the wing tranſom —	,8462	,84	,875
Stem to be ſided at the head, of the main breadth	,0442	,0435	,0423
Keelſon to be ſquare, of the main breadth —	,0326	,0327	,0334
Stemſon to be ſquare, of the keelſon —	,6452	,6667	,6667
Thickneſſes of the outſide plank.			
Main wales in thickneſs, of the main half breadth — — —	,0274	,0261	,0267
Black ſtrake in thickneſs, of the wales —	,7693	,8334	,8334
To be ſtrakes of thickſtuff under the wales in number — — —	5	5	4
Firſt ſtrake under the wales in thickneſs, of the wales — — —	,7693	,7917	,7917
And the following to diminiſh regularly downwards, to the thickneſs of the bottom.			
Sheer ſtrake in thickneſs, of moulding of the timber at that place — —	,7273	,8	,8
Plank between ditto and black ſtrakes, of the black ſtrake — —	,5123	,5912	,6011
Ditto above the ſheer ſtrake, of the ſheer ſtrake	,5872	,5812	,5781
Plank of the bottom, in thickneſs of the main half breadth — — —	,0147	,0131	,0134
Limber ſtrake in thickneſs, of the depth in the hold — — —	,0358	,0379	,0371
Stuff at the floorheads, of the moulding of timber at floorheads — —	,5653	,5334	,5334
Ditto at the firſt futtock heads, of ditto at firſt futtock heads — —	,5238	,5366	,5366
Footwaling, of the thickneſs of bottom —	,8572	,9166	,9166

Thick-

	SHIP OF 44 guns.	38 guns.	36 guns.
Thickneſs of the inſide plank continued.			
Orlop clamps, of the length of midſhip orlop beam — — —	,0127	,0125	,0125
Strake on the ends of orlop beams, of the orlop clamps — — —	,9231	,9311	,9311
Lower deck clamps, of length of the midſhip beam — — —	,9135	,0125	,0122
Ditto ſpirketting, of the clamps — —	,5143	,5019	,5011
Upper deck clamps, of length of the midſhip beam — — —	,0117	,0116	,0118
Ditto ſpirketting, of the clamps — —	,5834	,5841	,5833
Quarter deck and forecaſtle clamps in thickneſs, of the length of their reſpective longeſt beams — — —	,0105	,0104	,0107
Ditto ſpirkettings, of their reſpective clamps —	,6543	,6123	,6412
Beams. Lower deck beams to be moulded, of the main breadth — —	,0231	,0218	,0216
Orlop ditto ditto, of the lower deck beam —	,9311	,9211	,9211
Upper deck beams moulded, of the length of midſhip beam — —	,0243	,0242	,0249
Quarter deck and forecaſtle beams to be moulded, of their reſpective longeſt beams —	,0191	,0181	,0174
The beams on every deck within 13 feet from aft, and 12 feet from forward, to be leſs than the other beams — —	,9312	,9311	,9311
All the beams (except the orlop beams, which are to be ſquare) to be ſided, of what they are the moulding way — —	1,059	1,058	1,056
Knees. Lower deck and orlop lodging knees to be ſided, of the moulding of their reſpective beams — — —	,7728	,85	,8206

	SHIP OF		
	44 guns.	38 guns.	36 guns.
Knees. Thwartship arms long, of the length of respective beams — — —	,0999	,0998	,1019
Hanging knees on the lower deck to be sided, of the siding of the lodging knees —	,9877	,9871	,9873
Thwartship arms the same length as lodging knees.			
Standard knees on the orlop and lower deck to be sided, of the siding of their respective beams — — —	,6819	,6591	,7
Up and down arm to reach 6 inches on the clamps above.			
Lodging and hanging knees on the upper deck to be sided, of the moulding of their respective beams — — —	,7046	,7143	,6905
Thwartship arms in length, of the length of their respective beams — —	,0851	,0871	,0869
Standard knees on the upper deck to be sided, of the siding of the upper deck beams —	,6819	,6815	,6812
Lodging and hanging knees of the quarter deck and forecastle to be sided, of the moulding of their respective beams — —	,7	,7143	,7692
Their thwartship arms in length, of length of their respective beams — —	,0809	,0811	,0812
Knee of the head, &c. The knee of the head, at the breast of the figure, in distance from the stem, of the lengnh on lower deck —	,0857	,0816	,0731
And distant from the stem, or board, at the load water line, of the distance at breast of figure — — —	,2534	,2174	,3834
Gripe to be in the broadest place, of the main breadth — — —	,0883	,0827	,08

Cheeks

	SHIP OF		
	44 guns.	38 guns.	36 guns.
Cheeks and rails. In this claſs of ſhips the faireſt opportunity preſents itſelf, in order to the forming of a handſome head and ſet of rails, by reaſon of a ſnug and ſhallow topſide, in conſequence of which we muſt keep the rails and cheeks pretty cloſe, and by throwing the fore part of the rails and figure well up, we ſhall have a light and airy head, which will always appear well out of the water. Let the upper edge of the wales be the upper edge of the lower cheek, and the diſtance from thence to the upper edge of the upper cheek on the ſtem, of the length of the head, from ſtem to breaſt of figure —	,22	,2319	,2584
The lower cheek moulded on the ſtem, of the aforeſaid diſtance —	,3438	,3437	,3436
The upper cheek moulded on the ſtem, of the lower cheek — —	,9091	,9081	,9079
Let the diſtance from the upper edge of the upper cheek to the upper edge of the main rail on the ſtem, be the ſame as the diſtance from upper to upper edges of the cheeks.			
And to be only one rail between the upper cheek and main rail, and equally ſpaced between the after end of it, breaking in with a fair ſweep to the ſupporter of the cat-head.			
The breadth of the block or figure, that is, from breaſt to back; of the diſtance of the breaſt from ſtem —	,28	,2755	,3
Rother. The rother to be ſquare at the head, of the head of ſtern poſt —	1,158	1,162	1,167
The lower hance to be above the load water line	10 inch	9 inch.	8 inch
And to be broad at the lower hance, of what it is at lower part —	,7242	,7037	,6923
Ditto at lower part, of the main breadth —	,1218	,1174	,1156

A TA-

A TABLE, ſhewing the Number of Ports to be on each Deck, with their Dimenſions, Height from the Deck, and likewiſe the Diſtance between them, for this fourth Claſs of Ships.

	PORTS on the															
	Upper Deck					Quarter Deck					Forecaſtle		
Ship of	In N°.	Deep.	Fore and aft	Diſtance between	Lower edge of port from the deck.	In N°.	Deep.	Fore and aft	Diſtance between	Lower edge of port from the deck.	In N°.	Fore and aft	Lower edge of port from the deck.
		Ft. In.	Ft. In.	Ft. In.	Ft. In.		Ft. In.	Ft. In.	Ft. In.	Ft. In.		Ft. In.	Ft. In.
44 Guns	30	2 6	2 11	7 1	2 3	10	2 3	2 4	7 0	1 8	4	2 4	1 8
38 Guns	28	2 5	2 10	7 0	2 2	10	2 2	2 3	7 0	1 7			
36 Guns	26	2 5	2 10	7 2	2 1	10	2 1	2 2	7 0	1 6			

A TABLE, ſhewing the Heights between each Deck, from the upper Side of one Plank, to the under Side of the other.

Ship of	HEIGHTS between the															
	Orlop and Lower Deck						Lower Deck and Upper Deck		Upper Deck and Quarter Deck				Upper Deck and Forecaſtle			
	Afore		Midſhips		Abaft		Afore, Midſhips and Abaft		Afore		Abaft		Afore		Abaft	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
44 Guns	6	2	5	2	6	0	6	4	6	10	7	0	6	3	6	0
38 Guns	6	0	5	2	6	0	6	2	6	6	6	9	6	2	5	11
36 Guns	6	0	5	0	5	10	6	2	6	6	6	9	6	2	5	11

CHAP. VI.

Containing the proportions for ſhips of the fifth claſs, viz. thoſe of thirty-two, twenty-eight, and twenty-four guns.

PROPORTIONS.	SHIP OF 32 guns.	28 guns.	24 guns.
Lengths. Length from the foremoſt perpendicular to the middle of dead flat, of the length on the lower deck — — —	,3721	,3817	,3931
Room and ſpace, of ditto — —	,0179	,0172	,0189
Length of the lower breadth ſweep at dead flat, of main half breadth — —	,8613	,5556	,5715
Ditto of upper ditto at ditto, ditto — —	,6411	,6162	,6032
Ditto of floor ſweep at ditto, ditto — —	,6028	,5959	,5714

Breadths.

		SHIP OF	
	32 guns.	28 guns.	24 guns.
Breadths. Main breadth to the length of lower deck, as 11 is to — — —	40,73	40,17	39,98
Breadth of the aftermoſt part of the wing tranſom, of main breadth — —	,6315	,6212	,6191
Ditto of toptimber line at dead flat, of the main breadth — — —	,8851	,8788	,8809
Ditto at after perpendicular, of ditto —	,6316	,6067	,6191
Ditto at ſtern timber, of ditto — —	,5741	,5455	,5556
Half breadth of floor ſweep at dead flat, of the length of it — — —	,4047	,4322	,4445
Depths. Depth in the hold, of the main breadth —	,3626	,3334	,3281
Draught of water (load) of toptimber line in midſhips — — —	,6623	,6573	,6716
Deeper abaft than afore, of what it is in midſhips	,0588	,0638	,0667
Heights. Height of the toptimber line at dead flat, of the main breadth — —	,7368	,7223	,7099
Ditto at after perpendicular, of dead flat —	1,149	1,182	1,139
Ditto at foremoſt ditto, of ditto — —	1,084	1,083	1,082
Upper height of breadth at dead flat, of the toptimber line — — —	,6883	,6175	,6567
Lower ditto at ditto, of upper height of breadth	,9198	,9014	,9013
Height of the wing tranſom, of the toptimber line in midſhips — —	,8117	,8321	,8283
Ditto of the riſing in midſhips, of the length of floor ſweeps — — —	,0951	,0932	,0926
Ditto cutting down in midſhips to the riſing, as 11 is to — — —	7,334	6,05	6,112
Ditto lower deck at foremoſt perpendicular, of what it is in midſhips — —	1,086	1,108	1,137
Ditto at after perpendicular, ditto — —	1,149	1,153	1,185

Centers

	SHIP OF		
	32 guns.	28 guns.	24 guns.
Centers of the masts places.			
The center of the main mast from the foremost perpendicular of the lower deck, of the length of lower deck — — —	,5691	,5643	,5639
And to rake aft in every yard in length —	$\frac{1}{4}$ inch	$\frac{1}{4}$ inch	$\frac{3}{8}$ inch
Center of the fore mast from the foremost perpendicular, of the length between foremost perpendicular and main mast — —	,1986	,1961	,1960
And to rake aft in every yard in length —	$\frac{1}{8}$ inch	$\frac{1}{8}$ inch	$\frac{1}{8}$ inch
Center of the mizen mast from the center of main mast, of the length between that and after perpendicular — —	,6581	,6691	,6681
And to rake aft in every yard in length —	$\frac{3}{4}$ inch	$\frac{3}{4}$ inch	$\frac{3}{4}$ inch
The bowsprit to steeve up in every yard in length — — —	1ft. 2in.	1ft. 2in.	1ft. 1$\frac{1}{2}$in
Scantlings of timbers, &c.			
Floor timbers sided in midships, of the room and space — — —	,4685	,4807	,48
Ditto sided afore and abaft, of those in midships	,8432	,8411	,8391
Ditto moulded at the heads, of the siding in midships — — —	,7692	,76	,75
Lower futtocks sided in midships, of the floor timbers — — —	1,	,96	,9791
Ditto sided afore and abaft, of those in midships	,8123	,8112	,8091
Ditto moulded at the heads, of the siding in midships — — —	,7307	,75	,6808
Second futtocks sided in midships, of the lower futtocks — — —	,8846	,875	,8723
Ditto sided afore and abaft, of those in midships	,8791	,8781	,8769
Ditto moulded at the heads, of the siding in midships — — —	,7608	,7857	,7073

Scantlings

Scantlings of timbers &c. continued.	SHIP OF 32 guns.	28 guns.	24 guns.
Third futtocks ſided in midſhips, of the ſecond futtocks	,9347	,9523	,9512
Ditto ſided afore and abaft, of thoſe in midſhips	,8912	,8911	,8911
Ditto moulded at the heads, of the ſiding in midſhips	,7209	,725	,6411
Fourth futtocks ſided in midſhips, of the third futtocks	,9535	,975	,9743
Ditto ſided afore and abaft, of thoſe in midſhips	,8921	,8912	,8911
Ditto moulded at the heads, of the ſiding in midſhips	,6342	,6341	,6339
Toptimbers ſided in midſhips, of the fourth futtocks	,9981	,9979	,9978
Ditto ſided afore and abaft, of thoſe in midſhips	,8911	,891	,8899
Ditto moulded at topline, of the ſiding in midſhips	,4561	,4561	,4559
Main keel ſquare in midſhips, of the main breadth	,0334	,0329	,0344
Ditto ſided at foremoſt end, of what it is in midſhips	,7939	,7938	,7929
Ditto ſided at the after end, of ditto	,5882	,5881	,5879
Falſe keel thick, of the main keel	,4545	,4544	,4533
Stern poſt ſquare at the head, of the length of wing tranſom	,0682	,0691	,0683
Wing tranſom ſided, of its length	,0456	,0455	,0454
The other tranſoms ſided, of the wing tranſom	,875	,8749	,8761
Stem to be ſided at the head, of main breadth	,0431	,0431	,0432
Keelſon to be ſquare, of the main breadth	,0335	,0334	,0336
Stemſon to be ſquare, of the keelſon	,6659	,6658	,6649

Thickneſſes

	SHIP OF		
	32 guns.	28 guns.	24 guns.
Thickneſſes of the outſide plank.			
Main wales in thickneſs, of the main half breadth — — —	,0264	,0265	,0265
Black ſtrake ditto, of the wales — —	,7691	,7691	,7692
Sheer ſtrake ditto, of the top half breadth in midſhips — — —	,0202	,0202	,0199
Plank of the topſide ditto, of the black ſtrake —	,5912	,5911	,5912
Plank of the bottom ditto, of the main half breadth — — —	,0143	,0152	,0159
Thickneſſes of the inſide plank.			
Limber ſtrake in thickneſs, of the depth in hold	,0362	,0379	,0363
Stuff at the floor and firſt futtock heads, of the moulding of the timbers at the reſpective places — — —	,55	,5264	,5278
Footwaling, of the thickneſs of bottom —	,9167	,8334	,75
Deck clamps in thickneſs, of the length of their reſpective longeſt beams — —	,0111	,0112	,0121
Ditto ſpirkettings, of their reſpective clamps —	,6672	,6671	,6669
Beams. Lower deck beams moulded, of the main breadth — — —	,0192	,0196	,0198
Upper deck ditto ditto, of the length of midſhip beam — — —	,0328	,0327	,0326
Quarter deck and forecaſtle beams to be moulded, of their reſpective longeſt beams —	,0164	,0164	,0163
All beams to be ſided, of what they are moulded	1,071	1,069	1,068
The beams on the lower and upper deck within 12 feet from aft, and 10 feet from forward, to be leſs than the other beams —	,0612	,0611	,0609
Knees. Lower and upper deck knees both lodging and hanging, to be ſided, of the moulding of their reſpective beams — —	,6954	,6953	,6952

	SHIP OF		
	32 guns.	28 guns.	24 guns.
Knees. Their thwartſhip arms in length, of length of reſpective beams	,1	,0999	,0998
Lodging and hanging knees on the quarter deck and forecaſtle to be ſided, of the moulding of their reſpective beams	,7312	,7311	,7309
Their thwartſhip arms in length, of the length of ditto	,0981	,0979	,0971
Standard knees on the upper and lower deck to be ſided, of the ſiding of their reſpective beams	,6212	,6211	,6209
Of the head, cheeks, rails, &c.			
The knee of the head at the fore part, to be in diſtance from the ſtem, of the length on the lower deck	,0814	,0747	,0764
Ditto at the load water line, of what it is at the forepart	,2223	,2223	,21
Gripe to be broad, of the main breadth	,0862	,0859	,0873
The upper edge of the wales to be the upper edge of the lower cheek, and the diſtance between the upper and lower cheek on the ſtem to be, of the diſtance of the foremoſt part of the knee from the ſtem	,2063	,2223	,2191
The lower cheek moulded on the ſtem, of the diſtance between them	,6292	,2691	,2689
The upper cheek moulded on ditto, of the lower cheek	,9897	,9896	,9817
The diſtance between the main rail and the upper cheek on the ſtem to be the ſame as the diſtance between the cheeks.			
The main rail to be moulded at the ſtem, of the upper cheek	,9691	,9691	,9689

	SHIP OF 32 guns.	28 guns.	24 guns.
Heads, cheeks, rails, &c. continued.			
The lower rail to be ſpaced exactly in the middle between the upper cheek and main rail, and to be moulded in wake of the ſtem, of main rail	,8123	,8141	,8151
The block, or figure head, to be from breaſt to back, of the length from breaſt to the ſtem	,2698	,2963	,2857
Rother. The rother to be ſquare at the head, of the head of ſtern poſt	1,055	1,058	1,062
The lower hance to be above the load water line	8 inch	7 inch	7 inch
To be broad at the lower hance, of what it is at lower end	,7	,6875	,6738
To be broad at the lower end, of the main breadth	,1196	,1212	,1217

A TABLE, ſhewing the Number of Ports to be on each Deck, their Dimenſions, Height from the Deck, and Diſtance between them, for this fifth Claſs of Ships.

Ship of	PORTS on the Upper Deck: In N°.	Upper Deck: Deep. Ft. In.	Upper Deck: Fore and aft Ft. In.	Upper Deck: Diſtance between Ft. In.	Upper Deck: Height from the Deck. Ft. In.	Quarter Deck: In N°.	Quarter Deck: Deep. Ft. In.	Quarter Deck: Fore and aft Ft. In.	Quarter Deck: Diſtance between Ft. In.	Quarter Deck: Height from the Deck. Ft. In.	Forecaſtle: In N°.	Forecaſtle: Fore and aft Ft. In.	Forecaſtle: Height from the Deck. Ft. In.
32 Guns	26	2 3	2 5	6 8	1 9	4	2 1	2 1	6 6	1 6	2	2 1	1 4
28 Guns	24	2 3	2 4	6 6	1 9	4	2 0	2 0	6 6	1 6			
24 Guns	22	2 3	2 3	6 5	1 8	2	1 11	1 11	6 4	1 4½			

A TA-

A TABLE, ſhewing the Heights between each Deck, from the upper Side of one Plank, to the under Side of the other.

Ship of	HEIGHTS between the Orlop and Lower Deck: Afore	Orlop and Lower Deck: Mid-ſhips	Orlop and Lower Deck: Abaft	Lower Deck and Upper Deck: Afore, Midſhips and Abaft	Upper Deck and Quarter Deck: Afore	Upper Deck and Quarter Deck: Abaft	Upper Deck and Forecaſtle: Afore	Upper Deck and Forecaſtle: Abaft
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
32 Guns	6 3	5 11	6 3	6 0	6 4	6 7	6 2	6 0
28 Guns				5 10	6 2	6 6	5 10	5 10
24 Guns				5 8	6 0	6 4	5 6	5 6

CHAP. VII.

In which are laid down proportions for conſtructing ſhips of the ſixth claſs, viz. thoſe of twenty-two and twenty guns, and likewiſe for a ſloop of war of three hundred tons; with other remarks.

PROPORTIONS.	SHIP OF 22 guns.	20 guns.	Sloop.
Lengths. Dead flat from foremoſt perpendicular, of the length on lower deck — –	,3928	,3981	,4138
Length of the lower breadth ſweep at dead flat, of main half breadth —— –	,5755	,5666	,625
Ditto of upper ditto at ditto, ditto –	,3978	,5333	,5875
Ditto of floor ſweep at ditto, ditto –	,5	,5222	,5125
Room and ſpace, of length on the lower deck –	,0154	,0149	,0181

Breadths.

		SHIP OF		
		22 guns.	20 guns.	Sloop.
Breadths.	Main breadth to the length of the lower deck, as 10 is to — — —	36,13	36,	36,14
	Breadth at the aftermoſt part of the wing tranſom, of main breadth — —	,5484	,5333	,5607
	Ditto at toptimber line at dead flat, of the main breadth — — —	,7742	,8	,8972
	Ditto at ditto at after perpendicular, of what it is at dead flat — — —	,5808	,5625	,5417
	Half breadth of the floor ſweep at dead flat, of the length of it — —	,5591	,5319	,5217
Depths.	Depth in the hold, of the main breadth —	,3226	,3222	,2991
	Draught of water (load) of the height of toptimber line in midſhips — —	,5952	,5365	,5388
	Deeper abaft than afore, of the draught of water in midſhips — — —	,08	,0909	,0952
Heights.	Height of the toptimber line at dead flat, of the main breadth — —	,6774	,6836	,7289
	Ditto at foremoſt perpendicular, of what it is at dead flat — — —	1,047	1,048	1,051
	Ditto at after ditto, of ditto — —	1,191	1,179	1,179
	Upper height of breadth at dead flat, of the toptimber line — — —	,5912	,6341	,6411
	Lower height of breadth at ditto, of the upper height — — —		,9231	,92
	Height of the wing tranſom, of the main breadth — — —	,5242	,5334	,5919
	Ditto of the riſing in midſhips, of length of floor ſweep — — —	,0484	,0532	,0598
	Ditto of the cutting down in midſhips to the riſing, as 12 is to — —	3,652	4,285	5,077

	SHIP OF		
	22 guns.	20 guns.	Sloop.
Centers of the mafts places.			
Center of main maft from foremoft perpendicular on the lower deck, of the length between foremoft and after perpendicular — —	,5691	,5533	,5689
And to rake aft in every yard in length —	$\frac{3}{8}$ inch	$\frac{3}{8}$ inch	$\frac{1}{2}$ inch
Center of the fore maft from foremoft perpendicular, of the length between foremoft perpendicular and center of main maft — —	,1812	,1966	,1998
And to rake aft in every yard in length —	$\frac{1}{8}$ inch	$\frac{1}{8}$ inch	
Center of the mizen maft from the center of the main maft, of the length on lower deck —	,2857	,2777	,2891
And to rake aft in every yard in length —	$\frac{7}{8}$ inch	$\frac{7}{8}$ inch	$\frac{7}{8}$ inch
Bowfprit to fteeve up in every yard in length —	1 ft. 1$\frac{1}{2}$ in	1 ft. 1 in.	1 ft.
Scantlings of timbers, &c.			
Floor timbers fided in midfhips, of the room and fpace — — —	,45	,4	,3334
Ditto fided afore and abaft, of thofe in midfhips	,8888	,875	,8572
Ditto moulded at the heads, of the fiding in midfhips — — —	,8334	,875	,9643
Lower futtocks fided in midfhips, of the floor timbers — — —	1,112	1,125	1,143
Ditto fided afore and abaft, of thofe in midfhips	,8	,7778	,75
Ditto moulded at the heads, of the fiding in midfhips — — —	,725	,75	,8125
Second futtocks fided in midfhips, of the lower futtocks — — —	,8	,7778	,75
Ditto fided afore and abaft, of thofe in midfhips	,8791	,8789	,8792
Ditto moulded at the heads, of the fiding in midfhips — — —	,75	,8572	,9334
Third futtocks fided in midfhips, of the fecond futtocks — — —	,9063	,9719	1,

Scantlings

	SHIP OF		
	22 guns.	20 guns.	Sloop.
Scantlings of timbers, &c. continued.			
Third futtocks ſided afore and abaft, of thoſe in midſhips — — —	,9871	,9869	,9868
Ditto moulded at the heads, of the ſiding in midſhips — — —	‘6552	,6667	,6667
Toptimbers ſided in midſhips, of the third futtocks — — —	1,	1,	1,
Ditto ſided afore and abaft, of thoſe in midſhips	,9812	,9813	,9841
Ditto moulded at toptimber line, of the ſiding in midſhips — — —	,4827	,4074	,5
Main keel ſquare in midſhips, of the main breadth — — —	,0323	,032	,0343
Ditto ſided at after end, of what it is in midſhips — — —	,6667	,6739	,6818
Ditto ſided at foremoſt end, of ditto — —	,8334	,8261	,8182
Falſe keel in thickneſs, of the main keel in midſhips — — —	,375	,3478	,2991
Stern poſt ſquare at the head, of the length of wing tranſom — — —	,0687	,0678	,0667
Wing tranſom ſided, of its length —	,0539	,0546	,0528
The other tranſoms ſided, of the ſiding of wing tranſom — — —	,7273	,7	,6667
And to be diſtant from each other, of their ſiding	,5	,4285	,5
Stem to be ſided at the head, of the main breadth	,0379	,0362	,0374
Keelſon to be ſquare, of the main breadth —	,0296	,0292	,0312
Stemſon to be ſquare, of the keelſon — —	,7273	,7143	,7
Thickneſſes of the outſide plank.			
Wales in thickneſs, of the main half breadth —	,0256	,025	,025
Black ſtrake in thickneſs, of the wales —	,7895	,7778	,75

Thick-

	SHIP OF		
	22 guns.	20 guns.	Sloop.
Thicknesses of the outside plank continued.			
Sheer strake in thickness, of the wales —	,6316	,6667	,6875
Plank of the topside in thickness, of the sheer strake ——— ——— —	,7912	,7921	,7919
Plank of the bottom in thickness, of the main half breadth ——— ——— —	,0162	,0167	,0158
Thicknesses of the inside plank.			
Limber strake in thickness, of the depth in hold	,0334	,0324	,0365
Stuff at the floorheads, of moulding of the timber at that place ——— —	,5334	,5358	,5186
Ditto at the first futtock heads, of ditto —	,4827	,4815	,4616
Footwaling in thickness, of the bottom —	,8991	,8989	,8987
Deck clamps in thickness, of the length of their respective longest beams — —	,0128	,0127	,0126
Ditto spirkettings, of their respective clamps —	,6669	,6668	,6667
Beams. Lower deck beams moulded, of the main breadth ——— —	,0203	,0195	,0211
Upper deck ditto moulded, of the length of midship beam ——— —	,0326	,0325	,0324
Quarter deck and forecastle beams to be moulded, of the length of their respective longest beams	,0164	,0165	,0166
All the beams to be sided, of what they are moulded ——— ——— —	1,068	1,067	1,066
The beams on the upper and lower deck within 10 feet from aft, and within 9 feet from forward, to be less than the other beams —	,0608	,0607	,0606
Knees. Lower and upper deck knees, both lodging and hanging, to be sided, of the moulding of their respective beams ——— —	,8173	,8172	,8171
Their thwartship arms in length, of the length of their respective beams	,0999	,0989	,0998

Knees.

	SHIP OF 22 guns.	SHIP OF 20 guns.	SHIP OF Sloop.
Knees. Lodging and hanging knees of the quarter deck and forecaſtle to be ſided, of the moulding of their reſpective beams — –	,7312	,7309	,7308
Their thwartſhip arms in length, of the length of ditto — — –	,0973	,0972	,0976
Standard knees on the upper and lower deck to be ſided, of their reſpective beams –	,6309	,6307	,6305
Of the head, cheeks, rails, &c.			
The knee of the head at the forepart to be in diſtance from the ſtem, of the length of the lower deck — — –	,0767	,0779	,0854
Ditto of the load water line, of ditto –	,1747	,1683	,1617
Gripe to be broad, of the main breadth –	,0872	,0871	,0869
The diſtance between the upper and lower cheeks on the ſtem to be, of the length of forepart of knee from the ſtem — –	,2224	,2221	,2212
The lower cheek to be moulded on the ſtem, of the diſtance between them — –	,2689	,2688	,2687
The upper cheek moulded ditto, of the lower cheek — — –	,9889	,9888	,9876
The diſtance between the main rail and the upper cheek on the ſtem to be the ſame as the diſtance between the cheeks.			
The main rail to be moulded on the ſtem, of the upper cheek — –	,9688	,9687	,9686
The lower rail to be ſpaced exactly in the middle between the upper cheek and the main rail, and to be moulded at the ſtem, of the main rail at that place — –	,8151	,8149	,8148
The block or figure, to be from breaſt to back, of the length between the breaſt and ſtem –	,2856	,2855	,2854

Dd   Rother.

	SHIP OF		
	22 guns.	20 guns.	Sloop.
Rother. The rother to be ſquare at the head, of the head of ſtern poſt	1,072	1,039	1,
The lower hance to be above the load water line	6 inch	6 inch	6 inch
To be broad at lower hance, of what it is at the lower part	,6591	,6429	,625
And to be broad at the lower part, of the main breadth	,1183	,1167	,1246

A TABLE, ſhewing the Number of Ports to be on each Deck, their Dimenſions, Height from the Deck, and Diſtance between them, for this ſixth Claſs of Ships.

	PORTS on the																	
	Upper Deck									Quarter Deck								
Ship of	In N°.	Deep.		Fore and aft		Diſtance between		Height from the Deck.		In N°	Deep.		Fore and aft		Diſtance between		Height from the Deck.	
		Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.		Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
22 Guns	20	2	2½	2	2½	7	0	1	5½	2	2	1	2	1	6	6	1	3
20 Guns	18	2	2	2	3	7	2	1	5	2	2	1	2	1	6	6	1	2½
300 Tons	16	2	1½	2	4	7	1	1	5	2	2	1	2	1	6	5	1	2

A TA-

A TABLE, ſhewing the Heights between each Deck, from the upper Side of one Plank, to the under Side of the other.

Ship of	HEIGHTS between the						
	Platforms and Lower Deck.		Lower Deck and Upper Deck	Upper Deck and Quarter Deck		Upper Deck and Forecaſtle	
	Fore Plat-form.	After Plat-form.	Afore, Midſhips and Abaft	Afore	Abaft	Afore	Abaft
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
22 Guns	6 4	6 0	5 6	5 11	6 3	5 10	5 9
20 Guns	6 2	5 9	5 4	5 10	6 3	5 9	5 8
300 Tons		4 6	5 2	5 10	6 3	5 8	5 5

Having in the preceding chapters laid down proportions for conſtructing ſhips of war, of every claſs, I ſhall, in order to make them the more clear and uſeful, proceed to draw ſome remarks therefrom.

In the theory of this art, there being no abſolute or determined rules, either eſtabliſhed by demonſtration or confirmed by uſe, the theoriſt is conſequently left to the exerciſe of his own ideas, and for that reaſon ſhould act with as much caution on the one ſide, as he does with enterprize on the other. I have therefore in the ſaid proportions, acted with circumſpection, and have at the ſame time ventured to make ſuch trials as were favourable in their appearance, and have throughout the whole recommended a principal alteration in the conſtruction, and which is founded on actual experiment, as I have ſufficiently demonſtrated in the former part of this treatiſe, let it ſuffice to ſay, that it conſiſts principally in placing the midſhip bend conſiderably more forward than aft, and carrying the extreme breadth as high as poſſible, (or as other circumſtances will admit) above the load draught of water, or line of flotation, by which two

two principles a body ſo conſtructed will certainly inherit the moſt eſſential qualities required, both with reſpect to ſtiffneſs and velocity.

It ſhould alſo be obſerved in the conſtruction, to uſe no hollow water lines in the fore body, but to be rather inclined to round, by which means, and by uſing hollow water lines abaft, both the fore and after bodies will be nearly of the ſame capacity, or the immerged parts will each diſplace the ſame quantity of water, which is a very material object in point of velocity. The form for ſhips bodies in general that I have thus recommended, alſo greatly contributes to the ſtiffneſs, and the ſhip that is ſtiff from conſtruction is much better adapted for ſailing faſt, than one which is obliged to be loaded with a greater weight, in order to make her able to carry the ſame ſtreſs of ſail, the reſiſtance being as the quantity of water to be removed, or nearly as the area of a tranſverſe ſection of the immerſed part of the body at the midſhip bend.

And alſo a great advantage attending ſhips that are ſtiff from conſtruction is, they are leſs liable to roll, and, conſequently, leſs liable to be ſtrained in bad weather.

C H A P VIII.

Containing ſome neceſſary tables applicable to the foregoing chapters.

IN order for the ſtudent to calculate the dimenſions for a ſhip of any claſs, from the proportions that are laid down, he muſt determine on the length of the gun or lower deck, as from that determination the dimenſions are all caſt. I ſhall therefore lay down the lengths which are required for the ſhips of every rate, and ſhall alſo introduce ſome other tables, which will be found very neceſſary.

TABLES, ſhewing the Length on the Gun or Lower Deck, for Ships of the following Number of Guns, viz.

	GUNS.						
Ship of	100	90	80	74	64	50	44 upon 2 Decks.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Length on the Gun or lower Deck	190 0	184 0	182 0	176 0	164 0	150 0	140 0

Ship of	GUNS. 44 upon 1 Deck.	38	36	32	28	24	22	20	Sloop 300 Tons.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Length on the lower Deck	164 0	141 0	137 0	129 0	120 6	114 6	112 0	108 0	96 8

A TABLE, ſhewing the Thickneſſes of the Deck Plank, for a Ship of every Claſs.

Ship of	GUNS. 100	90	80	74	64	50	44 2 dk.	44 1 dk.	38	36	32	28	24	22	20	Sloop
	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
Plank of the Orlop	2	1h	$1\frac{3}{4}$	1	1	1	1	1	1	1	1					
Fore and after Platforms	3	3	3	3	3	2h	2h	2h	2h	2h	2h	2	2	2	2	2
Gun Deck	4h	4	4	4	4	4	3h	3	3	2h	2h	2h	2h	2	2	2
Middle Deck	3	3														
Upper Deck	3h	$3\frac{1}{4}$	$3\frac{1}{4}$	3	3	3	3	3	3	3	3	3	3	3	3	3
Quarter Deck	3	3	3	3	3	2h	2h	2h	2h	2h	2h	2	2	2	2	2
Forecaſtle	2h	2h	3	3	3	2h	2h	2h	2h	2h	2h	2	2	2	2	2
Roundhouſe	2h	2h	2h	2h	2	2										

A TA-

A TABLE, on which is ſhewn the Round on each Deck, at the broadeſt Place in the Ships, of the before mentioned Claſſes.

	Number of GUNS.															
Ship of	100	90	80	74	64	50	44 on 2 deck	44 on 1 deck	38	36	32	28	24	22	20	ſloop 14
	Inch	Inch	Inch	Inch	In	In	Inch	Inch	In	In	In	In	In	In	In	Inch
Orlop Deck	2	2	2h	2h	2	2	2	2	2	1h	1h					
Gun Deck	6	5h	5h	5h	5	4h	4	4	3	2h	2h	2	2	2	2	2
Middle Deck	7h	7														
Upper Deck	9	8h	8h	8	7h	7	7	6h	8h	7h	7h	7h	7	7	6h	6
Quarter Deck	9	8h	9	9	8	7h	7	7	6h	6h	6h	6h	6	6	6	6
Forecaſtle	8	7h	8	8	7	6h	6	6	5h	5h	5h	5h	5h	5h	5	5
Roundhouſe	12	11	11	10	9	9										

In the two foregoing tables, where the letter h occurs, read $\frac{1}{2}$; as $4\frac{1}{2}$ inch, &c.

A TABLE, wherein is given an Account of the Weight of Metal appropriated for each, of the ſeveral Rates of Ships in the Navy.

	Number of GUNS.															
Ship of	100	90	80	74	64	50	44 on 2 deck	44 on 1 deck	38	36	32	28	24	22	20	ſloop 300 tons.
	Pdrs	Pdrs	Pdrs	Pdrs	Pdrs	Pdrs	Pdrs	Pdrs	Pdrs	Pdrs	Pdrs	Pdrs	Pdrs	Pdrs	Pdrs	Pdrs
Gun Deck	42	32	36	32	24	24	18									
Middle Deck	24	18														
Upper Deck	12	12	24	18	18	12	9	24	18	18	12	9	9	9	9	6
Quarter Deck	6		12	9	9	6		9	9	9	6	3	2	2		
Forecaſtle	6	9	12	9	9	6	6	6		6						

A TA-

A TABLE, ſhewing the Number of Carronades, appropriated for each of the following Ships, viz.

Number of Guns.	Quarter Deck. Numb.	Quarter Deck. Weight.	Forecaſtle. Numb.	Forecaſtle. Weight.	Roundhouſe. Numb.	Roundhouſe. Weight.	Total to each Ship.
		Pdrs.		Pdrs.		Pdrs.	
Ship of 100			2	12	8	12	10
90			4	12	6	12	10
80			4	18	8	12	12
74			2	12	6	12	8
64			2	12	6	12	8
50	2	24	2	12	6	12	10
Two Deck 44	8	18	2	12			10
One Deck 44	4	24	4	18			8
38	6	18	4	18			10
36	4	18	4	18			8
32	6	18	2	18			8
28	4	18	2	18			6
24	6	12	4	12			10
22	6	12	2	12			8
20	6	12	2	12			8
Sloop of 300 Tons.	6	12	2	12			8

Having

Having now given the proportions for ſhips of war of every claſs, from the firſt rate down to the ſloop, and ſufficiently treated on the qualities required in them, and likewiſe the good properties they are likely to poſſeſs, I ſhall next proceed to lay down the proportions whereby we may conſtruct the different claſſes of merchant ſhips, or ſhips principally deſigned for ſtowage, and to carry large burthens, and ſhall then conclude the ſecond book.

C H A P IX.

In which are laid down proportions for merchant ſhips from 800, *down to* 500 *tons, with general obſervations and remarks upon thoſe kind of veſſels.*

THE chief object that is aimed at in ſhips for the merchant ſervice, is to conſtruct them in that form, which ſhall enable them to carry the greateſt burthen; with this conſideration, namely, that they ſhall bear or carry their merchandize ſafely from one port to another, without damnifying the goods ſo tranſported. However, in the merchants ſervice I could never obſerve that they had any general cuſtom in lading their ſhips, but juſt according to the advantage of the owner or merchant, without conſulting the true capacity of the veſſel to be loaded; the lading of their ſhips is therefore very different, as ſhips from ſome places are loaded a great deal deeper than they are from others; for inſtance, ſee the colliers, how extravagantly they are laden.

The laws of hydroſtatics will reaſonably inform us, how far to lade thoſe ſhips with reſpect to ſafety for ſailing, for from them we find that the weight of any floating body is equal to as much water, as the immersed part takes up the room of; so that a whole ship and every thing that presses upon her, is just the same in weight, as the water which is displaced by the immersed part, or that part of the ship which lies beneath the surface of the water. Therefore till the ship, or what rests or presses upon her, be an over-ballance for the water that supports her, she will swim and be something above its surface, but when she becomes heavier than the water, she will then necessarily sink. It is therefore not improper to observe, that many ships are laden with many sorts of goods, and very different in weight and bulk. As several ships are laden with cork, wool, tobacco, fir timber, and of several other kinds, which being put into the water, will swim very buoyant. And if a ship is loaded with lead or iron, or any other body which is as much heavier than water as the former are lighter, yet the ship is but still loaden, but then the light bodies will take up much more room than those that are heavier, and consequently will require much more art to load them than the other.

From whence it is very plain, that any ship when she is laden, sinks neither more nor less, than in proportion to the difference the bodies she is laden with are in weight to the water that bears those bodies.

For instance, if a ship be loaded with iron, which to water is near as seven to one, or with lead, which to water is as eleven to one, she will sink with the said lading in proportion as the weight of those bodies are to the water that bears them; so that the room such bodies take up in the hold will be but a seventh or an eleventh part of what the ship's body takes up in the water.

Again, if a ship was to be laden with cork or wool, (or any such light bodies) cork being to water as four to seventeen in weight, her hold would be full before she could be reasonably sunk and fit for sailing; for no more of such bodies press the ship, than that part which, was the whole put into the water, would be beneath the surface.

But

But in the loading of a ſhip with thoſe light bodies, there is a great deal more ſtrain than the weight itſelf that preſſes upon her, therefore in many caſes a ſhip had better be laden with heavy bodies, than others that are ſo light, and require ſo much preſſure to be uſed in the ſtowing of them, which conſequently will make a very great ſtrain. It muſt alſo be remarked, that a ſhip laden with fir, cork, or any ſuch light bodies, will ſcarcely ſink; whereas in loading a ſhip with lead, iron, or coals, the general cuſtom is ſo unreaſonable, that by the leaſt miſcarriage at ſea, the ſhip will be very eaſily ſunk or foundered.

It appears from what has been ſaid, that theſe kind of ſhips require a very great proportion of ſtrength, to adapt them to the various kinds of merchandizes they are allowed to carry, and alſo their bodies are required to be of the greateſt capacity, in order for the better accommodating of the ſtowage.

Their timber will neceſſarily require to be of larger ſcantlings than ſhips of war of the ſame dimenſions, and the ſhip in all reſpects put together with the greateſt care, in regard to the main point, which is that of ſtrength.

The draught of water whereby they might always be laden to with the greateſt ſafety, ſhould always be known, which I ſhall endeavour to point out in the proportions, to the greateſt nicety.

In conſtructing the bodies of ſuch ſhips, it ſhould alſo be obſerved that the beſt form that can be given them, to anſwer the purpoſes for which they are deſigned, will be to let them have a long floor, and little riſing, the lower futtocks very full, and upper futtocks near a ſtraight. To have good depth in the hold, wing tranſom to be carried pretty high, the faſhion pieces formed lean below the load water line, and very full above, and to have a raking bow. Alſo to give a good length, and not too much breadth, the midſhip frame to be carried pretty forward, and to have no hollow water lines in the

fore

fore body, the upper works ſhould be kept as low, and as ſnug as poſſible, and no roundhouſe ſhould be admitted in the ſmaller ſhips, or where it could be poſſibly done without.

All of which, particularly adhered to, will contribute to make a good merchantman; as ſhe would take the ground well, carry a good ſail, quickly anſwer her helm, and would likewiſe be fitly qualified to carry a large cargo.

PROPORTIONS

For the Firſt and Second Claſſes, viz. Firſt Claſs includes from 800 Tons and upwards, down to 700 Tons. Second Claſs, from 650, down to 500 Tons.

		Firſt Claſs.	Second Claſs.
Breadths.	Main breadth to the length between the perpendiculars*, forward and aft at the height of the wing tranſom, as 16 is to — —	60,99	60,88
	Breadth at the after part of wing tranſom, of the main breadth — — —	,7229	,7223
	Ditto at the toptimber line in midſhips, of ditto —	,8876	,8888
	Ditto at ditto on ſtern timber, of what it is in midſhips	,6857	,6875
Lengths.	Length from the foremoſt perpendicular to the middle of dead flat, of the length between the perpendiculars — — — —	,3999	,3988
	Room and ſpace, of the length between perpendiculars	,0158	,0159
Depths.	Depth in the hold, of the main breadth — —	,4027	,4028
	Depth in the waiſt, of the depth in hold —	,1035	,1034
Heights.	Height of the toptimber line in midſhips, of main breadth — — —	,8379	,8376
	Ditto, at after perpendicular, of ditto — —	,9181	,9146
	Ditto, at foremoſt ditto, of ditto — —	,8171	,8169

* The length between the perpendiculars in merchant ſhips, is from the fore ſide of the ſtem to the aft ſide of the ſtern poſt, at the height of wing tranſom, both forward and aft.

Heights.

	First Class.	Second Class.
Heights. Extreme height of the breadth in midſhips, of top-timber line ——— ——— —	,6468	,6464
Height of the wing tranſom, of the main breadth —	,15	,1498
Ditto of lower deck at after perpendicular, of what it is in midſhips ——— ——— —	1,268	1,267
Ditto at foremoſt ditto, of ditto ——— —	1,206	1,204
Height of the cutting down in midſhips, of the depth in hold ——— ——— —	,0805	,0801
Draught of water.		
Load draught of water in midſhips, of the height of toptimber line ——— ——— —	,6814	,6811
Deeper abaft than afore, of what it is in midſhips —	,0669	,0666
Centers of the maſts places.		
The center of the main maſt from the foremoſt perpendicular, of the length between the perpendiculars	,5781	,5778
To rake aft in every yard in length ——— —	$\frac{1}{4}$ inch	$\frac{1}{4}$ inch
Center of the foremaſt from the center of the main maſt, of the diſtance between main maſt and foremoſt perpendicular — — —	,8101	,8110
To rake aft in every yard in length ——— —	$\frac{1}{8}$ inch	$\frac{1}{8}$ inch
Center of the mizen maſt from the center of main maſt, of the diſtance between main maſt and after perpendicular ——— ——— —	,6741	,6739
To rake aft in every yard in length — —	$\frac{3}{4}$ inch	$\frac{3}{4}$ inch
The bowſprit to ſteeve up in every yard — —	1ft. 4in.	1ft. 3in.
Scantlings of timbers, &c.		
Floor timbers ſided in midſhips, of the room and ſpace	,4737	,4734
Ditto ſided afore and abaft, of thoſe in midſhips —	,8889	,8876
Ditto moulded at the heads, of the ſiding in midſhips	,8889	,8877
Lower futtocks ſided in midſhips, of the room and ſpace ——— ——— —	,4912	,4910

Scantlings

	First Clafs.	Second Clafs.
Scantlings of timbers, &c. continued.		
Lower futtocks fided afore and abaft, of thofe in midfhips — — —	,8541	,8531
Ditto moulded at the heads, of the fiding in midfhips	,7858	,7853
Second futtocks fided in midfhips, of the room and fpace — — -	,4561	,4559
Ditto fided afore and abaft, of thofe in midfhips —	,8784	,8781
Ditto moulded at the heads, of the fiding in midfhips	,7692	,7690
Third futtocks fided in midfhips, of the room and fpace	,4211	,4209
Ditto fided afore and abaft, of thofe in midfhips —	,8699	,8698
Ditto moulded at the heads, of the fiding in midfhips	,7083	,7081
Fourth futtocks fided in midfhips, of the room and fpace	,4118	,4116
Ditto fided afore and abaft, of thofe in midfhips —	,8617	,8615
Fourth futtocks moulded at the heads, of the fiding in midfhips — — —	,6522	,6519
Toptimbers fided in midfhips, of the room and fpace	,4118	,4116
Ditto fided afore and abaft, of thofe in midfhips —	,8614	,8612
Ditto moulded at toptimber line, of the fiding in midfhips — — —	,7334	,7321
Main keel fquare in midfhips, of the main breadth —	,0371	,0369
Ditto fided afore, of what it is in midfhips —	,7929	,7921
Ditto fided abaft, of ditto — —	,5884	,5881
Falfe keel thick, of the main keel — —	,4102	,4091
Stern poft fquare at the head, of the length of wing tranfom — — —	,0609	,0607
Wing tranfom fided, of its length — —	,0383	,0381
Other tranfoms below the wing fided, of the wing tranfom — — —	,8641	,8639
Except the deck tranfom which is to be fided, of the deck beams moulded — —	,8334	,8332

Scantlings

	First Clafs.	Second Clafs.
Scantlings of timbers, &c. continued.		
Stem to be fided at the head, of the main breadth	,0463	,0461
Ditto moulded, of what it is fided at the head	,6	,5999
Stemfon to be fquare, of the fiding of the ftem	,6111	,6109
Keelfon to be fquare, of the main breadth	,0371	,0369
Thickneffes of the outfide plank.		
Main wales in thicknefs, of the main half breadth	,0371	,0369
Black ftrake ditto, of the main wales	,7678	,7677
Channel wales ditto, of the main wales	,625	,6249
Plank between channel wales and black ftrake, of black ftrake	,4312	,4309
Sheer ftrake, of the half breadth of toptimber line in midfhips	,0208	,0206
Plank between ditto and channel wales, of fheer ftrake	,625	,6248
Ditto above fheer ftrake, of the fheer ftrake	,5	,4998
Plank at the floor-heads in the bearing of the body, to be three ftrakes; and in thicknefs, of the moulding of timber at floor head	,4167	,4165
Two ftrakes under main wales, of the main wales	,75	,6998
The reft of the plank of the bottom, of the main half breadth	,0185	,0184
Thickneffes of the infide plank.		
Limber ftrake in thicknefs, of the depth in hold	,0374	,0371
Stuff at the floor-heads, of the moulding of timbers at floor-head	,5	,4999
Ditto at the firft futtock heads, of ditto firft futtock heads	,4546	,4544
Lower deck clamps in thicknefs, of the length of midfhip beam	,0129	,0127

Thick-

	First Clafs.	Second Clafs.
Thickneffes of the infide plank continued.		
Footwaling in thicknefs, of the plank of the bottom —	,9998	,9996
Lower deck fpirketting, of the lower deck clamps —	,6815	,6812
Middle deck clamps, of the length of midfhip beam —	,0126	,0121
Ditto fpirketting, of the thicknefs of the clamps —	,6812	,6811
Upper deck clamps, of the length of midfhip beam —	,0121	,0119
Ditto fpirketting in thicknefs, of the clamps —	,5996	,5991
Round-houfe clamps, of the length of the foremoft beam — — — —	,0151	,0151
Beams. The lower deck beams to be moulded, of the length of midfhip beam — — —	,0288	,0286
Middle deck ditto ditto, of ditto — —	,0287	,0285
Upper deck ditto ditto, of ditto — —	,0234	,0231
Round-houfe ditto ditto, of the length of foremoft beam — — —	,0198	,0197
All the beams to be fided, of what they are the moulding way — — —	1,062	1,061
Knees. All the knees of lower deck, upper deck, middle deck and round-houfe, both lodging and hanging, to be fided, of the moulding of their refpective beams —	,6958	,6956
Their thwartfhip arms in length, of length of refpective beams — — —	,0982	,0981
Standard knees to be fided, of the fiding of their refpective beams — — —	,6198	,6196
Breaft hooks. The breaft hooks below the lower deck hook to be fided, of main breadth — —	,0301	,0301
The deck hooks to be fided, of their refpective deck beams moulded — — —	,8667	,8662
The hook above the upper deck to be fided, of the moulding of upper deck beam — — —	,8449	,8445

Steps

	First Clafs.	Second Clafs.
Steps of the mafts.		
Main ftep to be fided, of the main breadth —	,0694	,0692
And to be deep on the keelfon, of the depth in hold —	,0863	,0862
Fore ftep to be fided, of the main ftep — —	,9	,8998
Mizen ftep to be fided, of the fore ftep — —	,7407	,7405
Of the head, cheeks, rails, &c.		
The length of the head, or diftance from ftem to breaft of figure, to be of the length between the perpendiculars forward and aft — —	,0868	,0864
Breadth of the knee at load water line, of the length of the head — — -	,2381	,2379
Gripe to be in breadth, of the main breadth —	,1076	,1074
The diftance between the cheeks, of the length of head — — —	,2062	,2061
The diftance between upper cheek and main rail, to be the fame as the diftance between the cheeks.		
The lower cheek to be moulded on the ftem, of the diftance between — — —	,2689	,2688
The upper ditto ditto, of the lower cheek —	,9896	,9894
The block or figure to be from breaft to back, of the length of head — — —	,2699	,2697
Crutches. The crutches abaft the mizen ftem to be in number	2	2
And fided, of the after floor timber — —	,8334	,8333
Rother. The rother to be in diameter at the head, of the ftern poft — — — —	1,054	1,052
The lower hance to be above the load water line —	10 inch	9 inch
To be broad, or fore and aft at the lower hance, of what it is at the lower part — —	,7	,6998
Ditto at the lower part, of the main breadth —	,1526	,1524

 The

The tables for the dimenſions of ports, heights between the decks, &c. muſt here be omitted, as there can be no general rule laid down for them, thoſe things being governed by the various purpoſes for which ſhips of this denomination are deſigned.

CHAP. X.

Containing the proportions for merchant ſhips of the third and fourth claſſes, viz. third claſs from 450 tons to 300 tons; and fourth claſs from 250 tons to 100 tons; with obſervations and remarks upon the planking of ſhips in general.

PROPORTIONS.	Third Claſs.	Fourth Claſs.
Breadths. Main breadth to the length between the perpendiculars, as 15 is to — –	52,36	52,5
Breadth at the after part of wing tranſom, of the main breadth — — –	,7818	,7816
Ditto at the toptimber line in midſhips, of ditto –	,8919	,8917
Ditto at ſtern timber, of what it is in midſhips –	,6989	,6982
Lengths. Length from the foremoſt perpendicular to the middle of dead flat, of the length between the perpendiculars — — –	,3989	,3988
Room and ſpace, of the length between perpendiculars	,0217	,0215
Heights. Height of the toptimber line in midſhips, of main breadth — — –	,8	,7998
Ditto at after perpendicular, of what it is in midſhips	1,182	1,181
Ditto at foremoſt ditto, of ditto — –	1,084	1,082

Heights.

	Third Claſs.	Fourth Claſs.
Heights. Extreme height of the breadth in midſhips, of top-timber line — — —	,7727	,7725
Height of the wing tranſom, of the main breadth —	,6546	,6545
Height of the cutting down in midſhips, of the depth in hold — — —	,0903	,0902
Depths. Depth in the hold, of the main breadth —	,4364	,4363
Draught of water.		
Load draught of water in midſhips, of the height of toptimber line — — —	,6818	,6816
Deeper abaſt than afore, of the draught of water in midſhips — — —	,0668	,0664
Centers of the maſts places.		
Center of the main maſt on the lower deck from the foremoſt perpendicular, of the length between the perpendiculars — — —	,5698	,5697
To rake aft in every yard in length — —	$\frac{1}{4}$ inch	$\frac{1}{8}$ inch
Center of the fore maſt from the foremoſt perpendicular, of the diſtance from thence to the center of main maſt — — —	,1961	,1959
To rake aft in every yard in length — —	$\frac{1}{8}$ inch	$\frac{1}{8}$ inch
Center of the mizen maſt from the after perpendicular, of the diſtance from thence to the center of main maſt — — —	,3178	,3176
To rake aft in every yard in length — —	$\frac{7}{8}$ inch	$\frac{7}{8}$ inch
The bowſprit to ſteeve up in every yard — —	1ft. 2in.	1ft. 1in.
Scantlings of timbers, &c.		
Floor timbers ſided in midſhips, of the room and ſpace	,52	,5199
Ditto ſided afore and abaft, of thoſe in midſhips —	,8465	,8462
Ditto moulded at the heads, of the ſiding in midſhips	,7692	,7691
Lower futtocks ſided in midſhips, of the room and ſpace — — — —	,48	,4799

Scantlings of timbers, &c. continued.	Third Clafs.	Fourth Clafs.
Lower futtocks fided afore and abaft, of thofe in midfhips	,8461	,8459
Ditto moulded at the heads, of the fiding in midfhips	,75	,7499
Second futtocks fided in midfhips, of room and fpace	,44	,4399
Ditto fided afore and abaft, of thofe in midfhips —	,8521	,852
Ditto moulded at the heads, of the fiding in midfhips	,7272	,7271
Third futtocks fided in midfhips, of the room and fpace	,4	,41
Ditto fided afore and abaft, of thofe in midfhips —	,8786	,8785
Ditto moulded at the heads, of the fiding in midfhips —	,7	,71
Fourth futtocks fided in midfhips, of room and fpace	,4	,412
Ditto fided afore and abaft, of thofe in midfhips —	,8861	,8859
Ditto moulded at the heads, of the fiding in midfhips	,5	,4999
Toptimbers fided in midfhips, of the room and fpace	,4123	,4122
Ditto fided afore and abaft, of thofe in midfhips —	,8785	,8784
Ditto moulded at toptimber line, of fiding in midfhips	,5	,5
Main keel fquare in midfhips, of the main breadth —	,0394	,0392
Ditto fided afore, of what it is in midfhips —	,8818	,8816
Ditto fided abaft, of ditto ——— —	,6678	,6676
Falfe keel in thicknefs, of the main keel — —	,2309	,2308
Stern poft fquare at the head, of the length of wing tranfom ——— ——— —	,0549	,0547
Wing tranfom fided, of its length —— —	,0513	,0512
Deck tranfom fided, of the moulding of deck beam —	,8769	,8766
The other tranfoms fided, of the wing tranfom —	,7213	,7211
Stem to be fided at the head, of the main breadth —	,0424	,0422
Ditto moulded, of what it is fided at the head —	,7143	,7141
Stemfon to be fquare, of the fiding of the ftem —	,7857	,7854
Keelfon to be fquare, of the main breadth — —	,0394	,0392

Breaft-

	Third Clafs.	Fourth Clafs.
Breafthooks. The breafthook below the lower deck fided, of the main breadth — — –	,0301	,0299
The deck hooks fided, of the moulding of their refpective beams — — –	,8661.	,8659
The hook above the upper deck fided, of the moulding of upper deck beams — –	,8444	,8443
Thickneffes of the outfide plank.		
Main wales in thicknefs, of the main half breadth –	,0304	,0303
Black ftrake ditto, of the main wales — –	,7898	,7896
Sheer ftrake in thicknefs, of the top half breadth in midfhips — — –	,0272	,0272
Plank between ditto and black ftrake, of the black ftrake — — –	,5918	,5916
Plank above ditto in thicknefs, of the fheer ftrake –	,5812	,5811
Plank at the floorheads in the bearing of the body to be three ftrakes, and in thicknefs, of the moulding of timber at floorhead — –	,4	,4
Two ftrakes under wales in thicknefs, of the wales –	,7918	,7916
The reft of the plank of the bottom, of the main half breadth — — –	,0182	,0182
Thickneffes of the infide plank.		
Limber ftrake in thicknefs, of the depth in hold –	,0372	,0371
Stuff at the floorheads, of the moulding of timbers at floorheads — — –	,4998	,4996
Ditto at firft futtock heads, of the moulding of timbers at that place — –	,4543	,4542
Lower deck clamps in thicknefs, of the length of midfhip beam — — –	,0127	,0126
Footwaling in thicknefs, of the plank of the bottom –	,9995	,9994
Lower deck fpirketting, of the lower deck clamps –	,6814	,6811
Middle deck clamps, of the length of midfhip beam –	,0125	,0123

	Third Clafs.	Fourth Clafs.
Thicknefles of the infide plank continued.		
Middle fpirketting, of the clamps — —	,6811	,6810
Upper deck clamps, of the length of midfhip beam —	,0119	,0118
Ditto fpirketting, of the clamps ——— —	,5995	,5994
Round-houfe clamps, of the length of foremoft beam —	,0152	,0153
Beams. Lower deck beams moulded, of length of midfhip beam	,0285	,0286
Middle deck ditto, ditto ——— —	,0284	,0283
Upper deck ditto, ditto ——— —	,0231	,0232
Round-houfe ditto, of the length of its longeft beam —	,0196	,0195
All the beams to be fided, of what they are moulded —	1,059	1,058
Knees. All the knees of lower deck, middle deck, upper deck, and round-houfe, both lodging and hanging, to be fided, of the moulding of their refpective beams —	,6955	,6954
Their thwartfhip arms in length, of length of their refpective beams —— ——— —	,0981	,0979
Standard knees to be fided, of fiding of refpective beams	,6195	,6194
Steps for the mafts.		
The main ftep to be fided, of the main breadth —	,0691	,0689
And to be deep on the keelfon, of what it is fided —	,5	,5
Fore ftep to be fided, of the main ftep — —	,8998	,8997
Mizen ftep to be fided, of the fore ftep — —	,7406	,7404
Of the head, cheeks, rails, &c.		
The length of the head, or diftance from ftem to breaft of figure, to be of the length between the perpendiculars forward and aft ——— —	,0862	,0861
Breadth of the knee at the load water line, of the length of the head ——— — —	,2378	,2376
Gripe to be broad, of the main breadth — —	,1074	,1075
Diftance between the cheeks, of the length of the head	,2062	,2061
Diftance between the upper cheek and main rail at the ftem, to be the fame as the diftance between the cheeks at that place.		

Of

	Third Claſs.	Fourth Claſs.
Of the head, cheeks, rails, &c.		
The lower cheeks to be moulded on the ſtem, of the diſtance between them ——— —	,2687	,2688
The upper ditto ditto, of the lower cheek —	,9897	,9896
The block or figure to be from breaſt to back, of the length of the head —— —— —	,2698	,2697
Crutches. To have crutches abaft the mizen ſtep in number —	2	1
And to be ſided, of the ſiding of after floors —	,8432	,8436
Rother. The Rother to be in diameter at the head, of the head of ſtern poſt —— —— —	1,053	1,052
The lower hance to be above the load water line —	9 inch	8 inch
To be fore and aft, or broad at the lower hance, of what it is at the lower part ——— —	,7421	,742
And to be broad at the lower part, of the main breadth	,1523	,1528

Having in the foregoing proportions, been very particular in regard to the plank, both within and without board, I think it will be likewiſe very neceſſary to lay down a few obſervations and remarks upon the planking of ſhips in general.

Planking in a ſhip is a branch ſo very material, that unleſs it be carefully done, it will undeniably ſpoil the other good qualities. For planking to a ſhip is like the ſkin, ſinews, and ligaments to an animal; it ought therefore to be well performed, as in the joining or proper ſhifting, faſtening and caulking; and the goodneſs of every part of the materials for that purpoſe ſhould be carefully inſpected.

The length of the plank that is to be worked is principally to be obſerved, for if it cannot be worked up to the wales with the ſame lengths that were begun with, it will make very bad work, and not ſo ſtrong upwards as it is below. It is allowed, and hath generally been found to anſwer, that if three whole planks be wrought between two butts, and all the butts to over-launch, or be in diſtance from each other ſix feet, that it is ſufficiently ſtrong, and this rule is generally

generally obſerved in ſhips of every claſs and denomination. It muſt alſo be obſerved in ſhifting the butts, to keep them clear of the ſcarphs of the keel, and alſo that a butt's end is not put in the wake of the pumps, as both of them are of dangerous conſequences to the ſtrength of the ſhip.

In planking the foremoſt end of a bottom, the breadth ſhould be conſidered, and alſo the faſhion of the plank. And to bring every ſtrake of plank to the ſtem, the ſhape of the ſhip's body muſt be particularly obſerved, as the plank ſhould be always kept as much as poſſible from ſnying or cambering. But in full bodied ſhips, ſuch as have long floors and round bows, it would be impoſſible to bring every ſtrake to the ſtem. It is therefore cuſtomary to work in the bow of the ſhip every five or ſix ſtrakes a ſtealer, that is, letting a ſtrake fall ſhort of the ſtem, by ten or more feet, ſo that the ſtrake which is above, and that below it, their edges may come together, and at the ſtem the three ſtrakes will be worked in two, by which means all the ſtrakes that come to the ſtem, will be of ſufficient breadth. The after part of the bottom ſhould alſo be obſerved, where the ſhip's body forms a hanging conoid, and the tangent line perfectly ſtraight, by which means ſome ſhips have hollows ſo long and deep, that the after ends of the after planks cannot be worked too broad, to bring their edges ſtraight, that they may lie on a direct plane and out of winding.

The calculations of the different proportions being of the utmoſt conſequence, the Author thinks it neceſſary to give an Errata immediately following; but ſuch typographical errors as have or may happen in the courſe of the work, will be given at the concluſion.

ERRATA to the PROPORTIONS.

Page 56, ſixth line of figures, ſecond column, for 6 *read* ,6

	100 guns	90 guns
Page 59, line 7, main maſt to rake aft in every yard in length	$\frac{1}{3}$ inch	$\frac{3}{8}$ inch
line 10, fore maſt ditto — — — —	$\frac{1}{8}$ inch	$\frac{1}{4}$ inch
line 13, mizen maſt ditto — — — —	$\frac{7}{8}$ inch	$\frac{3}{4}$ inch
line 15, the bowſprit ſhould ſteeve up, &c. — —	1ft. 5in.	1ft. 4in.

ninth line of figures, firſt column, for 1, *read* ,1

	64 guns	50 guns	44 guns
Page 74, ſixth line of figures, for	,2743	,28	,2 14
read	47,83	46,43	47,90
Page 78, ſeventh line of figures, for	$\frac{1}{2}$ inch	$\frac{1}{2}$ inch	$\frac{1}{2}$ inch
read	,5	,5	,5

Page 89, third line of figures, firſt column, for ,9135 *read* ,0135

Page 98, ninth line of figures, firſt column, for ,6292 *read* ,2292

A TREA-

A TREATISE ON MARINE ARCHITECTURE.

BOOK III.

THE ſtudent being now perfectly well acquainted with the nature of ſhips' bodies, and likewiſe the proportions whereby any ſhip in the navy, or merchant's ſervice, may be conſtructed, I ſhall proceed in this book to lay down the dimenſions for a ſhip of eighty guns upon two decks, calculated from the ſaid proportions; and in order that the ſtudent may be properly qualified in the drawing part, or forming of a draught, I ſhall alſo lay down in what manner he is to proceed to conſtruct a draught from the ſaid dimenſions, and ſhall, as occaſion offers, make ſuch remarks as I think neceſſary.

C H A P. I.

In which are laid down the principal dimenſions for a third rate ſhip of war, to carry eighty guns upon two decks.

	Ft.	Inch.
LENGTHS. Length on the gun, or lower deck, from the aft part of the rabbet of the ſtem, to the fore part of the rabbet of the poſt	182	0
Length from the foremoſt perpendicular to dead flat	63	$11\frac{3}{4}$
Ditto ditto, to timber W	4	0
Ditto after perpendicular to timber 39	3	4
Room and ſpace of the timbers	2	$8\frac{3}{4}$
Length of the quarter deck from the aft part of ſtern	95	0
Ditto forecaſtle from the fore part of beak head	49	0
Ditto round-houſe deck from the aft part of ſtern	51	8
Heights. Height of the gun or lower deck, from the upper edge of the keel to the under ſide of the plank at dead flat	24	0
at foremoſt perpendicular	26	3
at after perpendicular	26	3
Height from the upper ſide of the gun deck plank to the under ſide of the upper deck plank, all fore and aft	7	0
Height from the upper ſide of the upper deck plank to the under ſide of the quarter deck plank — afore	6	10
abaft	6	11
Ditto to the under ſide of forecaſtle plank, afore and abaft	6	6
Height from the upper ſide of the quarter deck plank to the under ſide of the round-houſe plank — afore	6	9
abaft	6	10

Heighs.

		Ft.	Inch.
Heights.	Height of the lower edge of the main wales at foremoſt perpendicular — — — — —	24	6
	at dead flat — —	20	0
	at after perpendicular —	26	6
	Height of the lower edge of the channel wales at foremoſt perpendicular — — — — —	32	6
	at dead flat — —	29	0
	at after perpendicular —	34	0
	Height of the upper ſide of the wing tranſom — —	28	4
	Height of the touch of the lower counter at the middle line —	33	5
	Height of the touch of the upper counter at the middle line —	36	2
	Height of the toptimber line at the after part of the ſtern timber — — — —	44	7
Breadths and	main wales in breadth from lower to upper edge —	4	6
	Channel wales in breadth from lower to upper edge —	3	0
	Waiſt rail in breadth — — —	0	7
	Diſtance between the upper edge of the channel wales and the under edge of the waiſt rail — —	2	9
	Sheer rail in breadth — — — —	0	6
	Diſtance between the ſheer rail and the rail above, from timber 13 to the ſtern — — — —	2	5
	Ditto from timber 7 to timber 11 — — —	1	4
	Ditto from timber C, to the forepart of beakhead —	1	2
	And the ſaid rail to be in breadth — —	0	6
	Plank ſheer to be in thickneſs — — —	0	$2\frac{1}{2}$
Centers of the maſts.			
	From the foremoſt perpendicular to the center of the main maſt on gun deck — — —	103	2
	From the foremoſt perpendicular to the center of the fore maſt on gun deck — — —	20	5

Centers

		Ft.	Inch.
Centers of the maſts continued.			
From the after perpendicular to the center of the mizen maſt, on gun deck	—	28	6
Stem. The center of the ſweep of the ſtem abaft timber N	—	0	4
Height of ditto, from the upper edge of the keel	—	26	1
Stem moulded	—	1	3
Foremoſt part of the head afore the perpendicular	—	2	4
Height of ditto, from the upper edge of the keel	—	38	3
Stern poſt. Aft part of the rabbet afore the perpendicular on the upper edge of the keel	—	3	4
Aft part of the poſt abaft the rabbet at the upper edge of the keel	—	2	6
Ditto ditto, at the wing tranſom	—	1	1
Stern poſt fore and aft on the keel	—	3	1
Ditto ſquare at the head	—	2	$0\frac{1}{2}$
Counters. The touch of the lower counter at the middle line abaft the aft part of wing tranſom	—	7	6
Round aft of the lower counter	—	1	4
Round up of the lower counter	—	0	9
The touch of the upper counter at the middle line abaft the aft part of wing tranſom	—	9	9
Round aft of the upper counter	—	1	$3\frac{1}{2}$
Round up of the lower counter	—	0	10
Aft part of the ſtern timber at the middle line, at the height of the toptimber line, abaft the aft part of the wing tranſom	—	12	6
Round aft of the wing tranſom	—	0	6
Round up of ditto	—	0	$5\frac{1}{2}$
Draught of water. Load draught of water from the upper edge of the keel	afore	20	5
	abaft	20	5

Channels.

	Ft.	Inch.
Channels. Foremost end of the fore channel afore timber R —	1	0
The channel to be in length ——— ——— —	37	0
And in thickness at the outer edge ——— —	0	4½
The dead eyes to be 12 in number, and in diameter —	1	6
Foremost end of the main channel afore timber 9 —	0	10
The channel to be in length ——— ——— —	38	0
And in thickness at the water edge ——— —	0	4½
The dead eyes to be 14 in number, and in diameter —	1	6
Foremost end of the mizen channel abaft timber 27 —	2	4
The channel to be in length ——— ——— —	20	0
And in thickness at the outer edge ——— —	0	4
The dead eyes to be 7 in number, and in diameter —	1	0

TABLES of dimensions for constructing the bodies.

Fore body.	Timbers Names.															
	⊕		C		G		L		P		T		W		Y	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Lower Height of the breadth	22	6	22	6	22	7h	23	0h	23	11	25	7	26	10	28	8
Upper ditto ditto	24	10	24	10	24	10	24	10h	25	3h	26	4h	27	4h	29	0
Height of the toptimber line	37	5	37	7	38	0	38	5	39	1	39	10	40	4	40	9
Height of the rising line *	0	0	0	5h	3	10	9	10	18	6						
Height of the cutting down	2	3h	2	3h	2	3h	2	8	3	10	6	4				
Main half breadth	24	5h	24	5h	24	4h	24	0h	23	2h	20	2	17	1	11	0h
Toptimber half breadth	20	11	20	10	20	9	20	6	20	0	18	9h	17	10	16	6
Half breadth of the rising	8	7	8	4	6	5h	2	9	5	7 outside						
Length of the lower breadth sweeps	19	2	18	9	18	3	17	3	15	11	14	1	12	7h	12	0h
First diagonal line	7	9	7	8¾	7	7	7	1	6	3	3	8				
Second ditto	13	9	13	8h	13	4h	12	1	10	3	7	1h	4	6		
Third ditto	20	0	19	11	19	2	17	7	15	1	11	1	8	3¼	3	4h
Fourth ditto	23	4h	23	4h	23	0	21	8h	18	11	14	8h	11	5	6	0
Fifth ditto	24	8	24	8	24	4h	23	5h	21	2h	17	1[illegible]	13	8h	7	11
Sixth ditto																
Seventh ditto	24	1h	24	1h	24	0	23	9	22	10	20	10h	18	6h	14	7

* Rising height 11 feet 10 inches at dead flat, from which all the other rising heights must be set off.

After body.	Timbers Names.																				
	1		5		9		13		17		21		25		29		33		35		37	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In.	Ft.	In.
Lower height of the breadth	22	6	22	6	22	6	22	7h	22	9	23	0h	23	7h	24	6	25	10¾	26	9¾	28	3
Upper ditto	24	10	24	10	24	10	24	11	21	1	25	4	27	8	26	3	27	1h	27	9h	28	8
Height of the toptimber line	37	5	37	5	37	6	37	10	38	3h	38	11	39	8	40	6	41	5	42	0	42	6
Height of the cutting down	2	3h	2	3h	2	3h	2	3h	2	4	2	7h	3	5	5	2h	8	7				
Height of the rifing	0	2h	0	8h	1	9h	3	6h	6	0	10	1	17	0								
Main half breadth	24	5¼	24	4¾	24	4¼	24	3¾	24	1	2[illegible]	8h	23	0h	21	10						
Half breadth of the rifing	8	6	8	3	7	9	6	10h	5	3h	2	8	2	6	outfide							
Toptimber half breadth	20	11	20	10	20	9h	20	9	20	7	20	3	19	5	18	2	16	8	15	10h	15	0¼
Topfides half breadth											19	7	18	4	17	0	15	10	14	11	14	3
Length of lower breadth fweeps	19	2	19	2	19	0	18	7	17	1	16	0	14	5	12	5	9	10h	7	11	4	8
Firft diagonal line	7	9	7	8¼	7	7	7	5	7	2h	6	7	5	9	4	7	2	10	1	8h	0	7
Second ditto	13	9	13	8h	13	6	13	1	12	6	11	2	9	7	7	7	4	8¼	3	1	0	11
Third	20	0	19	11¼	19	7h	19	0	18	1h	16	6	14	2	11	5h	7	8h	5	5	2	1h
Fourth	23	4h	23	3	23	1h	22	6h	21	11	20	3	18	0h	15	3h	11	4	8	7	4	6¼
Fifth	24	8	24	7	24	6	24	1h	23	6h	22	3h	20	6h	18	2	14	4	11	5	7	0
Sixth																	18	8h	16	0	11	8
Seventh											23	9h	23	0	21	8h	20	0	18	11	17	8¾

Note. In the two foregoing Tables, for h read ½

An Account of the Diagonal Lines for both the Fore and After Bodies.

Fore and after bodies.	Names of the Diagonal Lines.													
	1ft.		2d.		3d.		4th.		5th.		6th.		7th.	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In.	Ft.	In.	Ft.	In.
Height up the middle line	6	11	11	4	16	5¼	20	8	23	5¾	27	5	43	9
Diftance from the middle line on the bafe line	4	8	9	1	15	6								
Height up the fide line							0	9½	6	7	12	7½	32	[illegible]½

CHAP. II.

Containing an explanation of the principal lines which are uſed in the conſtructing or drawing of a draught.

HAVING laid down the dimenſions for a ſhip of eighty guns, I think it will be very neceſſary, before I proceed to the conſtructing of the ſame, to give an explanation of the principal lines uſed therein, whereby the ſtudent will become thoroughly acquainted with that part, and not be at a loſs when he attempts to conſtruct a draught from the aforeſaid dimenſions: I ſhall therefore begin with the

Sheer draught or plan, which is the ſame with elevation in houſe architecture, and is a ſection ſuppoſed to be cut by a plane paſſing through the middle line of the keel, ſtem, and ſtern poſt.

Floor plan is the ſame with horizontal, and is that on which the whole frame is erected; the upper ſide of the keel, with all the floors, being in this plan.

Body plan is the ſame with the profile; it is a ſection ſuppoſed to cut the ſhip through the broadeſt place, which is at the midſhip bend; it is perpendicular to the ſheer or floor plans, and the ſhape of every timber in the ſhip is deſcribed therein.

Half breadth plan is an horizontal ſection, cutting the whole body of the ſhip lengthways, at the broadeſt place on each timber, and is generally drawn under the ſheer plan, and in it is deſcribed all ſections that cut the ſhip lengthways.

Height of the breadth is generally in two lines, the upper and the lower, and are deſcribed in the ſheer plan; they determine the height of the broadeſt place of each timber, which is that height where the main half breadth ſection is ſuppoſed to cut the ſhip lengthways.

Main half breadth is a line or ſection, ſuppoſed to cut the ſhip lengthways at the above-mentioned heights, and is the broadeſt part of the ſhip from the middle line to the outſide of every timber.

Toptimber line is a curve, which terminates the height of the ſhip in midſhips, and alſo deſcribes the ſheer; it is likewiſe where the toptimber half breadth ſection cuts the ſhip fore and aft, or lengthways.

Toptimber half breadth is a line or ſection, ſuppoſed to cut the ſhip lengthways at the height of the toptimber line.

Water lines are ſuppoſed to be drawn on the ſurface of a ſhip, by the upper part of the water on which ſhe ſwims, and are generally deſcribed on the draught in green: they are alſo formed by a ſection cutting the whole body of the ſhip lengthways, and are repreſented in the ſheer plan by ſtraight lines, and if parallel to the keel, will be repreſented on the body plan by ſtraight lines alſo; but they will be limited by curve lines in the half breadth plan, which curves limit the half breadth of the ſhip at the height of their correſponding lines in the ſheer plan.

Ribband lines are thoſe lines in the half breadth plan, by which the moulds are made for the ribbands and harpins, the uſe of the ribbands and harpins being to keep the timbers that compoſe the body of the ſhip together, and in their proper ſhape, until the plank is brought about.

Sweeps

Sweeps are arches of circles, defcribed in the body plan to form the timbers, and are as generally as follow.

First floor fweep. This fweep is limited by a line in the body plan, drawn perpendicular to the middle line, a little above the keel, and the diftance above the keel at the midfhip timber is called the dead rifing, the arch forms the head of the floor timber.

Second lower breadth fweep. The center of this fweep is in a line, taken from the fheer draught, reprefenting the lower height of breadth, on which line is fet off the main half breadth of the fhip at its correfponding timber, the diftance from which to the center is the radius that defcribes a circle downwards, which forms that part of the body below the height of breadth.

Third reconciling fweep is that which joins the two former ones, and in fuch a manner fo as to interfect neither, but to come exactly over the back of each; by which means all three are united together, and form a fair curve from the lower height of breadth down to the rifing, or floor fweep, and by drawing a line from the back of the floor fweep down to the keel, you will have the whole form of the timber below the lower height of breadth line.

Fourth upper breadth fweep. The center of this fweep is in a line taken from the fheer draught, reprefenting the upper height of breadth, on which is fet off the main half breadth of the fhip from its correfponding timber, as in the line for the lower height of breadth, and alfo from which is fet off on the line the length of the fweep which gives the center for defcribing a circle upwards, and forms that part of the body above the upper height of breadth.

Fifth toptimber fweep or hollow, is a fweep inverted with its back to the back of the former, and the upper part interfecting a fpot which is fet off for the toptimber half breadth, at the height of the toptimber line, the form of the timber is then compleated.

Rifing

Rising line. This is a curve drawn in the ſheer draught, and is the height of the centers of the floor ſweeps taken from the body plan, but if the whole height of thoſe centers were ſet off on their correſponding timbers in the ſheer draught, they would interpoſe with the upper line; it is therefore ſo contrived as to come to the lower part of the ſheer draught, which is done by taking all the heights of the centers in the body plan, from the height of the center of the ſweep of dead flat, and ſetting them of on their correſponding timbers in the ſheer draught, from the upper edge off the keel, by which means the riſing line in midſhips breaks in fair with the upper edge of keel.

Half breadth of the riſing. This is a line in the half breadth plan, which limits the diſtances that the centers of the floor ſweeps are from the middle line in the body plan.

Cutting down. This is a line deſcribed in the ſheer plan; it limits the depth of every floor timber at the middle line, and likewiſe the height of the upper part of the dead wood afore and abaft.

Room and ſpace. This is the diſtance betwixt the moulding edges of all the timbers which varies according to the ſize of the ſhip, but muſt always contain room enough for the breadth of two timbers, and a ſufficient opening between them, it muſt be obſerved that one mould ſerves for two timbers, the foreſide of the one being ſuppoſed to unite with the aſt ſide of the other, and ſo makes only one line, which is called the joint of the frame or timbers. The midſhip timber, or broadeſt part of the ſhip, is called dead flat, and diſtinguiſhed by this character ⊕. The timbers afore the midſhip are diſtinguiſhed by the letters A, B, C, &c. and thoſe abaft the midſhip by the figures 1, 2, 3, &c. Thoſe timbers following dead flat, both afore and abaſt, which are called flats, are diſtinguiſhed by the characters (A), (B), &c. and (1), (2), &c.

CHAP.

CHAP III.

Shewing in what manner to conſtruct the ſheer draught for the eighty gun ſhip, from the dimenſions that are laid down.

IN the beginning of this Treatiſe, I obſerved that the firſt ſtep towards building of a ſhip, was to conſtruct a draught for that purpoſe; and in conſequence thereof, I have endeavoured to conduct the ſtudent through every difficulty which would have ariſen in his way, had he attempted the ſame: and as I hope I have ſucceeded in my attempt, I ſhall now proceed to ſhew in what manner a draught of the eighty gun ſhip may be drawn from the aforeſaid dimenſions.

The firſt thing to be determined upon is the length on the gun deck, which may be found in the dimenſions to be 182 feet: draw a line on the paper repreſenting the upper edge of the keel (taking care to let it be a ſufficient diſtance from the bottom of the paper to admit of the half breadth plan coming below it;) erect a perpendicular on that end to the right, and from thence ſet off 182 feet, the length on the gun deck, and there erect another perpendicular; that to the right is called the foremoſt perpendicular, and that to the left the after one, upon which two perpendiculars all the foremoſt and aftermoſt heights, &c. muſt be ſet off, which are expreſſed in the dimenſions.

Next proceed and ſet off the diſtance of dead flat from the foremoſt perpendicular, and at that place erect a third perpendicular, which muſt be diſtinguiſhed

by

by the character (⊕); it is the broadeſt and fulleſt part of the ſhip, and is generally termed the midſhip bend. From dead flat the room and ſpace of all the timbers muſt be ſet off, but it will only be neceſſary to erect a perpendicular at every frame timber, which are in the fore body called, *Dead Flat*, A, C, E, &c. and in the after body (2), 1, 3, 5, &c. therefore the diſtance between the frame perpendiculars will be double the room and ſpace expreſſed in the dimenſions. * Then ſet off the heights of the gun deck afore, midſhips (or dead flat) and abaft, and by letting a curved line paſs through thoſe three heights, the upper ſide of the gun deck will be formed; then ſet off the thickneſs of the gun deck plank below that, and letting another curved line paſs parallel to the former, the gun deck will then be deſcribed at the middle line in the ſheer plan.

In the next place, the ſtem muſt be formed; in order to which, the center muſt be ſet off taken from the dimenſions; then fix one leg of the compaſſes in the center, and the other in the line for the upper edge of the keel, and from thence deſcribe a circle upwards, and likewiſe deſcribe another circle without the former, as much as the ſtem is moulded. Then ſet off the height of the head of the ſtem, with the diſtance afore the perpendicular, and there make a ſpot, and within that ſet off the moulding of the ſtem, and there make another ſpot, and from the laſt mentioned ſpot let a line paſs downwards, interſecting the perpendicular at the height of the gun deck, and breaking in fair with the inner circle, by which the after part of the ſtem is drawn, and by letting another line paſs from the foremoſt ſpot downward parallel to the former, and breaking in fair with the outer circle, the whole ſtem will then be formed, all but the after or lower end, which cannot be determined upon till hereafter.

The ſtern poſt muſt next be drawn in: ſet off on the upper edge of the keel a ſpot for the aft part of the rabbet, taken from the dimenſions, and from

* It muſt be obſerved, that all the heights are to be ſet off from the line repreſenting the upper edge of the keel.

that

that forward, ſet off another ſpot the thickneſs of the plank of the bottom, which is $4\frac{1}{2}$ inches, and from the laſt mentioned ſpot draw a line upwards interſecting the perpendicular at the height of the lower deck, then ſet up the perpendicular the height of the wing tranſom, and draw a level line, and where that level line interſects the line firſt drawn, that is the aftſide of the wing tranſom, on the upper part of the middle line ſet off from that place the diſtance of the aftſide of the ſtern poſt, and likewiſe ſet off the diſtance of the after part from the rabbet on the upper edge of the keel, then the aftſide may be drawn in by letting a ſtraight line interſect thoſe two ſpots already ſet off, then the aftſide of the rabbet may alſo be drawn in by ſetting off $4\frac{1}{2}$ inches, the thickneſs of the bottom abaft the line that was firſt drawn, and by letting the line run up parellel to the former, the rabbet of the ſtern poſt will be drawn, and the ſtern poſt likewiſe deſcribed; but the head of it will not be determined till hereafter.

Next proceed to draw the upper deck in, which is done by ſetting up the heights between the gun and upper deck, afore, midſhips, and abaft, taken from the dimenſions, through which heights draw a curve, then by ſetting up the thickneſs of the deck, and letting another curve paſs parrallel to the former, the upper deck will then be repreſented at the middle line of the ſhip.

Set off the height of the lower counter, at the middle line from the upper edge of the keel, and draw an horizontal line in pencil, then on the pencil line ſet off the diſtance, the touch of the lower counter is abaft the aftſide of the wing tranſom, and there make a ſpot, from thence to where the fore part of the rabbet of the ſtern poſt interſects the line, drawn for the upper part of the wing tranſom, draw a curve at pleaſure, which curve will repreſent the lower counter at the middle line.

 Then

Then proceed to ſet off the height of the upper counter at the middle line from the upper edge of the keel, and draw an horizontal line as before, ſetting off the diſtance, the touch of the upper counter is abaft the aftſide of the wing tranſom, and letting a curve paſs from thence to the touch of the lower counter, the upper counter will then be deſcribed at the middle line.

Having the upper and lower counters drawn in at the middle line, you muſt draw the upper part of the ſtern timber above the counters, proceeding as follows:

On the level line drawn for the upper ſide of the wing tranſom, ſet off the diſtance, that the aftſide of the ſtern timber at the middle line, (at the height of toptimber line) is from the aftſide of the wing tranſom, and erect a perpendicular, then up that perpendicular ſet the height of the toptimber line, at the after ſide of ſtern timber, at the middle line from the upper edge of the keel, and there make a ſpot, and drawing a ſtraight line from the touch of the upper counter, to paſs through the ſaid ſpot, the upper part of the ſtern timber will be drawn, by which the rake of the ſtern will be deſcribed.

As the ſtern rounds two ways, both up and aft the ſtern timber at the ſide, will conſequently alter from that at the middle line, and therefore remains to be repreſented. Take how much the upper counter rounds up from the dimenſions, and ſet it below the touch at the middle, drawing a level line in pencil, then take how much it rounds aft, ſet it forward from the touch on the touch line, and ſquare it down to the line laſt drawn in pencil, and where it interſects there make a ſpot, which will be the touch of the upper counter at the ſide. Then proceeding juſt in like manner with the lower

lower counter, the touch for the lower counter at the ſide will be produced, and by letting a curve paſs from one touch to the other, (ſimilar to the curve at the middle line) the upper counter at the ſide will be alſo formed.

Take the round up of the wing tranſom, and ſet it off below the line before drawn for the height of the wing tranſom, and draw another horizontal line in pencil, then take the round aft of the wing tranſom, and ſet it forward on the upper line from the ſpot repreſenting the aftſide of wing tranſom, and ſquaring it down to the lower line, the interſection will be the touch of the wing tranſom, and by drawing a curve from the touch of the wing tranſom (ſimilar to the curve at the middle line) to the touch of the lower counter at the ſide, the lower counter at the ſide will be thereby formed; and then drawing a ſtraight line from the upper counter upwards, the whole ſtern timber at the ſide will be repreſented.

But as the ſtraight line which muſt be drawn for the upper part of the ſide timber, ſhould not be parallel to that at the middle line, I ſhall deſcribe a method to determine on the exact rake thereof.

Draw a line at pleaſure, on which ſet off the breadth of the ſtern at the upper counter; then at the middle of that line ſet off the round aft of the upper counter, and letting a curve be drawn to interſect the ſpot at the middle, and the ſpots at the ends of the line, the round aft of the ſtern will be thereby deſcribed: next take the breadth of the ſtern at the toptimber line, and where that breadth will interſect the curve for the round aft of the ſtern, draw a horizontal line parallel to that firſt drawn, and the diſtance from the line laſt drawn to the curve at the middle of the line, is the diſtance that the ſide fide timber muft be from the middle timber, at the height of the top-timber line.

The rake of the ftern timbers being determined, next draw in the fheer, which muft be done by taking the heights afore, midfhips, and abaft, and fetting them off at their refpective places, and letting a curve pafs through thofe three fpots, or heights, the fheer will be thereby defcribed; but in order to have the fheer exactly correfpond with the dimenfions laid down, will be to proceed as follows: The perpendicular reprefenting timber dead flat, being already drawn, fet off from that the diftances for the other frame timbers (which is double the room and fpace as the frames are only every other one) and erect the perpendiculars, writing the name under each of them, which in the after body * is (2), (4), 1, 3, &c. and in the fore body C, E, &c. Then on every one of the perpendiculars, fet off their refpective heights of the toptimber line, taken from the tables of dimenfions for conftructing the bodies, and through thofe fpots fet off let a curve pafs, which will reprefent the fheer of the fhip, or toptimber line, exactly agreeable to the dimenfions.

The toptimber line being thus defcribed, we may proceed in the next place to get in the quarter deck and forecaftle, which may be done by taking their refpective heights and lengths from the dimenfions, and defcribing their curves, and in the fame manner likewife, the round-houfe deck may be drawn in. The decks being drawn in, reprefenting their heights at the middle, we muft alfo proceed to reprefent them at the fide. Take the round of the decks from the dimenfions, and fet them off below the lower line

* That part of the fhip abaft timber dead flat, is termed the after body, and that afore it, the fore body.

drawn

drawn for the middle, and letting a curve paſs fore and aft (obſerving to let it be rather quicker than the former) the decks will then be repreſented at the ſide.

The ports come next under conſideration; it muſt therefore be obſerved in the placing of them, that a due attention be paid in regard to ſtrength, or that they ſhall be diſpoſed of in ſuch a manner as not in the leaſt to weaken the ſhip, which is very often done by cutting off principal timbers, placing them in too large openings, having too ſhort timbers by the ſide of them, &c. We muſt therefore firſt conſult the frames, which is every other bend throughout the ſhip, and are repreſented by the perpendiculars already drawn and named: proceed to draw in two curves in pencil fore and aft, for the lower and upper parts of the lower deck ports, by taking their depths and height from the deck from the tables in the proportions, letting the two curves run parallel to the deck at the ſide, and obſerving to add the thickneſs of the deck to the height taken from the proportions, as the line for the deck at the ſide repreſents the under part of the deck.

In the next place proceed to get in the foremoſt port, placing it as far diſtant from forward as ſhall give ſufficient room for the manger, the moſt convenient place will therefore be to put it between the frames R and T, and equally diſtant from each, it will then be placed in the moſt conſpicuous point of ſtrength, as it will have a long toptimber on the aft ſide, and a long fourth futtock on the fore ſide of it; next get in the ſecond part from forward, which may be placed in like manner between the next two frames, which will alſo be ſituated for ſtrength juſt the ſame as the former, and ſo by following that method, the ports on the gun deck may alſo be placed, taking care to have

 two

two frames between every two ports, all fore and aft, as then they will be all equally ſpaced.

The gun deck ports being properly ſpaced, proceed to get in the upper deck ports, which in order to diſpoſe of them alſo in the ſtrongeſt ſituation poſſible, they muſt be placed over the midway, between the gun deck ports, ſo that every frame in the ſhip will run up to the top of the ſide, by their coming between a gun and upper deck port, and every port in the ſhip will be between the frames, which will in a great manner contribute towards the ſtrength of the ſhip. With regard to the ports on the quarter deck, it is not of ſuch material conſequence if they cut the head of the frame, as in placing them, the dead eyes muſt be conſulted, letting a port be placed where there is a vacancy between the dead eyes large enough to admit of one, but obſerving to place them as near as poſſible at an equal diſtance from each other, and where it happens that they do not fall in wake of a frame; the frame muſt by all means be carried up to the top of the ſide.

Having gone thus far, the upper part of the ſhip muſt be next conſidered, and endeavouring to keep the upper works as low and as ſnug as poſſible abaft, we ſhall be able to have a handſome ſtern, and inherit the qualities which have been mentioned before in conſequence thereof. The length of the roundhouſe deck muſt be determined on and ſet off, letting it be no longer than is juſt ſufficient for the neceſſary accommodations, for the ſhorter the roundhouſe the lower we ſhall be able to keep our works abaft, and a low ſnug ſtern is always accounted the handſomeſt.

The neceſſary length for the roundhouſe being determined in the dimenſions, it may be ſet off, then ſetting off the round of the deck at the foremoſt end,

end, below the line drawn, the deck at the ſide may be deſcribed by another curve drawn quite aft; then from where the ſpot for the round of the deck was ſet off, to the ſtern timber, draw a curve parallel to the toptimber line, and that will be the extreme height of the top of the ſide abaft, which height continues to range fair along to the foremoſt end of the roundhouſe, and at that place may have a fall about 14 inches, which may be turned off with a drift ſcroll; then where the fore part of the quarter deck comes, the topſide may have a riſe of 14 inches, which may alſo be turned off with a ſcroll, but as the riſing of the topſide only 14 inches at that place will not be ſufficient to unite with the heights abaft, we muſt of neceſſity riſe another 14 inches upon that, and brake it off with a ſcroll inverted on the firſt ſcroll, and continue thoſe two lines (parallel to the toptimber line) about 7 feet aft, which we may leave for the preſent, and return to the foremoſt end of the roundhouſe, where we already have a break of 14 inches, but in order to make that part uniform with the breaks at the foremoſt end of the quarter deck, there muſt be ſet down another 14 inches below the former, and at thoſe two heights continue two curves, from the aft part of the ſtern (parallel to the toptimber line) to the ends of thoſe two curves already drawn at the foremoſt end of the quarter deck; but if they ſhould happen not to break in fair with them, they muſt be turned off with a round, but to make them appear more handſome, the lower line may be turned off with a ſcroll. Thoſe lines being all drawn, they will repreſent the upper edges of the rails, which are put on for the embelliſhments of that part of the ſhip.

We muſt next proceed to the fore part of the ſhip, and conſider the height for the topſide there, which in order to give proper height for the fore-caſtle, we muſt there have a riſe of 14 inches, letting the break be at the

after

after end of the forecaſtle, and turned off as before; but this fore part of the ſhip being conſiderably lower than the after part, we muſt introduce another riſe of 8 inches upon the former, and turn it off with a ſcroll inverted as before, by which this part of the ſhip will appear more uniform to the after part.

The upper part of the ſhip being now complete, we have at one view the utmoſt extent of the ſheer draught, as ſeen on a plain ſurface, but it ſtill ramains to repreſent the finiſhing parts, as the wales, ſtern, head, rails, &c. We may therefore proceed to the wales, in which the ſtrength of the ſhip muſt be principally conſulted, as it depends in a very great manner on the wales, and in placing them great care muſt be taken that they are wounded as little as poſſible by the lower deck ports, and likewiſe be ſo ordered that the lower deck bolts ſhall bolt in them, and as the wales is the thickeſt ſtuff in the ſhip, and intended to bind the whole together, they muſt alſo come as near as poſſible on the broadeſt part of the ſhip. We muſt therefore in the firſt place determine on the height of breadth lines in order to be our guide, ſet off the height of breadths on each of their reſpective timbers, taken from the tables of demenſions, and letting curves paſs through the different ſpots all fore and aft, the height of breadth lines will then be drawn, which will appear to be very high, but in conſequence the ſhip will be much the ſtiffer.

The height of the wales may now be determined, which in general is in ſuch a manner, that the upper height of breadth line comes about 6 inches below their upper edge, by which the wales is then placed right upon the breadth lines, but as theſe breadth lines are placed higher than the general rule for the purpoſe above mentioned, we ſhould, by placing them in that manner,

manner, have them cut to pieces afore and abaft by the ports, and would likewiſe run ſo very high abaft, as to be above that part where the moſt ſtrength is required. Proceed to take the heights and breadth of them, afore, midſhips, and abaft, from the dimenſions, and draw in their curves, by which the wales will be repreſented, and will likewiſe be found ſituated in the beſt poſition, and the abovementioned ill conſequences from placing them too high will be avoided, they will not be cut by the lower deck ports, unleſs it is by the two after ones, which is very little, the lower deck will bolt in them quite to forward, and as far aft as is neceſſary, and their height agrees in proportion to the height of the toptimber line, which is proportioned according to the part which requires the moſt ſtrength.

Next get in the channel wales, which are principally intended for the ſtrength of the topſide, and ſhould therefore be conſidered in like manner to the main wales, they muſt be placed between the lower and upper deck ports, and the lower edge of them in midſhips ſhould be placed as low as poſſible, in order to prevent them from being cut by the upper deck ports afore and abaft. Therefore take their heights and breadth from the dimenſions, letting the curves paſs through the ſpots, and they will then be repreſented, by which we ſhall find them come clear of the ports, unleſs it is two or three of the after ones, which will be of little conſequence, as the upper deck clamps on the inſide will make good the deficiency of the wales in that place, and the upper deck bolts will come in the wales every where elſe, fore and aft.

The waſte rail may next be drawn in, taken from the dimenſions, keeping it parallel to the toptimber line, all fore and aft; this rail terminates the

the lower part of the paint work in the topſide, as all the work above this rail is generally painted, and the work of the topſide below it payed with a varniſh, except the main wales, which are always payed with pitch.

Take the draught of water from the dimenſions, and draw in the load water line, which is always done in green for diſtinction, draw in likewiſe between that and the upper edge of the keel, four more water lines, all equally divided between, which will be for the purpoſe of proving the fairneſs of the body hereafter.

In the next place the centers of the maſts may be ſet off on the gun deck, taken from the dimenſions, and the rake of them may likewiſe be taken from the proportions. The center of the bowſprit may be likewiſe taken from the proportions, and ſet off, letting it be 4 feet from the deck, at the after part of the ſtem, which will give ſufficient height for a light and airy figure.

The knight heads ſhould be drawn in, letting them run ſufficiently high above the bowſprit, to admit of a chock coming between them, for the better ſecurity of the bowſprit. The timber heads may alſo be drawn above the forecaſtle, obſerving to place the moſt convenient for the timbers of the frame, which will be thoſe timbers which comes over the upper deck ports; as they may be allowed long enough to form handſome heads, there ſhould be one placed abaft the cat-head for the foremoſt block to bolt to, and there may likewiſe be two ports on the forecaſtle formed by them, placing the ports where it is moſt convenient to the dead eyes.

Draw the channels in, taking their lengths and thickneſſes from the dimenſions, placing their upper edges well with the lower edge of the ſheer rail,

rail, the dead eyes may then be drawn, obſerving to place them in ſuch a manner that the chains may not interfere with the ports, and the preventer plates muſt all be placed on the channel wales, letting them be of ſuch a length, that the preventer bolt at each end may bolt on each edge of the channel wales. It muſt alſo be obſerved to give each of the chains and preventer plates a proper rake, that is, to let them lie in the direction of the ſhrowds, which may be done in the following manner; draw a line up for the center of the maſt, upon which ſet off the length of the maſt to the lower part of the head, then by letting up ſtraight lines paſs from that height, through the center of each dead eye, the direction of each chain will then be given by the different directions of each line.

After finiſhing the dead eyes and channels, the tenders may be drawn in, obſerving to place them right a-breaſt of the main hatch, for the conveniency of preventing the ſhip's ſide from being hurt by whatever may be hoiſted on board, the proper place for them will therefore come upon the frame 3, and the diſtance between them may be governed by the diſtance between the ports. The cheſt-tree may alſo be drawn, which muſt be placed at a proper diſtance abaft the foremaſt for the conveniency of hawling home the fore tack, it may therefore be drawn at the aftſide of frame C, from the top of the ſide, down to the upper edge of the channel wales, and the tenders may reach from the top of the ſide down to the upper edge of the main wales, and as the tenders and cheſt-tree comes on the outſide of the planks, wales, &c. they ſhould be repreſented as ſuch, by not letting the rails, wales, &c. run through them.

Proceed and draw the ſteps on the ſide, which muſt be at the fore part of the main drift, or break, letting them be in length as much as the diſtance between

between the upper and lower deck port will admit of. They may be about six inches asunder, and five inches deep, and continue from the top of the side down to the middle of the main wales.

Having now formed the sheer draught thus far, we may proceed to the finishing and ornamental parts, which are the head and stern, and shall therefore first treat of the head.

The head of a ship is intended both for ornament and conveniency; in the first place, as an ornament to the structure, the beauty of this part is more admired, or the deformities sooner discovered, than in any other part, for the head is always most observed by the generality of spectators, and many competent judges of naval architecture will assert, that the symmetry of the whole depends much on the proportion or disproportion it bears towards the head. For to see a head with all its parts well and neatly formed, and a due proportion and harmony between them, strikes the eye of the beholder with admiration, and the head may always be fashioned so as to make it beautiful. And in the second place, the conveniency in the head is to tack the weather clew of the foresail forward, to gammon the bowsprit, to water the provisions, and for houses of ease. The tacking of the foresail forward is of principal use, as it is to trim the sail to the wind, that the lee leetch may not bag, and oppose the motion of the ship; it may therefore be considered, that short heads are not proper, as it requires a good distance from the fore mast for the tacking of the fore sail forward.

We may now consult the foregoing observations, and proceed to forming of the head. In the first place, determine on the height of the beak head, which may be about two feet above the upper deck, draw at that place a horizontal line,

line, upon which ſet off the length of the beak head, which may be ſeven feet and half abaft the fore part of the ſtem, and from thence ſquare a line up to the forecaſtle deck, which line will repreſent the aft part of the beak head, and will likewiſe terminate the foremoſt end of the forecaſtle; the length of the head may now be determined, therefore calculating it from the proportions, we ſhall find it fifteen feet ſix inches from the forepart of the ſtem, which length will be found ſufficient to anſwer both for beauty and conveniency. Set it off from the fore part of the ſtem, and erect a perpendicular, which will be the utmoſt limits of the figure forward, then from the proportions the breadth of the figure may be taken, which is four feet four inches, and ſetting it off forward from the perpendicular, another perpendicular may be erected, which will ſhew the utmoſt extent of the hair bracket forward, or aft part of the figure.

In the next place proceed to draw the lower cheek, letting the upper edge be well with the upper edge of the main wales, and the after end ranging well with the beak head line, ſet off the depth of it on the ſtem, which is about eleven inches, and let a curved line paſs from the after end through the ſpot ſet off on the ſtem, and to break in fair with the perdendicular firſt drawn for the length of the head, the forepart of the curve will then repreſent the poſition of the figure.

The upper cheek may next be drawn, but in order to know the exact place of it on the ſtem, the place of the main rail muſt firſt be ſet off on the ſtem, the upper edge of which may be kept on a level with the beak head, then ſetting off the depth of it below that, the place for the upper cheek may be determined, letting it be exactly in the middle, between that and the lower cheek, then by letting curves paſs for the upper and lower edges of the cheek from the after end, parallel to the lower cheek, to break in fair with the perpendicular drawn for the back of the figure, the upper cheek will then be formed, and the upper part may run in a ſerpentine as high as where the ſhoulder of the figure is ſuppoſed to come, at which place it may be turned off with a ſcroll, and from the ſcroll down to the heel of the figure is called the hair bracket.

The head of the block may be formed by continuing the line at the breaſt round to the top of the hair bracket, obſerving to keep the top of it about ſix inches clear of the under ſide of the bowſprit.

Having the diſtance ſet off on the ſtem for the placing of the main rail, we may proceed to draw it in, keeping the bag of it as level as poſſible for the conveniency of the gratings, and letting the foremoſt end riſe gradually, according to the riſe of the upper cheek and hair bracket, and may turn off on the round of the ſcroll before drawn for the hair bracket. Then to form the after end, ſet off the ſize of the head of the rail abaft the beak head line, and erect a perpendicular; then deſcribe the arch of a circle that ſhall fall from that perpendicular, and break in fair with the lower ſide of the rail in the middle, and likewiſe another from the beak head perpendicular, to break in fair with the upper ſide of the rail at the middle, the main rail will then be completely formed, and it may be obſerved to let the head of it run up ſufficiently high to range with the timber heads above the forecaſtle.

The head timbers muſt next be drawn, placing the ſtem timber its thickneſs from the ſtem, and the foremoſt muſt be ſo that the foreſide of it ſhall be up and down with the heel of the block or figure, which has not been ſet

ſet off yet, therefore take the diſtance from the breaſt to the heel on a ſquare, which is ſeven feet, and erect a perpendicular from the lower part of the lower cheek, to the lower part of the upper cheek, which perpendicular will terminate the foremoſt end of the lower cheek and the heel of the figure, and will likewiſe terminate the lower end of the hair bracket, then by raiſing the ſame perpendicular from the upper part of the lower cheek, to the under part of the main rail, the foreſide of the foremoſt head timber will be ſhewn, and by ſetting off its thickneſs aft, both ſides may be drawn in. Then the middle head timber may be ſpaced equally between the two former ones, and there may alſo be one timber placed abaft the ſtem, the ſame diſtance from the ſtem timber as there is between the others, and the lower end of it may ſtep on the upper edge of the lower rail.

The head timbers being drawn, proceed to draw in the middle and lower rail, which may be done by dividing the ſpace between the lower part of the main rail and the upper part of the upper cheek, equally at every head timber, and letting curves paſs through thoſe ſpots, the middle and lower rail will be formed, letting the after end of the lower rail terminate at the after edge of the after head timber.

The cat-head may next be drawn, letting it be repreſented in ſuch a manner as to come againſt the aftſide of the head of the main rail, to rake forward 4 inches in a foot, and to ſteeve up 5½ inches in a foot, and may be 1 foot 6 inches ſquare, obſerving that the lower part comes on the plank of the deck at the ſide; the ſupporter under it muſt form a fair curve to break in with the after end of the middle rail.

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The hawſe-holes muſt come between the cheeks, that being the moſt convenient place for them, but we cannot exactly determine on their place the fore and aft way, till we have them laid down in the half breadth plan, and muſt therefore defer treating on them till we come to that part of the Treatiſe.

The knee of the head may be formed, letting it project from the breaſt of the figure about 2 inches, and particular care muſt be obſerved in the forming of it downwards, ſo that it ſhall not be too full, as in that caſe it will always be liable to rub the cable very much, which is a very great inconvenience in all ſhips, it may therefore have no more ſubſtance under the lower cheek at the heel of the figure, than is juſt ſufficient to admit of the bobſtay-holes, and may be in diſtance from the ſtem at the load water line $3\frac{1}{2}$ feet, and letting it run in an agreeable ſerpentine line, from the breaſt down to the third water line, (where it may be $1\frac{1}{2}$ feet from the ſtem) it will then be formed, and by continuing the ſame line downwards, and letting it be the more diſtant from the ſtem as it comes down, the gripe will be formed, letting the lower part break in fair with the under part of the falſe keel, and the breadth of the gripe at the broadeſt place will be found from the proportions to be $4\frac{1}{2}$ feet. As the aft part of the gripe is terminated by the fore foot, or foremoſt end of the keel, we will therefore now proceed to finiſh the keel, fore foot, &c.

From the line firſt drawn, repreſenting the upper edge of the keel, ſet down below the depth of the keel, and draw a line parallel to the former all fore and aft, which will repreſent the lower part of the keel; then where the line for the aft part of the ſtem riſes above the line for the upper edge of the keel

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as much as the whole depth of the keel in midſhips is, there erect a perpendicular from the lower part of the keel up to the line repreſenting the fore part of the ſtem, and from thence let it be ſquare from the fore ſide to the aft ſide of the ſtem, by which the foremoſt end of the keel will be repreſented, and the after or lower end of the ſtem may be repreſented by ſetting off the length of the ſcarph from the foremoſt end of the keel, which may be ſix feet, then ſet off below the line repreſenting the lower edge of the keel, the thickneſs of the falſe keel, which is ſeven inches, and letting a ſtraight line paſs fore and aft parallel to the former, the falſe keel will then be repreſented, the foremoſt end of which may be three inches afore the foremoſt end of the main keel.

Having now explained every thing relative to the head, we ſhall proceed to the ſtern, and make a few obſervations, which will ſuffice for the preſent, as the ſtern will be more particularly and fully treated of hereafter, in the laying of it down in the mould loft.

The ſide and middle timbers of the ſtern being already drawn, ſet off from the ſide timber the length of the lower gallery forward, which is fourteen feet, and draw a line parallel to the ſide timber in pencil, then draw a line to interſect the touch of the upper counter at the ſide, letting it run forward as far as the pencil line firſt drawn, letting it be parallel to the ſheer, and this line will repreſent the upper edge of the gallery rim, then the breadth of the rail (which is eight inches) may be ſet off below it, and the lower edge may then be drawn in; draw a line eight inches diſtant and parallel to the ſide timber at the fore ſide of it, then from where that line interſects the upper edge of the gallery rim, draw a curve to the middle timber parallel to the touches of the

upper

upper counter, and that will reprefent the upper edge of the upper counter rail, as it appears when viewed on the fheer draught, and by fetting off from that the depth of the rail, the lower edge of the rail may be alfo formed.

In the fame manner the lower counter rail may be defcribed, then fet off the diftance between that and the upper counter rail, below the rim rail, by which you may draw in the rail that comes on the lower ftool, keeping it parallel to the rim rail, then underneath that the lower finifhing may be formed, letting it be as light and agreeable as poffible.

In the next place determine on the projection of the balcony, which may be two feet from the middle timber, fet off from the middle timber on the end of the quarter deck, and draw a line up in pencil parallel to the middle timber, then on the pencil drawn, fet off one inch and half below the underfide of the quarter deck, and from that fpot draw a curve parallel to the upper counter rail down to the fide timber, which curve will reprefent the lower fide of the foot fpace rail of the balcony, as it appears in the fheer draught.

Take the diftance from where the upper edge of the upper counter rail interfects the middle timber, to where the underfide of the foot fpace rail interfects the middle timber alfo, upon the rake of the ftern, then fet up that diftance on a perpendicular from the upper edge of the rim rail at the foremoft end, and at that height draw a line, parallel to the rim rail, till it interfects the lower part of the foot fpace rail, and that line will reprefent the lower edge of the rail that comes on the middle ftool, and anfwer to the foot fpace rail, then between this line and the rim rail may be drawn in three lights or fafhes, having a muntin between each light about fourteen

fourteen inches broad, (or leaving that opening between each light or ſaſh) we ſhall then have the lower gallery finiſhed.

Then ſet off the depth of the middle ſtool rail above the line already drawn for the lower edge, by which the upper edge may be alſo drawn, and ſetting off the ſame depth above the curve drawn for the lower edge of the foot ſpace rail, the upper edge of that rail may then be drawn alſo.

In the next place proceed to draw the quarter piece, the heel of which muſt ſtep on the after end of the middle ſtool; the projection of the balcony being determined, draw a line up in pencil at that diſtance from the middle timber, and parallel to the middle timber, as high as may be found neceſſary, then on the line ſo drawn, ſet up from the round-houſe deck the height of the upper part of the ſtern or taff rail, which may be four feet above the deck, and at that height draw a horizontal line in pencil, and from where it interſects the line firſt drawn, draw a curve down to the middle ſtool rail, obſerving to let the lower part of the ſaid curve run nearly parallel to the ſide timber and the lower part, about three inches abaft the ſide timber; this curve will repreſent the aft ſide of the quarter piece at the outſide, then ſetting off the thickneſs of the quarter piece, (which is one foot ſix inches) afore the curve already drawn, another may be drawn parallel to it, from the lower part up to the top of the ſheer (which may terminate the head of the quarter piece) and the quarter piece will then be repreſented at the outſide. On the horizontal line drawn for the upper part of the taff rail, ſet off the thickneſs of the taff rail (which is one foot) forward, and draw a curve parallel to that firſt drawn down to the head of the quarter piece, by which that part of the taff rail will be deſcribed.

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It is cuftomary inftead of a fair curve for the upper part of the taff rail, to form it with one or two breaks, and their curves reverted, the ftudent may therefore pleafe his own fancy in that refpect, as it is only here defcribed with a fair curve, to make it more clear in the defcription, and the eafier to be underftood.

Proceed to determine on the depth of the taff rail, which may be about three feet and half, fet it off on the line drawn for the projection from the upper part, and there make a fpot, from which let a curve pafs down as low as the heel of the quarter-piece, and about five inches abaft it at that place, and obferving to let it run nearly parallel to the after edge of the quarter-piece, the after part of the quarter-piece which comes neareft to the fide will then be reprefented.

Set up on the line drawn for the projection of the balcony, the height of the upper part of the balcony or breaft rail, which is three feet fix inches from the deck; fet off the thicknefs of the rail below that, and then the breaft rail of the balcony may be drawn in, keeping it parallel to the foot fpace rail, and letting it end againft the line drawn for the after part of the quarter-piece neareft the fide, and the whole balcony will then be reprefented.

In the next place proceed to draw the upper quarter gallery; determine on the length, which may be eleven feet, fet it off from the fide timber forward, with the fheer, and at that length draw a line parallel to the fide timber, which line will reprefent the fore part of the gallery; then take the height from the upper part of the foot fpace rail to the upper part of the breaft rail,

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on a perpendicular, and ſet it off on a perpendicular from the upper part of the middle ſtool rail, on the line drawn for the fore part of the gallery, from which to the fore part of the quarter piece, draw a ſtraight line parallel to the rail below, which line will be the upper edge of the upper rim rail, and ſetting it off its thickneſs below that, the lower edge may alſo be drawn in; then from the upper edge of that rail, ſet up the ſame diſtance as there is between the lower rim rail and middle ſtool rail, and draw in the upper ſtool rail, the quarter piece will determine the after end, and the line for the length of the gallery the fore end of it, then there may be three ſaſhes drawn between thoſe two rails as before, by which the upper gallery will be formed.

The upper finiſhing ſhould next be drawn; determine on the length, which may be one foot and a half ſhorter than the upper gallery, draw a line parallel with the rake of the ſtern for the fore end of it, then let the upper part of the top ſide be the upper part of the upper rail, ſet down below that three inches for the thickneſs of the rail, and draw it in, and about eight inches below that, another rail may be drawn of the ſame thickneſs and length, from the end of which a ſerpentine line may be drawn down to the end of the upper ſtool rail, and then the upper finiſhing will be compleated.

Every thing relating both to the head and ſtern being now ſufficiently deſcribed, we may proceed to the rother, which muſt be particularly conſidered, as many of the qualities required in a ſhip depend in a great meaſure upon the rother; therefore determine on the breadth of the rother at the lower part, which may be calculated from the proportions, and ſet it off from the

 line

line for the aft part of the ftern poft, which line alfo reprefents the fore part of the rother; then determine on the lower hance, letting it be no higher than is juft fufficient, it may therefore be about one foot above the load water line, and fet off its breadth at that place calculated from the proportions, and draw a line from thence down to the breadth fet off at the lower part, by which the aftfide will be defcribed below the lower hance; there may alfo be another hance about the height of the lower deck, the ufe of which breaks or hances is to reduce the breadth as it rifes towards the head, the greateft breadth being only required below the water, where it feels the motion of the fhip; the aft part may be drawn above the lower hance, letting the break at the lower hance be about ten inches, and the break at the upper hance fix inches. The back may be drawn, which is a piece of elm about four inches thick on the aft part, therefore fet off that thicknefs abaft, and draw in another line from the lower hance down to the lower end, by which the back will be reprefented. The head of the rother fhould run high enough to receive a tiller above the upper deck, therefore fet off the fize of the head, above the upper deck, and draw a line from thence down to the break at the upper hance, by which the aft part of the rother will be reprefented all the way up; the bearding fhould be drawn by fetting off the breadth of it at the keel from the fore fide of the rother, which may be nine inches, and in the fame manner likewife fet off the breadth at the height of the wing tranfom, which may be twelve inches, and by drawing a ftraight line from the lower part of the rother, to about one foot above the wing tranfom, and to interfect the two fpots fet off for the breadth of it, the bearding will then be reprefented. But as the bearding is a very nice point, and the working of the rother very much depending upon that, it fhould always be particularly confidered.

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It has been a cuſtomary way, to beard the rother to a ſharp edge at the middle line, by which the main piece is reduced more than neceſſary, as is eaſily perceived in large ſhips; for we may obſerve, that when the rother is put hard over, the bearing will not be cloſe to the ſtern poſt by nearly an inch: to obviate which, the rother ſhould be bearded from the ſide of the pintles, and the fore ſide made to the form of the pintles. In deſcribing of the bearding on the draught, the moſt proper way will be to proceed as follows: draw a line, on which ſet off the ſize of the rother athwartſhips at the wing tranſom, then erect a perpendicular, and ſet off on it as much as you intend the rother ſhall be bearded at that place; and from thence draw a line on each ſide to the ſpots ſet off for the ſize of the rother, and you will then have the ſhape of the bearding of the rother at that place; then take how much the rother is athwartſhips at the keel, and where it will interſect both the lines already drawn for the bearding of the upper part, draw a line parallel to the line firſt drawn, then the diſtance from the line laſt drawn to the interſection of both ſides of the bearding, is the diſtance the bearding line is from the fore part of the rother at the keel, and then proceeding as firſt deſcribed, the bearding will be repreſented exactly as it appears in the ſheer draught.

The pintles and braces may next be drawn; in order to which, determine on the place of the upper one, which muſt be diſpoſed of in ſuch a manner, that the ſtraps ſhall come round the head of the ſtandard which is againſt the head of the ſtern poſt on the gun deck, and meet at the middle line, by which there is a double ſecurity both to the brace and the ſtandard; it muſt therefore be placed about four inches above the wing tranſom to come in that ſituation; the ſecond muſt be placed juſt below the gun deck, ſo as to bolt in the middle of the deck tranſom, and the reſt may be ſpaced equally between that and the lower

lower one, and the lower one may be about ſix inches above the upper edge of the keel; the number of them are generally ſeven pair upon this claſs of ſhips, but the number may be governed by the diſtance between the ſecond and upper one, letting the diſtance between the reſt be nearly the ſame. The length of the braces will be found by ſetting off the length of the lower one, (which may be eight feet afore the back of the ſtern poſt) and likewiſe the length of the third, (which is four feet and half afore the back of the ſtern poſt) and by drawing a line from one to the other, the length of the intermediate ones will be found, as they appear when viewed in the ſheer draught, by which they ſeem to diminiſh very much in length as they go up, but when meaſured or viewed on the ſhape of the body, they will be all found nearly of an equal length. The length of the ſtraps of the pintles which come upon the rother may all be within four inches of the aft ſide of the rother, and the rother being a flat ſurface, they will all appear of their proper lengths.

The ſheer draught being now drawn, and every part thereof repreſented, as far as can be done without the aſſiſtance of the body, I ſhall proceed in the next chapter to conſtruct the body and half breadth plans, and ſhall alſo deſcribe thoſe parts of the ſheer draught which are not yet repreſented, on account of their connection with the body and half breadth plans.

CHAP.

CHAP. IV.

Of conſtructing the body and half breadth plans, with further obſervations on the ſheer plan.

THE half breadth plan muſt firſt be drawn; in order to which, draw a ſtraight line below the ſheer plan, the whole length of the ſhip, and parallel to the upper edge of the keel, obſerving to keep it of a ſufficient diſtance beneath the keel line, to admit of the main half breadth line coming clear of the keel; then from the upper edge of the keel ſquare down all the frames to the line juſt drawn, which line is the middle line in the half breadth plan, and repreſents the middle line of the ſhip, paſſing fore and aft or lengthways. The fore and after perpendiculars ſhould alſo be ſquared down to the middle line in the half breadth plan; then from that height in the ſheer plan, where the height of breadth lines interſect the aft part of the ſtem, ſquare down to the middle line the fore part and aft part of the rabbet, and likewiſe the fore part of the ſtem: then take from the dimenſions what the ſtem is ſided at that place, and ſet off half of it from the middle line in the half breadth plan, on the lines ſo ſquared down, and drawing a line to interſect the three lines ſo ſquared, the half breadth of the ſtem will be repreſented in the half breadth plan; then with the compaſſes take the thickneſs of the plank of the

 bottom,

bottom, which is four inches and half, and deſcribe the rabbet of the ſtem in the half breadth plan.

In the next place, ſquare down to the middle line in the half breadth plan, where the height of breadth lines in the ſheer plan interſect the counter timber at the ſide; alſo ſquare down where they interſect the counter timber at the middle line; then ſet off the half breadth of the counter from the middle line in the half breadth plan, on the line firſt ſquared down, and there make a ſpot; then from that ſpot to where the line laſt ſquared down interſects the middle line, draw a curve, by which the half breadth of the counter will be repreſented at the height of breadth, which will be the broadeſt part of the ſtern.

Then take the main half breadth of timber dead flat from the dimenſions, and ſet it off from the middle line on dead flat in the half breadth plan; take alſo from the dimenſions the main half breadth of every timber there expreſſed, and ſet it off from the middle line on their correſponding timbers in the half breadth plan, on every one making a ſpot; then by letting a curve line paſs from the end of the line repreſenting the half breadth of the counter, through all the ſpots ſet off on the timbers, to the aft part of the rabbet of the ſtem, the main half breadth line will be repreſented, by which is ſhewn a ſection of the ſhip lengthways at the broadeſt place, and ſuppoſed to be at the height, and in the direction of the height of breadth lines in the ſheer plan.

Take from the dimenſions the toptimber half breadth, by which the toptimber half breadth line may be alſo deſcribed, proceeding juſt the ſame as before-mentioned for the main half breadth line.

Take

Take alſo from the dimenſions the half breadth of the riſing, and ſet it off from the middle line on the correſponding timbers in the half breadth plan, obſerving where the word *outſide* is expreſſed in the tables, the half breadth for that timber muſt be ſet off below (or outſide) the middle line; then by letting a curve interſect all the ſpots ſet off, the half breadth of the riſing will be repreſented in the half breadth plan.

We may now quit the half breadth plan for the preſent, and proceed to the body plan: draw a line at the after end of the ſheer plan, the ſame height as the upper edge of the keel, and likewiſe to range well with that line, erect a perpendicular on that end neareſt the ſheer plan, obſerving to keep it clear of the ſtern, then from that ſet off the main half breadth of dead flat, and erect another perpendicular, and then the main half breadth from that, and erect a third perpendicular: the line firſt drawn is the baſe line, the firſt perpendicular is called the ſide line of the fore body, the ſecond perpendicular the middle line, and the third perpendicular the ſide line of the after body; by which three lines, and the baſe line firſt drawn, we ſhall be able to conſtruct the body plan, as the heights and breadths muſt all be ſet off from thoſe lines.

In the next place, take from the dimenſions the heights of the diagonals up the middle line, and ſet them from the baſe line up the middle line in the body plan; take alſo the diſtances of them from the middle line on the baſe line, and ſet them off, and likewiſe their heights up the ſide line, and ſet them off alſo; then draw in the diagonal lines, from the ſpots ſet up the middle line to their correſponding ſpots on the baſe and ſide line.

The diagonals being drawn, we may next proceed to the height of breadth lines,

lines; therefore take from the ſheer plan the heights of the lower height of breadth line in the after body, and ſet them off up the middle line in the body plan, and likewiſe up the ſide line to the left (which is the ſide line for the after body;) then at every one of thoſe heights ſet off, draw an horizontal line in pencil from the ſide to the middle line, then take off the upper height of breadth line, and proceed juſt in the ſame manner as deſcribed for the lower height of breadth line.

The riſing muſt next be ſet off on the body plan; in order to which, we muſt firſt deſcribe it in the ſheer plan, take the heights from the dimenſions, and ſet them off on their correſponding timbers in the ſheer plan; then by letting a curve paſs through the heights ſet off, the riſing line will be deſcribed in the ſheer plan: then take from the dimenſions the riſing height of dead flat, and ſet it off in the body plan, drawing an horizontal line; then take all the riſing heights from the ſheer plan, and ſet them off in the body plan, from the line drawn for the riſing height of dead flat, and draw horizontal lines at the ſaid heights: take from the half breadth plan the half breadths of the riſing, and ſet them off from the middle line in the body plan, on their correſponding heights, which will give the centers of the floor ſweeps for their correſponding timbers.

Take from the half breadth plan the main half breadth line, and ſet it off from the middle line in the body plan, on the correſponding lines already drawn for the lower height of breadth; then from where they interſect the lines of their reſpective heights, ſet off the lengths of their reſpective lower breadth ſweeps.

Take from the dimenſions the diſtance each timber is from the middle line

on

on the diagonals, and ſet them off from the middle line on their reſpective diagonal lines, making ſpots at the different diſtances; then having thoſe ſpots ſet off, the lower breadth ſweeps deſcribed, and likewiſe the floor ſweeps, the ſhape of the timbers below the breadth may now be deſcribed, proceeding as follows:

We will firſt deſcribe the midſhip timber, or dead flat; place one leg of the compaſſes in the diſtance ſet off for the length of the lower breadth ſweep, and extend the other to the ſpot which terminates the breadth, which will be in the ſide line; from thence deſcribe a circle downwards which will interſect the ſpots ſet off on the upper diagonal lines, letting it paſs as low as convenient; then fix one leg of the compaſſes in the center of the floor ſweep, and the other in the ſpot ſet off on the fourth diagonal, which is the floor head, and deſcribe a circle, letting it interſect as many of the ſpots on the diagonals as it will; then let a curve paſs from the back of the lower breadth ſweep, through the ſpots on the diagonals, down to the back of the floor ſweep, and from the back of the floor ſweep let another paſs through the ſpots on the lower diagonals to interſect the upper part of the rabbet of the keel, the midſhip timber will then be formed below the breadth; and by proceeding in the ſame manner with the reſt of the timbers, they may all be formed below the lower height of breadth.

Then proceed to form the timbers above the lower height of breadth, where the timbers already drawn interſect the lower height of breadth lines, ſquare them up to their correſponding upper height of breadth lines, and from thence ſet off the length of the upper breadth ſweeps, then fix one leg of the compaſſes in the ſpots ſet off for the upper breadth ſweeps, and the other leg in the line ſquared up, from whence deſcribe a circle upwards: then from the ſheer plan take off the heights of the toptimber lines, and ſet them off in the body plan, drawing horizontal lines, on which ſet off the toptimber half breadths, taken from their correſponding timbers in the half breadth plan.

Then by letting of curves paſs from the back of the upper breadth ſweeps through the ſpots ſet off on the ſeventh or upper diagonal, and interſecting the toptimber half breadths, the timbers will then be formed from the keel to the top of the ſide. The upper end of the timbers will be determined by taking the heights of the upper part of the topſide above the toptimber line, and ſetting them off above the toptimber line on their correſponding timbers in the body plan. The lower part of the timbers are ended at the rabbet of the keel, which muſt be deſcribed in the following manner.

Having the keel drawn in the body plan, ſet the compaſſes to the thickneſs of the bottom which is four inches and half; fix on one leg where the line for the thickneſs of the keel interſects the baſe line, and with the other deſcribe the arch of a circle to interſect the keel line and the baſe, then fix one leg where the arch already deſcribed interſects the keel, and with the other deſcribe an arch from where the keel interſects the baſe, till it interſects the other arch; then from the interſection of both arches draw a ſtraight line to the interſection of the keel and baſe line, and another line to the interſection of the lower arch with the keel, by which the rabbet of the keel will then be deſcribed in midſhips; therefore all the timbers in the midſhip part of the ſhip which have no riſing, terminate where the upper edge of the rabbet interſects the baſe line, but when the timbers begin to riſe, the lower part

of

of them will end in the center of the rabbet, that is, where the two circles interſect.

Thoſe timbers which come near the after end of the keel, muſt be ended by ſetting off the half breadth of the keel at the poſt, in the half breadth plan, and deſcribing the tapering of the keel; then at the correſponding timbers take off the half breadth of the keel, and ſet it off in the body plan, then proceed as before to deſcribe the rabbet, letting every timber end where the two circles for its reſpective rabbet interſect.

The timbers being now formed and ended, proceed to draw in the ſide counter, or ſtern timber; take the height of the wing tranſom, lower counter, upper counter, and toptimber line, at the ſide from the ſheer plan, and transfer them to the body plan, drawing horizontal lines at thoſe heights; draw in likewiſe two horizontal or level lines ſpaced equal between the wing tranſom and lower counter, and one ſpaced equal between the upper counter and the toptimber line in the ſheer plan, and transfer them to the body plan.

Then where the aft ſide of the ſtern timber at the ſide interſects the wing tranſom at the ſide, in the ſheer plan, ſquare it down to the middle line in the half breadth plan; ſquare down alſo the touch of the upper and lower counter, and likewiſe where the ſtern timber interſects the two horizontal lines drawn between, and where the ſtern timber interſects the horizontal line between the upper counter and toptimber line; then having thoſe lines ſquared down to the half breadth plan, you muſt proceed to form curves in the half breadth plan for the ſhape of the body at every one of thoſe heights.

In

In order to which, begin with the level line repreſenting the height of the wing tranſom in the body plan, lay a ſtrip of paper to that line, and mark on it the middle line, and likewiſe the timbers, 37, 35, 33, and 29, transfer it to the half breadth plan, fitting the ſpot marked off on the paper for the middle line well with the middle line of the half breadth plan, and ſetting off the half breadths on their correſponding timbers, 37, 35, 33, and; 29, then let a curve paſs fair through the ſpots ſet off, and to interſect the line ſquared down from the ſheer plan. Then proceed juſt in the ſame manner with the horizontal lines at the height of the counters, between the lower counter and wing tranſom, above the upper counter and toptimber line; then from where the curve ſo drawn in the half breadth plan interſects the lines that was ſquared down from the ſheer plan, take the diſtance to the middle line, and ſet it off on their correſponding lines in the body plan, and by letting a curve paſs through the ſeveral ſpots ſo ſet off, the ſtern timber will thereby be deſcribed in the body plan.

The round-up of the wing tranſom upper and lower counter, may be taken off from the ſheer draught, and ſet off at the middle line above their reſpective level lines in the body plan, by which the round-up of each may be drawn in. The round-aft of the wing tranſom may alſo be taken from the ſheer plan, and ſet off at the middle line, abaft the line ſquared down for the wing tranſom in the half breadth plan, by which the round-aft of the wing tranſom will be deſcribed. The after body being now compleatly formed, we may proceed to forming of the fore body, but as the operation is the ſame with that of the after body, it would be unneceſſary to have a repetition; I ſhall therefore only deſcribe ſuch parts thereof as do not exactly agree with thoſe in the after body.

The

The heeling of the foremoſt timbers muſt be conſidered, as the ending of them is on the ſtem, and conſequently differs from thoſe in the after body; draw a line in the body plan parallel to the middle line, and in diſtance from it half what the ſtem is ſided. Then take the height of the ſheer plan where the timber (which is required to be ended) interſects the lower part of the rabbet of the ſtem, and ſet it off on the line before drawn in the body plan, there making a ſpot; then with the compaſſes take the diſtance in the ſheer plan from where the timber interſects the lower part of the rabbet of the ſtem, to the interſection of it with the upper part, and fix one leg of the compaſſes in the ſpot already made in the body plan, and with the other deſcribe a circle, keeping the compaſſes at the ſaid diſtance, and the timbers may then paſs over the back of the circle ſo deſcribed; then by applying a ſmall ſquare to the timber, and letting the back of it interſect the ſpot ſet off for the lower part of the rabbet, the lower part of the rabbet will be deſcribed, and likewiſe the ending of the timbers.

The foremoſt timbers ſhould alſo be conſidered at the head, as they alſo differ very much in that part from thoſe of the after body, as in conſequence of the ſhip carrying her breadth ſo far forward at the toptimber line, (being nearly as broad forward as in midſhips) occaſions the two foremoſt frames to fall out at the head beyond the breadth, from which they are called knuckle timbers. To deſcribe them, proceed as follows:

The height of the toptimber line being ſet off in the body plan, ſet off on it the top half-breadth taken from the half-breadth plan, and at that place draw a perpendicular line; then from the ſheer plan take the height of the top of the ſide, and ſet it off on the perpendicular line in the body plan;

likewiſe take the breadth of the rail at the toptimber line in the ſheer plan, and ſet it off below the toptimber line, at the perpendicular line in body plan, by which will be determined the ſtraight part of the knuckle timber to be drawn, then from the laſt mentioned ſpot ſet off, let a curve paſs through the ſpots ſet off for the timber, down to the upper breadth, and the whole knuckle timber will then be formed, by which it will be ſeen that thoſe timbers forward will fall out beyond the main breadth with a hollow, contrary to the reſt of the topſide which falls within the main breadth with a hollow.

The after and fore body being now compleatly formed, we may proceed to draw the water lines on the body plan, from which they muſt be deſcribed on the half breadth plan, in order to prove the fairneſs of the bodies.

In this draught the water lines are all repreſented parallel to the keel, their heights therefore may be taken from the ſheer plan, and transferred to the body plan, drawing horizontal lines, by which the water lines on the body plan will be repreſented; but in ſhips that draw more water abaft than afore, the water lines will conſequently be not parallel to the keel; the heights muſt then be taken at every timber in the ſheer plan, and ſet off on their correſponding timbers in the body plan, and letting curves paſs through the different ſpots, the water lines will thereby become repreſented in the body plan.

Take the diſtances from the middle line to where the water lines interſect the different timbers in the body plan, and ſet them off from the middle

middle line on their correſponding timbers in the half breadth plan, where the water lines in the ſheer plan interſects the aft part of the rabbet of the ſtern poſt, ſquare them down to the half breadth plan, and upon the lines ſo ſquared down, ſet off the half thickneſs of the ſtern poſt at its correſponding water line, (which may be taken from the body plan, by ſetting off the ſize of the poſt at the head and the heel, and drawing a line for the tapering of it, and where the line ſo drawn interſects the water lines, that will be the half thickneſs required); then ſet the compaſſes to the thickneſs of the plank, and fix one leg where the half thickneſs of the poſt interſects the line ſquared down, and with the other deſcribe a circle, from the back of which the water lines may paſs through their reſpective ſpots ſet off, and end at the fore part of the half breadth plan, proceeding in the ſame manner as with the after part.

The aft part of the rabbet of the poſt may be ſquared from the water line to the ſpot ſet off for the the half thickneſs of the poſt, by which the rabbet will be repreſented, and likewiſe in the ſame manner the rabbet of the ſtem may be repreſented. The water lines being all deſcribed, we ſhall now be able to ſee if the body is fair, and whether the timbers require any any alteration, which if they ſhould it may be complied with.

The cant timbers of the after body may next be deſcribed in the half breadth plan, in order to which we muſt firſt determine on the cant of the faſhion piece; therefore having the round-aſt of the wing tranſom repreſented in the half breadth plan, and likewiſe the ſhape of a level line at the wing tranſom height, ſet off the breadth of the wing tranſom at the end, which is one foot four inches, and there make a ſpot on the level line, which is the place where

where the head of the faſhion will come, then to determine on the cant of it, we muſt conſult the ſhape of the body, as we muſt cant it in ſuch a manner to preſerve as great a ſtraightneſs as is poſſible for the ſhape of the timber, by which the timber will be much ſtronger than if it were to be very crooked, as then it would conſequently be very much cut againſt the grain; we muſt alſo conſider the cant, as to let the timbers have as little bevelling as poſſible, by which two conſiderations, the converſion will be very much helped.

Therefore, let the heel of the timber be ſet off on the middle line two feet afore timber 35, and then drawing a ſtraight line from thence to the ſpot ſet off on the level line for the wing tranſom, the cant of the faſhion-piece will be deſcribed, and will be found ſituated in the beſt manner poſſible to anſwer the before-mentioned purpoſes.

The cant of the faſhion-piece being repreſented, we may now eaſily determine on the cant of the other timbers; let timber 29 be the foremoſt cant timber in the after body, and draw in timber 28 in pencil; then obſerve how many timbers there are to come in between 28 and the faſhion-piece, which you will find to be nine in number, viz. 29, 30, 31, 32, 33, 34, 35, 36, and 37; then with the compaſſes divide the diſtance between timber 28 and the faſhion-piece on the middle line, into ten diviſions, making nine ſpots: proceed alſo the ſame on the main half breadth line, and then by drawing of ſtraight lines from the ſpots on the half breadth line to their correſponding ſpots at the middle line, the cant timbers of the after body will be thereby repreſented.

The line drawn for the cant of the faſhion-piece repreſents the aft ſide of it, which comes to the end of the tranſoms; but in order to help the converſion with

with regard to the lower tranſoms, there may be two more faſhion pieces abaft the former, therefore the foremoſt faſhion piece, or that which is already deſcribed in the half breadth plan, may only take the ends of the three upper tranſoms, which is the wing, filling, and deck; the middle faſhion piece may take the four next, and the after faſhion piece the lower ones; therefore ſet off in the half breadth plan the ſiding of the middle and after faſhion piece, which may be thirteen inches each, then by drawing of lines parallel to the foremoſt faſhion piece at the aforeſaid diſtance from each other, the middle and after faſhion piece will be repreſented in the half breadth plan.

The faſhion pieces and tranſoms yet remain to be repreſented in the ſheer plan, in order to which, determine on the number of tranſoms required, which for ſo large a buttock may be ſeven below the deck tranſom, draw them in pencil, beginning with the wing, the upper ſide of which is repreſented by a level line at its height, ſet off its ſiding below that, and draw a level line for the lower edge.

The filling tranſom follows, which is merely for the purpoſe of filling the vacancy between the under edge of the wing, and upper part of the deck plank; therefore it may be repreſented by drawing of two level lines for the upper and lower edge, leaving about two inches between the upper edge and lower edge of wing tranſom, and four inches between the lower edge and the gun deck plank; then the deck tranſom muſt be governed by the gun deck, letting the under ſide of the gun deck plank repreſent the upper ſide of it, and ſetting off its ſiding below that, the under edge may be drawn in alſo; the tranſoms below the deck may all be ſided equally, which may be eleven

 inches,

inches, they muſt alſo have a ſufficient diſtance between them for the circulation of the air to preſerve them, as thoſe timbers are more difficult to ſhift than any others in the ſhip; therefore by ſetting them off to have three inches diſtance between each, and drawing of horizontal lines at their different heights they will thereby be repreſented.

The tranſoms being now drawn in pencil, we muſt proceed to find the length of them as they appear in the ſheer plan, in order to draw them in ink, we muſt therefore deſcribe the faſhion pieces as they appear in the ſheer plan, by which the length of the tranſom will be determined.

The foremoſt faſhion piece may be firſt deſcribed, as that reaches above the upper tranſoms, in order to which, proceed and draw in the ſheer plan a ſufficient number of level lines, or as the water lines are level, they will ſuffice only by drawing one level line between the upper water line and the wing tranſom, and one above the wing tranſom at the height you intend the head of the faſhion piece ſhould run, which may be about five feet; then take the heights of thoſe two level lines and transfer them to the body plan, and take off two or three timbers and run them in the half breadth plan, in the ſame manner as the water lines were done; then where the line drawn for the cant of the faſhion piece in the half breadth plan interſects the level line for the head of the faſhion piece, ſquare it up to the ſaid level line in the ſheer plan, making a ſpot; take alſo the interſection of the cant line with the level line for the wing tranſom in the half breadth plan, and ſquare it up to the wing tranſom in the ſheer plan, then take where the cant line in the half breadth plan interſects the level line below the wing tranſom, and alſo the water lines, ſquaring their interſections up to their correſponding lines in the ſheer

ſheer plan, then by letting a curve paſs through the ſeveral ſpots ſo ſet off, the foremoſt faſhion piece will be deſcribed, as it appears when viewed in the ſheer plan; in the ſame manner may the middle and after faſhion piece be deſcribed, obſerving to let the middle one run up no higher than the under part of the deck tranſom, and the after to the under ſide of the fourth tranſom under the deck; the tranſoms may now be drawn in ink as their length are limitted by the lines for the faſhion pieces.

The ſtern poſt may now be compleated (the fore ſide being not drawn in, nor the head of it determined) take from the dimenſions how much the ſtern poſt is fore and aft at the keel, and ſet it off on the upper edge of the keel, from the line repreſenting the aft ſide, making a ſpot, then the head of the poſt muſt be determined, which muſt run juſt high enough to admit of the helm port tranſom and the tiller coming between it and the upper deck beam, the height therefore that is neceſſary will be one foot nine inches above the wing tranſom; draw a level line for the head at that height, and ſet on it the ſize of the ſtern poſt at that place taken from the dimenſions, and then drawing a ſtraight line from thence down to the ſpot ſet off on the keel, (obſerving not to draw the line through the tranſoms as it will only appear between them) the fore ſide of the ſtern poſt will be deſcribed, and the ſtern poſt compleated.

The inner poſt may be drawn by ſetting off the byeneſs fore and aft from the ſtern poſt, and drawing a ſtraight line as before, continuing it no higher than the under ſide of the deck tranſom.

The cant timbers of the after body being deſcribed, and every part alſo which depended on them, we may now proceed to the cant timbers of the fore

fore body, in order to which we muſt firſt determine on the foremoſt and aftermoſt cant timber, and likewiſe the cant of the foremoſt one, therefore under the ſame conſiderations as thoſe of the after body, the foremoſt cant timber will extend as far forward as to be named &c, the cant on the middle line may be one foot four inches afore ſquare timber W, and on the main half breadth line one foot nine inches afore Y, in which ſituation the line may be drawn for the cant; the aftermoſt may be timber Q. They may now all be drawn in, proceeding as before deſcribed for thoſe of the after body, which is only ſpacing them all equally between the cant timber &c, and the ſquare timber P, both on the main half breadth and middle line, and drawing their lines from the ſpots on the main half breadth line to their correſponding ſpots on the middle line, obſerving to let them run out to the toptimber half breadth line, where it comes without ſide the main half breadth line.

The hawſe pieces muſt next be conſidered in the half breadth plan, the ſides of which muſt look fore and aft with the ſhip, by reaſon of the round bow; take the ſiding of the apron, which may be about four inches more than the ſtem, and ſet off half of it from the middle line, drawing a line from the main half breadth to the foremoſt cant timber, which will repreſent the foremoſt edge of the knight head; then from that ſet off the ſiding of the knight head, which may be one foot two inches, and draw in the aft ſide of it: the hawſe pieces may then be drawn, which are four in number, by ſetting off their ſidings (one foot ſix inches) parallel from the knight head, and from each other, and then by drawing of ſtraight lines from the main half breadth line to the foremoſt cant timber, they will be repreſented.

In the next place, deſcribe the hawſe holes, which ſhould be placed in ſuch a manner as to wound the hawſe pieces as little as poſſible; they may

may therefore be placed ſo that the joint of the hawſe pieces ſhall be in the center of the holes, by which they will only cut half the hawſe pieces; whereas were they placed between the joints they would cut the hawſe pieces right off. Take the dimenſions of the hawſe holes, which is one foot ſix inches, and ſet off the foremoſt one, or that next to the middle line on the joint between the firſt and ſecond hawſe piece, then ſet off the other on the joint between the third and fourth hawſe piece, and by drawing of ſmall lines acroſs the main half breadth line at their reſpective places, they will thereby become repreſented in the half breadth plan.

The hawſe holes ſhould now be repreſented in the ſheer plan, in order to which determine on their place there; in this claſs of ſhips they always are placed in the middle between the cheeks, therefore ſet off their diameter (one foot ſix inches) between the cheeks, drawing of lines parallel to the cheeks for their upper and lower part, then to determine on their ſituation agreeable to the half breadth plan, which is the fore and aft way, we muſt ſquare up from the half breadth plan where they interſect the main half breadth line, to the lines drawn between the cheeks, which will give the true ſituation the fore and aft way, then by deſcribing them as round or circular, agreeable to the ſpots ſet off, they will be repreſented as they appear when viewed in the ſheer plan.

The apron may be drawn in the ſheer plan, ſetting off its bigneſs from the ſtem, and letting it come as low that the ſcarph may be about two feet higher than the foremoſt end of the fore foot, by which it will give ſhift to the ſcarphs of the ſtem, it may run up to the head of the ſtem.

The

The cutting down ſhould next be drawn, therefore take from the tables of dimenſions the different heights there expreſſed, and ſet them off from the upper edge of the keel on their correſponding timbers in the ſheer plan; then by letting a curve paſs through the ſpots ſet off from the inner poſt aft, to the apron forward, the cutting down line will be repreſented; next ſet off from the cutting down the thickneſs of the limber ſtrake, which is eight inches and half, and then by letting another curve paſs parallel to the former, the limber ſtrake will be deſcribed, from which the depth in the hold is always meaſured.

In the next place proceed to draw in the keelſon, by taking the depth of it from the dimenſions, which is one foot ſeven inches, and ſetting it off above the cutting down line, and by letting a curve line paſs fore and aft, parallel to the cutting down, the keelſon will thereby be deſcribed.

The cutting down line being deſcribed, we may now be able to repreſent the knee of the dead wood abaft timber 27, being the after floor timber; ſet off the ſiding of the floor abaft it, and erect a perpendicular line in the ſheer plan, which will terminate the foremoſt end of the after dead wood, then the fore and aft arm of the knee may be half the length of the whole dead wood, and the up and down arm reach to the under part of the lower tranſom, and the whole knee muſt be placed in ſuch a manner that the upper piece of dead wood ſhall bolt over it, and be of as much ſubſtance as the knee itſelf, therefore the cutting down line repreſenting the upper part of the dead wood, the knee muſt conſequently be placed its whole thickneſs below that line.

The

The ſheer draught is now compleatly formed, and every part thereof repreſented, as alſo the body and half breadth plans, from which the ſhip may be laid down in the mould loft, and likewiſe the whole frame may be erected; and to complete the whole ſhip there only now remains to draw a profile of the inboard works; but as the uſe of the diagonal lines in the body plan has not yet been ſufficiently explained, I ſhall therefore proceed to treat of them in the next chapter.

CHAP. V.

Containing an explanation of the nature and uſe of the diagonal lines in the body plan.

THE diagonal lines in the body plan are mentioned in the tables of dimenſions, merely for the purpoſe of forming the body therefrom; but after the body is formed they are of very principal uſe, as at their ſtations the ribbands and harpins which keep the body of the ſhip together whilſt in her frames, are all deſcribed, and the heads of the different timbers in the frame likewiſe determined; it conſequently follows that a particular explanation of them is neceſſary: I ſhall therefore begin with the

Lowermoſt, or N° 1, which is termed the Lower Sirmark, at which place the bevellings are taken for the hollow of the floors; its ſituation is generally in the middle between the keel and floor ſirmark.

Second

Second Diagonal is placed in the midſhips, about eighteen inches below the floor head, and is the ſtation where the floor ribband is placed in midſhips, and likewiſe the floor harpin forward, there is alſo a bevelling taken at this diagonal all the way fore and aft, from which it is termed the Floor Sirmark.

Third Diagonal terminates the length of the floors, and is therefore called the Floor Head, there are likewiſe bevellings taken at this diagonal to as far forward and aft as the floor extends. The placing of this diagonal is of the utmoſt conſequence to the ſtrength of the ſhip, it being ſo near to that part of the bulge which takes the ground, and of conſequence is always liable to the greateſt ſtrain, it ſhould therefore be placed as much above the bearing of the body in midſhips as could be conveniently allowed by converſion of the timber, but afore and abaft it is of not ſo much conſequence.

Fourth Diagonal is placed in the middle between the floor head and fifth diagonal, at which place a ribband and harpin are ſtationed for the ſecurity of the firſt or lower futtock, from which it is termed the Firſt Futtock Sirmirk. There are alſo bevellings taking at this diagonal all fore and aft, which being part of the body where the timbers moſt vary, occaſions them to be the greateſt bevellings in the whole body.

Fifth Diagonal terminates the heads of the firſt futtocks, and is therefore called the Firſt Futtock Head; it ſhould be placed at a convenient diſtance above the floor head, in order to give ſufficient ſcarph to the lower part of the ſecond futtocks, which is particularly obſerved in the tables of proportions. There is likewiſe bevellings for the timbers taken at this diagonal all fore and aft.

Sixth

Sixth Diagonal ſhould be placed in the middle between the firſt futtock head and ſeventh diagonal, at which place the ribband and harpin are ſtationed for the ſupport of the ſecond futtocks, and bevellings are alſo taken at this diagonal all fore and aft; it is termed the Second Futtock Sirmark.

Seventh Diagonal terminates the ſecond futtock heads from the fore to the aftermoſt floors, and afore and abaft them it terminates the double futtock heads in the fore and after cant bodies; it ſhould be placed in midſhips as much above the firſt futtock head, as the firſt futtock is above the floor head, by which it gives the ſame ſcarph to the lower part of the third futtock as the firſt futtock does to the ſecond; there are bevellings alſo taken all fore and aft at this diagonal, and it is termed the Second Futtock Head.

Eighth diagonal is the ſtation for the ribband and harpin which ſupports the third futtocks, and is therefore placed between the ſecond futtock head and ninth diagonal; it is alſo a bevelling place, and is termed the Third Futtock Sirmark.

Ninth and laſt diagonal is placed the ſame diſtance above the ſecond futtock head, as that is above the firſt, and terminates all the heads of third futtocks which are in the frames, as thoſe come between the ports; but ſuch as are between the frames and come under lower deck ports, muſt run up to the under part of the ports, as no ſhort timbers ſhould by any means be admitted under the ports, which require the greateſt ſtrength that is poſſible. This diagonal is likewiſe a bevelling place for the heads of the third futtocks, and is therefore called the Third Futtock Head.

 The

The fourth futtock heads are terminated by the under part of the upper deck ports all fore and aft, and a ribband is placed fore and aft at the height of the upper breadth line, another between the lower and upper deck ports, and one at the toptimber line, which, with the ribbands and harpins before-mentioned, keeps the whole body of the ſhip together, and likewiſe in its proper form and ſhape.

It muſt be obſerved, that the diagonal lines laid down in the dimenſions, will not correſpond to what has been ſaid upon the diagonals in this chapter, as they were drawn diſcretionally upon the body for the purpoſe of giving the true dimenſions of it; the ſtudent muſt therefore, when he has his body drawn in fair, rub out the firſt diagonals (which ſhould only be in pencil) and then proceed to draw in the proper diagonals in red ink, ſtrictly adhering to what has been ſaid on the ſubject.

CHAP VI.

In which are laid down inſtructions for drawing or delineating a profile of inboard works for the eighty gun ſhip, with obſervations and remarks on the inboard works of ſhips in general.

A Draught being now conſtructed of the outboard works, wherein every part is deſcribed that is neceſſary to enable the artiſt to put the ſhip in her frames, we muſt now proceed to form another draught to contrive the cavity

cavity of the ſhip, or inboard works, and in ſuch a manner as to admit of the due ranging and diſpoſing of every thing therein contained, to the beſt advantage.

It is very uſual to draw the inboard works in the ſheer draught, but it generally occaſions much confuſion; it is therefore the beſt and eaſieſt method to appropriate a draught to that purpoſe, by which every part will be clear, and eaſier to be underſtood, and likewiſe be more conſpicuous to the view, and the artiſt alſo, when he has it formed, will not be under the neceſſity of working from his principal draught.

Take from the ſheer draught the ſtem, ſternpoſt, counter timbers and keel, and deſcribe them on another paper; draw in likewiſe the cutting down, keelſon, apron, tranſoms, faſhion pieces, and decks, alſo the upper line of the ſheer all fore and aft, timbers and ports, which will be found all that is neceſſary for our preſent purpoſe.

The beams come firſt under conſideration, and ſhould be ſo diſpoſed as to come one under, and one between, each port, or as near as can be to anſwer other works of the ſhip; but where it happens that a beam cannot poſſibly be placed under the port, then a beam arm ſhould be introduced to make good the deficiency; every beam, and likewiſe the beam arms, ſhould be kneed at each end with one lodging and one hanging knee, and in thoſe parts of the ſhip which require the knees to be very acute, ſuch as the after beams of the gun deck, and in ſome ſhips (whoſe bodies are very ſharp) the foremoſt beams of the gun deck, then there ſhould be knees of iron: care ſhould be taken always to let the upper ſide of the knees be below the ſurface of the beams in

large

large ſhips one inch and half, and ſmall ſhips one inch only, which gives the air a free paſſage between the knees and under part of the deck.

In the converſion of the beams, that ſide as the lodging knee is at ſhould be left as broad at the end of the beam as can poſſibly be allowed by the timber, letting the beam hold its proper ſcantling at the end of the lodging knee, and by ſo doing the lodging knees will be more without a ſquare, which conſequently makes them the more eaſy to be provided.

In ſhips where the beams can be got in one piece, they ſhould be ſo diſpoſed as to have every other one with the butt-end the ſame way, for this reaſon, that the butts will decay before the tops: in large ſhips the beams are made in two or three pieces, and are allowed to be ſtronger than thoſe that are in one piece. The beams in two pieces may have the ſcarph one-third of the length, and thoſe in three pieces ſhould have the middle piece half the length of the whole beam: the cuſtomary way of putting them together is to table them, and the length of the tablings ſhould be one-half more than the depth of the beam; it is very common to divide the tablings in the middle of the beam, and that part which is taken out at the upper ſide, to be left at the lower ſide, and then kerſey or flannel is put into the ſcarph; when done in this manner, the water is liable to lay in the ſcarphs, and muſt be the means of rotting the beams; but if the beams were tabled together in dovetails, and taken through from ſide to ſide, putting tar only between them, which hardens the wood, the water occaſioned by the leaking of the decks would then have a free paſſage, and the beam would dry again, and this method would not be found inferior in point of ſtrength to the other. The length of the fore and aft arm of the lodging knee ſhould extend to the ſide of the hanging knee next to it,

but

but there is no neceſſity for that arm to be any longer than the other. In faſtening the knees care ſhould always be taken to let one bolt paſs exactly through the middle of the throat, one foot ſix inches from each end, and the reſt divided equally between, obſerving always to have the holes bored ſquare from the knee; the bolts for the thwartſhip arms of both hanging and lodging knees may go through the arms of each knee, and drove every one the other way.

We may now proceed to draw the beams in the draught; take the moulding of the lower deck beams, and ſet it off below the line repreſenting the deck at the ſide, and draw a line in pencil parallel thereto, which will repreſent the under ſide of the beams: in the ſame manner repreſent the under ſide of the beams for the upper deck, quarter deck, forecaſtle, and roundhouſe; then take the ſiding of the lower deck beams, and place one under, and one between, each port, all fore and aft, only drawing them in pencil; determine on the dimenſions of the well fore and aft, which is ten feet, ſet it off abaft the beam under the eighth port, placing the beam under the ninth port at that diſtance; thoſe two beams may then be drawn in ink, and will terminate the extent of the well the fore and aft way, and as there cannot be a beam go acroſs the ſhip by its being the well and maſt room, there muſt be a beam arm between thoſe two beams, placing the end at the ſide its thickneſs neareſt to that beam it does not bolt to.

The main hatchway ſhould be determined upon, letting the beam that forms the fore part of the well, form the aft part of it; then the beam under the next port may form the fore ſide of it, which beam may alſo be now drawn in ink; there ſhould alſo be another beam arm introduced in wake of the main hatchway.

The fore hatchway may alſo be determined, the fore ſide of which ſhould range well up and down with the after end of the forecaſtle, and it may be fore and aft 4-7ths of the main hatchway; at the fore ſide of the fore hatchway there muſt be a ladder way down to the orlop, which may be fore and aft agreeable to what the ſpace of the beams will allow; the reſt of the beams afore the fore hatchway may remain as firſt placed, there being nothing in the way to alter the ſhift: determine on the after hatchway, the fore ſide of which comes to the aft ſide of the main maſt room.

There ſhould alſo be a hatchway, the fore ſide of which may be formed by the aft ſide of the beam under the twelfth port, which is for the conveniency of the ſpirit and fiſh rooms, and there ſhould be a ladder way abaft it, which ſhould lead down to the cockpit. There may be alſo another hatchway, the fore ſide of it to be formed by the aft ſide of the beam under the eleventh port; the ſize of which ladder and hatchways muſt be governed by the beams, as when there is once a good ſhift of beams they ſhould never be altered for ladder and hatchways, unleſs it is the three principal hatchways, which muſt always be of a proper ſize, according to the ſize of the ſhip.

The after capſtan muſt be placed between thoſe two hatchways laſt deſcribed, and the beams abaft may ſtand as they are already ſhifted, obſerving only the mizen maſt. There ſhould be a ſmall ſcuttle placed afore the ſecond beam from aft, for the convenience of the bread room; it muſt be on one ſide the middle line, as there is a carling at the middle under the four of five after beams, to receive the pillars for the ſupport thereof.

The bits may be placed, letting the fore ſide of the after ones come againſt the

the aft ſide of the beam abaft the third port, and the foreſide of the foremoſt ones againſt the next beam, but one forward; then at the fore ſide of each bit there ſhould be drawn a ſmall ſcuttle for the conveniency of handing up the powder from the magazine. The breaſt hook ſhould alſo be drawn, which may be three feet the moulding way, and ſided 9-10ths of the beams of the lower deck.

The gun deck, beams, knees, &c. being deſcribed, I ſhall now proceed to the upper deck; the ſame precautions in ſpacing the beams muſt be uſed, the ſame upon all the decks that has ports, as hath been before ſpoken of, only obſerving to keep the beams upon one deck as near as can be over the beams on the other, for the conveniency of pillaring, as they will then ſupport each other.

Conſider the hatchways, placing them all exactly over thoſe on the lower deck, ſo that conſequently where there is a beam arm on the lower deck, there muſt likewiſe be one about it on the upper deck, and the ſame on the middle deck in three deck ſhips. It commonly happens in ſhips of the line, that there cannot be a whole beam between the deck breaſt hook and the beam that ſupports the ſtep of the bowſprit, becauſe the bowſprit paſſes down through that place, when it ſo happens, there muſt be a beam arm placed, letting the end come equally between the beam and the breaſt hook; but in ſhips that the bowſprit will allow of a whole beam, then the ports and the reſt of the beams muſt be conſulted in order to ſpace it, and when it ſo happens that the fore maſt comes in wake of a port, then a beam arm muſt be neceſſarily introduced.

Then having placed the beams according to the diſpoſition of the other beams below, the ladder ways ſhould be contrived; there ſhould be one next abaft

abaft the fore hatchway, which is a ſingle ladder way, and one next afore the main hatch, which is a double ladder way, and the ladders ſtanding the fore and aft way, there ſhould be alſo another next abaft the after hatch, and likewiſe one over the cockpit, correſponding with that on the lower deck.

The next thing to be conſidered are the capſtans, the after one is already placed on the lower deck, the barrel of which muſt paſs through the upper deck to receive the whelps and drumhead there, it being a double capſtan. In three deck ſhips the upper part of the capſtans are on the middle deck, and in one deck ſhips they have only this one capſtan, the upper part of which is placed on the quarter deck. The foremoſt capſtan ſhould be placed in the moſt convenient ſpot to admit of its being lowered down to the orlop, out of the way of the long boat; therefore it may be placed between the main and fore hatchway, the beam under the ſixth port of the lower deck may form the aft ſide of its room, the beams on each ſide of it ſhould be placed exactly over or under the beams on the other decks, and ſhould be in diſtance from each other ſufficient to let the drumheads paſs between them. The center of the capſtan ſhould then be placed in the middle between the beams which compoſe its room, and the partners ſhould be fitted in that manner as to ſhift occaſionally when wanted, which is by letting them be in two pieces fitted in together; the partners on the lower deck wherein the canſtan ſteps, muſt be ſupported by a pillar on the orlop deck, the lower part of which may be fitted in an oak chock, ſo that when the pillar is taken away, and the capſtan lowered down, that chock ſerves as a ſtep for the capſtan; thoſe two beams on the orlop, by having the pillar and chock upon them, conſequently has the whole weight of the capſtan preſſing downwards, and in order for the

the ſupport of them there ſhould be a carling placed underneath the fore and aft way, with three pillars, one under each beam, and one between and all ſtept in the keelſon by which the orlop deck will be well ſupported in wake of the capſtan, and the other decks will feel no ſtrain at all from it.

In the next place diſpoſe of the fire hearth, which is placed different according to the ſize of the ſhip, for in three deckers it is found moſt convenient to place it on the middle deck, which by ſo doing conſequently makes much more room under the fore caſtle than otherwiſe would be was it placed there. In all two deck ſhips it is placed under the forecaſtle, becauſe on the deck underneath the bitts are in the way, and it is alſo under the fore caſtle in one deck ſhips though confined between the bitts; therefore in one deck ſhips it ſhould be kept as near as poſſible to the after bitts, that there may be more room between it and the foremoſt bitts to make a good galley.

The main top ſail ſheet bitts next claims our attention, the foremoſt of which muſt be placed ſo as to let its fore ſide come againſt the aft ſide of the beam abaft the main hatchway, and to paſs down to the lower deck, and there ſtep in the beams, admitting of its being a ſtraight piece it would come at the aft ſide of the lower deck beam, the ſame as it does at the upper deck beam, in conſequence of thoſe two beams ranging well up and down with each other, it muſt therefore have a caſt under the upper deck beam, by which the lower part may be brought forward ſufficient to ſtep in the lower deck beam. The aftermoſt muſt be placed againſt the fore ſide of the beam abaft the maſt, and ſtep on the beam below, but there is no neceſſity to provide a crooked piece as before, for the beam of the upper deck may be moved a little farther aft, till it admits of the bitt ſtepping on the lower deck beam, unleſs the beam comes under a port, which in that caſe it muſt not by any means be moved, proceeding then as was firſt obſerved; the croſs pieces to the bitts ſhould be on the fore ſide, and ſhould be in height from the upper deck about one third of the height between it and the quarter deck. Then with regard to the heads of the bitts, we ſhould conſider the length of the ſhips waſte, and if there is length enough from the fore caſtle to the foremoſt bitts for to admit of the ſpare geer being ſtowed thereon without reaching farther aft, then the quarter deck may run ſo far forward that the head of the foremoſt bitts ſhall tenon in the foremoſt beam which gives the main maſt another deck, and admits of the quarter deck being all that the larger; but if there is not the room beforementioned then the quarter deck muſt run no further forward than the after bits, which will then tenon in the foremoſt beam, and the foremoſt bitts muſt have a croſs piece let on their heads, which is termed a horſe, and will be for the purpoſe of receiving the ends of the ſpare geer.

We may now proceed to the quarter deck and fore caſtle. The length of the quarter deck being before determined upon, the firſt object preſenting itſelf is the beams; therefore in placing them the different contrivances on the quarter deck ſhould be conſulted, and alſo the general rule which is to be obſerved for the quarter deck of all ſhips in general; we muſt therefore obſerve that it is neceſſary in the quarter deck, round-houſe, and forecaſtle, to have no carlings or ledges (except carlings for the hatches) as being a quantity of timber expended for no other purpoſe than to weaken the beams, they being very ſmall, or at leaſt ſhould be ſo as much as the ſize of the ſhip will admit of, for lightneſs in her upper works; therefore as having no carlings and

and ledges, the deck muſt certainly require a greater number of beams, and a good round up, as on the contrary the deck would be apt to bend with its own weight; the moſt approved rule is therefore to have double the number of beams in the quarter deck, as there is in the upper deck in the quarter decks length.

Then proceed to ſhift them to the greateſt advantage, conſulting the hatchways and ladderways, maſts, bitts, ſteering wheel, &c. in reſpect to the ladderways on the quarter deck of all ſhips, there ſhould be one near the fore part of the great cabbin for the officers, and another near to the foremoſt end of the quarter deck, conſiſting of double ladders for the conveyance of the men up from the other decks in caſes of emergency, and likewiſe one on each ſide at the fore part of the quarter deck from the gang ways, and in every ſhip of the line all the beams from the foremoſt ladder way to the after one ſhould be open with gratings for the more expedition of conveyances of different things in time of action, and alſo for air.

You may diſpoſe of two ſcuttles, one on each ſide abreaſt of the main maſt, (if the main maſt happens to come through the quarter deck) for the top tackles to paſs through, to hook to the eye bolts drove in the upper deck for that purpoſe.

You may diſpoſe of the ſteering wheel, which ſhould be placed under the forepart of the round-houſe, and the two beams of the quarter deck which comes under it ſhould be placed conformable to the two uprights, ſo that they may tenon in them. The quarter deck beams ſhould be kneed at each end, with one hanging and one lodging knee which adds greatly to the ſtrength of the ſide, the hanging knees which come in the great cabbin may

be

be of iron, their up and down arms two thirds of the length of these of wood, which should reach the spirketting; it should be observed that the beam abaft which comes under the screen bulkhead should round aft agreeable to the round of the bulkhead, in order for the support of the same.

The fore castle beams should be placed according as the works of the deck will admit; therefore, first consider the hatchways, there should be one for the funnel of the fire hearth to pass through, and one over the copper to admit of vent for the steam, and also one or two over the galley as the forecastle will admit of; consider the fore top sail sheet bitts, which should be so disposed as to come one pair on the fore, and one on the aft side of the mast, to let into the side of the forecastle beams, and step on the upper deck beams below; there should be also a ladderway at the fore part of the forecastle for the conveniency of the fore part of the ship.

Then after these things have been considered, the beams may be placed agreeable to them, letting the number of beams be four more then there is in the upper deck in the fore castles length, and where there happens to be a wide opening between the beams, as where hatchways are, mast room, &c. then a half beam of fir may be introduced, which will make good the deficiency. The foremost beam should be broad enough to take the aft side of the inboard arms of the catheads, as they are secured upon this beam by being bolted thereto; every beam of the fore castle should be kneed at each end, with one hanging and one lodging knee, the up and down arms of the hanging knees should reach the spirketting, and the knees well bolted and carefully clenched.

Proceed

Proceed to the round-houſe, letting the ſame obſervations ſuffice with reſpect to the beams as were made on thoſe of the quarter deck, for as the round-houſe beams are ſided very ſmall, it conſequently requires them to be near to each other; therefore let the number of beams on the round-houſe be four more than in the ſame length of the quarter deck, let every other beam be fir for lightneſs, and every oak beam may be kneed at each end, with one hanging and one lodging knee, the hanging knees abaft may be of iron, their up and down arms to be in length two-thirds of thoſe of wood. The round-houſe ſhould always have a great round up, both for ſtrength and conveniency; there muſt be on the round-houſe a ſmall pair of knee bitts on each ſide the mizen maſt, turned round and ſcarphed over each other, and bolted through the maſt carlings; there muſt alſo be a companion on the round-houſe placed over the middle of the coach in order to give light thereto.

With regard to placing the round-houſe beams, there is only to obſerve the uprights of the ſteering wheel, and the mizen maſt, as when the beams which interfere with thoſe parts are properly ſpaced, then the reſt may be diſpoſed of at diſcretion, or at equal diſtance from each other, and letting the beam over the ſcreen bulk-head have a proper round aft agreeable to the quarter deck beam underneath.

The upper parts of the inboard works being now deſcribed, we may proceed to the lower parts, or thoſe which come beneath the lower deck; therefore draw in the orlop by taking the heights afore, midſhips, and abaft, between that and the gun deck, from the dimenſions, and letting a curve paſs fore and aft, the upper part of the deck will be repreſented, and ſetting off the thickneſs of the plank below that, the under ſide of the plank will be

 repreſented

repreſented alſo. But as this deck does not run quite forward nor aft as the other decks, we muſt next determine on the length of it; therefore let the after beam be placed at a ſufficient diſtance from aft, to admit of the bread rooms being of a proper ſize for the ſhip, which will be under that beam of the gun deck that comes at the ſecond port from aft.

The after beam being drawn in, proceed to ſpace the other beams, placing them exactly under thoſe of the gun deck, and that which comes under the foremoſt beam of the gun deck may terminate the fore part of the orlop; draw the limber ſtrake by ſetting off its thickneſs above the cutting down line, and letting a curve paſs parallel thereto, it will be thereby repreſented. That part of the orlop which is over the after magazine, ſpirit room, and fiſh room, and that likewiſe which is over the fore magazine is laid with thicker plank than the reſt of the deck, which is for the better ſecurity of thoſe places, and the plank is likewiſe laid over the beams; but in the midſhips, from the fore part of the ſpirit room, to the aft part of the foremoſt magazine, the beams are laid level with the ſurface of the deck, and the planks are rabbitted in from one beam to the other.

Therefore to repreſent the orlop as juſt deſcribed, we muſt terminate on the different apartments above mentioned; let the aft ſide of the after beam be the aft ſide of the after magazine, and from thence draw the bulk-head down to the limber ſtrake, and the fore ſide of the third beam may be the fore ſide of the after magazine, drawing that bulk-head likewiſe, which will alſo form the aft ſide of the fiſh room; then the fore ſide of the fiſh room may be drawn from the aft ſide of the fifth beam, which will alſo repreſent the aft ſide of the ſpirit room; then the fore ſide of the ſpirit room may be drawn

from

from the fore ſide of the ſixth beam; then conſequently from the fore ſide of the ſixth beam quite aft the deck, will be repreſented by the two lines already drawn, and the upper ſide of the beams will be repreſented by the lower line.

In the next place proceed to the fore part of the orlop, letting the foreſide of the after bitts be the aft part of the foremoſt magazine, drawing the bulk-head thereof, which will come to the aft ſide of the ſixth beam; therefore from the ſixth beam to the foremoſt end of the orlop, the plank and beams will be repreſented juſt in the ſame manner as before mentioned for the after part of the orlop, then the midſhip part of the deck will be repre-ſented by letting the upper line be the upper ſide of the plank, and like-wiſe the upper ſide of the beams, and the lower line will repreſent the lower edge of the plank, only drawing it from beam to beam, and obſerving not to let it paſs through them.

The hatchways, &c. may now be repreſented on the orlop, letting the main, fore, and after, be exactly under thoſe of the gun deck, there muſt be one over the fiſh room, and one likewiſe over the ſpirit room; there muſt be two ſcuttles over the after magazine, for the paſſages to the magazine and light room; there ſhould alſo be one afore the fourth beam from forward, for the paſſage to the fore magazine, and one abaſt the ſecond beam for the paſſage to the light room.

The bulk-heads for the fore and after parts of the well may be drawn from the lower deck beams to the orlop, and from thence to the limber ſtrake in the hold. The ſhot lockers may alſo be repreſented, having one afore, and one

one abaft the well, there ſhould alſo be one abaft the foremoſt magazine, the ends of which may be formed by the after bitts. The ſteps for the maſts may be drawn in by continuing their centers down to the limber ſtrake, and likewiſe two crutches abaft the mizen ſtep, divided equally between that and the after part of the cutting down; the breaſt-hooks may alſo be drawn, letting them be five in number below the lower deck hook, and all equally divided between that and the fore ſtep.

Every part of the inboard works being now deſcribed, as far as is neceſſary, and alſo the outboard works, with the body and half breadth plans, I ſhall in conſequence thereof finiſh this chapter, and likewiſe come to a concluſion of the third book.

END OF THE THIRD BOOK.

A

TREATISE

ON

MARINE ARCHITECTURE.

BOOK IV.

HAVING in the foregoing book laid down inſtructions from the eighty gun ſhip, whereby the ſtudent may have come to a thorough knowledge of the nature of forming, or drawing a draught; I ſhall in this book proceed to furniſh him with a ſet of dimenſions for forming the bodies of different claſſes of ſhips in the navy, all of which I have ſelected as being the moſt approved bodies, by gentlemen of very diſtinguiſhed abilities, and ſhall likewiſe lay down the principal dimenſions and ſcantlings of each. The ſtudent may then, by theſe means, become in poſſeſſion of a ſet of draughts, whereby he may indulge in ſpeculation, and perſevere in finding out thoſe points which are as yet undetermined.

TABLES of Dimenſions for forming the Bodies of ſeveral Rates of Ships in the Navy.

1. Royal Sovereign, of 100 Guns.

Fore Body.	Timbers Names.																	
	⊕		(D)		D		H		M		Q		U		Z		& 3	
	Ft.	In.	Ft.	In	Ft.	In.	Ft.	In	Ft	In.	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In.
Lower height of breadth	18	10	18	10	18	11	19	3	19	7	20	6	22	2	25	3	28	11
Upper ditto	24	2	24	2	24	2	24	2	24	4	24	7	25	7	27	9	30	6
Height of the toptimber line	44	5	44	5	44	5	44	7	45	0	45	7	46	4	47	3	47	11
Height of the cutting down	1	9	1	9	1	9	1	11	2	5	2	9	3	11	6	2	10	0
Height of the riſing*	0	5	0	5	0	5	0	7	0	10	1	6	3	0				
Main half breadth	25	7½	25	7½	25	7½	25	7	25	6	25	3	24	0	21	2	16	7
Riſing half breadth	10	5	10	5	10	5	10	5	10	2	9	5	7	9				
Toptimber half breadth	18	7	18	7	18	7	18	7	18	6	18	4	18	0	17	5	16	6
Topſide's half breadth	17	8	17	8	17	8	17	8	17	8	17	8	17	9	17	5	16	6
Length of lower breadth ſweeps	18	6	18	6	18	2	17	8	17	1	16	2	17	0	16	10	12	4
Firſt diagonal line	10	6	10	6	10	6	10	6	10	5	10	2	9	2	6	2	1	9
Second ditto	18	0	18	0	18	0	17	10	17	7	17	0	15	3	10	11	5	3
Third ditto	23	5	23	5	23	4	23	2	22	11	22	0	19	9	14	4	7	11
Fourth ditto	27	8	27	8	27	8	27	6	27	3	26	4	24	1	19	2	12	0
Fifth ditto	29	8	29	8	29	8	29	8	29	3	28	6	26	9	22	9	16	2
Sixth ditto	20	9	20	9	20	9	20	9	20	7	20	5	20	0	18	6	16	4

* Length of the floor ſweeps above the riſing is 12 feet all fore and aft.

After

After Body.	Timbers Names.																	
	3		7		11		15		19		23		27		31		32	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Lower height of breadth	18	10	19	0	19	3	19	10	20	7	22	0	24.	2	27	5	28	7
Upper ditto	24	2	24	4	24	8	25	0	25	6	26	3	27	5	29	2	29	7
Height of toptimber line	44	7	45	3	45	8	46	5	47	3	48	4	49	7	51	0	51	5
Height of the cutting down	1	11	2	1	2	4	2	10	3	6	4	7	6	9	12	0		
Height of the rifing	0	5	0	9	1	2	2	0	3	7	6	4	10	0	15	9		
Main half breadth	25	7½	25	7	25	5	25	0	24	4	23	4	21	11	19	8	19	0
Rifing half breadth	10	3	10	1	9	6	8	4	6	10	5	0	2	9				
Toptimber half breadth	18	7	18	6	18	4	17	10	17	3	16	6	15	6	14	4	14	1
Topfide's half breadth	17	8	17	8	17	8	17	3	16	8	15	9	14	10	13	8	13	3
Length of lower breadth fweeps	17	11	16	5	14	9	11	9	9	10	8	8	8	5	7	0	5	1
Firft diagonal line	10	6	10	4	10	1	9	9	9	0	7	10	6	4	3	6	1	10
Second ditto	17	11	17	9	17	2	16	1	14	9	13	0	10	3	6	9	3	3
Third ditto	23	4	23	0	22	4	21	0	19	0	16	7	13	0	7	6	4	7
Fourth ditto	27	6	27	2	26	6	25	2	23	3	21	0	17	2	10	11	8	8
Fifth ditto	29	8	29	4	28	10	28	2	26	9	24	10	22	2	16	6	13	4
Sixth ditto	20	9	20	9	20	6	20	3	19	9	19	0	18	2	16	11	16	5

An Account of the Diagonal Lines.

Fore and After Bodies.	Names of the Diagonal Lines.											
	1ft.		2d.		3d.		4th.		5th.		6th.	
	Ft.	In.	Ft	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Height up the middle line	9	6	15	3	19	1	24	4	29	5	47	9
Diftance from the middle line on the bafe line	5	2	10	7	16	9						
Height up the fide line							2	8	12	9	38	11

2. Impregnable, 90 Guns.

Fore Body.	Timbers Names.															
	⊕		B		F		K		O		S		X		Y	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Lower height of breadth	18	4	18	4½	18	9	19	5	20	9	22	11	26	5	27	7
Upper ditto	22	4	22	4	22	4	22	5½	23	1	24	7	27	5	28	4
Height of toptimber line	42	10	42	10	42	11	43	2	43	6	44	0	44	8	44	10
Height of the cutting down	1	8	1	8	1	10	2	2	3	0	4	5	7	9		
Height of the rifing	0	5	0	5¾	0	9	1	6	3	1	5	8½	10	1		
Main half breadth	24	2	24	2	24	2	24	1	23	8	22	1	17	7	15	5
Rifing half breadth	9	8	9	7	9	3	8	5	6	11	4	6	0	8		
Toptimber half breadth	17	3	17	3	17	3	17	3	17	1	16	10	16	0	15	10
Topfide's half breadth									16	6	16	4	16	0	15	10
Length of lower breadth fweeps	17	1	17	1	17	0¾	15	10	13	1	11	5½	11	4½	11	11
Lower firmark	8	1	8	1	7	11¼	7	8½	7	2¾	6	1½	2	2		
Floor firmark	13	2¼	13	1½	12	9¾	12	2	11	1¾	9	1½	4	8	2	10½
Floor head	18	5	18	3½	17	10¼	16	9½	14	11¼	12	0¾	7	1	5	2½
Greateft bevelling	20	8¼	20	6¾	20	1¼	19	0	16	11¼	13	7½	8	2½	6	3
Firft futtock head	22	2½	22	1¾	21	9	20	9	18	8¾	15	3¾	9	6½	7	5½
Second futtock head	24	3	24	3	24	1½	23	7½	22	2	19	1	12	9	10	3¾
Third futtock head	24	5½	24	5½	24	5½	24	5½	24	0½	22	0	16	1¼	13	8

After

After Body.	Timbers Names.																	
	1		5		9		13		17		21		25		29		31	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft	In.	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In.
Lower height of breadth	18	4	18	4	18	8	19	2	0	0	21	5	23	3	26	1	27	10
Upper ditto	22	4	22	4	22	5	22	10	23	4	24	3	25	5	27	2	28	4
Height of the toptimber line	42	11	43	2	43	6½	44	1	44	9	45	6	46	8	47	6	48	1
Height of the cutting down	1	8	1	10	2	0	2	4	3	0	4	2	6	0	9	6	12	4
Height of the rising*	0	5½	0	10	1	6	2	6¾	4	1¼	6	6¾	9	11	15	0		
Main half breadth	24	2	24	1	23	11	23	6	22	10	21	9	20	2	18	3	17	2
Rising half breadth	9	7	9	5	9	0¾	8	4½	7	3¼	5	8	3	8	1	1		
Toptimber half breadth	17	3	17	3	17	2	16	10	16	4	15	8	14	10	13	9	13	1
Topside's half breadth	16	4	16	4	16	4	16	0	15	7	14	11	14	0	12	11	12	5
Length of lower breadth sweeps	17	1	16	7¾	15	7	14	6¼	13	3½	12	0	10	7	8	3	6	0
Lower firmark	8	0	7	11½	7	8	7	3	6	6	5	5	4	2	2	4	1	3
Floor firmark	13	1	12	9	12	3	11	4½	10	0	8	2¼	6	1	3	2	1	7
Floor head	18	3	17	10	16	11	15	8	13	9½	11	3½	8	6	4	7½	2	3
Greatest bevelling	22	1	21	9	20	11	19	7½	17	7½	14	10	11	6	6	2	3	10
First futtock head	25	0	24	7	23	11	22	9½	21	0	18	3½	14	10½	10	0	6	3
Second futtock head	27	0	26	11	26	7	25	10	24	7	22	8	19	9½	14	11	10	10
Third futtock head	26	5	26	5	26	3	25	10	25	0	23	9	21	11¼	18	11	16	5

* Length of the floor sweeps is 11 feet 2 inches.

An Account of the Diagonals.

	Fore Body.						After Body.					
	Up the middle line.		On the base line.		Up the side line.		Up the middle line.		On the base line.		Up the side line.	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Lower firmark	7	1½	4	2½	—	—	7	1½	4	2½	—	—
Floor firmark	10	7½	8	6¾	—	—	10	7½	8	6¾	—	—
Floor head	14	0	13	9	—	—	14	0	13	9	—	—
Greatest bevelling	15	6½	19	1	—	—	17	9½	18	8	—	—
First futtock head	17	1¼	—	—	0	11¼	21	8	23	6¾	—	—
Second futtock head	20	3	—	—	10	7	26	2	—	—	10	3¾
Third futtock head	23	5	—	—	19	1	30	0	—	—	19	1

3. Brunſwick, 74 Guns.

Fore Body.	Timbers Names.															
	⊕		B		F		K		O		S		U		X	
	Ft.	In.	Ft.	In.	Ft	In.	Ft.	In	Ft.	In	Ft.	In.	Ft.	In.	Ft.	In.
Lower height of breadth	21	5	21	5	21	6	21	11	22	9	24	4	25	6	27	0
Upper ditto	23	7	23	7	23	7	23	8	24	2	25	3	26	3	27	7
Height of toptimber line	35	8	35	9	35	11	36	3	36	8	37	3	37	7	38	0
Height of the riſing*			0	4½	3	8	10	2								
Height of the cutting down	1	10	1	11	2	0	2	3	2	11	4	8	6	6		
Main half breadth	24	0	24	0	24	0	23	11	23	3	20	6	17	9	12	8
Toptimber half breadth	20	11	20	11	20	11	20	9	20	2	19	0	18	0	16	5
Topſide's half breadth	19	10	19	10	19	10	19	10	19	6	18	10	18	0	16	5
Half breadth of the floor ſweeps	8	7	8	6	7	0	2	10								
Length of the lower breadth ſweeps	19	0	19	0	18	1	17	1	15	7½	14	0	13	0	12	2
Firſt diagonal	10	8	10	7	10	3	9	6	8	5	6	3	4	3	1	2
Second ditto	17	1	16	10	16	2	14	9	12	7	9	4	7	2	3	7
Third ditto	21	4	21	3	20	7	19	2	16	8	13	0	10	3	6	5
Fourth ditto	25	10	25	10	25	6	24	6	22	4	18	7	15	7	10	10
Fifth ditto	27	0	27	0	26	11	26	6	25	4	21	11	18	9	13	6

* Riſing height is 11 feet 6 inches at dead flat, from which all the other riſing heights muſt be ſet off.

After

After Body.	Timbers Names.																	
	4		8		12		16		20		24		28		32		36	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Lower height of breadth	21	3	21	3	21	3	21	4	21	8	22	4	23	3	24	6	26	5
Upper ditto	23	5	23	5	23	5	23	6	23	9	24	3	24	9	25	6	26	9
Height of toptimber line	35	6	35	8	36	0	36	5	37	0	37	8	38	7	39	7	40	8
Height of the rising	0	5½	1	4½	2	7	4	10	8	2½	13	0						
Height of the cutting down	1	10½	1	11	2	0	2	2	2	5	3	4	4	8	7	5	12	1
Main half breadth	24	0	23	11	23	10	23	8	23	4	22	6	21	5	20	0	17	8
Toptimber half breadth	20	8	20	8	20	7	20	6	20	0	19	3	18	0	16	8	15	0
Topside's half breadth	19	11	19	11	19	11	19	9	19	5	18	4	17	3	15	11	14	4
Half breadth of the floor sweeps	8	3½	8	0	7	4	6	4½	4	3½	0	9½						
Length of lower breadth sweeps	18	2	18	0	17	10	17	7	16	6	15	2	13	5	11	0	6	10
First diagonal	10	7	10	6	10	3	9	9	9	0	7	9	6	3	4	2	1	3
Second ditto	16	10	16	8	16	3	15	6	14	4	12	6	9	10	6	10	2	4
Third ditto	21	4	21	2	20	8½	19	11	18	8	16	9	14	2	10	4	4	7
Fourth ditto	25	9	25	8	25	6	24	10	24	0	22	4	20	0	16	5½	10	7
Fifth ditto	27	1	27	1	26	11	26	7	25	11	24	9	23	2	20	8	16	1

An Account of the Diagonals.

Fore and After Bodies.	Names of the Diagonals.									
	1st.		2d.		3d.		4th.		5th.	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Height up the middle line	9	2	13	4	17	8	24	7	29	0
Distance from the middle line on the base line	6	7	12	5½	18	0				
Height up the side line							3	10	13	0

4. Stand-

4. Standard, 64 Guns.

Fore Body.	Timbers Names.															
	⊕		B		F		K		O		S		U		X	
	Ft.	In	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In
Lower height of breadth	16	9	16	10	17	1	17	10	19	0	20	7	21	6	22	6
Upper ditto	19	6	19	6	19	8	20	1	20	8	21	3	22	0	22	10
Height of toptimber line	32	9	32	10	32	11	33	7	34	2	34	10	35	3	35	9
Height of topſide ditto							35	11	36	6	36	11	37	6	38	0
Height of the cutting down	1	9	1	9	1	9	1	9	2	0	3	9	5	6		
Main half breadth	21	10	21	10	21	10	21	6	20	5	17	0	14	0	9	6
Toptimber half breadth	17	3	17	3	17	1	16	8	16	0	15	0	14	1	12	10
Length of lower breadth ſweeps	15	5	15	1	14	9	11	8	8	11	9	3	9	3	8	0
Firſt diagonal line	11	6	11	4	11	0	10	5	8	9	6	2	4	2	1	2
Second ditto	16	0	15	11	15	6	14	3	12	0	8	4	5	7	2	2
Third ditto	19	6	19	5	18	11	17	8	15	7	11	4	8	1	4	3
Fourth ditto	21	9	21	9	21	6	20	2	18	3	13	11	10	9	6	6
Fifth ditto	23	9	23	9	32	8	22	9	21	0	17	4	14	2	9	8

After Body.	Timbers Names.																	
	(2)		3		7		11		15		19		23		27		31	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Lower height of breadth	16	9	16	11	17	2	17	7	18	2	18	11	19	11	21	10	24	4
Upper ditto	19	6	19	6	19	6	19	6	19	11	20	6	21	5	22	8	24	9
Height of toptimber line	32	9	32	10	33	2	33	7	34	2	34	11	35	8	36	6	37	9
Height of topside ditto					36	11	37	4	39	9	40	5	42	5	43	6	44	7
Height of the cutting down	1	9	1	9	1	10	2	0	2	6	3	0	4	0	6	6	11	0
Main half breadth	21	10	21	10	21	9	21	5	20	9	20	0	18	9	17	5	15	10
Toptimber half breadth	17	3	17	2	17	0	16	9	16	6	15	11	15	3	14	3	13	0
Topside's half breadth							16	0	15	8	15	0	14	0	13	3	12	0
Length of lower breadth sweeps	15	6	15	0	13	0	10	5	8	10	7	5	6	8	6	8	6	0
First diagonal	11	1	10	6	9	3	8	2	6	9	5	8	4	0	2	9	0	10
Second ditto	15	11	14	10	13	3	11	7	9	10	7	11	5	11	3	11	1	0
Third ditto	19	5	18	5	17	0	15	6	13	10	11	6	9	3	6	5	2	7
Fourth ditto	21	9	21	3	20	5	19	5	17	10	15	10	13	3	10	2	5	6
Fifth ditto	23	9													16	5	12	2

An Account of the Diagonals.

Fore and After Bodies.	Names of the Diagonals.									
	1st.		2d.		3d.		4th.		5th.	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Height up the middle line	8	11	11	4	14	8	17	11	23	4
Distance from the middle line on the base line	8	9	17	9						
Height up the side line					2	5	7	7	13	2

5. Aſſurance, 44 Guns.

Fore Body.	Timbers Names.															
	⊕		(B)		D		H		M		Q		U		Y	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Lower height of breadth	14	11	14	11	15	2	15	8	16	10	18	8	21	2	23	10
Upper ditto	17	2	17	2	17	4	17	7	18	4	19	8	21	9	24	3
Height of toptimber line	30	5	30	5	30	5	30	7	31	0	31	5	32	0	32	6
Height of the Topſide ditto									33	0	33	5	34	0	34	6
Height of the riſing	0	7	0	8	1	1	1	11	3	4½	5	9	8	4		
Height of the cutting down	1	8	1	8	1	8	1	11	2	4	3	3	5	1		
Main half breadth	18	7	18	7	18	6	18	3½	17	7	16	2	13	2	8	5
Toptimber half breadth	13	11	13	11	13	10	13	7	13	3	12	9	11	10	10	11
Topſide half breadth									13	1	12	8	11	10	10	11
Half breadth of the riſing	6	6	6	6	6	5	6	4	5	10	4	9	2	6		
Length of the lower breadth ſweeps	13	11	13	10	13	9	13	8	13	4	12	10½	11	6	8	10
Firſt diagonal	9	9½	9	9	9	6	9	2	8	5	7	2	4	5	1	4
Second ditto	16	4½	16	3½	16	1	15	4	13	8	11	4	7	5	3	1½
Third ditto	19	2	19	1½	18	10	18	3	16	9	14	4	9	10	4	5
Fourth ditto	20	4											12	6	6	3

After

After Body.	Timbers Names.															
	2		6		10		14		18		22		26		29	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In	Ft	In	Ft.	In.
Lower height of breadth	15	0	15	4	16	0	17	0	18	3	19	9	21	7	23	4
Upper ditto	17	4	17	7	17	11	18	6	19	9	21	0	22	5	23	8
Height of toptimber line	30	6	30	9	31	3	31	9	32	6	33	2	34	3	35	0
Height of the topſide ditto							34	7	35	4	36	0	37	1	37	10
Height of the riſing	0	9	1	0	1	6	2	5	4	0	6	6	10	8		
Height of the cutting down	1	8	1	9	2	1	2	7½	3	7	4	11	7	5		
Main half breadth	18	7	18	7	18	4	18	0	17	2	16	0	14	5	12	11
Toptimber half breadth	13	11	13	10	13	8	13	5	13	0	12	3	11	2	10	3
Topſide's half breadth							13	2	12	6	11	8	10	9	9	11
Half breadth of the riſing	6	4	6	1	5	9	5	5	4	9	2	6				
Length of lower breadth ſweeps	13	10	13	9½	13	8½	13	5	12	8	10	7	6	10	2	10
Firſt diagonal line	9	9	9	6	9	2	8	6	7	8	6	3	4	0	1	6
Second ditto	16	3	15	10	15	4	14	2	12	5	9	11	6	8	2	9
Third ditto	18	11	18	8	18	1	17	1	15	3	12	7	8	10	4	3
Fourth ditto													11	8	6	6

An Account of the Diagonals.

Fore and After Bodies.	Names of the Diagonals.							
	1ſt		2d		3d		4th	
	Ft.	In.	Ft.	In	Ft.	In.	Ft.	In.
Height [illegible] the middle line	9	0	14	2	17	[illegible]	20	3
Diſtanc[illegible] [illegible]e middle line on the baſe line	5	3	12	9				
Heigh[illegible] [illegible]ide line					3	9	11	0

6. La-

6. Latona, 38 Guns.

Fore Body.	Timbers Names.															
	⊗		C		G		L		P		T		W		Y	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In.	Ft.	In.	Ft.	In.
Lower height of breadth	17	3	17	3	17	6	18	0	19	2	20	11	22	1	23	8
Upper ditto	19	2	19	2	19	2	19	5	20	0	21	4	22	2	23	8
Height of toptimber line	27	5	27	6	27	7	27	10	28	1	28	4	29	0	29	4
Height of the Topside ditto							30	6	30	9	31	0	31	8	22	0
Height of the rising	1	0	1	0	1	5	2	4½	3	10						
Height of the cutting down	1	11	2	0	2	1	2	4½	3	0	4	6	6	0	8	5
Main half breadth	19	2	19	2	19	1	18	9	17	7	15	3	13	0	9	2
Toptimber half breadth	16	10	16	10	16	10	16	7	15	10	14	4	12	11	9	11
Topside half breadth							16	5	15	8	14	2	13	0	10	5
Half breadth of the rising	5	1	5	0	4	6	3	4	2	7						
Length of the lower breadth sweeps	13	3	13	0	12	6	11	10	10	9	10	6	11	0	11	0
First diagonal	9	11	9	10	9	7	8	9	7	7	5	7	4	4	1	10
Second ditto	15	4	15	3	14	8	16	9	11	5	8	9	6	8	3	10
Third ditto	18	6	18	5	17	11	16	8	14	10	11	8	9	2	5	10
Fourth ditto	20	0											11	9	7	11

After

After Body.	Timbers Names.																	
	1		5		9		13		17		21		25		27		29	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Lower height of breadth	17	5	17	6	17	9½	18	4	19	2	20	6	22	3	23	4	24	4½
Upper ditto	19	2	19	2	19	4	19	7	20	0	20	11	22	3	23	4	24	4½
Height of toptimber line	27	5	27	9	28	2	28	6	29	0	29	7	30	6	30	10	31	4
Height of topside ditto			30	6	30	11	31	3	31	9	32	4	33	3	33	7	34	1
Height of the rising	1	0	1	1½	1	6	2	3	3	7	6	4						
Height of the cutting down	1	11	2	0	2	2	2	4	2	9	4	0	7	2	9	8		
Main half breadth	19	2	19	1½	19	0	18	8	18	0	17	0	15	5	14	3½	13	2
Toptimber half breadth	16	10	16	8	16	5½	16	2	15	8	14	11	13	8	13	0	12	3
Topside's half breadth			16	2	16	0	15	9	15	2	14	5	13	3	12	6	11	10
Half breadth of the rising	5	1	5	0	4	11	4	5	3	2	0	7						
Length of lower breadth sweeps	13	2	13	0	12	0½	10	0	8	11	7	8	6	2	5	5	3	10
First diagonal	9	11	9	10	9	6	9	0	8	1	6	5	3	10	2	8	1	3
Second ditto	15	4	15	3	14	10	13	10	12	3	9	5	6	1	4	2½	2	0½
Third ditto	18	6	18	5	18	0	17	1	15	4	12	4	8	8	6	2	3	3
Fourth ditto	20	0	19	11	19	6	18	9	17	3	15	1	11	5	8	10	5	3
Fifth ditto													14	5	12	3½	9	1½

An Account of the Diagonals.

Fore and After Bodies.	Names of the Diagonals.									
	1st.		2d		3d.		4th.		5th.	
	Ft.	In.	Ft	In	Ft.	In.	Ft.	In.	Ft.	In.
Height up the middle line	9	6	13	11	17	9	20	8	22	11
Distance from the middle line on the base line	5	9	11	5						
Height up the side line					0	10½	9	6	15	6

Flora, 36 Guns.

Fore Body.	Timbers Names.															
	⊕		B		F		K		O		S		U		X	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Lower height of breadth	15	10	16	0	16	2	16	10	17	$10\frac{1}{2}$	19	6	20	10	22	4
Upper ditto	18	1	18	1	18	1	18	4	19	0	20	4	21	3	22	6
Height of toptimber line	26	9	26	10	27	0	27	4	27	9	28	4	28	7	28	11
Height of the Topside ditto					29	5	29	9	30	2	30	9	31	0	31	4
Height of the cutting down	1	5	1	5	1	5	1	8	2	2	3	5	4	9	6	10
Height of the rising*	0	0	0	0	2	5	8	3	16	3	•					
Main half breadth	18	9	18	9	18	9	18	8	17	9	15	$2\frac{1}{2}$	13	2	9	6
Toptimber half breadth	16	$7\frac{1}{2}$	16	7	16	5	16	2	15	8	14	4	12	11	10	3
Topside half breadth					16	0	15	9	15	2	14	2	13	0	11	0
Half breadth of the rising	5	1	5	1	3	10	0	5 outside	•							
Length of the lower breadth sweeps	13	3	13	0	12	8	11	10	10	10	10	6	11	0	12	7
First diagonal	11	$9\frac{1}{2}$	11	$9\frac{1}{2}$	11	5	10	10	9	8	7	8	5	11	3	$8\frac{1}{2}$
Second ditto	16	1	16	1	15	$8\frac{1}{2}$	14	7	13	0	10	3	8	2	5	8
Third ditto	19	0	19	0	18	9	17	9	15	$11\frac{1}{2}$	13	0	10	9	7	9
Fourth ditto	21	6	21	6	21	2	20	8	19	0	15	$11\frac{1}{2}$	13	$6\frac{1}{2}$	9	$10\frac{1}{2}$

* Rising height at dead flat is 12 feet.

After

After Body.	Timbers Names.															
	5		9		13		17		21		25		27		29	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft	In	Ft	In.	Ft	In	Ft	In	Ft.	In.
Lower height of breadth	15	11	16	2	16	10	17	11	19	2	20	10½	21	11	2	11
Upper ditto	18	0	8	2	18	7	19	0	19	10½	21	2	2	0	22	11
Height of toptimber line	26	10	27	2	27	6	28	2	29	0	29	10	30	5	30	11
Height of the topside ditto			29	11	30	3	30	11	31	9	32	7	33	2	33	8
Height of the cutting down	1	6	1	7	1	10	2	5	3	9	6	5	8	4	11	1
Height of the rising	1	9	6	1	12	5										
Main half breadth	18	9	18	8	18	3	17	9	16	8	15	0	14	0	12	11
Toptimber half breadth	16	7½	16	1	15	7	14	11	13	11	12	9	2	0	11	3
Topside's half breadth			15	6	14	11	14	3	13	3	12	4	11	9½	10	11
Half breadth of the rising	4	0	0	10	4	0 outside										
Length of lower breadth sweeps	12	10	11	10½	10	5	8	11	7	2	5	5	4	8	3	11
First diagonal line	11	6	11	0	10	2	8	9½	7	0	4	10	3	4	1	10
Second ditto	15	9	14	11	13	9	11	10	9	7	6	9	4	10½	2	7
Third ditto	18	9	18	0	16	9	14	11½	12	6	[illegible]	2	6	11	3	11
Fourth ditto							18	5	16	1	12	10	10	6	7	2
Fifth ditto											15	1	13	4	10	5

An Account of the Diagonals.

Fore and After Bodies.	Names of the Diagonals.									
	1st.		2d.		3d.		4th.		5th.	
	Ft.	In.	Ft	In	Ft.	In.	Ft.	In.	Ft.	In.
Height up the middle line	10	11	14	8	18	2	22	3	24	3
Distance from the middle line on the base line	6	10	12	5						
Height up the side line					0	9	8	4	13	10

Solebay

Solebay, 32 Guns.

Fore Body.	Timbers Names.															
	⊕		B		F		K		O		S		U		X	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In	Ft.	In.	Ft.	In.	Ft.	In.
Lower height of breadth	16	1	16	1	16	3½	16	10	17	10	19	6½	20	8	22	0
Upper ditto	17	9	17	9	17	9	18	0	18	10	20	3	21	1	22	4
Height of toptimber line	25	8	25	8	25	9	25	10½	26	3	26	8	27	0	27	4
Height of the Topside ditto							27	10½	28	3	28	8	29	0	29	4
Height of the cutting down	1	6	1	6	1	6	1	9	2	5	3	10	5	1	6	11
Height of the rising	0	0	0	3½	2	3	7	7	19	11						
Main half breadth	17	5	17	5	17	5	17	4	16	7½	14	7	12	8	9	6
Toptimber half breadth	15	6	15	6	15	6	15	3½	14	11	13	11	12	9	10	8
Topside half breadth							15	0	14	8	14	0	13	3	11	7
Half breadth of the rising	4	3	4	1	2	10½	1	3	12	0						
							outside		outside							
Length of the lower breadth sweeps	15	1	15	0	14	6½	12	10	11	4	10	9	10	8	10	11
First diagonal	7	5	7	5	7	5	7	2	6	6½	5	0	3	10	1	10
Second ditto	10	10	10	10	10	7	9	11½	8	8	6	7	5	1	2	11
Third ditto	13	8	13	8	13	4	12	6	10	10	8	5	6	8	4	2
Fourth ditto	16	11	16	11	16	8	15	10	14	2	11	6	9	4½	6	6
Fifth ditto	19	5	19	5	19	3	18	8	17	4	14	7	12	4½	9	0

An Account of the Diagonals for the Fore Body.

	Names of the Diagonals.									
	1st		2d		3d		4th		5th	
	Ft.	In.	Ft.	In	Ft.	In.	Ft.	In.	Ft.	In.
Height up the middle line	7	5	9	9	12	2	16	1	20	8
Distance from the middle line on the base line	3	11	8	0	12	5				
Height up the side line							2	0	9	0

After

After Body.	Timbers Names.								
	1	5	9	13	17	21	25	27	29
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Lower height of breadth	16 1	16 2	16 5	17 0	17 9	18 9	19 $10\frac{1}{2}$	20 8	21 6
Upper ditto	17 9	17 9	17 10	18 1	18 9	19 6	20 6	21 1	21 10
Height of toptimber line	25 8	25 10	26 1	26 6	27 0	27 6	28 $1\frac{1}{2}$	28 6	28 11
Height of the topside ditto			28 10	29 3	29 9	30 3	30 $10\frac{1}{2}$	31 3	31 8
Height of the cutting down	1 6	1 7	1 8	2 2	3 0	4 5	6 11	8 7	11 9
Height of the rising	0 0	1 2	4 10	14 6					
Main half breadth	17 5	17 5	17 3	16 9	16 3	15 $5\frac{1}{2}$	14 $3\frac{1}{2}$	14 8	12 $10\frac{1}{2}$
Toptimber half breadth	15 6	15 5	15 3	14 10	14 4	13 8	12 9	12 3	11 8
Topside's half breadth			14 10	14 6	13 11	13 3	12 4	11 10	11 4
Half breadth of the rising	4 3	3 7	1 0	6 8 outside					
Length of lower breadth sweeps	15 1	13 10	12 1	10 7	8 $11\frac{1}{2}$	7 7	6 1	5 4	4 1
First diagonal line	6 4	6 2	5 10	5 3	4 4	3 0	1 11	1 3	0 8
Second ditto	10 7	10 4	9 7	8 7	7 0	5 3	3 $1\frac{1}{2}$	2 1	1 1
Third ditto	14 0	13 9	12 11	11 8	9 11	7 $8\frac{1}{2}$	5 0	3 $7\frac{1}{2}$	2 11
Fourth ditto	18 4	18 0	17 4	16 2	14 9	12 8	9 $10\frac{1}{2}$	8 0	5 3
Fifth ditto							14 0	12 7	10 3

An Account of the Diagonals for the Fore Body.

	Names of the Diagonals.				
	1st	2d	3d	4th	5th
	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.
Height up the middle line	5 10	9 3	12 8	18 $5\frac{1}{2}$	22 10
Distance from the middle line on the base line	4 7	8 7	13 1		
Height up the side line				4 8	10 8

 Thisbe

Thiſbe, 28 Guns.

Fore Body.	Timbers Names.													
	⊕		A		E		I		N		R		T	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In.	Ft.	In.
Lower height of breadth	12	10	12	11	13	3	14	3	16	1	18	4	19	$7\frac{1}{2}$
Upper ditto	15	9	15	9	15	$9\frac{1}{2}$	16	$2\frac{1}{2}$	17	1	18	7	19	8
Height of toptimber line	24	1	24	3	24	6	25	0	25	$7\frac{1}{2}$	24	5	26	0
Height of the topſide ditto							27	5	28	$0\frac{1}{2}$	28	10	29	3
Height of the cutting down	1	8	1	8	1	9	1	11	2	6	4	6	6	7
Height of the riſing	0	0	0	7	4	10	14	0						
Main half breadth	16	6	16	6	16	4	16	0	14	$9\frac{1}{2}$	11	10	8	11
Toptimber half breadth	14	5	14	5	14	3	14	0	13	6	11	6	9	3
Topſide's half breadth							13	11	13	6	11	8	9	6
Half breadth of the riſing	4	3	4	$0\frac{1}{2}$	1	$6\frac{1}{2}$	5	7 outſide						
Length of lower breadth ſweeps	9	2	8	11	8	4	7	9	8	2	9	4	9	9
Firſt diagonal line	8	0	7	11	7	8	7	0	5	11	3	10	2	0
Second ditto	11	10	11	8	11	2	10	2	8	4	5	7	3	5
Third ditto	14	$10\frac{1}{2}$	14	9	14	4	13	2	11	1	7	10	5	4
Fourth ditto	17	2	17	1	16	8	15	6	13	6	9	$10\frac{1}{2}$	7	2
Fifth ditto									15	5	11	10	8	$9\frac{1}{2}$

After

After Body.	Timbers Names.							
	3	7	11	15	19	23	27	29
	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Lower height of breadth	12 10	13 4	14 0	14 11	16 1	17 8	19 4	20 4
Upper ditto	15 9	15 9	16 0	16 7	17 4	18 5	19 9	20 7
Height of toptimber line	24 1	24 4	24 6	24 11	25 6	26 1½	27 0	27 7
Height of the Topside ditto		27 8	27 10	28 3	28 10	29 5¼	30 4	30 11
Height of the cutting down	1 8	1 9	1 11	2 4	3 2	5 0	8 1	
Height of the rising	0 5	2 5	6 11	14 10				
Main half breadth	16 6	16 6	16 3	15 9	14 11	13 9	12 3	11 5
Toptimber half breadth	14 5	14 4	14 0	13 6	12 11	12 0	10 11	10 4
Topside half breadth		13 6	13 3	12 11	12 4	11 8	10 10	10 2
Half breadth of the rising	4 1	2 9	0 9 outside	7 0 outside				
Length of the lower breadth sweeps	8 9	8 2	7 8	7 3	6 7	5 8	4 2	3 3
First diagonal	8 0	7 10	7 3	6 4	4 11	3 6	1 11	1 0
Second ditto	11 8	11 4	10 5	9 1	7 2	5 2	2 9	1 5
Third ditto	14 8½	14 4	13 6	12 1	10 1	7 8	4 5	2 6
Fourth ditto	17 0	16 8	15 11	14 8½	12 10	10 3	6 6½	4 0
Fifth ditto						13 0	9 7	6 10

An Account of the Diagonals.

Fore and After Bodies.	Names of the Diagonals.				
	1ſt.	2d	3d.	4th.	5th.
	Ft. In.	Ft In.	Ft. In.	Ft. In.	Ft. In.
Height up the middle line	7 2	10 1	13 7	16 5	19 3
Diſtance from the middle line on the baſe line	5 10	10 1	15 11		
Height up the ſide line				5 1	10 0

Por-

Porcupine, 24 Guns.

Fore Body.	⊕		(B.)		C		G		L		P		R		S	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In.	Ft.	In.	Ft.	In.
Lower height of breadth	12	5	12	5	12	6	13	3	14	7	16	10	18	1	18	9
Upper ditto	15	2	15	2	15	2	15	5	16	0	17	4	18	3	18	10
Height of toptimber line	23	0	23	0	23	2	23	5	23	10	24	4	24	8	24	10
Height of the Topfide ditto							25	3	25	8	26	2	26	6	25	6
Height of the cutting down	1	5	1	5	1	5	1	7	2	0	3	4	4	11	6	1
Height of the rifing	0	0	0	0	2	0	7	10								
Main half breadth	15	9	15	9	15	8	15	6	14	9	11	6	10	2	8	6
Toptimber half breadth	13	10	13	10	13	10	13	8	13	2	11	5	10	2	9	0
Topfide half breadth							13	1	12	9	11	8½	10	6	9	6
Half breadth of the rifing	4	2	4	2	3	2	1	0								
							outfide									
Length of the lower breadth fweeps	8	11	8	9	8	4	7	0	6	10	8	7	9	7	9	10
Firft diagonal	8	6	8	6	8	4	8	0	6	10	4	10½	3	4	2	3
Second ditto	11	8	11	8	11	6	10	8	9	1	6	6	4	9	3	5½
Third ditto	14	3	14	3	14	1	13	3½	11	5	8	7	6	7	5	3
Fourth ditto	16	3	16	3	16	2	15	5	13	7	10	8½	8	5½	6	10
Fifth ditto											12	8	10	2	8	6

After

After Body.	Timbers Names.													
	3		7		11		15		19		23		25	
	Ft.	In	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Lower height of breadth	12	9	13	5	14	5	15	6	17	0	18	7	19	6
Upper ditto	15	3	15	7	16	0	16	8	17	6	18	9	19	7
Height of toptimber line	23	2	23	5½	23	10	24	6	25	3	26	0	26	5
Height of the Topside ditto			25	11½	26	10	27	6	28	3	29	0	29	5
Height of the cutting down	1	6	1	8	2	1	2	10½	4	8	8	0		
Height of the rising	1	5	5	6	13	6								
Main half breadth	15	7½	15	6	15	0	14	6	13	3	11	9½	10	10
Toptimber half breadth	13	8	13	5	13	0	12	5	11	7½	10	6	9	11
Topside half breadth			13	0	12	5	11	10	11	2	10	2	9	8
Half breadth of the rising	3	3	0	6	5	4								
					outside									
Length of the lower breadth sweeps	8	10	7	1	6	5	5	10	5	0	3	9	2	10
First diagonal	7	2	6	7	5	8	4	4	2	10	1	4	0	8
Second ditto	11	4	10	7	9	4	7	5	5	3	2	8	1	3
Third ditto	13	10	13	1½	11	9½	9	10	7	4	4	0	2	0
Fourth ditto	15	9	15	2	14	1	12	2	9	10	6	0	3	4
Fifth ditto	17	4	16	9	15	10	14	5	12	2	8	10	5	8

An Account of the Diagonals.

Fore and After Bodies.	Names of the Diagonals.									
	1st.		2d.		3d.		4th.		5th.	
	Ft	In.	Ft	In.	Ft.	In.	Ft.	In.	Ft.	In.
Height up the middle line	7	6	10	0	12	9	15	6	18	4
Distance from the middle line on the base line	5	10	10	0	14	10				
Height up the side line							4	5	8	8

New Sloop of 300 Tons, upon a new Construction.

Carries 18 Carriage Guns and 14 Swivels.

Fore Body.	Timbers Names.													
	⊕		C		F		I		M		P		Q	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Height of the breadth	10	7	11	8½	11	1	11	5	12	0	12	9	13	0
Height of toptimber line	16	7	16	8	16	10	17	0	17	5½	17	11	18	0
Height of topside ditto							17	10	18	3½	18	9	18	10
Height of the cutting down	1	3	1	3	1	4	1	7	2	3	3	11	5	3
Height of the lower edge of the wales	9	6	9	7	9	10	10	2	10	7	11	2	11	5
Height of the lower edge of the ports	13	6	13	6	13	6	13	7	13	9	14	0		
Main half breadth	12	10½	12	10	12	6½	11	11	10	5	7	6	6	2
Toptimber half breadth	11	1	11	1	11	1	10	8	9	11½	7	11	6	7
Topside half breadth							10	7	9	11	8	1	7	0
Half breadth of load water line	12	10½	12	10	12	6	11	8	10	0	6	10	5	3
Length of lower sweeps	7	3	7	2½	7	2	7	0	7	4	7	4	7	4
Aft part of the rabbet of the stem above the upper edge of the keel							well.		0	3	1	3½	2	2
First diagonal	6	0	5	11½	5	11	5	7	4	7	3	2	2	3
Second ditto	8	2	8	1	7	11	7	6	6	2	4	2	3	4
Third ditto	10	9	10	6	10	1	9	5	8	0	5	7	4	4½
Fourth ditto									9	7	6	10	5	5
Fifth ditto	11	5½	11	5½	11	5	11	0	10	0	7	7	6	0

After

After Body.	Timbers Names.															
	6		12		15		18		21		24		27		30	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Height of the breadth	10	9	11	6	12	0	12	6	13	3	14	0	14	11	15	10
Height of toptimber line	16	7	17	0	17	3	17	8	18	1½	18	8	19	4	20	0
Height of the Topside ditto					18	9	19	2	19	7½	20	2	20	10	21	6
Height of the cutting down	1	6	2	1	2	5½	2	10	3	4	4	0	5	6	8	8
Height of the lower edge of the wales	9	6	9	10	10	2	10	7	11	0	11	8	12	4	13	4
Height of the lower edge of the ports	13	7	13	11	14	2½	14	6	14	9	15	0	15	6		
Main half breadth	12	5½	11	8	11	3	10	8	10	0	9	4	8	6	7	7
Toptimber half breadth	10	8	9	11½	9	6	9	0	8	6	7	10	7	2	6	5
Topside's half breadth					9	6	8	11	8	6	7	8	6	9	5	11
Half breadth of the load water line	12	5½	11	7	11	0	10	4	9	6	8	4	6	4	1	8
Length of the lower sweeps	6	3	6	0	5	10½	5	11½	5	8	5	6½	4	7½	2	11
First diagonal	5	11	5	1	4	7½	3	11	3	3	2	6	1	8	0	6½
Second ditto	7	10	6	7½	6	1	5	5½	4	7	3	8	2	7	0	9
Third ditto	10	0	8	9	8	2	7	4	6	5	5	2	3	7	1	3
Fourth ditto	12	0	10	9	10	0	9	2	8	3	6	8	4	9	2	0

An Account of the Diagonals.

Fore and After Bodies.	Names of the Diagonals.									
	1st.		2d.		3d.		4th.		5th.	
	Ft.	In.	Ft	In.	Ft.	In.	Ft.	In.	Ft.	In.
Height up the middle line	6	0	7	10	9	9	11	4	17	9
Distance from the middle line on the base line	5	0	9	6						
Height up the side line					1	8	5	6	15	3

Weazle

Weazle Brigantine, 201 Tons,

Carries 10 Carriage Guns and 16 Swivels.

Fore Body.	Timbers Names.													
	⊕		D		H		M		O		P		Q	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Height of the breadth	11	1	11	2	11	8	13	0	14	1	14	11	15	9
Height of the topſide	15	3	15	3	15	5	16	0	16	6	16	8½	17	0
Height of the cutting down	0	11	0	11	1	1½	2	3	3	9	4	10½		
Height of the lower edge of the ports	13	5	13	5	13	7	13	10	14	0				
Main half breadth	12	3½	12	3	11	9	10	2	8	4	7	1	5	4½
Topſide's half breadth	12	1	11	11	11	6	10	1	8	6	7	4	5	8
Half breadth of the load water line	12	1	11	9	11	0	8	5	5	8	3	11	1	11
Length of the lower ſweeps	8	3	8	3	8	6	8	1						
Aft part of the rabbet of the ſtem, above the upper edge of the keel							0	9	3	3	3	7	5	5
Firſt diagonal line	5	7	5	6	5	4	4	3	3	1	2	1	0	9
Second ditto	8	1	8	0	7	7	6	1½	4	8	3	7	2	1
Third ditto	11	0	10	8	10	2	8	1½	6	4	5	2	3	4
Fourth ditto							9	9	7	9	6	3	4	4
Fifth ditto									8	9	7	3	5	2

After

After Body.	Timbers Names.															
	2		6		10		14		16		18		20		Tuck	
	Ft.	In.	Ft.	In	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Height of breadth	11	2	11	7	12	3	13	0	13	6	14	2	14	9		
Height of the topfide	15	4	15	8	16	3	17	0½	17	6	18	1	18	7		
Height of the cutting down	0	11	0	11½	1	7	3	2	4	5	6	0	8	0		
Height of the lower edge of the ports	13	6	13	8	14	4	15	2	15	8						
Main half breadth	12	3½	12	3	11	11	11	4	10	10	10	3	9	7		
Topfide half breadth	12	1	11	11	11	7	10	8½	10	3	9	8	9	0		
Half breadth of the load water line	12	1	11	11	11	5	10	2½	9	2	7	5½	4	5	1	7
Length of the lower fweeps	7	8	7	2	6	6	5	10½	5	1	4	1½	3	0		
Firft diagonal	5	4	5	0	4	4	3	4	2	7½	2	0	0	10½		
Second ditto	7	11	7	4	6	4	5	0	3	11	2	11	1	6		
Third ditto	10	9	10	1	9	0	7	4	6	2	4	9½	3	3	1	8½
Fourth ditto							9	8	18	5	7	1	5	6	3	10
Fifth ditto											9	8½	8	4	7	3½

An Account of the Diagonals

Fore and After Bodies.	Names of the Diagonals.									
	1ft.		2d.		3d.		4th.		5th.	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Height up the middle line	6	1	8	4	11	0	13	1	15	3½
Diftance from the middle line on the bafe line	4	1	8	0						
Height up the fide line					0	10½	5	1½	8	9

Cutter upon a new Construction, 273 Tons.

Carries 16 Carriage Guns and 22 Swivels.

Fore Body.	Timbers Names.															
	⊕		B		D		F		H		K		M		N	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In	Ft.	In.
Height of the breadth	11	5	11	5	11	7	11	8½	12	1	12	6½	13	2½	13	7½
Height of topside	16	6	16	8	16	10½	17	1	17	5	17	10	18	4	18	7
Height of the cutting down	1	2	1	2½	1	4	1	6	1	10	0	6	4	1½	5	8½
Height of the lower edge of the ports	14	1¼	14	2	14	3	14	6	14	8	15	0½	15	5		
Main half breadth	14	7	14	6	14	3	13	8	12	7	10	9	8	2	6	4
Topside half breadth	14	3	14	2	13	11	13	5	12	5	10	9	8	4	6	7
Half breadth of load water line	14	4	14	3½	13	11	13	0½	11	6	9	0½	5	6¼	3	7
Length of the breadth sweeps	6	7	6	4½	5	7½	4	11	4	9	4	8	3	4	3	0¼
Aft part of the rabbet of the stem above the upper edge of the keel											0	5	2	5	4	3
First diagonal	5	9	5	8	5	5	5	0	4	4	3	2¾	1	10	1	2
Second ditto	8	5	8	4	8	0	7	3	6	4½	5	1	3	5	2	6
Third ditto	11	3	11	2	10	7	9	9	8	6½	7	0	5	2	4	0
Fourth ditto	13	7	13	4	12	9	11	8	10	4	8	9	6	7	5	3
Fifth ditto													7	8	6	1½

After Body.	Timbers Names.								
	4	6	8	10	12	14	16	18	Tuck
	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Height of breadth	11 5	11 6	11 7	11 10	12 1	12 5	12 10½	13 6	
Height of the topſide	16 6	16 7	16 8	16 11	17 2	17 5	17 9½	18 2	
Height of the cutting down	1 3	1 5	1 6½	1 11	2 7	3 8	5 4	7 7	
Height of the lower edge of the ports	14 1¼	14 1¼	14 2	14 4	14 5	14 8	14 10½	15 3	
Main half breadth	14 7	14 6	14 3	13 10	13 2	12 2	11 0	9 7	
Topſide half breadth	14 3	14 2	13 11	13 6	12 10	11 10	10 8	9 3	
Half breadth of the load water line	14 4	14 2	13 11	13 3	12 1	9 11	6 8	2 11½	1 1
Length of the breadth ſweeps	6 7	6 7	6 1	4 11	3 6	2 7	2 1	1 10	
Firſt diagonal	5 8	5 7	5 4	5 0	4 4	3 5	2 1		
Second ditto	8 4	8 3	7 11	7 4	6 5	5 4	3 8	1 5	0 7
Third ditto	11 3	11 0	10 8	9 11	8 10	7 4	5 6	3 3	2 1
Fourth ditto	13 5	13 3	12 10	12 2	10 10	9 1	7 1	5 2	4 0
Fifth ditto				13 10	12 8	10 11	9 4	7 4	6 3

An Account of the Diagonals

Fore and After Bodies.	Names of the Diagonals.				
	1ſt.	2d	3d.	4th.	5th.
	Ft. In.	Ft In.	Ft. In.	Ft. In.	Ft. In.
Height up the middle line	6 0	8 10	11 4½	13 2	14 6
Diſtance from the middle line on the baſe line	4 6	8 2	12 1½		
Height up the ſide line				2 11	7 0

Royal

Royal Charlotte Yacht, 232 Tons.

Carries 8 Carriage Guns and 8 Swivels.

Fore Body.	Timbers Names. ⊕		C		F		I		M		P		S		U	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In.
Lower height of the breadth	9	2	9	2	9	3	9	6	9	10	10	9	11	10	12	10
Upper height of the breadth	9	10	9	10	9	10½	10	2	10	6	11	2½	12	3	13	3
Height of toptimber line	15	8	15	8	15	9	16	0	16	2¼	16	5	16	10	17	1
Height of topside ditto									17	8½	17	11	18	4	18	7
Height of the lower edge of the ports	13	7	13	7	13	8	13	9	13	11						
Height of the cutting down	0	10	0	10½	0	11½	1	1½	1	5	2	2	3	6	5	6
Height of the rising	0	4½	0	5	0	8	1	2	1	11	3	2	4	10		
Main half breadth	12	1	12	1	12	0	11	9	11	3	10	5	8	10	6	9½
Toptimber half breadth	10	6	10	6	10	5	10	3	9	10	9	5	8	7	7	8
Topside half breadth									9	9	9	5	8	7	7	8
Half breadth of the rising	3	10½	3	10½	3	9½	3	6	2	10	1	10	0	5		
Half breadth of load water line	12	0½	12	0	11	10½	11	7	11	0½	9	10	7	4	4	6
Length of the lower breadth sweeps	9	1	8	9	8	6	8	0	6	10	5	5	4	7	5	4
Aft part of the rabbet of the stem above the upper edge of the keel									0	0½	0	6	2	0	4	3
First diagonal	7	5½	7	5	7	2	6	7	6	1	5	1	3	6	1	10
Second ditto	10	4	10	3	9	11	9	2	8	2	6	8	4	10	3	0
Third ditto							11	4	10	4	8	10	6	7	4	7
Fourth ditto													6	1	6	0½

After

After Body.	Timbers Names.								
	3	6	9	12	15	18	21	24	26
	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In
Lower height of the breadth	9 2	9 4	9 6	9 9	10 2	10 6	10 11	11 6	12 1
Upper height of the breadth	9 11	10 1	10 3	10 5	10 7	11 2	11 7	12 1	12 6
Height of toptimber line	15 8	15 9	16 0	16 3	16 6	16 9½	17 4	17 9½	18 2
Height of topſide ditto			18 10	19 1	19 4	19 7½	20 2	20 7½	21 0
Height of the lower edge of dining room lights			16 7	16 8	16 9	16 11			
Height of the cutting down	0 10	0 10	0 11	1 1	1 6½	2 4	3 7	5 6	7 9
Height of the riſing	0 5	0 8	1 1½	1 9	2 9	4 1	5 6	7 4	8 7
Main half breadth	12 1	11 11	11 8	11 5	11 1	10 7	10 0	9 3	8 7
Toptimber half breadth	10 6	10 5	10 3	10 0	9 7	9 2	8 8	8 2	7 8
Topſide half breadth			9 7	9 4	9 0	8 7	8 3½	7 8	7 3
Half breadth of the riſing	3 10	3 7	3 5	3 3	3 0	2 9	2 5½	2 2	1 10
Half breadth of load water line	11 10	11 8	11 6	11 3	10 10	10 2	9 0	6 7	3 8
Length of the lower breadth ſweeps*	9 2	9 0	8 5	7 2	5 9	4 10	3 9	2 11	2 10
Firſt diagonal	7 4	7 1	6 8	6 2	5 4	4 5	3 4½	2 0	1 1
Second ditto	10 2	9 9	9 3	8 5½	7 5	5 10	4 6½	2 11	1 9
Third ditto	12 0	11 8	11 4	10 8	9 10	8 5	7 0	5 1	3 8
Fourth ditto						10 5½	9 3	7 7	6 3

An Account of the Diagonals

Fore and After Bodies.	Names of the Diagonals.			
	1ſt.	2d.	3d.	4th.
	Ft. In.	Ft In.	Ft. In.	Ft. In.
Height up the middle line	6 5	8 1	10 3	11 11
Diſtance from the middle line on the baſe line	4 8	9 7		
Height up the ſide line			2 2	5 10

Yacht built for the Prince Royal of Denmark, of 218 Tons and 10 Guns.

Fore Body.	Timbers Names.															
	⊕		B		D		F		H		K		M		O	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Height of breadth	9	11½	10	0	10	1	10	3	10	6	10	11	11	5	12	2
Height of toptimber line	14	5	14	5½	14	6½	14	7	14	9	15	0	15	3	15	7
Height of the topside ditto							14	10	16	0	16	3	16	6	16	10
Height of the cutting down	1	4	1	4	1	4	1	4	1	6	1	10	2	7	4	6
Height of the lower part of the ports	12	6	12	6	12	7	12	8	12	9	12	11				
Aft part of the rabbet of the stem above the upper edge of the keel									0	0½	0	2	0	11	3	2
Main half breadth	11	6	11	6	11	5	11	3	10	10	10	0	8	4½	5	7
Toptimber half breadth	10	7	10	7	10	6½	10	5	10	1	9	6	8	4	6	1
Topside half breadth							10	3	9	11	9	6	8	7	6	9
Half breadth of the load water line	11	4	11	4	11	2	10	11	10	4	9	3	7	3	3	10
Length of the breadth sweeps	8	5	8	5	8	2½	8	0	7	7	6	11	6	4	6	1
First diagonal	6	1½	6	1½	6	1	5	11½	5	8	5	2	4	3	2	4½
Second ditto	9	10	9	8	9	6	9	3	8	9	7	11	6	7	4	3
Third ditto									11	1	10	0	8	4½	5	8
Fourth ditto													9	3	6	4

After

After Body.	Timbers Names								
	2	6	10	14	16	18	20	22	Tuck.
	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Height of breadth	9 11½	10 2	10 6	11 0	11 5	11 9	12 3	12 10	
Height of toptimber lin.	14 6	14 8	15 0	15 7	15 11	16 3	16 8	17 1	
Height of topſide ditto			16 9	17 4	17 8	18 0	18 5	18 10	
Height of the cutting down	1 4	1 5	1 7	2 0	2 6	3 4	4 9	6 11	
Height of the lower part of dining room lights			14 3	14 4	14 5	14 7			
Main half breadth	11 6	11 4	11 0	10 6	10 2	9 10	9 3	8 9	
Toptimber half breadth	10 7	10 6	10 2	9 9	9 4½	9 0	8 6	8 1	
Topſide half breadth			10 2	9 6	9 1	8 9½	8 3	7 10	
Half breadth of load water line	11 3½	11 2	10 10	10 0	9 6	8 6½	7 2½	3 9	
Length of the breadth ſweeps	8 3	8 3	8 2	7 1	6 2½	5 0	3 10	2 10	
Firſt diagonal	6 1	6 0	5 7	4 11	4 5	3 7	2 7	1 2	
Second ditto	9 8	9 6	8 11	7 10	7 1	6 0	4 7	2 8	0 8½
Third ditto				10 2	9 5	8 4	6 10½	4 11	3 1
Fourth ditto						10 1	9 0½	7 8	6 0

An Account of the Diagonals

Fore and After Bodies.	Names of the Diagonals.			
	1ſt.	2d	3d.	4th.
	Ft In.	Ft In.	Ft. In.	Ft. In.
Height up the middle line	6 6	9 8	12 0	13 10
Diſtance from the middle line on the baſe line	3 10	8 4		
Height up the ſide line			2 5	6 10

Oreſtes

Orestes Brig Cutter, of 399 Tons, and 24 Guns.

Fore Body.	Timbers Names.													
	⊗		B		D		F		H		K		L	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Height of the Topside	18	6	18	3	18	0	17	11	17	11	18	3	18	6
Height of the lower edge of the ports	15	7	15	3	15	0	14	10	14	10	15	3	15	8
Height of the cutting down	2	1	1	10	1	8	1	8	2	0	3	8	5	4
Main or topside half breadth	15	0	14	11	14	6	13	9	12	5	9	3	6	6
Half breadth of the load water line	13	11	13	10	13	5	12	6	10	10	6	1	2	8
Aft part of the rabbet of the stem, above the upper edge of the keel									0	3	1	2	3	4
First diagonal	4	8	5	3	5	5	5	3	4	6	2	9	1	5
Second ditto	9	0	9	10	10	0	10	0	8	7	5	8	4	0
Third ditto	14	2	14	11	15	0	14	8	12	11	9	10	7	4
Fourth ditto	15	8	15	9	15	10	15	1	13	6	10	0	7	5

An Account of the Diagonals for the Fore Body.

	Names of the Diagonals.							
	1st		2d		3d		4th	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Height up the middle line	7	0	11	8	16	5	18	5
Distance from the middle line on the base line	4	5	11	6				
Height up the side line					3	11	10	8

After

After Body.	Timbers Names.							
	1	3	4	5	6	7	8	9
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Height of the Topfide.	18 9	19 3	19 9	20 3	20 10	21 4	22 0	22 8
Height of the lower edge of the ports	15 11	16 5	16 11	17 5	18 0	18 6	19 ½	19 8
Height of the cutting down	2 5	2 11	3 4	3 10	4 4	5 3	6 3	7 9
Main or topfide half breadth	15 0	14 8	14 4	14 1	13 10	13 2	12 8	12 1
Half breadth of the load water line	14 5	13 10	13 5	12 9	11 11	10 7	8 6	5 8
Firft diagonal	5 5	4 7	4 1	3 7	2 11	2 6	1 10	1 1
Second ditto	8 8	7 4	6 7	5 11	5 2	4 3	3 4	2 6
Third ditto	13 9	12 5	11 10	11 2	10 3	9 0	7 9	6 4
Fourth ditto	17 1	16 3	15 8	15 1	14 4	13 5	12 2	10 10
Fifth ditto	17 9	17 3	16 10	16 3	15 10	15 1	14 3	13 5

An Account of the Diagonals for the After Body.

	Names of the Diagonals.				
	1ft	2d	3d	4th	5th
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Height up the middle line	8 1	12 1	16 9	20 8	23 10
Diftance from the middle line on the bafe line	5 0	12 0			
Height up the fide line			4 0	9 2	14 4

The

The Principal DIMENSIONS and SCANTLINGS

Principal Dimensions, &c.	100 Guns.		90 Guns.		74 Guns.		64 Guns.	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Length. By the keel for tonnage	153	0½	146	6	145	2	131	0
On the gun or lower deck from the aft side of the rabbet of stem, to the fore side of the rabbet of the stern post	186	0	177	6	176	0	159	6
From the fore part of the stem, at the height of the hawse holes, to the aft part of the stern post, at the height of the wing transom	190	2	181	8	179	5	163	0
From the foremost perpendicular to the center of dead flat	93	6	77	8	66	9	66	0
From the foremost timber expressed in the respective tables of dimensions to the foremost perpendicular	8	11	7	2½	6	3	6	0
From the after timber expressed in the respective tables of dimensions to the after perpendicular	4	5	4	3½	3	7	7	10½
Of the floor sweeps	12	0	11	2	11	2		
Of the upper breadth sweeps	19	0	17	10	15	2	14	6
Of the tread of the keel, from the aft side of the post to the foremost part of the fore foot	169	4	162	0	160	5	142	6
Breadth. Extreme, allowing only the thickness of the bottom on each side to be added to the breadth moulded, to compute it	52	0	49	0	48	8	44	4
Moulded	51	3	48	4	48	0	43	8

of each of the before-mentioned SHIPS.

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons.	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Orestes.
Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In
115 9	116 7	113 1	107 0	99 6	94 3½	83 0	60 8	58 6	72 2½	74 10¾	81 6½
140 0	141 0	137 0	129 0	120 6	114 3	98 5	78 7	78 0	90 1	89 5	102 0
143 3	144 8	140 8	132 9	124 0	117 7	101 5	80 5	80 0	91 4	91 7	104 8
62 8	64 0	62 2	58 4	55 0	52 9	36 3	34 5	32 7	40 3	34 4	48 6
3 9½	4 5	5 2	5 8½	5 0	5 0	4 3	2 9	4 9	4 11	4 5	4 6
4 2½	2 11	2 10	4 2	2 0	2 6	2 2	4 6	6 1	3 9	3 6	13 6
8 9	10 10	11 0	10 4	9 10	9 4	—	—	—	7 10	—	—
12 4	11 4	11 0	11 0	10 2	9 10	7 0	—	—	5 7	8 4	—
127 3	132 0	128 0	119 2	111 6	105 0	92 0	66 1	63 0	80 1	80 3	83 4
37 10	38 10	38 0	35 4	33 6	32 0	26 2	25 0	29 8	24 7	23 5	30 4
3 2	38 4	37 6	34 10	33 0	31 6	25 9	24 7	29 3	24 1	23 0	29 10

Breadth.

Principal Dimensions, &c.	100 Guns.		90 Guns.		74 Guns.		64 Guns.	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Breadth continued.								
At the afterpart of the wing tranſom from out to outſide of the plank	37	4	33	9	34	1	30	4
Of the ſtern at the height of the toptimber line from out to outſide of the plank - - - - - -	24	6	23	5	25	0	20	8
Height. Of the gun or lower deck from the upper edge of the keel to the upper ſide of the plank, at the middle line of the deck								
At the foremoſt perpendicular - -	26	9	25	3	24	4	23	3
At dead flat - - -	25	[illegible]	[illegible]	8	22	5	21	8½
At after perpendicular -	27	5	26	2	24	4	23	9
Of the upper ſide of the wing tranſom at the middle line from the upper edge of the keel - - - - -	29	9	28	7	26	6	26	0
From the upper edge of the keel to the touch of the upper counter at the middle line - - - - -	37	3	36	7	34	3	33	0
From the upper edge of the keel to the touch of the lower counter at the middle line - - - - -	34	9	33	5	30	9	30	5
From the upper edge of the keel to the upper part of the breaſt rail of the lower balcony - - - - -	46	4	44	8	42	6	42	0
From the upper edge of the keel to the upper part of the breaſt rail of the upper balcony - - - - -	53	7	[illegible]	8	—		—	
From the upper edge of the keel to the upper part of the taffrail	60	2	58	3	50	4	50	0
Of the head of the ſtem at the fore part - - - - -	44	0	41	1	35	9	35	0
Of the upper part of the figure - - - - - -	52	0	48	0	42	0	41	0
Of the top of the ſide in midſhips - - - -	45	9	44	3	37	8	33	9
Depth. In the hold (taken from the ſtrake next to the limber boards)	22	3	21	0	19	6	19	0
In the waſte, in midſhips - - - - - - -	6	9	6	8	7	[illegible]	6	0

Riſing

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Orestes.
Ft. In.	Ft. In	Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
24 10	22 4	23 0	23 3	20 6	19 6	12 8	17 0	16 2	15 2	16 0	20 0
17 6	21 0	19 6	20 7	18 4	1[illegible] 8	10 4	13 2	11 4	13 6	14 4	20 0
20 2	17 2	16 10	15 11	14 8	13 9	13 8	13 6	14 8	13 4	12 6	15 0
18 10	16 2	15 4½	14 9	13 4	12 5	12 5	12 6	13 0	12 6	11 10	14 4
21 0	18 6	17 10	17 0	15 4	14 11	14 6	16 1	14 6	——	11 6	21 0
23 4	22 1	21 2	20 10	19 4	18 6	14 3½	14 0	13 0	11 9	12 1	20 10
30 10	28 8	27 8	26 7	24 9	24 4	17 2	19 11	20 2	15 9	15 2	27 0
27 11	26 0	25 5	24 6	22 7	22 0	——	17 5	17 3	14 5	14 3	23 10
40 4	36 9	35 10	34 7	32 8	32 1	24 0	21 2	20 8	23 9	21 2	23 10
30 7	30 9	29 6	27 8	26 3	24 8	18 10	17 5	19 6	17 0	16 6	20 0
36 0	33 9	32 6	30 10	29 0	28 2	21 8	18 4	——	19 6	18 6	21 0
31 7	28 11	28 3	27 0	25 0	24 2	16 9	15 2	16 6	16 4	14 8	18 4
16 4	13 6	13 3	12 7	11 0	10 3	10 7	11 0	11 1	11 2	10 0	12 0
6 7	6 10	6 9	6 3	6 6	6 0	4 10	3 6	4 3	4 2	3 4	4 8

Principal Dimensions, &c.	100 Guns.	90 Guns	74 Guns.	6[illegible] Guns.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Rising of the midship flat	0 3	0 5	0 5	0 $7\frac{1}{2}$
Draught of Water, Afore	23 0	22 0	20 3	19 4
Draught of Water, Abaft	24 0	23 0	20 3	20 8
Burthen in tons	2201	1870	1828	1369
Orlop. Height from the upper side of the orlop beam to the under side of the gun deck plank at the middle of the beam	7 3	7 1	7 2	6 10
Plank thick	0 2	0 2	0 2	0 $1\frac{1}{2}$
Platforms. Height between the upper side of the plank of the fore platform and the underside of the gun deck plank at the middle of the beam	7 3	7 1	7 2	6 10
Height between the upper side of the plank of after platform and the under side of the plank of gun deck at middle of the beam	7 3	7 1	7 2	7 0
Planks thick	0 3	0 3	0 3	0 3
Orlop and platform beams to round	0 2	0 2	0 $2\frac{1}{2}$	0 2
Gun or lower deck. Beams to round	0 $5\frac{1}{2}$	0 5	0 5	0 $4\frac{1}{2}$
Plank thick	0 4	0 4	0 4	0 4
Height from the upper side of the gun deck plank to the under side of the deck plank above, afore, midships, and abaft	7 2	7 1	7 2	6 $11\frac{1}{2}$
Height from the plank to the port cells	2 4	2 4	2 5	2 3
Height of the ports from the water in midships	5 3	5 0	4 6	5 6
Ports deep	2 9	2 8	2 9	2 8
Fore and aft	3 5	3 5	3 6	3 4
In distance from each other	7 7	7 9	7 6	6 9
In number	30	28	28	[illegible]

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Orestes.
Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
0 7	1 1	1 0	1 0½	0 11	0 10	——	——	——	0 5	——	——
16 10½	17 7	17 2	16 7	1[illegible] 6	1[illegible] 6	11 0	9 0	10 10	9 10	9 1	10 2
18 1½	18 8	18 1	[illegible] 7	16 6	15 [illegible]	12 3	11 6	10 10	10 0	10 2	14 10
880	935	868	710	594	513	300	201	273	232	218	399
6 7½	5 0	5 2	5 0								
0 1½	0 1	0 1	0 1								
6 6	5 0	5 2	6 4	6 0	6 0	5 6	5 2	5 7	6 6	6 1	6 0
6 6	6 0	6 2	5 11	5 10	5 8	5 6	6 3	6 1	——	——	6 0
0 3	0 2½	0 2½	0 2½	0 2½	0 2½	0 2½	0 2	0 2	0 1½	0 1½	0 2
0 1½	0 1	0 1	0 1	0 1	0 1						
0 4	0 4½	0 4½	0 4	0 4	0 4						
0 3	0 3	0 2½	0 2½	0 2½	0 2½						
0 8	6 2	6 2	6 0	5 11	5 10						
2 1											
4 10	8 0	7 6	7 0	6 1	6 6	3 8	4 8	4 6	5 4	4 3	4 4
2 6											
2 11											
8 10											
2 [illegible]											

Gun

Principal Dimensions, &c.	100 Guns.		90 Guns.		74 Guns.		6[illegible] Guns.	
Gun or lower deck continued.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Fore side of the foremost, abaft the foremost perpendicular -	17	7	16	10	18	3	16	8
Aft side of the aftermost, afore the after perpendicular - -	7	3	11	0	10	8	13	0
Middle deck. Beams to round - - - - - - -	0	7½	0	7				
Plank thick - - - - - - - - - - -	0	3	0	3				
Height from the upper side of the plank to the upper side of the upper deck beam afore, midships and abaft - -	7	1	7	0				
Height from the plank to the port cells - - -	2	2	2	2				
Ports deep - - - - - - - - - -	2	9	2	8				
Fore and aft - - - - - - - - -	3	3	3	5				
In distance from each other - - - - - -	7	9	7	9				
In number - - - - - - - - -	32		32					
Fore side of the foremost, abaft the foremost perpendicular	3	7	3	4				
Aft side of the aftermost, afore the after perpendicular -	12	11	6	0				
Upper deck. Beams to round - - - - - - -	0	8½	0	7	0	8½	[illegible]	4½
Plank thick - - - - - - - - - -	0	3	0	3	0	3	[illegible]	4
Height from the upper side of the plank to the upper side of the quarter deck beam at the middle of the beam — Afore	6	11	6	8	6	10	6	8
— Abaft	7	2	6	11	7	0	6	8
Height from the upper side of the plank to the upper side of the forecastle beam at the middle of the beam — Afore	6	7	6	4	6	7	6	5
— Abaft	6	7	6	4	6	7	6	5
Height from the plank to the port cells - - -	1	10	1	10	2	0	1	11
Ports deep - - - - - - - - - -	2	8	2	7	2	6	2	8
Fore and Aft - - - - - - - - -	2	11	2	9	2	1[illegible]	2	10

[illegible] Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Oestes.
Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
16 10											
12 0											
0 4	[illegible]										
0 3[illegible]	0 [illegible]	0 8	0 7½	0 7	0 6½	0 7	0 6½	0 6½	0 5	0 6	0 5
[illegible] 3	0 3	0 3	0 3	0 3	0 3	0 3	0 3	0 3	0 2½	0 2½	0 3
6 6	6 6	6 6	6 4	6 1	6 1	5 9					
6 8	6 9	7 0	6 7	6 6	6 6	6 6					
5 10	6 3	6 0	6 2	6 0	5 11	5 2	——	——	4 8	4 4	
5 10	6 2	6 0	6 2	5 11	5 10	5 2	——	——	4 8	4 4	
1 8	2 1	2 1	1 9	1 9	1 9	1 6	1 6	1 10	1 6	1 2	1 9
2 4	2 6	2 5	2 3½	2 2	2 2	2 0	1 5	1 10	1 6	1 6	2 1
2 5	2 11	2 10	2 6	2 4	2 3	2 5	2 0	2 0	1 9	1 6	2 1

Ppp

Upper

Principal Dimensions, &c.	100 Guns.		90 Guns.		74 Guns.		[illegible]	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Upper deck continued.								
Ports in distance from each other - - - - - -	8	1	8	5	8	1	7	2
In number - - - - - - - - - -	30		30		30		28	
Fore side of foremost abaft the foremost perpendicular - -	10	6	10	6	13	1	11	6
Aft side of the aftermost afore the after perpendicular - -	7	2	1	11	6	9	8	0
Quarter deck. Beams to round - - - - - - - -	0	9	0	$8\frac{1}{2}$	0	$8\frac{1}{2}$	0	$7\frac{1}{4}$
Plank thick - - - - - - - - - - -	0	3	0	3	0	3	0	3
Height from the upper side of the plank to the upper side of the round house beam at he middle of the beam - - - - - - - - Afore	6	6	6	3	6	6	6	6
Abaft	6	9	6	5	6	8	6	8
Height from the plank to the port cells - - - - -	1	8	——	——	1	7	1	6
Ports deep - - - - - - - - - -	2	6	——	——	2	6	2	4
Fore and aft - - - - - - - - - -	2	9	——	——	2	9	2	6
In number - - - - - - - - -	12		——		12		10	
Length form the aft side of the middle timber to the fore side of the foremost beam - - - - - - - -	92	0	85	0	90	0		
Fore castle. Beams to round - - - - - - - -	0	$7\frac{1}{2}$	0	7	0	$7\frac{1}{2}$		
Plank thick - - - - - - - - - - -	0	$2\frac{1}{2}$	0	$2\frac{1}{2}$	0	3	0	$2\frac{1}{2}$
Ports fore and aft - - - - - - - - - -	2	9	2	9	2	8	2	6
In number - - - - - - - - - - -	2		2		4		2	
Cells from the deck - - - - - - - - - -	1	6	1	6	1	7	1	5
Fore side of the foremost abaft the foremost perpendicular -	24	0	21	6	16	10	22	5
In distance from each other - - - - - - -	——		——		14		——	

4[illegible] Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot Yacht	[illegible]mark Yacht.	Orestes
Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In	Ft. In.
9 6	6 7	7 2	6 9	6 8	6 11½	6 11½	8 4	6 7	5 4	7 8	5 9
22	28	26	26	24	22	18	12	16	8	10	24
11 0	7 5	10 4	10 3	10 8	11 [illegible]	11 0	9 0	9 0	19 5	11 9	7 0
7 3	7 0	4 6	5 1	8 3	8 2	10 0	14 10	6 10	——	——	11 0
0 8	0 7½	0 7	0 6½	0 6	0 6	0 6½	——	——	0 5	0 6	
0 3	0 3	0 3	0 2½	0 2½	0 2½	0 2	——	——	0 2	0 2	
——	1 10	1 9	1 8	1 6	1 5						
——	2 4	2 3	2 3	2 2	2 0						
——	2 5	2 4	2 4	2 3	2 1						
——	12	12	8	6	6						
[illegible]	70 4	65 4	66 6	56 0	55 0	50 0	——	——	——	37 0	
[illegible] 6½	0 6½	0 7	0 6	0 5½	0 5½	0 6	——	——	0 5	0 4	
0 2½	0 2½	0 2½	0 2½	0 2	0 2	0 2	——	——	0 2	0 2	
2 5	2 6	2 6	2 5	2 3	2 2						
2	4	4	2	2	2						
1 5	1 5	1 5	1 4	1 4	1 4						
22 6	11 3	10 3	11 7	19 3	8 0						
——	11 10	7 6									

Fore

Principal Dimensions, &c.	100 Guns.	90 Guns	74 Guns.	[illegible] Guns.
Forecastle continued.	Ft. In.	Ft. In.	Ft. In	Ft. In.
Length of the forecastle from the fore side of the stantions of the beakhead bulkhead, to the aft side of the after beam	40 6	40 6	49 6	36 2
Round house. Beams to round - - - - - - -	0 10	1 0	0 11	0 9
Plank thick - - - - - - - - - - -	0 2½	0 2½	0 2½	0 2½
Length taken from the after part of the stern timber to the fore side of the foremost beam - - - - - -	52 0	38 6	51 0	44 3
Stern. Round up of the lower counter - - - - - -	0 11	0 10	0 10	0 10
Round aft of ditto - - - - - - - - - -	1 2	1 4	1 6	1 3
Round up of the upper counter - - - - - - -	1 1	1 0	1 0	0 11
Round aft of ditto - - - - - - - - - -	1 2	1 4	1 7	1 4
Length from the after perpendicular to the touch of the lower counter at the middle line - - - - - -	7 11	6 6	6 11	7 6
Length from the after perpendicular to the touch of the upper counter at the middle line - - - - - -	9 6	8 0	8 11	9 6
Length from the after perpendicular to the counter-timber at the middle line, at the height of the taffrail - -	16 5	13 0	3 4	76 0
Length of the lower gallery from the after part of the side counter timber - - - - - - - -	15 2	12 10	12 10	11 [illegible]7
Length of the middle gallery from the side counter timber -	12 3	10 1		
Length of the upper gallery from the side counter timber -	10 4	7 11	10 2	9 6
Upper side of the lower balcony breast rail above the plank of the deck - - - - - - - - -	3 6	3 4	3 4	3 4
Upper side of the upper balcony breast rail above the plank of the deck - - - - - - - - -	3 0	3 2		
Depth of the taffrail - - - - - - - - - -	3 10	2 9	3 [illegible]	[illegible] 3

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Oreftes.
Ft. In.	Ft. In	Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
31 0	37 3	35 10	32 0	29 6	28 5	22 6	——	——	12 4	17 3	
0 9	0 9	0 $8\frac{1}{2}$	0 8	0 7	0 7	0 6	0 5	0 $5\frac{1}{2}$	0 5	0 4	0 4
1 2	1 1	1 1	1 0	0 11	0 10	0 $9\frac{1}{2}$	0 10	0 11	0 9	0 6	0 6
0 10	0 9	0 $8\frac{1}{2}$	0 8	0 7	0 8	——	——	——	0 5	0 4	
1 2	1 1	1 1	1 0	0 11	0 10	——	——	——	0 9	0 6	
6 2	6 0	6 1	5 8	5 3	5 1	4 0	5 0	6 0	3 0	3 1	0 10
8 2	7 6	7 3	7 0	6 4	6 6	——	6 0	7 6	3 6	3 11	
67 6	10 5	9 9	10 0	8 9	9 3	7 8	6 8	——	5 6	6 5	3 9
0 4	11 5	10 0	9 5	8 6	8 4						
3 2	2 10	2 3	2 11	2 8	2 7	2 0	——	——	3 5	1 11	

Stern

Principal Dimensions, &c.	100 Guns.		90 Guns.		74 Guns.		64 Guns.	
Stern continued.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Quarter pieces fore and aft or sided - - - - -	1	10	1	8	1	6	1	5
Projection of the balconies at the middle line from the side counter timber - - - - - - -	3	6	3	5	3	3	2	6
Hollow of the upper counter - - - - - - -	0	1½	0	2	0	1	0	1
Ditto of the lower counter - - - - - - - -	0	9	0	7	0	5	0	6
Lower gallery lights in length - - - - - - -	3	9	3	6	3	6	3	6
Breadth - - - - - - -	3	2	2	10	2	10	2	8
Middle gallery lights in length - - - - - - -	3	8	3	4				
Breadth - - - - - - -	2	1	2	1				
Upper gallery lights in length - - - - - - -	3	4	2	10	3	2	3	2
Breadth - - - - - - -	1	10	1	8	2	5	2	4
Plank of the lower counter thick - - - - -	0	3	0	3	0	3	0	3
Ditto upper counter ditto - - - - -	0	2½	0	2½	0	2½	0	2½
Stern post. Square at the head - - - - - - -	2	1	2	0½	1	11	1	9½
Fore and aft at the keel (the false post included) - - -	3	0	3	0	3	0	2	8
Aft side of it abaft the aft part of the rabbet at the wing transom	1	2½	1	1	0	10	0	10
Aft part of the rabbet abaft the after timber, expressed in the tables of dimensions, at the upper edge of the keel -	0	3 afore it	1	10	1	3	1	4
Aft side abaft the after part of the rabbet at the keel - -	2	4	2	3	2	3	2	0
Aft part of the rabbet abaft the after timber, expressed in the tables of dimensions, at the height of the wing transom -	4	1	6	2	5	0	8	3
False post. The back of it abaft the rabbet on the keel - - -	2	4	2	3	2	[illegible]	2	0

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlott Yacht.	Denmark Yacht.	Oreftes
Ft. In.	Ft. In	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In.
1 3	1 2	1 1	1 0	0 11	0 10½	0 9½	0 9	0 10	1 4	1 0	0 1
0 1	0 0¾	0 0¾	0 0¾	0 0¾	0 0¾	—	—	—	0 0½	0 0½	
0 5	0 4	0 4	0 4	0 4	0 3½	0 3	0 4	0 5	0 4	0 3	
3 4	3 1	2 11	2 9	2 8	2 8						
2 6	2 4	1 9	1 11	1 10	1 10						
0 3	0 3	0 3	0 2½	0 2½	0 2	0 2	0 2	0 2½	0 2	0 2	0 2
0 2½	0 2½	0 2	0 2	0 1½	0 1½	0 1½	0 1½	0 1½	0 1½	0 1½	0 1½
1 6½	1 6½	1 6	1 6	1 5	1 3½	1 2	1 1	1 2	1 1	0 10½	0 11
2 6	2 7	2 8	2 8	2 5	2 5	3 2	2 1	2 7	2 0	1 8	2 0
0 8	0 10	0 10	0 10	0 9	0 10	0 10	0 9	0 10	0 6	0 7	0 10
1 4	1 7½	1 6	2 3	1 1	0 7	1 3 afore it	1 3 afore it	3 6 afore it	1 5	0 11	0 7 afore it
1 7	1 9	1 8	1 10	1 9	1 8	2 9	1 7½	2 3	1 1	1 3	1 3
4 4½	4 4	4 0	4 11	3 9	3 3	—	4 5	4 5	4 3	3 10	12 10
1 7	1 9	1 8	1 10	1 9	1 8	2 9	1 7½	2 3	1 1	1 3	1 3

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
	Ft. In.	Ft. In.	Ft. In	Ft. In.
Inner post. Fore and aft at the upper end	1 4	1 1½	1 1	1 0
Ditto, on the keel	1 5¼	1 7½	1 5	1 4
Transoms. Wing transom sided	1 3	1 2½	1 2	1 1
Moulded at the end	1 8	1 7½	1 6.	1 5
In length at the aft side	35 6	32 2	32 6	28 8
Filling transom sided	0 9	0 9½	0 10	0 9½
Or so as to leave for air between it and the wing	0 3	0 3	0 3	0 3
And above the deck plank	0 3	0 3½	0 3	0 2½
Deck transom sided	1 2	1 1½	1 0½	1 0½
Moulded as broad as conveniently can be got, for the better fastening the deck plank.				
Transoms below the deck, in number	6	7	6	5
Sided	1 1	1 0½	0 11	0 11½
To be whole transoms	2d, 4th, 6	1, 3, 5	all	all
Half ditto	1st 3d, 5	2, 4, 6	——	——
The half transoms fitted to meet at the middle line, with a strong lap scored in on the fore side of the inner post	0 3	0 3	——	——
And on each side	0 2	0 1½	——	——
The lap to be thick	0 6	0 5½	——	——
Bolted with bolts in each, in number	2	2	——	——
Each half transom to have a strong tenon also into the aft side of the fashion pieces, and both whole and half transoms so disposed as to leave space for air between each other	0 5	0 4½	0 [illegible]	0 4

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop, 300 Tons.	Weazel 201 Tons.	Cutter 273 Tons.	Royal Charlot. Yacht.	Den-mark Yacht.	Oreſtes.
Ft. In.	Ft. In	Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
0 10	0 10	0 9	0 9	0 8	0 8	0 6	0 5	0 5½	—	0 7	
1 2	1 2	1 2	1 1	1 0	1 0	0 8	0 8	0 9	—	0 9	
1 0	1 0½	1 0	1 1	1 0½	1 0	0 10½	0 11	0 11	0 9½	0 9½	0 10
1 4	1 4	1 3	1 2	1 1½	1 1	1 0	0 10½	0 10½	1 0	1 3	1 0
23 8	21 4	22 2	22 6	21 0	18 10	12 0	16 6	15 4	14 8	15 7	19 2
0 8	0 10¼	0 10½	0 10½	0 9	0 8½	0 7					
0 3	0 3	0 3	0 2½	0 2½	0 2½	0 2½					
0 3											
0 11½	0 11½	0 11	0 10½	0 10	0 10						
4	2	2	2	1							
0 11	0 10½	0 10½	0 9½	0 9							
2, 4,	all	all	all								
1, 3,											
0 2½											
0 1¼											
0 5											
2											
0 4	0 3	0 3	0 3	0 3	0 3	0 3					

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Transoms continued.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
The wing transoms to be bolted with bolts, in number	2	2	2	2
In diameter	0 $1\frac{1}{2}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{8}$
The filling to be bolted with bolts, in number	1	1	1	1
In diameter	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$
The deck to be bolted with bolts, in number	2	2	2	2
In diameter	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{8}$
The whole transoms below the deck bolts, in number	1	1	1	1
In diameter	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$
Fashion pieces. The after fashion piece to run up to transom	deck	deck	2nd	deck
Sided	1 1	1 1	1 0	0 $11\frac{1}{2}$
The middle one to run up to transom the	——	——	deck	
Sided	——	——	1 0	
The foremost one to run above the wing transom	4 0	3 10	3 8	3 6
Sided	1 2	1 $1\frac{1}{2}$	1 1	1 $0\frac{1}{4}$
Head. Length from the fore side of the stem to the fore part of the knee at the head	18 2	17 4	15 0	12 4
From the fore side of the stem at the height of the beakhead to the fore side of the beakhead bulkhead	8 10	8 6	7 6	6 9
Height of the lower edge of the lower cheek on the fore side of the stem from the upper edge of the keel	29 0	28 5	26 3	24 0
Lower cheek moulded on the stem	1 1	1 0	0 10	0 11
Distance between the cheeks on the stem	3 8	3 0	2 6	2 1

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons.	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Orestes.
Ft. In.	Ft. In	Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In.
2	2	2	2	2	2	2	2	2	2	2	2
0 1⅛	0 1⅛	0 1	0 1	0 0⅞	0 0⅞	0 0¾	0 0¾	0 0¾	0 0¾	0 0¾	0 0¾
1	1	1	1	1	1	1					
0 1⅛	0 1	0 1	0 1	0 0⅞	0 0⅞	0 0¾					
2	2	2	2	2	2						
0 1	0 1	0 1	0 0⅞	0 0¾	0 0¾						
1	1	1	1	1	1						
0 1	0 1	0 1	0 0⅞	0 0¾	0 0¾						
1st	deck	deck	filling	filling	filling						
0 11	0 11	0 10½	0 10	0 9½	0 9½						
3 4	3 2	3 0	2 11	2 8	2 6	2 0	1 11	1 11	2 0	2 0	
1 0	0 11¼	0 11	0 10½	0 10	0 9¾	0 9	0 8¾	0 8¾	0 8½	0 8	0 8
11 4	11 5	9 8	10 1	8 10	8 7	8 6	5 6	—	6 6	7 6	6 0
5 7	—	—	—	—	—	—	—	—	4 5		
22 9	22 3	21 5	20 7	19 2	18 5	14 6	11 11	—	10 10	10 11	13 6
0 9½	0 9½	0 8½	0 8	0 7½	0 7	0 5½	0 5	—	0 5	0 4½	0 4
2 0	1 9	2 0	1 7	1 10	1 6	1 2	1 0	—	1 0	1 0	1 4

Principal Dimenſions, &c.	100 Guns.		90 Guns.		74 Guns.		64 Guns.	
Head continued.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Upper cheek moulded on the ſtem	0	11½	0	11	0	9½	0	10
Diſtance between the upper cheek and the main rail on the ſtem	5	9	5	6	2	9	3	0
Main rail moulded on the ſtem	0	10	0	9	0	9	0	9
The main rail ſided at the after end	1	0	0	11	0	10	0	8¾
Ditto moulded ditto	1	3	1	2	1	1	0	11½
Middle rail moulded at the after end	0	9½	0	9	0	8	0	7½
Lower rail moulded at the after end	0	9	0	8	0	7½	0	7
Breaſt of the figure in diſtance from the ſtem	17	10	17	1	14	10	12	1
Diſtance from breaſt of figure to the fore part of the hair bracket	5	9	4	4	4	3	3	10
Foremoſt head timber afore the ſtem	8	6	9	1	8	0	7	0
Height of the ſcroll of hair bracket above the upper edge of keel	47	0	44	4	38	2	35	9
Cat-heads. To be fore and aft	1	8	1	7	1	5½	1	5
Deep	1	6	1	5	1	4½	1	3
Steeve up in a foot	0	4	0	4½	0	5	0	5
Steeve forward in a foot	0	5	0	5½	0	5½	0	6½
upporter. The ſupporter to cat head ſided	1	1	0	11	0	9½	0	9
Moulded at the upper end	3	6	3	5	3	5	3	2
Knee. The knee at the aft ſide of the cat head ſided	0	9	0	8	0	7	0	6½
Thwartſhip arm long	3	10	3	8	3	6	3	0
Fore and aft arm long	5	6	5	4	5	0	5	0

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Oreftes.
Ft. In.	Ft. In	Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
0 8½	0 8½	0 7½	0 7	0 7	0 6½	0 5	0 4¾	—	0 4¾	0 4¼	0 4
2 6	2 4	2 0	2 2	1 10	1 7	1 3	1 1	—	2 9	1 3	1 9
0 8	0 7¾	0 7	0 6	0 5¾	0 5½	0 4	0 4½	—	0 4½	0 5½	0 5
0 8½	0 7½	0 7	0 6	0 6	0 6	0 5½	0 5¼	—	0 5½	0 5½	0 5
0 11	0 9¼	0 9	0 8½	0 8	0 7¾	0 6½	0 6	—	0 7½	0 7	0 6
0 7	—	—	—	—	—	—	—	—	0 3½		
0 6½	0 5½	0 5	0 4½	0 4¼	0 4¼	0 3½	—	—	0 3	0 3½	
11 1	11 2	9 6	9 11	8 8	8 5	8 4	5 4	—	6 4	7 4	5 10
3 3	2 9	2 8	2 7	2 6	2 3	2 2	1 5	—	—	1 7	1 5
5 6	6 0	5 0	5 2	4 4	4 4	4 10	2 9	—	3 6	4 2	3 6
32 0	31 10	30 8	29 0	28 0	26 6	20 10	18 5	—	17 4	16 5	20 9
1 3	1 3½	1 3	1 2	1 1	1 0	0 11	0 9	0 9½	0 8	0 8	0 8
1 1	1 1	1 1	1 0	0 11	0 11	0 10	0 8	0 8	0 7	0 7	0 6½
0 4	0 3½	0 4	0 3½	0 3	0 3	0 3	0 2½	0 2	0 2	0 3	0 2½
0 5	0 4½	0 5	0 4½	0 4	0 4¾	0 4½	0 3	0 3½	0 3	0 4	0 3½
0 8	0 7¾	0 7½	0 7	0 6	0 5¾	0 4½	0 4	—	0 4	0 4¼	0 4½
2 10	2 6	2 4	2 2	2 0	1 11	1 6	1 4	—	1 4	1 3½	1 4
0 6	0 5¾	2 5½	0 5	0 4½	0 4¼	0 4	—	—	0 3½		
2 10	2 9	2 8	2 6	2 5	2 4	2 0	—	—	2 0		
4 10	4 8	4 7	4 6	4 4	4 0	3 0	—	—	2 10		

Principal Dimensions, &c.	100 Guns.		90 Guns.		74 Guns.		64 Guns.	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Bollard timbers. The bollard or knighthead timbers to be sided at the heads	1	4½	1	4½	1	4	1	2½
And at the heels	1	2	1	1	1	1	1	0½
To run down low enough to take a bolt in the hook below the gun deck hook, and from the head of the stem up to be opened to the diameter of the bowsprit.								
Hawse pieces. Hawse pieces on each side in number	4		4		4		4	
The middle ones sided	1	8	1	7½	1	6	1	6
The foremost and aftermost sided	1	9	1	8½	1	5	1	5
Hawse holes. The hawse holes in diameter	1	7	1	5	1	5	1	2½
To be in distance from each other on a square	1	8	1	9	1	9	1	5
Lower part from the deck	3	9	4	5	2	10	2	9
Their counters to come exactly on the joints of the hawsepieces and their insides lined with lead, in thickness	0	1½	0	1¼	0	1¼	0	1
Stem. The stem to be moulded	1	8½	1	8	1	6	1	5
Number of pieces	3		3		3		3	
Scarphs in length	4	6	4	4	4	2	3	11
And bolted with bolts in number	6		6		6		6	
In diameter	0	1¼	0	1¼	0	1¼	0	1⅛
Two of the middle bolts to go through the false stem and the lips of the scarphs not to be more than	0	4½	0	4	0	4	0	4
To be thwartships at the head	2	6	2	5	2	0	1	11
And to diminish from thence to the lower side of the lower cheek to	1	9	1	7½	1	6	1	5

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Orestes.
Ft. In.	Ft. In	Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
1 1½	1 1½	1 1	1 0	0 11½	0 11	0 10	0 10	0 9½	0 9	0 9½	0 10
1 0	1 0	1 0	0 11	0 11	0 11	0 9½	0 9	0 9½	0 8	0 7½	0 10
4	4	4	4	4	4	3	3	3	4	3	3
1 2½	1 3½	1 2½	1 2	1 1	1 0	0 11	0 10	0 10½	0 10	1 5½	1 0
1 2½	1 3½	1 2½	1 2	1 1	1 0	0 10	0 10	0 10¼	0 9½	1 0	1 0
1 2	1 1	1 2	1 1	0 11	0 10½	0 9	0 8	0 9½	0 8	0 8	0 9
1 1	1 1	1 2	1 1	1 0	1 0	1 0	1 0	1 2	1 2	0 10	0 11
3 9	2 3	1 10	1 7	1 7	1 7	2 9	0 4	1 4	——	0 7	0 4
0 1	0 1	0 1	0 1	0 0¾	0 0½	0 0⅜	0 0¼	0 0¼	0 0¼	0 0¼	0 0¼
1 4	1 3	1 2	1 4	1 2	1 2	1 6	1 2	1 7	1 0	0 11	1 10
3	3	2	2	2	2	2	2	2	2	2	2
3 8	3 6	3 4	3 4	3 0	2 10	3 0	3 0	3 2	3 0	3 0	3 0
6	6	6	6	6	5	5	5	5	5	5	5
0 1	0 1	0 1	0 1	0 0⅞	0 0⅞	0 0¾	0 0¾	0 0¾	0 0¼	0 0¾	0 0¾
0 4	0 3¾	0 3½	0 3½	0 3½	0 3½	0 3	0 3	0 3	0 3	0 3	0 3
1 9	1 8	1 7	1 5½	1 4	1 3	1 1	1 0	1 1	1 0	1 1	1 0
1 3½	1 3½	1 3½	1 3	1 2	1 1	1 0	1 0	——	1 0	0 11	1 0

Stem

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Stem continued.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
And at the end of the keel to - - - - - - -	1 6	1 5½	1 3	1 2
Apron. The falſe ſtem or apron to be thick - - - - -	1 0	1 0	0 11	0 11½
And in breadth - - - - - - - - -	2 6	ſame as the ſtem	2 4	2 2
The ſcarphs to be long - - - - - - -	1 4	1 3	1 2	1 0
Main keel. Square in the midſhips - - - - - -	1 8	1 7½	1 6	1 5
Sided afore - - - - - - - - - -	1 6	1 5½	1 3	1 2
Sided at the rabbet of the poſt - - - - - -	1 2	1 1	0 11½	1 0
Number of pieces - - - - - - - -	6	6	6	6
Scarphs in length - - - - - - - -	5 0	4 10	4 8	4 3
And bolted with bolts in number - - - - -	8	8	8	8
In diameter - - - - - -	0 1¼	0 1¼	0 1¼	0 1¼
Lips of the ſcarphs in thickneſs - - - - -	0 4½	0 4¼	0 4	0 4
Falſe keel. The falſe keel to be thick - - - - - -	0 4	0 6	0 6	0 5
Number of pieces - - - - - - - -	6	6	5	5
And to be of ſuch lengths as to give proper ſhifts to the ſcarphs of the main keel.				
Dead wood. To have a ſufficient number of pieces of dead or riſing wood on the keel in midſhips thick - - - -	0 10	0 9½	0 8	0 7½
Broad - - - -	1 10	1 9½	1 8	1 9
And the dead wood afore and abaft for the ſecurity of the half timbers, to be of a proper height to anſwer the run of the keelſon, and to give proper ſhifts to the ſcarphs of the keel, and to each other; the lower piece of dead wood on the keel abaft to tenon into inner poſt with two tenons in the after end.				

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Oreſtes.
Ft. In.	Ft. In	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
1 1	1 1½	1 0	0 10¼	0 9½	0 9½	0 9	0 8	0 8	0 8	0 9½	0 9
0 8½	0 9½	0 8	0 9½	0 9	0 9	0 8	0 8	0 8½	0 8	0 6	0 7
1 10	1 8	1 8	1 7½	1 6	1 5	1 2	1 1	1 2	1 0	1 1½	1 1
0 11	0 11	0 10½	0 10½	0 10	0 10	0 9	0 8½	0 9	0 8	0 9	0 10
1 3½	1 3	1 3	1 2	1 1½	1 1	1 2	1 0	1 1	1 1	0 11	1 3
1 1	1 1½	1 0	0 10¼	0 9½	0 9½	0 9	0 8	0 8	0 8	0 9½	0 9
0 10	0 11½	1 0	0 10¼	0 10	0 9¾	0 9	0 7	0 7½	0 7	0 8½	0 8
6	6	5	5	5	5	4	4	3	3	3	4
4 1	4 2	4 0	3 11	3 6	3 5	3 6	3 4	3 2	3 0	3 0	2 11
8	8	8	6	6	6	5	5	6	6	6	6
0 1⅛	0 1⅛	0 1	0 1	0 0⅞	0 0⅞	0 0⅞	0 0¾	0 0¾	0 0¼	0 0¾	0 0¾
0 4	0 3¾	0 3¾	0 3¾	0 3½	0 3¼	0 3	0 3	0 3	0 3	0 3	0 3
0 6	0 6	0 5	0 6	0 6	0 6	0 6	0 5	——	0 5	0 4	0 5
5	5	5	5	5	5	4	4	——	3	3	4
0 6	0 8½	0 7	0 7	0 6½	0 6½	0 8	0 9	0 9	0 6	0 7	0 8
1 7	1 6½	1 6	1 4	1 3	1 3½	1 1	1 2	1 3	1 1	1 2	1 3

Principal Dimenſions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Keelſon. The keelſon ſquare - - - - - - - -	1 8	1 7½	1 6	1 5
Scored down on the floor timbers - - - - -	0 1½	0 1	0 1	0 1
Number of pieces - - - - - - - -	6	6	6	6
The ſcarphs in length - - - - - - - -	5 8	5 6	5 6	5 6
And ſo diſpoſed that the middle of each ſcarph is over a floor timber that is not bolted, that a keelſon bolt may go through the middle of a ſcarph; the ſcarphs, hook and butt, and the lips of the ſcarphs in thickneſs - - - - -	0 5	0 4½	0 4	0 4½
And bolted with bolts, in number - - - - -	2	2	2	2
In diameter - - - - -	0 0⅞	0 0⅞	0 0¾	0 0¾
The keelſon to be bolted through every other floor timber and and the main keel with bolts in diameter - - -	0 1⅞	0 1⅝	0 1½	0 1½
Stemſon. The ſtemſon, or inner ſtem, to run up to the lower ſide of the upper deck breaſt hook, ſquare - - - -	1 3½	1 3	1 1	1 1
To give ſcarph to the foremoſt piece of keelſon, and give ſhifts to the ſcarphs of the ſtem and apron below.				
Room and ſpace. The room and ſpace of the timbers is - - -	2 9	2 9½	2 9	2 6
Number of rooms in the after body - - - - -	32	34	38	34
Ditto in the fore body - - - - - - - -	31	25	22	24
Frame. It being of the utmoſt conſequence to the ſtrength of a ſhip that timbers of the frame ſhould as much as poſſible be prevented from being cut by the ports on each deck, a diſpoſition for that purpoſe is generally made on a draught, and the timbers appointed to make the ſides of ports are or ſhould be continued up to the top of the ſide and framed in bends, by faſtening the firſt, ſecond, third and fourth futtocks and top-timbers together, letting every ſcarph be bolted with bolts in number - - - - - - - -	3	3	3	3

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 3c0 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Orestes
Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In.
1 3	1 3	1 3	1 2	1 $1\frac{1}{2}$	1 1	1 0	0 $11\frac{1}{2}$	0 $11\frac{1}{2}$	0 10	0 11	0 9
0 1	0 1	0 1	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$
6	6	5	5	5	5	4	4	3	3	3	4
4 9	4 9	4 9	4 10	4 6	4 4	4 2	4 0	4 1	4 0	3 10	3 10
0 $4\frac{1}{2}$	0 4	0 4	0 $3\frac{3}{4}$	0 $3\frac{1}{2}$	0 $3\frac{1}{2}$	0 3	0 3	0 3	0 3	0 3	0 3
2	2	2	2	2	2	2	2	2	2	2	2
0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{5}{8}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$
0 $1\frac{3}{8}$	0 $1\frac{3}{8}$	0 $1\frac{3}{8}$	0 $1\frac{1}{4}$	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 1	0 1	0 1	0 1	0 $1\frac{1}{8}$	0 1
0 $11\frac{1}{2}$	0 $10\frac{1}{2}$	0 10	0 10	0 9	0 9	0 8	0 7	—	—	0 7	0 $6\frac{1}{2}$
2 $4\frac{1}{2}$	2 $4\frac{7}{8}$	2 6	2 $3\frac{3}{4}$	2 3	2 3	2 0	2 0	2 2	1 $9\frac{1}{2}$	2 2	2 0
31	31	29	29	28	26	30	20	18	26	24	20
25	25	23	23	22	21	16	16	13	20	14	22
3	3	3	3	3	3	2	2	2	2	2	2

Frame

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Frame continued.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
In diameter - - - - - - - - - -	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$
The ſtations of the frames ſo diſtinguiſhed ſhould be preſerved with great exactneſs on the ſhip, and the lower futtock of every bend ſhould be bolted to the floors with bolts, in number - - - - - - - - -	3	3	3	3
In diameter - - - - - - - - -	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	0 1	0 1[illegible]
And ſuch of them as ſtand afore and abaſt the ſquare frames and are canted, thoſe keep their ſtations at the breadth, and what is required to give the faſhion-piece and beakhead timber a proper cant, according to the turn of the body, is done by reducing the room and ſpace on the ſide of the keel. And as by the diſpoſition of the frames in their ſeveral ſtations, they are reſpectively appointed to ſtand on every gun deck, and one ſide of every middle or upper deck port at once provided for by them, and one fourth futtock and one toptimber proper will make the ſide of every gun-deck port, and upper deck port likewiſe in three deck ſhips, and a toptimber proper and a fourth futtock continued up (when can be got of a length) will make the ſides of every middle deck port, and in two deckers it will make the ſides of the upper deck ports; but if the fourth futtocks cannot be got of a length to run up to perform that office, the ſaid ſide of ſuch middle or upper deck ports are to be made by the timbers which come under the ports, being formed into a caſt over the fourth futtock head, by which means it will make a whole toptimber; but care muſt be taken that the ſaid caſt be ſo diſpoſed that it may not be cut ſo as to hurt the timbers by the lower port cell; and as all timbers ſhould be as light as poſſible in their upper works, conſiſtent with the ſervice required of them, ſo the frame ſhould not be encumbered with any timber more than is neceſſary for the ſeveral offices for which they may be wanted, and if two ſhort timbers, and by no means more, ſided at the lower end - - - -	1 0	0 $11\frac{1}{2}$	0 $11\frac{1}{2}$	0 $10\frac{1}{2}$
And at the upper end - - - -	0 10	0 $9\frac{1}{2}$	0 $9\frac{1}{2}$	0 9
ſtand upon the cell of every gun deck port properly ſpaced				

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons.	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Orefles.
Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In.
0 1¼	0 1¼	0 1¼	0 1⅛	0 1	0 1	0 0⅞	0 0¾	0 0½	0 0¾	0 0¾	0 0¾
3	3	3	3	3	3	2	2	2	2	2	2
0 1¼	0 1¼	0 1¼	0 1⅛	0 1	0 1	0 0⅞	0 0¾	0 0¾	0 0¾	0 0¾	0 0¾
0 10											
0 8½											

Principal Dimenſions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Frame continued.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
to receive a ſtandard above, quarter deck port, or ſuch other ſervice neceſſary to their ſtations, and there be alſo two ſhort timbers admitted to ſtand on the cell of every middle or upper deck port, ſided at the lower end -	0 10½	0 10	0 9½	0 9
And at the upper end - - - -	0 9	0 8¾	0 8½	0 7
which with ſuch as are neceſſary to make gallery doors from the quarter, ſides of the quarter deck ports, filling in between the foremoſt frame and hawſepieces, the whole ſhip's frame will be ſufficiently full, every purpoſe anſwered and not the leaſt occaſion for more. The timbers of which the frame is compoſed, are as follow:				
Floors. The floor timbers in the bearing of the ſhip between - -	8 & I	7 & H	8 & D	5 & F
Sided - - - -	1 4	1 2	1 4	1 3
And from thence forward and aft - - - - -	1 3	1 0	1 2½	1 2
In length in the midſhips - - - - - - -	30 10	28 7	24 4	25 10
No chocks to be larger on any floor timber than will admit of whole wood below the cutting down in midſhips -	1 4	1 3	1 2½	1 2
And afore and abaft to increaſe as the ſhape of the timbers may require for ſtrength.				
To be moulded at heads - - - - - - -	1 2½	1 2	1 1½	1 0¼
Square timbers to be continued from - - - - -	S	S	O	O
To (incluſive aft) - - - - - - - -	23	23	28	21
Cant floors forward from (incluſive) - - - -	U	T	Q	
Ditto aft from ditto - - - - -	24	24	29	
Every other floor timber to be bolted through the main keel with bolts in diameter - - - - - -	0 1⅞	0 1⅝	0 1½	0 1½

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Orestes.
Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
0 $8\frac{1}{2}$	0 $8\frac{1}{2}$	0 8	0 8	0 $7\frac{3}{4}$	0 $7\frac{1}{2}$						
0 $6\frac{1}{2}$	0 $6\frac{1}{2}$	0 $6\frac{1}{2}$	0 6	0 6	0 6						
5 & D	5 & E	7 & F	9 & E	7 & C	5 & C	—	—	—	6 & F	4 & F	
1 2	1 2	1 2	1 1	1 $0\frac{1}{2}$	1 0	0 11	0 10	0 $9\frac{3}{4}$	0 $9\frac{1}{2}$	0 10	0 10
1 0	1 1	1 1	1 0	0 $11\frac{1}{2}$	0 11	0 11	0 10	0 $9\frac{3}{4}$	0 9	0 $8\frac{3}{4}$	0 10
22 0	21 0	19 4	19 0	18 6	17 4	19 6	18 8	20 0	16 0	15 10	24 0
1 1	1 2	1 1	1 1	1 0	0 11						
1 0	0 $11\frac{3}{4}$	0 $11\frac{3}{4}$	0 10	0 $9\frac{1}{2}$	0 $9\frac{1}{4}$	0 $8\frac{1}{4}$	0 8	0 9	0 $7\frac{1}{2}$	0 $6\frac{3}{4}$	0 $8\frac{1}{2}$
O	Q	P	P	N	N	L	L	H	O	K	I
20	21	21	21	21	18	23	15	12	20	19	7
0 $1\frac{3}{8}$	0 $1\frac{3}{8}$	0 $1\frac{3}{8}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{8}$	0 1	0 1	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$

Lower

Principal Dimensions, &c.	100 Guns.		90 Guns.		74 Guns.		64 Guns.	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Lower futtocks. The lower futtocks to be sided in midships	1	$3\frac{3}{4}$	1	$3\frac{1}{2}$	1	$2\frac{1}{2}$	1	3
Afore and abaft	1	$2\frac{1}{4}$	1	2	1	$1\frac{1}{2}$	1	2
And in wake of the half timbers according to the room and space the cant timbers will allow.								
And the said lower futtocks to run down to the dead wood, and to give scarph to the floor timbers	10	6	10	0	10	0		
To have chocks across on the heels of them to supply the wood that may be wanting from thence to the cutting down.								
To scarph on the second futtocks in midships	8	2	7	8	6	8	6	7
Afore and abaft	7	0	6	6	6	4	5	5
Moulded at the heads	1	2	1	$1\frac{3}{4}$	1	$0\frac{3}{4}$	1	$0\frac{5}{8}$
Second futtocks. The second futtocks in midships sided	1	3	1	2	1	$1\frac{1}{2}$	1	2
Afore and abaft	1	$2\frac{3}{4}$	1	2	1	1	1	$1\frac{1}{2}$
And in wake of the cant timbers according to what is required from the room and space of them.								
Thickstuff. The strakes of thickstuff under the main wales, in number	7		7		6		6	
The upper edge of the first strake thick	0	8	0	8	0	7	0	$6\frac{1}{2}$
Ditto second strake thick	0	7	—	—	—	—	—	—
Ditto third strake thick	0	6	0	7	0	$5\frac{1}{2}$	0	$5\frac{1}{2}$
Ditto fifth strake thick	0	$5\frac{1}{2}$	0	$6\frac{1}{2}$	0	$4\frac{1}{2}$	0	$4\frac{1}{2}$
Ditto seventh strake thick	0	5	0	5				
And the lower edge of the last strake to wear off to	0	$4\frac{1}{2}$	0	$4\frac{1}{2}$	0	4	0	4
The strakes of thickstuff upon the main wales, in number	2		1		2		1	

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons.	Cutter 273 Tons.	Royal Charlot Yacht.	Den-mark Yacht.	Oreftes.
Ft. In.	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
1 1½	1 1½	1 1½	1 1	1 1	1 0	0 10	0 9½	0 10½	0 9	0 10	0 10
1 1½	1 1½	1 0	1 0	1 0	0 11½	0 9	0 9	0 10½	0 9	0 8½	0 10
6 0	6 6	6 6	6 0	5 11	5 11	5 0	5 0	5 6	5 4	5 0	6 0
4 10	6 0	6 0	5 2	5 0	5 0	——	——	——	4 10	4 8	5 0
0 11½	0 10¼	0 10¼	0 9½	0 9¼	0 8	0 7½	0 7	0 7½	0 6½	0 6¼	0 7¾
1 0¼	1 0¼	1 0½	0 11½	0 11	0 10¾	0 9½	0 9	0 9	0 8½	0 8	0 9
0 11¼	0 11¼	0 11½	0 10¾	0 10½	0 10½	0 9	0 9	0 9	0 8	0 8	0 9
4	5	4	2	2	2	2	1	2	2		
0 5	0 5	0 5	0 4¼	0 4	0 3¾	0 3½	0 3	0 4	0 3	2	1
——	——	——	——	——	——	——	——	0 3		0 3	0 3
0 4	0 4¾	0 4¾									
0 3	0 3	0 3	0 3	0 3	0 3	0 2½	0 2½	0 2½	0 2½	0 2½	0 2
1	1	1	1	1	1	1	1	1	1	1	1

Thick-

Principal Dimensions, &c.	100 Guns.	90 Guns	74 Guns.	64 Guns.
Thickstuff continued.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
The first strake thick	0 8	0 $7\frac{1}{2}$	0 $6\frac{1}{2}$	0 $6\frac{1}{2}$
Broad	1 1	1 4	1 0	1 4
The second strake thick	0 6	——	0 $5\frac{3}{4}$	
Broad	1 0	——	1 0	
Stuff between that and the channel wales thick	0 $4\frac{1}{2}$	0 4	0 4	0 4
[The following Dimensions of second, third and fourth futtocks, and toptimbers, should have been placed before Thickstuff.]				
Second futtocks to scarph to the third futtocks in midships	8 2	7 8	7 0	6 7
Afore and abaft	6 6	6 0	6 6	5 5
Moulded at the heads	1 $1\frac{1}{2}$	1 $1\frac{3}{8}$	1 $0\frac{5}{8}$	0 $11\frac{3}{8}$
Third futtocks. The third futtocks in midships sided	1 $2\frac{1}{2}$	1 2	1 $1\frac{5}{8}$	1 $1\frac{1}{2}$
Afore and abaft	1 2	1 $1\frac{1}{4}$	1 1	1 1
To scarph to the fourth futtocks in midships	8 2	7 8	7 0	6 7
Afore and abaft	6 6	6 0	6 6	5 10
But those that come under the gun deck ports to run up to the cell.				
Moulded at the heads	1 1	1 $0\frac{3}{4}$	0 $11\frac{5}{8}$	0 $10\frac{7}{8}$
Fourth futtocks. The upper or fourth futtocks to be sided	1 2	1 $1\frac{1}{2}$	1 1	1 $1\frac{1}{2}$
To scarph to the timbers in midships	12 6	11 10	11 6	11 2
Afore and abaft	10 8	10 0	9 6	8 8
To be moulded at the middle deck	0 $11\frac{3}{4}$	0 $11\frac{1}{4}$		
Ditto at the upper deck	0 9	0 $8\frac{5}{8}$	0 $10\frac{1}{2}$	0 $9\frac{3}{4}$

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Oresles.
Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
0 4½	0 5	0 5	0 4½	0 4¼	0 4	0 3½	0 3	0 4	0 3	3 3	0 3
1 1	1 3	1 3	1 3	1 2	1 1	1 0	0 10	0 11	0 10	0 10	0 9
0 3½											
6 0	6 6	6 3	6 0	5 11	5 11	5 0	5 0	4 10			
4 10	6 0	5 9	5 2	5 0	5 0						
0 10½	0 9¾	0 9¾	0 8⅝	0 8⅜	0 8¼	0 4	0 3⅞				
0 11	0 11½	0 11½	0 11	0 10½	0 10						
0 10½	0 11	0 11	0 10½	0 10	0 9¾						
6 0	6 6	6 3	6 0	5 11	5 11						
4 10	6 0	5 9	5 5	5 0	5 0						
0 10	0 9¾	0 9¼	0 7⅝	0 7⅜	0 7¼						
0 10¾	0 11	0 11	0 10¾	0 10¼	0 10						
10 10	11 0	10 8	10 0	10 0	10 0						
8 0	8 0	7 10	7 0	7 6	7 0						
0 8¾	0 8	0 8	0 7	0 6¾	0 6½						

Top-

Principal Dimensions, &c.	100 Guns.		90 Guns.		74 Guns.		64 Guns.	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Toptimbers. The toptimbers fided at the heels	1	$1\frac{7}{8}$	1	$1\frac{1}{2}$	1	$1\frac{1}{2}$	1	1
Ditto at the upper futtock heads	1	0	1	$1\frac{1}{2}$	1	1	1	1
Ditto at the top of the fide	0	$11\frac{1}{2}$	0	$11\frac{1}{2}$	1	0	1	0
Moulded at the range of the gun deck ports	1	$0\frac{3}{4}$	1	$0\frac{1}{4}$	0	$11\frac{1}{2}$	0	$11\frac{1}{4}$
Ditto at the range of the quarter deck	0	$5\frac{1}{2}$	0	$5\frac{1}{4}$	0	$5\frac{5}{8}$	0	5
Ditto at the range of the forecaftle	0	$6\frac{1}{2}$	0	$6\frac{1}{4}$	0	$6\frac{1}{4}$	0	$5\frac{1}{4}$
Ditto in the waift at the top of the fide	0	$5\frac{1}{2}$	0	$5\frac{1}{4}$	0	$5\frac{1}{4}$	0	5
Bottom. The plank of the bottom thick	0	$4\frac{1}{2}$	0	$4\frac{1}{2}$	0	4	0	4
And to have three ftrakes between every two butts on the fame timber, and the fcarphs not lefs than fix feet.								
Main wales. Height of the lower edge at the foremoft perpendicular	25	5	23	5	22	6	20	9
Ditto at dead flat	20	3	19	8	18	8	17	6
Ditto at the after timber	27	8	25	7	23	8	22	0
The main wales in breadth from upper to lower edge	5	3	4	8	4	3	4	2
And in thicknefs	0	10	0	$9\frac{1}{2}$	0	$8\frac{1}{2}$	0	8
To have ftrakes in number	4		4		4		4	
And thofe which have four ftrakes to have a fair feam in the middle, and the two upper and lower ftrakes to be locked into each other with hook and butt wrought of fuch lengths, and the butts fo difpofed as to give the ftrongeft fhift to the ports and to each other.								
Channel wales. The channel wales in breadth	3	0	3	5	3	0	2	5
In thicknefs	0	$5\frac{1}{2}$	0	5	0	$5\frac{1}{2}$	0	$5\frac{1}{4}$

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Orestes
Ft. In.	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In.
0 $10\frac{1}{4}$	0 $10\frac{1}{2}$	0 $10\frac{3}{4}$	0 $10\frac{1}{2}$	0 $10\frac{1}{4}$	0 10	0 9	0 9	0 $8\frac{1}{2}$	0 8	0 $7\frac{1}{2}$	0 $8\frac{1}{2}$
0 10	0 10	0 $10\frac{3}{4}$	0 10	0 10	0 10						
0 9	0 10	0 $10\frac{3}{4}$	0 9	0 9	0 $8\frac{7}{8}$						
0 9	0 $8\frac{1}{2}$	0 $8\frac{1}{2}$									
0 $4\frac{1}{4}$	0 5	0 5	0 4	0 4	0 4	0 4					
0 $4\frac{1}{2}$	0 $5\frac{1}{2}$	0 $5\frac{1}{4}$	0 $4\frac{1}{4}$	0 $4\frac{1}{4}$	0 $4\frac{1}{8}$	0 4					
0 $4\frac{1}{4}$	0 5	0 5	0 4	0 4	0 4	0 4	0 $3\frac{7}{8}$	0 $5\frac{1}{4}$	0 $3\frac{1}{2}$	0 $3\frac{1}{4}$	0 $5\frac{1}{2}$
0 3	0 3	0 3	0 3	0 3	0 3	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 2
18 6	20 3	19 4	19 7	17 0	16 1	12 1	11 8	13 0	10 9	10 9	13 2
15 10	16 9	16 2	16 2	14 1	13 6	9 6	9 5	10 3	8 6	8 10	12 0
20 7	20 9	20 2	19 7	17 3	17 3	13 3	12 11	11 10	10 11	11 5	16 5
3 8	3 9	3 9	3 7	3 6	3 2	2 9	1 6	2 0	2 7	1 8	1 7
0 6	0 6	0 6	0 $5\frac{1}{2}$	0 5	0 $4\frac{1}{2}$	0 4	0 4	0 5	0 4	0 4	0 $3\frac{1}{2}$
4	4	4	4	4	4	3	2	2	2	2	2
2 6											
0 4											

 Channel

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Channel wales continued	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Strakes in number - - - - - - - - -	4	4	3	3
To work down to the gun deck ports in midships, to make a proper stop, and afford wood for the port hooks.				
Distance between the upper edge of the main wales, and the lower edge of the channel wales on a perpendicular -	4 5	4 2	4 5	4 7
Plank above the channel wales. The lower edge of the first strake upon the channel wales to be thick - - - - -	0 4	0 4	0 4	0 4
The next strake thick - - - - - - -	0 3	0 3	0 3	0 3
Distance between the upper edge of the channel wales and the lower edge of the sheer wales on a perpendicular -	4 2	3 5		
Sheer wales. The sheer wales in breadth - - - - -	2 9	3 2		
In thickness - - - - - - - - -	0 4	0 4		
Strakes in number - - - - - - - -	3	4		
To work down to the middle deck ports in midships, to make a proper stop, and afford wood for the port hooks.				
Distance between the upper edge of the sheer wales, (channel wales in two deck ships) and toptimber line - -	4 7	4 4	5 4	4 1
The plank from the sheer wales to the sheer strake thick -	0 $3\frac{1}{2}$	0 3	——	——
Sheer strakes. To have sheer strakes in number - - - -	1	1	2	1
Each in breadth - - -	1 4	1 1	1 1	1 0
And in thickness - - -	0 4	0 $3\frac{1}{2}$	0 4	0 4
The plank from the sheer strakes up in thickness - - -	0 3	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$
The upper edge of the lower sheer strake to be agreeable to the upper edge of the sheer rail.				

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons.	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Oreſtes.
Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
3											
3 10											
0 3											
0 $2\frac{3}{4}$											
4 7	6 9	6 10	5 11	6 6	6 4	4 4	4 4	4 2	4 6	3 11	4 8
——	0 $3\frac{1}{2}$	0 $3\frac{1}{2}$	0 3	0 $2\frac{1}{2}$	0 2	0 $1\frac{3}{4}$	0 $1\frac{3}{4}$	0 2	0 $1\frac{3}{4}$	0 $1\frac{3}{4}$	0 2
1	2	1	2	1	1	1	1	1	1	1	1
0 11	0 10	1 2	1 1	1 $2\frac{1}{2}$	1 1	1 0	0 11	1 0	0 10	0 10	0 11
0 3	0 4	0 4	0 $3\frac{1}{2}$	0 3	0 3	0 $2\frac{3}{4}$	0 $2\frac{1}{2}$	0 3	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$
0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 2	0 2	0 $1\frac{7}{8}$	0 $1\frac{1}{2}$	——	——	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	

Rails,

Principal Dimenſions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Rails, &c. Upper edge of the waſte rail below the upper edge of the ſheer rail	2 2	1 11	2 4	2 0
Waſte rail in breadth	0 8½	0 8	0 7½	0 7
Upper edge of the ſheer rail agreeable to toptimber line.				
Sheer rail in breadth	0 9	0 8½	0 8	0 8
Fore part of the main drift afore the fore ſide of the foremoſt beam of the quarter deck	3 2	7 11	well	6 10
Upper edge of the rail above upper edge of the ſheer rail	1 8	1 8	1 9	2 0
Fore part of the next drift aft, abaft the fore part of the main drift	12 9	12 2	10 6	9 6
Upper edge of the rail above upper edge of the ſheer rail	2 10	3 0	2 4	3 10
Drift rails in breadth ſame as the ſheer rail.				
Lower edge of the fife rail above the upper edge of the drift rail from main drift to quite aft	1 2	1 0	1 5	1 6½
Fore part of the round houſe drift afore the fore ſide of the foremoſt beam of the round-houſe	1 0	7 3	2 0	3 4
Rail above the fife rail	0 10	0 11	1 1	1 1½
After part of the fore drift abaft the aft ſide of the after beam of the forecaſtle	2 10	1 4	1 3	2 0
Upper edge of the rail above the upper edge of ſheer rail	1 7	1 4	1 9	1 10
Lower edge of the fife rail above the upper edge of the drift rail	0 10	0 8	0 9	0 7
Fife rail thick	0 3½	0 3½	0 3	0 3
Plank ſheer thick	0 3½	0 3½	0 3½	0 3
Fenders. The fenders to be placed abreaſt of the main hatchway and ſided	0 4½	0 4	0 3½	0 3

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Chariot. Yacht.	Denmark Yacht.	Orestes.
Ft. In.	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft In.	Ft. In.	Ft. In.
2 0	1 10	1 10	1 9	2 0	1 9	1 9	1 1	1 4	1 4	1 4	
0 6½	0 6	0 6	0 5⅞	0 5¾	0 5¾	0 5½	0 5	0 5	0 5	0 4½	
0 7	0 6½	0 6¼	0 6⅛	0 6	0 6	0 5¾	0 5½	0 6	0 5¼	0 5	
5 0	0 7	4 2	well	3 6	3 3	well	—	—	—	3 9	
1 2	1 1½	1 1½	1 1	1 1	1 4	0 11	—	—	1 0	1 0	
8 0	9 0	8 6	7 2	8 6	8 6	7 0	—	—	5 8		
2 0	1 10	1 10	1 9	1 4	2 0	1 6	—	—	1 9		
0 8	0 8	0 8	0 9	0 10	0 10	0 6	—	—	0 8	0 6	
2 0	2 11	2 4	0 7½	2 3	1 1	1 0	—	—	3 7	5 0	
1 6	1 4	1 6	1 2	1 0	1 3	0 11	—	—	0 7	0 7	
0 6	0 8	0 8	0 7½	0 7	0 6	0 4	—	—	0 7	0 6	
0 2½	0 2½	0 2½	0 2½	0 2¼	0 2¼	0 2	—	—	0 2	0 2	
0 2½	0 2½	0 2½	0 2½	0 2¼	0 2¼	0 2	0 2½	0 2½	0 2	0 2	0 2½
0 3	0 3	0 3	0 3	0 3	0 2¾	0 2½	0 2½	0 2½	0 2	0 2	

Fenders

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
enders continued.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
In the clear asunder - - - - - - - - -	1 3	1 2½	1 3	1 4
And to be in length from the top of the side down to the upper edge of the main wales.				
Chestrees. The chestrees to be sided - - - - - -	0 8	0 7½	0 7¼	0 7
Bolted with bolts in number - - - - - - -	4	4	3	3
In diameter - - - - - - -	0 1	0 1	0 0⅞	0 0⅞
Fore side abaft the fore drift - - - - - - -	11 0	7 3	5 0	4 6
And to be in length from the top of the side - - -	11 6	11 0	6 0	5 6
Channels. The main channel in length - - - - - -	39 0	38 0	38 0	27 8
Thick at the inner edge - - - -	0 6½	0 6	0 5¾	0 5¾
Ditto at the outer edge - - - -	0 4½	0 4½	0 4¼	0 4
Foremost end afore the center of the mast - - - -	0 6	0 10	0 8	0 6
Bolted with bolts in number - - - - - - -	11	11	11	9
In diameter - - - - - - -	0 1⅜	0 1⅜	0 1¼	0 1¼
Upper edge below the upper edge of sheer rail - - -	5 3	4 5	0 8	well
Ditto above the upper edge of ditto - - - -	—	—	—	—
The fore channel in length - - - - - - -	33 6	34 0	37 0	23 2
Thick at the inner edge - - - -	0 6½	0 6	0 5¾	0 5¾
Ditto at the outer edge - - - -	0 4½	0 4½	0 4¼	0 4
Foremost end afore the center of the mast - - - -	0 6	0 10	0 8	0 6
Bolted with bolts in number - - - - - -	9	9	9	8

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Oreftes.
Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In.
1 3	1 2	1 2	1 2	1 2	1 3	1 4	1 4	1 3	1 2	1 2	
0 6	0 $5\frac{3}{4}$	0 $5\frac{1}{2}$	0 5	0 $4\frac{3}{4}$	0 $4\frac{1}{2}$	0 4	0 $3\frac{3}{4}$	0 4	0 3	0 4	
3	3	3	3	3	3	2	2	2	2	3	
0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{5}{8}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{3}{8}$	0 $0\frac{3}{4}$	
6 0	5 0	7 0	3 3	5 10	5 9	11 0	———	———	4 2	6 3	
4 6	6 10	6 10	5 6	6 0	6 6	3 0	2 0	2 0	1 6	4 0	
26 10	25 9	27 6	24 9	24 4	20 0	15 0	12 0	8 0	13 0	13 6	14 0
0 $5\frac{1}{2}$	0 $5\frac{1}{4}$	0 $5\frac{1}{4}$	0 $5\frac{1}{4}$	0 5	0 5	0 $4\frac{1}{2}$	0 4	0 4	0 4	0 4	0 $3\frac{1}{2}$
0 $3\frac{7}{8}$	0 $3\frac{3}{4}$	0 $3\frac{3}{4}$	0 $3\frac{3}{4}$	0 $3\frac{1}{2}$	0 $3\frac{1}{2}$	0 3	0 3	0 3	0 $2\frac{3}{4}$	0 $2\frac{3}{4}$	0 $2\frac{1}{2}$
0 9	0 6	0 6	0 7	0 6	well	well	0 4	well	2 0 abaft	0 6	0 6
8	8	8	7	7	6	5	4	4	5	5	5
0 $1\frac{1}{4}$	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 1	0 1	0 1	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 1	0 1	0 1	0 1
0 7	———	0 $2\frac{1}{2}$	well	0 9	0 6	well	2 0	1 8	1 4	1 4	2 11
———	0 $3\frac{3}{4}$										
25 4	25 6	24 0	21 10	17 6	17 6	13 6	9 0	———	9 8	9 8	13 6
0 $5\frac{1}{2}$	0 $5\frac{1}{4}$	0 $5\frac{1}{4}$	0 $5\frac{1}{4}$	0 5	0 5	0 $4\frac{1}{2}$	0 4	———	0 4	0 4	0 $3\frac{1}{2}$
0 $3\frac{3}{8}$	0 $3\frac{1}{2}$	0 $3\frac{1}{2}$	0 $3\frac{1}{2}$	0 $3\frac{1}{2}$	0 $3\frac{1}{2}$	0 3	0 3	———	0 $2\frac{3}{4}$	0 $2\frac{3}{4}$	0 $2\frac{1}{2}$
0 6	0 5	0 6	0 11	0 6	well	well	0 4	———	0 6	0 6	0 6
8	8	7	6	6	6	5	4	———	4	4	5

Channels

Principal Dimensions, &c.	100 Guns.		90 Guns.		74 Guns.		64 Guns.	
Channels continued.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Bolted with bolts in diameter	0	$1\frac{3}{4}$	0	$1\frac{3}{8}$	0	$1\frac{1}{8}$	0	$1\frac{1}{4}$
Placed the fame as main channel.								
The mizen channel in length	19	6	19	6	13	0	14	0
Thick at the inner edge	0	$5\frac{3}{4}$	0	$5\frac{1}{2}$	0	$4\frac{1}{2}$	0	5
Ditto at the outer edge	0	$3\frac{3}{4}$	0	$3\frac{1}{2}$	0	$3\frac{1}{2}$	0	$3\frac{1}{2}$
Foremoft end afore the center of the maft	0	3	1	0	0	6	0	3
Bolted with bolts in number	7		7		6		6	
In diameter	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$	0	$1\frac{1}{8}$
Upper edge above the upper edge of the fheer rail	well		0	$5\frac{1}{2}$	well		well	
Dead eyes. To have on the main channel dead eyes, in number	12		11		12		11	
In diameter	1	7	1	6	1	5	1	3
In thicknefs	0	$10\frac{1}{2}$	0	10	0	$9\frac{1}{2}$	0	$8\frac{1}{2}$
To have abaft the main channel for the main topmaft back-ftays, dead eyes, in number	2		2		2		2	
In diameter	1	0	1	0	1	0	0	10
In thicknefs	0	$6\frac{1}{2}$	0	$6\frac{1}{2}$	0	$6\frac{1}{2}$	0	$5\frac{1}{2}$
On the fore chcnnel dead eyes, in number	11		11		11		9	
In diameter	1	7	1	6	1	5	1	$2\frac{1}{2}$
In thicknefs	0	$10\frac{1}{2}$	0	10	0	$9\frac{1}{2}$	0	$8\frac{1}{4}$
And abaft the fore channel for fore topmaft backftays, in number	2		2		2		2	
In diameter	1	0	1	0	0	$11\frac{1}{2}$	0	10
In thicknefs	0	$6\frac{1}{2}$	0	$6\frac{1}{2}$	0	$6\frac{1}{4}$	0	$5\frac{1}{2}$

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Orestes.
Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In.
0 1¼	0 1	0 1⅛	0 1	0 1	0 1	0 0⅞	0 0⅞	——	0 1	0 1	0 1
15 0	12 0	9 6	11 6	9 6	9 6	8 6	——	——	5 6	6 3	
0 4	0 4½	0 4½	0 4½	0 4	0 3¾	0 3	——	——	0 3	0 3	
0 3	0 3½	0 3½	0 3½	0 3	0 2¾	0 2	——	——	0 2	0 2	
0 4	0 5	0 1	well	well	0 6 abaft	well	——	——	0 4 abaft	0 3 abaft	
6	6	5	6	5	5	4	——	——	3	3	
0 1⅛	0 1	0 1	0 0⅞	0 0⅞	0 0¾	0 0⅝	——	——	0 0⅝	0 0⅝	
0 7 below	0 4½	0 3 below	well	0 6 below	0 6 below	well	——	——	1 4 below	1 4 below	
10	12	11	11	10	9	7	5	5	7	6	7
1 0	1 0	1 0	1 0	0 11	0 10½	0 9	0 9	1 0	0 10	0 10	0 11
0 7	0 7	0 7	0 6½	0 6	0 5¾	0 5	0 5	0 7	0 6	0 6	0 6½
2	2	2	2	2	2	2	2	——	2	2	2
0 8	0 8	0 8	0 8	0 7	0 6¾	0 5½	0 5	——	0 6	0 6	0 6
0 4½	0 4	0 4½	0 4½	0 4	0 3¾	0 3	0 2¾	——	0 3½	0 3½	0 3½
9	10	10	9	8	8	6	4	——	5	5	7
1 0	0 11½	0 11½	0 11½	0 11	0 10½	0 9	0 9	——	0 10	0 10	0 11
0 7	0 6½	0 6½	0 6½	0 6	0 5¾	0 5	0 5	——	0 6	0 6	0 6½
2	2	2	2	2	2	2	2	——	2	2	2
0 8	0 8	0 8	0 8	0 7	0 6¾	0 5½	0 5	——	0 6	0 6	0 6
0 4½	0 4½	0 4½	0 4½	0 4	0 3¾	0 3	0 2¾	——	0 3	0 3½	0 3½

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Dead Eyes continued.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
On the mizen channel dead eyes, in number - - - -	7	6	6	6
In diameter - - - - -	1 3	1 2	1 0	0 10
In thicknefs - - - -	0 8½	0 8	0 6½	0 5½
And abaft the mizen channel for mizen topmaft backftays, in number	2	2	2	2
In diameter -	0 10	0 10	0 9½	0 7
In thicknefs -	0 5½	0 5½	0 5	0 3¼
Within board. Limber boards in thicknefs - - - - - -	0 3½	0 3½	0 3	0 3
Strake next to the limbers thick - - - - - - -	0 8	0 8	0 7½	0 7
Broad - - - - - - -	1 3	1 4	1 2½	1 2
And diftant from the fide of the keelfon between the foremoft magazine and fifh room bulkhead - - - -	1 0	0 11	0 11	0 11
And from thence forward and aft to diminifh to - - -	0 6	0 5	0 5	0 5
The next ftrake to that to be thick - - - - -	0 6	0 6	0 6½	0 6
Broad - - - - -	1 2	1 2	1 1½	1 0
Which two ftrakes may be reduced to one afore and abaft, and in thicknefs - - - - - - - - -	0 4½	0 4	0 4	0 4
Stuff at the floorheads. Strakes of thickftuff at the floor heads, in number - - - - - - - - - -	5	5	5	5
The middle ftrake to be wrought on the joints of the timbers at the floorhead, and in thicknefs - - - - - -	0 9½	0 9	0 8¾	0 7¾
Broad - - - - - -	1 6	1 5	1 3	1 3
And the ftrake above and below it thick - - - -	0 9½	0 9	0 8¼	0 7¾
Broad - - - - -	1 3	1 2	1 1	1 1

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Orestes
Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
5	6	5	5	5	4	4	—	—	4	4	
0 8	0 9	0 9	0 9	0 8½	0 8	0 7	—	—	0 6½	0 7	
0 4½	0 5½	0 5½	0 5½	0 4¾	0 4½	0 4	—	—	0 3¾	0 3¾	
2	2	2	2	2	2	2	—	—	2	2	
0 6	0 6	0 6	0 6	0 5½	0 5½	0 5	—	—	0 4½	0 4½	
0 3½	0 3½	0 3½	0 3½	0 3	0 3	0 2¾	—	—	0 2¾	0 2¾	
0 3	0 3	0 3	0 2½	0 2	0 2	0 2	0 2	0 2	0 2	0 2	0 2
0 6	0 6½	0 6	0 5	0 4½	0 4	0 3½	0 3	0 4½	0 4	0 4	0 4
1 1	1 1	1 1	1 1	1 0	1 0	0 11	0 11	1 0	1 0	1 1	1 0
0 10	0 10	0 10	0 10	0 9	0 9	0 8	0 8	0 9	1 3	1 3	0 9
0 5	0 5	0 5	0 5	0 4½	0 4½	0 4	0 4	0 4½	0 4½	0 5	0 5
0 5½	0 5½	0 5	0 4	0 3¾	0 3⅝	0 3	0 2¾	0 3½	0 3	0 3	0 3½
1 0	1 0	1 0	1 0	1 0	0 11	0 10	0 10	0 11	0 10	0 11	0 10½
0 3½	0 4	0 4	0 3	0 2¾	0 2½	0 2	0 2	0 2½	0 2	0 2	0 2½
5	5	5	5	5	5	3	3	3	3	3	3
0 6½	0 6	0 6	0 5½	0 5¼	0 5	0 4	0 3½	0 4½	0 4	0 4	0 4
1 2	1 3	1 3	1 3	[illegible] 2	1 1	1 0	0 11	0 11	1 1	1 0	1 0
0 6	0 5½	0 5½	0 5½	0 5	0 5	0 3½	0 2¾	0 3½	0 3	0 3	0 3½
1 6	1 0	1 0	1 2	1 2	1 2	0 11½	0 11	0 10	0 10	0 9	0 10

Stuff

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Stuff at the floorheads continued.	Ft. In.	Ft. In.	Ft. In	Ft. In.
And the upper and lower strake thick - - - - - -	0 $8\frac{1}{2}$	0 8	0 $6\frac{1}{4}$	0 $6\frac{1}{4}$
Broad - - - - - -	1 1	1 1	1 0	1 0
Which five strakes are to be reduced afore and abaft to strakes in number - - - - - - - - -	4	4	4	4
And in thickness - - - - - - - -	0 $4\frac{1}{2}$	0 4	0 4	0 4
Stuff at first futtock heads. Strakes of thickstuff at the first futtock heads, in number - - - - - - -	3	3	3	3
The middle strake wrought on the joints of the timbers at the first futtock head, and in thickness - - - -	0 8	0 8	0 7	0 $6\frac{1}{2}$
Broad - - - - - -	1 5	1 5	1 3	1 3
And the strake above and below it thick - - - -	0 7	0 7	0 6	0 $5\frac{1}{2}$
Broad - - - - -	1 3	1 2	1 1	1 1
Which three strakes are to be reduced to two afore and abaft, and in thickness - - - - - - -	0 4	0 4	0 $3\frac{1}{2}$	0 $3\frac{1}{2}$
Footwaling. The common footwaling between the thickstuff next the limbers and floor head, and also between the floor and lower futtock heads, and likewise between the lower futtock heads and orlop clamps, to be in thickness - - - -	0 4	0 4	0 4	0 4
Reduced afore and abaft to - - - - - - - -	0 3	0 3	0 3	0 3
Orlop Clamps. The orlop clamps to be strakes, in number - -	2	2	2	2
The upper strake thick - - - - - - - -	0 $8\frac{1}{2}$	0 8	0 $7\frac{1}{4}$	0 7
Broad - - - - - - - -	1 4	1 4	1 3	1 $2\frac{1}{2}$
The lower strake thick - - - - - - - -	0 $7\frac{1}{2}$	0 7	0 $6\frac{1}{4}$	0 6
Broad - - - - - - - -	1 2	1 2	1 1	1 1

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutte 273 Tons.	Royal Charlot Yacht	Denmark Yacht.	Orestes.
Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.
0 5	0 4½	0 4½	0 4½	0 4¼	0 4						
0 11½	0 11	0 11	1 1	1 0	1 0						
4	4	4	3	3	3	1	1	1	1	1	1
0 3	0 3	0 3	0 3	0 2¾	0 2½	0 2	0 2	0 2½	0 2	0 2	0 2½
3	3	3	3	3	3	——	——	3	1	1	1
0 6	0 5½	0 5½	0 5	0 4½	0 4	——	——	0 4	0 3¾	0 3½	0 3
1 2	1 2	1 3	1 3	1 2	1 1	——	——	0 11	0 11	0 10	0 11
0 4½	0 4½	0 4	0 4	0 3½	0 3⅜	——	——	0 3½			
0 11	1 0	1 0	1 0	1 0	1 0	——	——	0 10			
0 3	0 3	0 3	0 3	0 2¾	0 2½	——	——	0 2½	0 2	0 2	0 2½
0 3	0 3	0 3	0 3	0 3	0 2½	0 2	0 2	0 2½	0 2	0 2	0 2
0 3	0 2¾	0 2¼	0 2½	0 2½	0 2	0 2	0 1¾	0 2	0 2	0 2	0 2
2	2	2	2								
0 6	0 5	0 5	0 4								
1 1	1 1	1 1	1 2								
0 5	0 4	0 4	0 3								
0 11	0 11	0 11	0 11								

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Orlop clamps continued.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Which two strakes may be reduced to one at the fashion piece and apron in thickness - - - - - - -	0 $5\frac{1}{2}$	0 5	0 $4\frac{1}{2}$	0 4
And breadth - - - - - - -	0 11	0 11	0 $10\frac{1}{2}$	0 10
Orlop beams. To have in the orlop, beams in number - - -	19	20	22	21
Aft side of the after beam afore the after perpendicular - -	25 0	22 11	24 3	22 8
Fore side of the foremost beam abaft the foremost perpendicular	9 7	9 9	10 4	7 11
Beams moulded - - - - - - - - - - -	1 5	1 $3\frac{1}{2}$	1 3	1 $2\frac{1}{4}$
Sided - - - - - - - - - -	1 5	1 $4\frac{1}{2}$	1 3	1 $2\frac{1}{4}$
Knees. The orlop beams knee'd at each end with one lodging and one standard knee (except those beams appointed for second futtock riders and the foremost and aftermost) the lodging knees to be sided - - - - - - - - -	0 $10\frac{1}{2}$	0 10	0 $9\frac{1}{4}$	0 9
Thwartship arm long - - - - - - -	4 8	4 6	4 4	4 3
The fore and after not shorter than - - - - - -	4 4	4 2	4 1	4 0
Standard knees to be sided - - - - - - -	0 $10\frac{1}{2}$	0 10	0 $9\frac{1}{4}$	0 9
Thwartship arm long - - - - - - -	4 8	4 6	4 4	4 3
And the up and down arm to reach the lower edge of the upper strake of gun deck clamps.				
Each to be bolted with bolts, in number - - - - -	9	9	8	7
In diameter - - - - -	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$
Carlings and ledges. To have carlings in the orlop on each side, number of tier - - - - - - - - -	4	4	3	3
From the room before the fore hatch to the room of the mizen mast				
And from thence forward and aft to have in number - -	3	3	2	2

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Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In
0 3	0 $2\frac{3}{4}$	0 $2\frac{3}{4}$	0 $2\frac{3}{4}$								
0 10	0 10	0 $10\frac{1}{2}$	0 8								
1	6	6	6								
0 11	0 10	0 10	0 9								
0 11	0 11	0 11	0 9								
0 $7\frac{3}{4}$	0 $7\frac{1}{2}$	0 $7\frac{1}{4}$	0 $6\frac{1}{2}$								
4 0	3 11	3 10	3 6								
3 9	3 10	3 6	3 2								
0 $7\frac{3}{4}$	0 $7\frac{1}{2}$	0 $7\frac{1}{4}$	0 $6\frac{1}{2}$								
4 0	3 11	3 10	3 6								
6	6	6	6								
0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 1								
3	3	3	3								
2	2	2	2								

Carlings

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Carlings and ledges continued.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Carlings broad	0 11	0 10½	0 9	0 8½
Deep	0 10	0 9½	0 8½	0 8
Scored on upon the beam aloft	0 1½	0 1½	0 1½	0 1½
And below	0 1¼	0 1¼	0 1¼	0 1¼
The ledges broad	0 5½	0 5	0 5½	0 5½
Deep	0 4½	0 4½	0 5	0 5
And asunder	1 0	1 0	0 11	0 11
Those carlings that make the sides of the hatchways and the tier next the side, and also those in the fore and after platforms to be even with the beam on the upper side; the others to be let down below the upper side of the beam the thickness of the plank, so that the upper part of the beams in midships may be even with the surface of the deck plank.				
Strake on the ends of the orlop beams. To have a strake on the ends of the orlop beams thick	0 8	0 7½	0 6	0 5½
Broad	1 2	1 2	1 2	1 1
And the plank from thence to the gun deck clamps to be thick	0 5	0 4½	0 4½	0 4
In Hold. The lower deck transom knee sided	1 0	0 11½	0 10½	0 10
Thwartship arm long	6 0	5 10	5 8	5 6
The fore and aft arm to reach the aft side of the after beam.				
Sleepers. To have on each side transom knees, or sleepers, in number	3	3	3	3
Sided	0 10½	0 10	0 9½	0 9
The thwartship arm long	6 0	5 10	5 6	5 0
The fore and aft arm long	8 0	7 10	7 6	7 0

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Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
0 7¾	0 7	0 7	0 6½								
0 5¾	0 5	0 5	0 4¾								
0 1¼	0 1	0 1	0 1								
0 1⅛	0 0⅞	0 0⅞	0 0⅞								
0 4½	0 4	0 4	0 3¾								
0 3½	0 3	0 3	0 3								
0 11	0 11½	0 11	0 11								
0 4	0 4	0 4	0 4								
1 0	1 0	1 0	1 0								
0 3½	0 3	0 3	0 2¾								
0 9	0 8¾	0 8½	0 8	0 7½	0 7						
5 0	5 0	5 0	5 0	4 9	4 6						
3	2	2	2	2	2	1					
0 8½	0 9	0 9	0 8¼	0 8	0 7½	0 6					
4 6	4 8	4 6	4 6	4 3	4 2	3 6					
6 6	6 8	6 6	6 4	6 0	5 10	4 6					

Floor

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Floor Riders. To have floor riders in number	5	5	3	3
In length	31 0	30 0	26 6	26 10
Sided	1 5	1 $4\frac{1}{2}$	1 5	1 4
Deep in the keelſon	1 $2\frac{1}{2}$	1 2	1 4	1 3
Moulded at the floor head	1 4	1 $3\frac{1}{2}$	1 2	1 1
And faſtened with bolts, in number	12	12	12	10
In diameter	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	0 $1\frac{3}{8}$
Lower futtock riders. To have lower futtock riders on each ſide, in number	8	8	6	6
Sided	1 5	1 4	1 4	1 3
Moulded at the floor head	1 4	1 $3\frac{1}{2}$	1 2	1 2
Ditto at the heads	0 11	0 $10\frac{1}{2}$	1 0	0 $11\frac{1}{2}$
The lower end to reach from the keelſon, and to be ſquare at the ends not leſs than	0 $6\frac{1}{2}$	0 6	0 6	0 $5\frac{1}{2}$
The heads to reach the under ſide of the orlop beams when can be got, and ſuch of them as are placed by the ſide of floor riders to be fayed and bolted thereto with bolts, in number	3	3	3	3
In diameter	0 $1\frac{3}{8}$	0 $1\frac{3}{8}$	0 $1\frac{3}{8}$	0 $1\frac{1}{4}$
To have croſs chocks fayed down on the heels of them (where there is no floor rider by the ſide of it) with a ſcarph in length	7 6	7 0	6 6	6 0
Wrought with hook and butt, the chocks to be on the keelſon	1 3	1 2	1 1	1 0
And bolted with bolts, in diameter	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	0 $1\frac{1}{8}$
Second futtock riders. To have ſecond futtock riders on each ſide, in number	8	8	6	6

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Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In.	Ft. In	Ft In.	Ft. In.	Ft. In.

Second

Principal Dimenfions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Second futtock riders continued.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Sided	1 3	1 2½	1 2	1 2
And in length from the floor riders to underfide of the lower deck beam.				
Moulded at the middle againft the orlop beam	1 6	1 5	1 4	1 6
Ditto at the lower end	1 2	1 1½	0 11½	0 11½
Ditto at the head	0 10	0 9½	0 10½	0 10
To be bolted with bolts, in number	11	11	10	9
In diameter	0 1½	0 1½	0 1½	1 1⅜
To be fayed and bolted to the fide of the lower futtock riders with bolts, in number	3	3	3	3
In diameter	0 1⅜	0 1⅜	0 1⅜	0 1¼
Crutches. Crutches in the run abaft the mizen ftep, in number	2	2	2	2
Sided	1 2½	1 2	1 1	1 1½
The arms each in length	9 0	8 6	7 6	8 0
Bolted with bolts, in number	12	12	12	12
In diameter	0 1½	0 1½	0 1⅛	0 1¼
The foremoft one abaft the mizen ftep	6 0	5 0	6 0	5 10
The after one abaft the foremoft	6 6	5 6	6 0	5 10
Mizen Step. The mizen ftep fided	1 11	1 10½	1 8	1 7½
The arms each in length	9 0	8 6	7 6	8 0
Bolted with bolts, in number	12	12	12	12
In diameter	0 1½	0 1½	0 1½	0 1⅜

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Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
2	2	2	1	1	1	1	1	1	1		
0 10$\frac{1}{2}$	0 10	0 10	0 9$\frac{1}{2}$	0 9	0 8$\frac{3}{4}$	0 7$\frac{1}{2}$	0 7	0 9	0 8		
6 0	6 6	6 3	5 6	5 6	5 4	5 0	5 6	6 0	5 0		
9	9	8	7	7	7	5	5	6	5		
0 1$\frac{1}{8}$	0 1$\frac{1}{8}$	0 1$\frac{1}{8}$	0 1$\frac{1}{8}$	0 1	0 1	0 0$\frac{7}{8}$	0 0$\frac{7}{8}$	0 1	0 0$\frac{7}{8}$		
5 6	4 6	4 0	7 6	7 0	6 0	3 6					
5 4	4 6	5 0									
1 5	1 6$\frac{1}{2}$	1 6	1 2$\frac{1}{2}$	1 2	1 1$\frac{1}{2}$	1 0	——	——	0 9	0 9	
6 0	6 6	6 3	5 6	5 6	5 4	5 0	——	——	5 0	5 0	
9	9	8	7	7	7	5	——	——	5	5	
0 1$\frac{1}{4}$	0 1$\frac{1}{4}$	9 1$\frac{1}{4}$	0 1$\frac{1}{8}$	0 1	0 1	0 0$\frac{7}{8}$	——	——	0 0$\frac{7}{8}$	0 0$\frac{7}{8}$	

Principal Dimensions, &c.	100 Guns.		90 Guns.		74 Guns.		64 Guns.	
	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In
Main ſtep. The main ſtep ſided - - - - - - -	3	5	3	1½	2	11½	2	9½
Deep on the keelſon - - - - - - - -	1	5	1	3½	1	5	1	4
And of a length ſufficient to ſlide eaſy by the ſtantions of the well.								
Fore Step. The fore ſtep to be made by two crutches, each ſided - -	0	11	0	10½	0	10½	1	0
In the clear aſunder - - - - - - - -	3	9	4	0	3	0	3	0
In length - - - - - - - - - - -	12	0	11	0	12	0	12	0
To be fitted ſo as to receive a ſliding ſtep between them, and each bolted with bolts in number - - - - -	8		8		8		8	
In diameter - - - - - -	0	1½	0	1½	0	1½	0	1¼
Breaſt-hooks. To have breaſt-hooks below the gun deck breaſt hook, in number - - - - - - - - - Equally divided between that and the fore ſtep.	5		5		4		4	
The upper one in length - - - - - - - -	18	0	18	0	19	0	18	0
The lower one ditto - - - - - - - -	16	0	16	0	15	6	16	0
Each of them ſided - - - - - - - -	1	3	1	2½	1	2	1	1
And bolted with bolts, in number - - - - - -	13		13		13		11	
In diameter - - - - -	0	1⅛	0	1⅜	0	1⅜	0	1⅜
Pillars. The pillars in the hold under the gun and orlop deck beams, to be ſquare at the lower end - - - - - - - -	0	9½	0	9¼	0	9	0	8½
Ditto at the upper end - - - - - - - -	0	8½	0	8¼	0	8	0	7¾
Well. The well to be fore and aft - - - - - - -	11	8	9	6	10	0	8	6
Thwartſhips - - - - - - - - - -	10	0	8	6	8	0	7	3
Plank thick - - - - - - - - - -	0	3½	0	3¼	0	3	0	3

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Orestes
Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In	Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In	Ft. In
2 $4\frac{1}{2}$	2 6	2 5	2 1	2 0	1 11	1 9	1 10	2 1	1 7	1 6	1 5
1 2	1 2	1 $1\frac{1}{2}$	1 3	1 1	0 11	0 9	1 0	1 5	1 .0	1 0	1 1
0 10	0 10	1 11	1 11	1 9	1 8	1 6	1 6	——	1 4	1 3	1 2
1 11	2 2										
11 0	12 0	11 0	11 0	10 0	9 6	8 0	7 6	——	6 0	5 0	4 6
8	8	8	8	6	6	5	5	——	5	5	4
0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 1	0 1	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	——	0 $0\frac{7}{8}$	0 $0\frac{3}{4}$	0 $0\frac{7}{8}$
4	3	4	3	3	3	2	3	3	3	3	3
15 0	15 0	15 0	14 0	12 6	12 0	10 0	10 0	11 0	9 0	9 0	10 0
11 0	12 0	11 0	12 0	11 0	10 6	9 0	9 6	9 0	8 6	8 0	8 6
0 11	0 11	0 11	0 $10\frac{1}{2}$	0 10	0 $9\frac{3}{4}$	0 9	0 9	0 $8\frac{1}{2}$	0 9	0 8	0 9
11	11	11	10	9	9	7	7	7	7	7	8
0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{8}$	0 1	0 1	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 1	0 1	0 1	0 1
0 8	0 8	0 $7\frac{3}{4}$	0 $7\frac{1}{2}$	0 7	0 $6\frac{1}{2}$	0 $5\frac{1}{2}$	0 $5\frac{1}{2}$	0 $5\frac{1}{2}$	0 5	0 5	0 $5\frac{1}{2}$
0 $7\frac{1}{4}$	0 7	0 $6\frac{1}{2}$	0 $6\frac{1}{4}$	0 $5\frac{1}{2}$	0 $5\frac{1}{4}$	0 $3\frac{1}{2}$	0 $3\frac{1}{4}$	0 $3\frac{1}{2}$	0 3	0 3	0 $3\frac{1}{2}$
7 4	7 0	7 0	6 8	6 0	6 10	5 0	3 6	3 0	3 0	3 0	3 6
6 10	6 9	6 8	6 8	6 0	6 0	5 0	4 6	4 0	3 0	3 0	3 6
0 3	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 2	0 2	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$

Shot-

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Shot-lockers. To have a shot-locker afore, and another abaft the well, of the same breadth.				
Thwartships as the well.				
Each to be fore and aft in the clear - - - - - -	2 10	2 5	2 6	2 1
The sides of the well run forward and aft sufficient to receive the ends of the lockers, and a cant also put to keep the nails from drawing by the weight of the shot.				
Foremost magazine. The after bulkhead of the foremost magazine distance from the foremost perpendicular - - -	42 $9\frac{1}{2}$	41 4	42 6	36 6
Foremost bulkhead afore the after one - - - - - -	20 6	20 0	20 0	20 0
Plank of the bulkheads in thickness - - - - - -	0 $3\frac{1}{2}$	0 3	0 3	0 3
Stantions square - - - - - - - - -	0 8	0 $7\frac{1}{2}$	0 7	0 6
In the clear asunder - - - - - - - - -	2 11	2 10	2 9	2 8
Height from the upper side of the pallatin to the under side of the plank of the fore platform - - - - -	9 2	8 8	8 10	8 4
Pallatin beams square - - - - - - - -	0 7	0 6	0 6	0 6
Scuttles to the magazine and light room square - - - -	3 0	2 9	2 6	2 4
After magazine. The after magazine to be placed abaft the fish room in those ships which have no hanging magazine, the after bulkhead of which is the bulkhead of the bread room, and is placed well with the aft side of the after beam of the orlop, or after platform, and the foremost bulkhead is afore the after one in the clear - - - - - - - -	——	——	9 8	——
Plank of ditto, in thickness - - - - - - -	——	——	0 3	——
Stantions square - - - - - - - - -	——	——	0 6	——
In the clear asunder - - - - - - - - -	——	——	2 9	——

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Oreſtes.
Ft. In.	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft In.	Ft. In.	Ft. In.
2 0	2 0	1 11	1 10	1 9	1 8	1 6	1 8	1 6	——	——	1
33 6	34 9	33 9	24 6	20 0	18 0	——	——	——	——	——	19 0
17 6	15 9	15 4	6 4	6 0	6 0	——	——	——	——	——	7 0
0 3	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 2	0 2	0 2	——	——	——	——	——	0 $2\frac{1}{2}$
0 $5\frac{1}{2}$	0 5	0 5	0 $4\frac{3}{4}$	0 $4\frac{1}{2}$	0 4	——	——	——	——	——	0 4
2 6	2 4	2 4	2 0	2 0	2 0	——	——	——	——	——	2 0
6 4	6 0	5 10	——	——	——	——	——	——	——	——	5 10
0 5	0 5	0 $4\frac{3}{4}$	0 $4\frac{1}{2}$	——	——	——	——	——	——	——	0 3
2 4	2 3	2 2	2 2	2 2	2 2	——	——	——	——	——	2 4
7 0	7 4	7 3	11 0	——	——	8 0	12 6	9 11	——	——	13 5
0 3	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 2	0 2	0 2	——	——	0 $2\frac{1}{2}$
0 5	0 $4\frac{1}{2}$	0 $4\frac{1}{2}$	0 $4\frac{1}{2}$	0 $4\frac{1}{2}$	0 4	0 $3\frac{3}{4}$	0 3	0 3	——	——	0 3
2 6	2 4	2 4	2 2	2 1	2 0	2 0	2 0	2 0	——	——	2 0

After

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
After magazine continued.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Magazine athwartship in the clear - - - - - -	——	——	10 0	——
Height from the upper side of the magazine platform, to the under side of the deck above - - - - - -	——	——	7 4	——
Hanging Magazines. Those ships in which it is not found convenient to have a magazine abaft the fish room, are supplied with hanging magazines under the gun deck, in three deck ships there is two hanging magazines, but in two deckers one is found sufficient. The foremost bulk head of the after one abaft the aft side of the main hatchway - - - - -	27 0	25 6	——	21 5
The magazine fore and aft in the clear - - - - - -	6 2	5 1	——	6 0
Athwartships in the clear - - - - - - - - -	9 0	8 6	——	9 0
Light room fore and aft in the clear - - - - - -	2 6	2 5	——	2 2
Plank of the bulkheads in thickness - - - - - -	0 3	0 3	——	0 3
Upper part of the magazine below the under part of the gun deck plank - - - - - - - - - -	3 2	4 3	——	3 5
Lower part of the magazine below the under side of the orlop plank - - - - - - - - - -	2 3	3 7	——	2 8
The foremost hanging magazine (which is only in three deckers) is of the same dimensions as the after one, and the fore part of it is abaft the after part of the fore hatchway - - - - - - - - - -	3 3	4 1		
Fish room. The after bulkhead of the fish room is the foremost bulkhead of the after magazine, but in those ships which have no magazine abaft, the aft side of it is afore the aft side of the after beam of the orlop - - - - - - -	8 0	6 6	——	4 8
And in distance from the after perpendicular - - -	——	——	——	——
The fish room fore and aft in the clear - - - - -	10 6	10 0	9 8	10 8

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Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
10 0	10 6	10 0	14 0	13 0	12 0	11 0					
6 0	9 0	9 0	7 6	7 0	7 0	7 0	3 0	3 1	——	——	5 0
——	26 10	26 0	32 3	29 0	27 6	21 0	24 2	25 4	——	——	33 0
10 0	8 10	8 6	7 0	7 6	7 0	9 0	3 0	6 6	——	——	4 6

Principal Dimenſions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Spiritous liquor room. The foremoſt bulkhead of the fiſh room makes the after bulkhead of the ſpiritous liquor room, and the ſpiritous liquor room fore and aft in the clear - -	5 5	6 9	7 2	5 8
The ſcuttles fore and aft - - - - - - -	5 5	4 0	4 8	4 8
Each athwartſhips - - - - - - - -	3 6	2 10	2 9	2 9
Aſunder - - - - - - - - -	1 0	0 11	0 $10\frac{1}{2}$	0 10
Gun deck clamps. The gun or lower deck clamps to be ſtrakes, in number	3	3	3	3
The upper ſtrake thick - - - - - - -	0 9	0 $8\frac{1}{2}$	0 $8\frac{1}{4}$	0 8
Broad - - - - - - -	1 5	1 5	1 5	1 4
The ſecond ſtrake thick - - - - - - -	0 8	0 $7\frac{1}{2}$	0 $7\frac{1}{4}$	0 7
Broad - - - - - - -	1 3	1 3	1 2	1 2
The third ſtrake thick - - - - - - -	0 7	0 $6\frac{1}{2}$	0 $6\frac{1}{4}$	0 6
Broad - - - - - - -	1 2	1 2	1 1	1 1
Tabled one into the other with hook and butt, the upper ſtrake ſcarphed with ſcarphs, in length - - - - -	3 8	3 6	3 6	3 4
And ſecured by a ſmall bolt in the lip of each ſcarph, and the ſtrakes to be reduced at the faſhion piece and apron to ſtrakes, in number - - - - - - -	2	2	2	2
Thickneſs - - - - - - -	0 $6\frac{1}{2}$	0 6	0 $5\frac{1}{2}$	0 5
Preſerving their proper thickneſs from the extremes - -	12 0	11 0	10 6	10 0
Gun deck breaſt hook. The gun or lower deck breaſt hook ſided -	1 3	1 $2\frac{1}{2}$	1 2	1 1
Long -	18 0	18 0	18 0	18 0
Bolted with bolts, in number - - - - - -	15	15	13	13

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Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
5 7	5 2	5 0	4 0	4 6	4 0	5 0					
4 6	4 6	4 5	3 5	3 2	3 0	3 0					
2 9	2 9	2 9	2 9	2 8	2 8	2 8					
0 9	0 7	0 6	0 6	0 6	0 5½	0 5					
3	2	2	2	2	2	—	—	—	—	—	1
0 6	0 5½	0 5½	0 5½	0 5¼	0 5	—	—	—	—	—	0 4
1 4	1 3	1 3	1 3	1 2	1 1	—	—	—	—	—	1 2
0 5	0 4½	0 4½	0 4	0 3¾	0 3⅝						
1 0	1 1	1 1	1 1	1 0	0 11½						
0 4											
0 11											
3 2	3 0	2 11	2 10	2 8	2 6						
2	1	1	1	1	1						
0 4	0 3½	0 3½	0 3½	0 3	0 3						
9 0	8 6	8 6	8 6	8 0	7 6						
1 0	0 11½	0 11½	0 11	0 10	0 9						
16 0	16 0	16 0	16 0	14 0	13 0						
11	11	11	11	9	9						

Gun

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Gun deck breast-hook continued.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Bolted with bolts in diameter - - - - - - -	0 1⅛	0 1⅜	0 1⅜	0 1⅜
Fayed to the timbers, and moulded as broad as conveniently may be for the better fastening the plank of the deck.				
Gun deck beams. The gun or lower deck beams in midships sided -	1 6	1 5	1 4½	1 3¼
Moulded -	1 6	1 4¼	1 4½	1 3
The foremost and aftermost less - - - - - - -	0 3	0 2¾	0 2	0 1
The second from ditto, ditto - - - - - - -	0 2	0 1¾	0 1	0 0½
The third from ditto, ditto - - - - - - -	0 1½	0 1¼	0 0¾	0 0¼
The fourth from ditto, ditto - - - - - - -	0 1	0 0⅞		
Beams on the lower deck in number - - - - - -	27	28	27	27
And disposed of one under and one between each port, or as nearly so as the hatchways, masts, &c. will admit, and in wake of the main hatch, main mast, &c. to have double arm beams, the arms sided - - - - - -	1 4	1 3	1 2½	1 2
Moulded - - - - - -	1 4	1 2½	1 2	1 1
And those beams which are made in three pieces the middle piece to be in length one half the length of the beam; and those which are made in two, the scarphs to be one third the length of the beam, tabled into each other, and the ends in thickness	0 4	0 3⅜	0 3½	0 3
The scarphs bolted with bolts in number - - - -	9	8	8	7
In diameter - - - - -	0 1⅛	0 1⅛	0 1⅛	0 1
Knees. The lower deck beams knee'd at each end with one hanging and one lodging knee.				
The hanging knees sided - - - - - - -	0 11½	0 11¼	0 10	0 9½
Up and down arm in length - - - - - - -	6 6	6 4	6 2	5 10

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Oreftes.
Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
0 1¼	0 1¼	0 1¼	0 1⅛	0 1⅛	0 0⅛						
1 1¼	0 11	0 10¾	0 9	0 8	0 7½	—	—	—	—	—	0 8
1 0½	0 10	0 9¾	0 8	0 7½	0 7	—	—	—	—	—	0 7
0 1	0 1	0 1	0 1	0 1							
0 0½	0 0½	0 0½	0 0½	0 0½							
24	27	26	26	24	22	—	—	—	—	—	19
1 0	0 10	0 9½	0 8	0 7	0 6½						
1 0	0 9	0 8¾	0 7	0 6	0 6						
0 3	0 2¾	0 2½	0 2½	0 2½	0 2						
6	6	6	6	6	6						
0 1	0 1	0 1	0 1	0 1	0 1						
0 8¾	0 8¼	0 8	0 7½	0 6½	0 6	—	—	—	—	—	0 5½
4 10	4 9	4 6	4 6	4 3	4 2	—	—	—	—	—	4 0

Knees

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Knees continued.	Ft. In.	t. In.	Ft. In.	Ft. In.
Thwartship arm in length - - - - - - - -	5 0	4 8	4 6	4 3
Bolted with bolts, in number - - - - - - -	8	8	7	6
In diameter - - - - - - - -	0 $1\frac{3}{8}$	0 $1\frac{3}{8}$	0 $1\frac{3}{8}$	0 $1\frac{3}{8}$
The lodging knees sided - - - - - - -	0 11	0 $10\frac{3}{4}$	0 $9\frac{1}{2}$	0 9
Thwartship arm in length - - - - - - - -	5 0	4 10	4 6	4 6
Fore and aft arm the whole length between the beams when can be got.				
Bolted with bolts, in number - - - - - - -	8	8	7	6
In diameter - - - - - - -	0 $1\frac{3}{8}$	0 $1\frac{3}{8}$	0 $1\frac{3}{8}$	0 $1\frac{3}{8}$
Carlings and ledges. The lower deck to have on each side from the room before the fore hatch to the mizen mast room, carlings, number of tier - - - - - -	4	4	3	3
And from thence forward and aft - - - - -	3	3	2	2
The carlings broad - - - - - - - - - -	0 $11\frac{1}{2}$	0 $10\frac{1}{2}$	0 9	0 $8\frac{1}{2}$
Deep - - - - - - - - - -	0 $10\frac{1}{2}$	0 $9\frac{1}{2}$	0 $8\frac{1}{2}$	0 8
Scored on upon the beam aloft - - - - - - -	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$
Ditto below - - - - - - - -	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$
The ledges broad - - - - - - - - - -	0 6	0 5	0 6	0 $5\frac{1}{2}$
Deep - - - - - - - - - -	0 5	0 $4\frac{1}{2}$	0 $5\frac{1}{2}$	0 5
In the clear asunder - - - - - - - - -	1 0	1 0	0 11	
Bitts. The bitts in the three and two deck ships to be upon the lower deck, and in one deck ships upon the upper deck, and to be number of pair - - - - - - - - -	2	2	2	2

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons.	Cutter 273 Tons.	Royal Charlot Yacht.	Den-mark Yacht.	Orestes.
Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In.
3 8	3 8	3 8	3 8	3 6	3 4	——	——	——	——	——	3 0
7	8	8	8	7	7	——	——	——	——	——	6
0 1¼	0 1⅛	0 1⅛	0 1	0 1	0 1	——	——	——	——	——	0 0⅞
0 8¼	0 7¾	0 7½	0 7	0 6	0 5½	——	——	——	——	——	0 5
3 9	3 9	3 9	3 8	3 6	3 4	——	——	——	——	——	3 0
7	8	8	8	7	7	——	——	——	——	——	6
0 1¼	0 1	0 1⅛	0 1	0 1	0 1	——	——	——	——	——	0 0⅞
3	3	3	3	2	2						
2	2	2	2	1	1						
0 7½	0 7	0 7	0 6½	0 6	0 5¾						
0 7	0 6½	0 6½	0 5½	0 5	0 5						
0 1¼	0 1¼	0 1¼	0 1¼	0 1	0 1						
0 1	0 1	0 1	0 1	0 0¾	0 0¾						
0 4½	0 4	0 4	0 3¾	0 3½	0 3¼						
0 4	0 3½	0 3½	0 3¼	0 3	0 3						
2	2	2	2	2	2	2	——	——	1	——	2

Principal Dimensions, &c.	100 Guns.		90 Guns.		74 Guns.		64 Guns.	
Bitts continued.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Square at the head - - - - - - - - -	1	10	1	9	1	8	1	7
And to continue that bigneſs downward below the lower deck beam	4	3	3	6	2	6	2	0
And to taper from thence to the lower end to - - -	1	3	1	2	1	$1\frac{1}{2}$	1	1
Their heads above the deck - - - - - - -	5	2	5	0	5	3	5	1
The foremoſt ones abaft the foremoſt perpendicular - -	31	8	30	9	31	5	26	2
Diſtance between the foremoſt ones athwartſhips - - -	4	0	3	10	3	8	3	9
The aftermoſt ones abaft the fore ſide of the foremoſt ones -	11	5	10	10	11	4	10	7
Diſtance between the after ones athwartſhips - - -	4	10	4	8	4	4	4	5
Each of them to let forward with a ſcore upon lower deck beams of	0	$2\frac{1}{2}$	0	$2\frac{1}{4}$	0	2	0	2
And bolted thereto with bolts, in number - - - -	2		2		2		2	
In diameter - - - -	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$	0	$1\frac{1}{8}$	0	$1\frac{1}{8}$
The cleats againſt the fore ſide under the lower deck beam in length	4	9	4	6	4	6	4	6
Thickneſs - - - - - - - - - - -	0	8	0	$7\frac{1}{2}$	0	7	0	$6\frac{1}{2}$
Breadth - - - - - - - - - - - -	1	1	1	0	0	$11\frac{1}{2}$	0	11
Croſs-pieces to the bitts. The croſs-pieces fore and aft - - -	1	8	1	7	1	$6\frac{1}{2}$	1	6
Deep - - - -	1	7	1	6	1	$5\frac{1}{2}$	1	5
Their backs of elm, in thickneſs - - - - - -	0	6	0	6	0	6	0	6
The under ſide of the foremoſt above the deck - - -	1	10	1	$9\frac{1}{2}$	1	9	1	7
The under ſide of the aftermoſt above the deck - - -	1	9	1	$8\frac{1}{2}$	1	8	1	6
Each ſcored on the bitt pins - - - - - - -	0	4	0	4	0	$3\frac{1}{2}$	0	3
Their ends without the bitts - - - - - - -	2	3	2	2	2	3	2	3

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Oreſtes
Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In.
1 4	1 3	1 2	1 1	1 0	0 11	0 10	—	—	0 10	—	0 11
1 6	1 0	0 6	0 6	0 6	0 6	0 6	—	—	3 0	—	0 6
0 11$\frac{1}{2}$	0 11	0 10$\frac{3}{4}$	0 10	0 9$\frac{1}{2}$	0 9	0 8	—	—	0 8	—	0 8
5 0	5 0	5 0	4 4	4 3	4 2	3 6	—	—	3 6	—	4 6
23 5	18 8	18 6	18 0	16 10	15 9	12 6	—	—	15 6	—	10 6
2 11	3 5	3 1	3 2	3 1	3 1	3 0	—	—	4 0	—	3 0
10 4	16 2	15 3	15 10	14 0	13 1	9 6	—	—	—	—	5 6
3 8	5 0	5 2	5 0	4 10	4 8	4 0	—	—	—	—	4 0
0 2	0 2	0 2	0 2	0 2	0 2	0 1$\frac{1}{2}$	—	—	0 1$\frac{1}{2}$	—	0 1$\frac{1}{2}$
2	2	2	2	2	2	2	—	—	2	—	2
0 1	0 1	0 1	0 1	0 0$\frac{7}{8}$	0 0$\frac{7}{8}$	0 0$\frac{3}{4}$	—	—	0 0$\frac{3}{4}$	—	0 0$\frac{7}{8}$
4 0	3 0	2 6	2 0	1 9	1 8	1 6	—	—	1 4	—	1 2
0 5$\frac{1}{2}$	0 5	0 4$\frac{3}{4}$	0 4$\frac{1}{2}$	0 4$\frac{1}{4}$	0 4	0 4	—	—	0 4	—	0 4
0 10	0 9	0 8$\frac{1}{2}$	0 8	0 7	0 6$\frac{1}{2}$	0 6	—	—	0 6	—	0 7
1 3$\frac{1}{2}$	1 3	1 2$\frac{3}{4}$	1 2	1 1	1 0	0 10	—	—	0 10	—	0 11
1 2	1 2	1 2	1 0	0 11	0 10	0 9	—	—	0 9	—	0 9$\frac{1}{2}$
0 5	0 5	0 5	0 5	0 5	0 4$\frac{1}{2}$	0 4	—	—	0 4	—	0 5
1 6$\frac{1}{2}$	1 6	1 10	1 6	1 5	1 5	1 5	—	—	1 4	—	1 0
1 5	1 7	1 10	1 6	1 6	1 6	1 6	—	—	—	—	1 10
0 3	0 2$\frac{3}{4}$	0 2$\frac{3}{4}$	0 2$\frac{1}{2}$	0 2$\frac{1}{4}$	0 2	0 2	—	—	—	—	0 2
2 3	2 0	1 11	2 0	1 11	1 10$\frac{1}{2}$	1 10	—	—	1 8	—	1 8

Principal Dimenſions, &c.	100 Guns.		90 Guns.		74 Guns.		64 Guns.	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Standards to the bitts. The ſtandards ſided - - - - -	1	1	1	$0\frac{3}{4}$	1	1	1	$0\frac{1}{2}$
Let down below the gun deck beam - - - - -	0	2	0	2	0	$1\frac{3}{4}$	0	$1\frac{1}{2}$
The foremoſt ones to run to the beam afore the fore maſt, and with the carling below make the outer piece of partners; the aftermoſt to be continued to the aft ſide of the foremoſt bitts, and both bolted through the beams and carlings with bolts, in diameter - - - - - - - -	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$
The upper part of the up and down arms of each to reach as high as the upper ſide of the croſs-pieces.								
Waterways. The lower deck waterways in thickneſs - - -	0	5	0	$5\frac{1}{2}$	0	$5\frac{1}{2}$	0	5
Chined down to the thickneſs of the deck, and bearded back - - - - - - - - - - -	0	$0\frac{1}{2}$	0	$0\frac{1}{2}$	0	$0\frac{1}{2}$	0	$0\frac{3}{8}$
Main partners. The carlings on the lower deck for the partners of the main maſt broad - - - - - - - -	1	8	1	7	1	6	1	4
Deep - - - - - - - -	1	9	1	8	1	7	1	5
Aſunder in the clear - - - - - - - -	4	2	4	0	3	10	3	7
Their upper ſides above the beam - - - - - -	0	9	0	9	0	8	0	8
And bolted through the beam with bolts, in diameter - -	0	1	0	$1\frac{1}{4}$	0	$1\frac{1}{8}$	0	$1\frac{1}{8}$
The rabbets to be deep enough to receive the croſs chocks, which are in thickneſs - - - - - - - - -	0	9	0	9	0	8	0	8
Fore partners. The carlings on the lower deck for the partners of the fore maſt, broad - - - - - - - -	1	6	1	5	1	4	1	3
Deep - - - - - - - -	0	$10\frac{1}{2}$	0	10	0	$9\frac{1}{2}$	0	9
Let down below the beam - - - - - - - -	0	2	0	2	0	$1\frac{1}{2}$	0	$1\frac{1}{2}$
And aſunder in the clear - - - - - - -	4	0	3	10	3	8	3	4

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons.	Cutter 273 Tons.	Royal Charlot. Yacht.	Denmark Yacht.	Oreftes.
Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
0 11½	0 11	0 10½	0 10	0 9	0 8½	0 7	0 6	0 6	0 6	—	0 6
0 1¼	0 1	0 1	0 1	0 0¾	0 0¾	0 0½					
0 1⅛	0 1⅛	0 1	0 1	0 0⅞	0 0⅞	0 0¾	0 0¾	0 0¾	0 0¾	0 0¾	0 0¾
0 5	0 4	0 4	0 4	0 3¾	0 3½	—	—	—	—	—	0 2
0 0⅜	0 0¾	0 0¼	0 0¼	0 0¼	0 0¼						
1 2	1 2	1 2	1 2	1 0	0 11						
1 3	1 1	1 1	1 1	0 10	0 9½						
3 4	3 2	3 1	2 10	2 8	2 6						
0 6½	0 7	0 6½	0 6	0 5	0 4½						
0 1	0 1	0 1	0 1	0 1	0 0⅞						
0 6½	0 7	0 6½	0 6	0 5	0 4½						
1 0	1 1	1 1	1 1	0 11	0 10						
0 8	0 8	0 8	0 8	0 7	0 6						
0 1½	0 1	0 1	0 1	0 1	0 0¾						
3 2	2 8	2 6	2 8	2 6	2 4						

Fore

Principal Dimenſions, &c.	100 Guns.		90 Guns.		74 Guns.		64 Guns.	
Fore partners continued.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
The ſtandards to the foremoſt bitts to make the upper part of the partners as before obſerved; and to form the rabbets for the croſs chocks which are in thickneſs - - - -	0	8	0	8	0	$7\frac{1}{2}$	0	7
Mizen partners. The lower deck mizen partners thick - - -	0	$7\frac{1}{2}$	0	7	0	6	0	5
Broad - - -	4	1	4	0	3	11	3	9
Step of the bowſprit. The ſtep of the bowſprit in two pieces rabbitted into each other, and bolted together with two bolts athwartſhips, in diameter - - - - - - - -	0	$1\frac{1}{2}$	0	$1\frac{1}{2}$	0	$1\frac{3}{8}$	0	$1\frac{1}{4}$
One above and one juſt below the mortice for the heel of the bowſprit.								
To be in length from the upper ſide of one deck beam to the lower ſide of the other, and let aft on each - -	0	$2\frac{1}{2}$	0	$2\frac{1}{2}$	0	$2\frac{1}{4}$	0	2
In breadth - - - - - - - - - - -	4	6	4	4	4	2	3	11
Thickneſs - - - - - - - - - -	1	2	1	$1\frac{1}{2}$	1	1	1	0
And to be bolted to the beams with bolts in diameter - -	0	$1\frac{3}{8}$	0	$1\frac{3}{8}$	0	$1\frac{1}{4}$	0	$1\frac{1}{8}$
Partners of the capſtands. The partners for the fore and main jeer capſtans to be thick - - - - - - -	0	8	0	$7\frac{1}{2}$	0	7	0	$6\frac{1}{2}$
And in breadth - - - - - - - - -	5	10	5	8	5	6	5	4
Hatchways. The main hatch fore and aft - - - - - -	8	10	8	10	8	4	8	0
Thwartſhips - - - - -	6	10	6	9	6	6	6	0
Aft ſide afore the center of the main maſt - - - - -	5	8	5	8	6	2	5	2
The fore hatch fore and aft - - - - - - -	5	2	4	6	4	4	4	8
Thwartſhips - - - - - - -	5	2	5	0	4	10	4	8
Fore ſide of it abaft the center of the fore maſt - - -	32	0	28	3	32	2	25	3

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Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
0 6	0 6½	0 6	0 5½	0 5	0 4¾						
0 5	0 5	0 5	0 5	0 5	0 4½						
3 6	3 5	3 4	3 2	3 0	2 11						
0 1¼	0 1⅛	0 1⅛	0 1	0 1	0 0⅞	0 0⅞	——	——	0 0¾	0 0¾	
0 2	——	——	——	——	——	——	——	——	0 1½	0 1½	
3 8	——	——	——	——	——	——	——	——	1 9	1 9	
0 10	——	——	——	——	——	——	——	——	0 7	0 7	
0 1⅛	0 1	0 1	0 1	0 1	0 0⅞	0 0⅞	——	——	0 0¾	0 0¾	
0 6	0 5½	0 5½	0 5¼	0 5	0 5	0 4¾					
5 3	5 2	5 2	5 0	4 8	4 4	4 0					
7 3	7 6	6 8	6 8	6 4	6 0	5 6	5 0	5 7	4 6	4 9	5 1
5 10	5 8	5 6	5 0	5 0	4 10	4 6	4 6	4 8	4 0	3 10	4 6
3 6	4 5	4 0	3 4	3 4	3 4	3 3	2 9	——	3 2	3 0	6 8
4 8	5 0	4 5	4 8	4 6	4 3	4 0	4 2	4 2	4 2	4 1	3 6
4 8	4 8	4 6	4 5	4 4	4 4	4 0	4 0	4 0	3 6	3 10	3 8
23 8	27 3	26 0	23 9	22 0	20 0	10 0	8 6	——	13 2	11 10	6 11

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Hatchways continued.	Ft. In	Ft. In.	Ft. In.	Ft. In.
The hatch abaft the mizen mast fore and aft - - - -	4 8	4 7	4 6	4 8
Thwartships - - - -	5 2	5 0	4 10	4 8
Fore side of it abaft the aft side of main hatch - - - -	12 7	11 4	12 4	10 3
The hatch over the fish room fore and aft - - - -	4 8	4 2	4 10	4 10
Thwartships - - - -	5 0	5 0	4 10	4 6
Aft side of it afore the center of the mizen mast - - -	8 1	8 4	11 10	8 0
The hatch to the steward room fore and aft - - - -	3 3	3 2	3 2	3 3
Thwartships - - - -	5 0	5 0	4 10	4 8
Scuppers. To have on each side on the lower deck lead scuppers, in number	8	8	6	6
In diameter	0 $5\frac{1}{2}$	0 $5\frac{1}{4}$	0 5	0 4
Manger. The manger boards to be thick - - - - -	0 4	0 4	0 4	0 4
Rabbetted and well secured with cants on the aft side.				
To have on each side in the manger two lead scuppers, diameter in the clear - - - - - - - - -	0 $6\frac{1}{2}$	0 $6\frac{1}{4}$	0 6	0 5
Spirketting. To have on each side on the lower deck strakes of spirketting, in number - - - - - - - -	2	2	2	2
In thickness - - - - - - -	0 $6\frac{1}{4}$	0 6	0 6	0 $5\frac{3}{4}$
Wrought with hook and butt, and to have a bolt in the timber next to the butt of each piece, in diameter - - -	0 1	0 1	0 1	0 $0\frac{7}{8}$
Great care should be taken to shift the spirketting clear of the ports, and to give scarph to each other of such lengths that in general each piece may overlaunch three gun deck ports, and it should also be observed to dispose of the butts properly for the pump dales.				
Stuff between the ports. The stuff above the lower deck spirketting which comes between the ports to be in thickness - -	0 $3\frac{3}{4}$	0 $3\frac{3}{4}$	0 $3\frac{1}{2}$	0 3

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Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
4 8	4 8	4 8	4 8	4 0	3 10	3 9	2 10	2 4			
4 8	4 8	3 10	3 8	3 6	3 4	3 4	4 0	4 0			
10 0	9 0	8 2	7 10	7 8	7 6	9 0	7 8	7 6			
4 0	4 0	4 0	3 11	3 8	3 6						
4 6	4 6	4 6	4 5	4 0	3 8						
9 3	9 0	10 2	19 4	17 6	16 2						
3 1	3 4	3 4	3 9	2 10	2 8						
4 6	4 6	4 6	4 5	4 0	3 8						
6											
0 4											
0 4	0 3	0 3	0 3	0 3	0 3	0 $2\frac{1}{2}$	——	——	0 2	0 2	
0 $4\frac{3}{4}$	0 $4\frac{3}{4}$	0 $4\frac{3}{4}$	0 $4\frac{3}{4}$	0 $4\frac{1}{2}$	0 $4\frac{1}{2}$	——	——	——	0 4	0 4	
2	2	2	2	2	2						
0 $5\frac{1}{4}$	0 5	0 $4\frac{3}{4}$	0 4	0 $3\frac{3}{4}$	0 $3\frac{1}{2}$						
0 $0\frac{7}{8}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{5}{8}$	0 $0\frac{5}{8}$						
0 3	0 3	0 3	0 3	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$						

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Wing tranfom knee. The wing tranfom knee fided	1 $1\frac{1}{2}$	1 1	1 0	0 $11\frac{3}{4}$
The fore and aft arm long	18 0	18 0	16 6	15 6
Thwartfhip ditto	7 6	7 0	6 6	6 0
Bolted with bolts, in number	14	14	13	12
In diameter	0 $1\frac{3}{8}$	0 $1\frac{3}{8}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$
And likewife two bolts in the lip of the end, in diameter	0 1	0 1	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$
Counter ports. To have ports in the lower counter, in number	4	4	2	2
Thwartfhips	2 8	2 6	2 5	2 4
Deep	2 $4\frac{1}{2}$	2 4	2 3	2 2
Pillars. The pillars on the gun deck fquare at the lower end	0 $8\frac{3}{4}$	0 $8\frac{1}{2}$	0 8	0 $7\frac{1}{2}$
Ditto at the upper end	0 $7\frac{3}{4}$	0 $7\frac{1}{2}$	0 7	0 $6\frac{1}{2}$
Helm port tranfom. The helm port tranfom deep	0 $10\frac{1}{2}$	0 $10\frac{1}{4}$	0 10	0 $9\frac{1}{2}$
Scored and bolted thro' the counter timbers with bolts, in diameter	0 $1\frac{3}{8}$	0 $1\frac{3}{8}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$
It fhould have no more caft than what is juft neceffary to give room to the tiller, which fhould hvae three inches play above and below between the deck and helm port tranfom.				
The helm port tranfom knees fided	0 $9\frac{1}{2}$	0 9	0 $8\frac{3}{4}$	0 $8\frac{1}{2}$
The fore and aft arm long	11 6	11 0	10 6	10 0
Thwartfhip arm long	6 4	6 2	5 10	5 4
Bolted with the fame fized bolts as the deck knees, and to let on upon the hanging knees of the deck, above which comes in the wake thereof; and in the caft part of the tranfom, where the wood is apt to fpring, to have two fmall bolts drove from the under fide, and clenched on the upper fide, as clofe as can be to the middle part on which the tiller traverfes.				

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Ft. In.	Ft. In	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft In.	Ft. In.	Ft. In
0 11	0 10	0 9¾	0 9	0 8½	0 8	—	—	—	0 6	0 5¾	
14 6	13 0	12 6	11 6	10 0	9 6						
6 0	6 3	6 3	6 3	6 0	5 10	—	—	—	3 0	3 0	
12	11	11	10	8	8	—	—	—	5	5	
0 1¼	0 1¼	0 1	0 1¼	0 1⅛	0 1⅛	—	—	—	0 0¾	0 0¾	
0 0⅞	0 0¾	0 0¾	0 0¾	0 0⅝	0 0⅝						
2	2	2	2	2	2						
2 2	2 0	1 11	1 10	1 8	1 6						
2 1	1 10	1 9	1 8	1 6	1 2						
0 7¼	0 7	0 7	0 6¾	0 6¼	0 6	—	—	—	0 6	0 5¾	
0 6½	0 6¾	0 6¾	0 6½	0 6	0 5¾	—	—	—	0 5	0 5	
0 9											
0 1⅛											
0 8											
9 0											
5 0											

Standards.

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
	Ft. In	Ft. In.	Ft. In.	Ft. In
Standards. To have standards on each side of the lower deck, in number	12	12	11	10
Sided - -	1 1	1 0½	1 0¼	1 0
The up and down arm to reach the upper edge of the clamps above, and the other long - - - - - -	4 10	4 9	4 6	4 3
Bolted with bolts, in number - - - - - -	8	8	7	7
In diameter - - - - - - -	0 1⅜	0 1⅜	0 1¼	0 1¼
Knee against the post. The standard knee on the gun deck against the head of the stern-post sided - - - - - - -	1 1	1 0½	1 0¼	1 0
The fore and aft arm to be of sufficient length to receive a bolt in the third gun deck beam from aft, and to be scored down on the gun deck beams - - - - - - -	0 3	0 3	0 2¾	0 2½
The up and down arm to reach the upper side of the helm port transom, and bolted with bolts, in diameter - - -	0 1⅜	0 1⅜	0 1¼	0 1¼
Tiller. The tiller to be square in the biggest place - - - -	1 1	1 0	0 11¾	0 11½
In length - - - - - - - - - - - -	29 4	28 0	26 0	24 0
Square at the foremost end - - - - - - - -	0 10	0 9	0 8¾	0 8½
Ring and eye bolts. To have each gun deck port ring bolts, in number	4	4	4	4
Eye bolts in number - - - - - - - - -	2	2	2	2
The bolts in diameter - - - - - - - - -	0 1½	0 1½	0 1¼	0 1¼
The rings diameter in the clear - - - - - - -	0 6	0 6	0 5½	0 5
To have a sufficient number of ring bolts on the deck for the guns, with bolts in diameter - - - - - - -	0 1¼	0 1¼	0 1⅛	0 1⅛
And stopper bolts in diameter - - - - - - -	0 1¾	0 1¾	0 1⅝	0 1⅝
The diameter of the rings of the stopper bolts in the clear - -	0 6¾	0 6¾	0 6	0 6
The eyes of the eye bolts in the clear - - - - - -	0 2¾	0 2⅝	0 2½	0 2⅜

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Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
8	6	6	4	4	4						
0 11	0 $9\frac{3}{4}$	0 $9\frac{3}{4}$	0 9	0 $8\frac{1}{2}$	0 8						
4 0	3 6	3 6	3 4	3 0	2 11						
7	7	7	7	6	6						
0 $1\frac{1}{4}$	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 $1\frac{1}{3}$						
0 10											
0 2											
0 $1\frac{1}{4}$											
0 10	0 $9\frac{3}{4}$	0 $9\frac{3}{4}$	0 $9\frac{1}{2}$	0 9	0 8	0 $6\frac{1}{2}$	0 $6\frac{1}{4}$	0 $6\frac{1}{2}$	0 $5\frac{1}{2}$	0 $5\frac{1}{2}$	0 $6\frac{1}{2}$
22 6	22 0	21 0	19 0	18 6	18 0	12 6	12 0	11 6	10 6	10 8	13 0
0 8	0 $7\frac{3}{4}$	0 $7\frac{3}{4}$	0 $7\frac{1}{2}$	0 7	0 6	0 $4\frac{3}{4}$	0 $4\frac{1}{2}$	0 $4\frac{1}{2}$	0 4	0 $4\frac{1}{4}$	0 $4\frac{3}{4}$
4											
2											
0 $1\frac{1}{4}$											
0 $4\frac{7}{8}$											
0 $1\frac{1}{8}$											
0 $1\frac{1}{2}$											
0 $5\frac{3}{4}$											
0 $2\frac{1}{4}$											

Principal Dimensions, &c.	100 Guns.		90 Guns		74 Guns.		64 Guns.	
	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In
Pump Cisterns. To have on the lower deck pump cisterns, in number	2		2		2		2	
One abaft and the other afore the main mast, to be broad from out to outside	2	6	2	2	2	1	1	$11\frac{1}{2}$
Deep	3	3	2	9	2	8	2	7
Height from the deck	1	1	1	2	1	1	1	0
The ends without side the heads of the pumps	1	2	1	0	0	10	0	8
Centers of the masts. The center of the fore mast abaft the foremost perpendicular on the lower deck	20	8	20	2	21	11	17	3
Rake aft in a yard	0	$0\frac{1}{8}$	0	$0\frac{1}{8}$	0	$0\frac{1}{8}$	0	$0\frac{1}{8}$
The center of the main mast abaft the foremost perpendicular on the lower deck	103	2	99	2	100	9	89	3
Rake aft in a yard	0	$1\frac{1}{8}$	0	1	0	1	0	1
The center of the mizen mast afore the after perpendicular on the lower deck	30	0	27	2	27	4	25	1
Rake aft in a yard	0	$1\frac{5}{8}$	0	$1\frac{1}{2}$	0	$1\frac{1}{2}$	0	$1\frac{1}{2}$
Middle deck clamps. To be strakes in number	2		2					
Thick at the upper edge	0	7	0	$6\frac{1}{2}$				
At the lower edge bearded to	0	6	0	$5\frac{1}{2}$				
Wrought from the under sides of the knees down to the upper sides of the gun deck ports, and the scarphs to be in length	3	9	3	6				
The scarphs bolted with up and down bolts, in number	2		2					
Breast-hook. The middle deck breast-hook sided	1	3	1	$2\frac{1}{2}$				
In length	18	6	18	0				

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Oreftes.
Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
1											
1 11											
2 6											
1 1											
0 8											
15 5	15 7	15 3	14 9	13 4	13 3	15 9	12 8	———	10 9	14 8	13 2
0 $0\frac{1}{8}$	0 1-16th	0 1-16th	0 1-16th	0 1-16th	0 1-16th	0 $0\frac{1}{8}$	0 $0\frac{1}{2}$	———	0 $0\frac{1}{8}$		
76 9	83 0	77 0	73 7	68 2	64 7	59 0	57 3	27 9	48 0	55 0	62 0
0 $0\frac{7}{8}$	0 $0\frac{5}{8}$	0 $0\frac{5}{8}$	0 $0\frac{3}{8}$	0 $0\frac{1}{4}$	0 $0\frac{5}{8}$	0 $0\frac{3}{4}$	0 1	0 $1\frac{1}{2}$	0 $0\frac{3}{4}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$
22 6	22 2	20 9	19 0	17 2	16 6	15 6	———	———	14 4	13 3	
0 $1\frac{1}{4}$	0 1	0 1	0 1	0 1	0 1	0 $1\frac{1}{8}$	———	———	0 $1\frac{1}{4}$	0 1	

Breaft-

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Breast-hook continued.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Bolted with bolts, in number	13	13		
In diameter	0 $1\frac{3}{8}$	0 $1\frac{3}{8}$		
Beams. The middle deck beams fided	1 $3\frac{1}{2}$	1 $2\frac{1}{4}$		
Moulded	1 $1\frac{1}{4}$	1 $0\frac{1}{4}$		
In number	31	30		
Knees. The middle deck beams knee'd at each end with one hanging and one lodging knee.				
The hanging knees fided	0 10	0 $9\frac{1}{2}$		
Thwartfhip arm long	4 3	4 0		
Hanging arm to reach the lower deck fpirketting.				
The lodging knees fided	0 10	0 9		
Thwartfhip arm long	4 6	4 6		
Fore and aft arm the length between the beams.				
And both hanging and lodging knees to be bolted with bolts, in number	7	7		
In diameter	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$		
Carlings and ledges. To have on the middle deck, from the fore hatch to the mizen maft room, carling and ledges, number of tier	3	3		
And from thence forward and aft	2	2		
The carlings broad	0 $10\frac{1}{2}$	0 10		
Deep	0 $8\frac{1}{2}$	0 8		
The ledges broad	0 $5\frac{1}{2}$	0 5		
Deep	0 5	0 $4\frac{1}{2}$		

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Orestes.
Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.

Principal Dimenſions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Carlings and ledges continued.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
And from the mizen maſt aft to have half beams of fir let into a tier of oak carlings at the middle line; the half beams deep	0 8	0 7		
Broad	0 11	0 10		
The ſaid oak carlings broad - - - - - -	0 $10\frac{1}{2}$	0 10		
Deep - - - - - - - -	0 11	0 $10\frac{1}{2}$		
Waterways. The middle deck waterways thick - - - -	0 $4\frac{1}{2}$	0 4		
Spirketting. Strakes of ſpirketting on each ſide of the middle deck, in number - - - - - - - - -	2	2		
Thick at the lower edge - - - - - - -	0 $6\frac{1}{2}$	0 $6\frac{1}{2}$		
And at the upper edge - - - - - - -	0 $5\frac{1}{2}$	0 $5\frac{1}{2}$		
Standards. To have ſtandards on the middle deck, number of pair -	6	5		
Sided - - - - - - - - - - - -	0 $11\frac{1}{2}$	0 $11\frac{1}{4}$		
Bolted with bolts, in number - - - - - - -	9	9		
In diameter - - - - - - -	0 $1\frac{3}{8}$	0 $1\frac{3}{8}$		
Tranſom. The middle deck tranſom deep - - - - - -	0 $10\frac{1}{2}$	0 $10\frac{1}{4}$		
Scored and bolted to the counter timbers with bolts, in diameter	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$		
And knee'd with one lodging knee at each end the ſame ſize as the other middle deck knees.				
Pillars. The pillars on the middle deck ſquare at the lower end - -	0 8	0 $7\frac{3}{4}$		
Ditto at the upper end - - - - - - - -	0 7	0 $6\frac{3}{4}$		
Ring and eye bolts. To have two ring and two eye bolts to each middle deck port, the bolts in diameter - - - - - -	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$		
The rings diameter in the clear - - - - - - -	0 $5\frac{1}{2}$	0 $5\frac{1}{4}$		

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons.	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Oresles.
Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.

Upper

Principal Dimenſions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
	Ft. In	Ft. In.	Ft. In.	Ft. In
pper deck clamps. The upper deck clamps thick at the upper edge	0 6	0 $5\frac{1}{2}$	0 $5\frac{1}{4}$	0 $5\frac{1}{4}$
Bearded at the lower edge to	0 5	0 $4\frac{1}{2}$	0 $4\frac{1}{4}$	0 4
The ſcarphs in length	4 11	4 9	4 6	4 3
Wrought with hook and butt, and bolted up and down through the lips of the ſcarphs with bolts, in number	2	2	2	2
In diameter	0 1	0 1	0 $0\frac{7}{8}$	3 $0\frac{7}{8}$
Beams. The upper deck beams to be ſided	1 $1\frac{1}{2}$	1 $0\frac{3}{4}$	1 2	1 $1\frac{1}{2}$
Moulded	0 $11\frac{1}{4}$	0 $10\frac{3}{4}$	1 0	0 $11\frac{1}{2}$
In number	32	32	28	27
Knees. The upper deck beams knee'd at each end with one hanging and one lodging knee.				
The hanging knees ſided	0 9	0 $8\frac{1}{4}$	0 $8\frac{1}{2}$	0 8
The up and down arm to reach on the ſpirketting below	0 6	0 6	0 6	0 6
The thwartſhip arm long	3 9	3 6	3 9	3 6
The lodging knees ſided	0 8	0 $7\frac{3}{4}$	0 $7\frac{3}{4}$	0 $7\frac{1}{2}$
Thwartſhip arm long	4 3	4 0	4 2	3 1[illegible]
Both lodging and hanging knees to be bolted with bolts, in number	7	7	7	7
In diameter	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$
Tranſom. The upper deck tranſom deep	0 9	0 $8\frac{1}{2}$	0 9	0 9
Scored and bolted to the counter timbers with bolts, in diameter	0 $1\frac{1}{8}$	0 1	0 $1\frac{1}{8}$	0 1
Breaſt hook. The upper deck breaſt hook to be ſided	1 $1\frac{1}{2}$	1 1	1 1	1 1
In length	19 6	19 0	1[illegible] 0	18 0

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Oreftes.
Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
0 5	0 5½	0 5½	0 4	0 3¾	0 3½	0 3	0 3	0 3½	0 3	0 3	0 3¾
0 4	0 4	0 4	0 3½	0 3¼	0 3	0 2¾	0 2¾	0 3	0 2¾	0 2½	0 2¾
4 2	4 0	3 10	3 9	3 6	3 2	3 0	2 10	3 0	2 8	2 8	3 0
2	2	2	2	2	2	2	2	2	2	2	2
0 0¾	0 0¾	0 0¾	0 0¾	0 0⅝	0 0⅝	0 0½	0 0½	0 0½	0 0½	0 0½	0 0½
0 10½	1 1	1 0½	0 11	0 10	0 9¾	0 9½	0 9¾	0 10	0 8½	0 8¼	0 11
0 8¾	0 11	0 11	0 9	0 8½	0 8¼	0 8	0 7	0 8	0 7	0 6¾	0 8
26	28	26	27	24	22	19	16	16	13	14	25
0 7½	0 8½	0 8½	0 7½	0 6½	0 6	0 5½	0 5¼	0 5½	0 5	0 5	0 6½
0 6	0 6	0 6	0 8	0 5	0 5						
3 4	3 8	3 6	3 4	3 2	3 0	2 10	2 8	2 10	2 6	2 6	3 0
0 6⅞	0 8	0 8	0 7	0 5¾	0 5½	0 5	0 5	0 5	0 4½	0 4½	0 6
3 8	4 0	4 0	3 6	3 4	3 2	3 0	2 10	3 0	2 8	2 8	2 11
7	7	7	7	6	6	6	5	5	5		
0 1	0 1	0 1	0 1	0 1	0 0⅞	0 0⅞	0 0¾	0 0¾	0 0⅝	0 0⅝	0 0¾
0 8	0 8½	0 8½	0 7½	0 7	0 6½	0 6¼	0 6	0 6			
0 0⅞	0 0⅞	0 0⅞	0 0⅞	0 0⅞	0 0¾	0 0¾	0 0¾	0 0¾			
0 11	0 11½	0 11	0 11	0 9½	0 9	0 8	0 7	0 7½	0 7	0 6¾	0 8
16 0	16 0	16 0	16 0	14 0	13 6	12 0	11 0	11 6	11 0	10 6	11 6

Breaft-

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Breast hook continued.				
Bolted with bolts, in number	15	14	13	13
In diameter	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$
Carlings and ledges. To have on the upper deck from the fore hatch to the mizen mast room, carlings and ledges, number of tier	3	3	3	3
And from thence forward and aft	2	2	2	2
The carlings broad	0 $9\frac{3}{4}$	0 $9\frac{1}{2}$	0 $8\frac{1}{2}$	0 8
Deep	0 $7\frac{1}{2}$	0 7	0 $6\frac{1}{4}$	0 6
The ledges broad	0 $4\frac{3}{4}$	0 $4\frac{1}{2}$	0 $4\frac{1}{2}$	0 4
Deep	0 $4\frac{1}{4}$	0 4	0 4	0 $3\frac{1}{2}$
From the mizen mast aft to have half beams of fir, broad	0 11	0 $10\frac{1}{2}$	0 11	0 10
Deep	0 8	0 $7\frac{1}{2}$	0 8	0 7
Which are to be let into oak carlings at the middle, and the said oak carlings broad	0 9	0 $8\frac{3}{4}$	0 9	0 $8\frac{1}{2}$
Deep	0 $9\frac{1}{8}$	0 9	0 $9\frac{1}{4}$	0 9
Waterways. The upper deck waterways thick	0 $5\frac{1}{2}$	0 $5\frac{1}{3}$	0 5	0 $4\frac{1}{2}$
Main partners. The partners of the main mast on upper deck in thickness	0 4	0 4	0 3	0 3
Deep	——	——	——	——
Fore partners. The fore partners broad	1 2	1 $1\frac{3}{4}$	1 $1\frac{1}{2}$	1 1
Deep	1 $3\frac{1}{4}$	1 3	1 $2\frac{1}{2}$	1 2
Mizen partners. The mizen partners thick	0 6	0 6	0 6	0 5
Scored down	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	0 1
And fastened with bolts in diameter	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{5}{8}$

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Orestes.
Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
11	11	11	11	9	9	8	8	8	7	7	7
0 1¼	0 1¼	0 1¼	0 1¼	0 1⅓	0 1⅛	0 1½	0 1	0 1	0 1	0 1	0 1
3	3	3	3	3	3	2	2	2	2	2	2
2	2	2	2	2	2	1	1	1	1	1	1
0 7	0 7½	0 7¼	0 7	0 6½	0 6	0 5¾	0 5¾	0 6	0 5	0 5	0 6
0 5	0 6½	0 6¼	0 5	0 4¾	0 4½	0 4½	0 4½	0 4½	0 4½	0 4½	0 5
0 4	0 4	0 3½	0 3½	0 3¼	0 3	0 3	0 3	0 3	0 3	0 3	0 3½
0 3¼	0 3	0 3	0 3	0 3	0 2⅞	0 2¾	0 2¾	0 2¾	0 2½	0 2½	0 3
0 9	0 8	0 7¾	0 7½	0 7	0 6½	0 6½					
0 6½	0 6	0 5¾	0 5½	0 5	0 4½	0 4½					
0 8	0 3¼	0 8	0 7½	0 7	0 6¾	0 6½					
0 8½	0 9	0 8	0 7¾	0 6	0 5	0 5					
0 4½	0 4½	0 4½	0 4½	0 4	0 3⅞	0 3¾	0 3¾	0 3¾	0 3½	0 3½	0 3¾
0 3	0 3	0 3	0 3	0 3	0 3	1 0	0 10	0 11	1 0	1 0	1 0
——	——	——	——	——	——	0 8	0 7	0 7	0 6	0 6	0 7
1 0	1 3	1 2½	1 2	1 0	0 11	0 10	0 9	——	0 10	0 10	0 10
1 1	0 8¼	0 8	0 7	0 6½	0 6	0 7	0 6	——	0 5½	0 5½	0 6
0 4½	0 4¼	0 4¼	0 4	0 4	0 4	0 4	——	——	0 3	0 3	
0 1	0 0¾	0 0¾	0 0¾	0 0¾	0 0¾	0 0¾	——	——	0 0½	0 0½	
0 0⅝	0 0⅝	0 0½	0 0½	0 0½	0 0½	0 0½	——	——	0 0½	0 0½	

Spirk.

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Spirketting. The upper deck spirketting to be strakes in number -	2	2	2	2
In thickness -	0 4	0 4	0 5	0 $4\frac{1}{2}$
Quickwork. The quickwork between the spirketting and string in the waste in thickness - - - - - -	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 $2\frac{3}{4}$	0 $2\frac{1}{2}$
Seat transom. To have a transom across the stern at the height of the lower port sills in thickness - - - - - -	0 $7\frac{3}{4}$	0 $7\frac{1}{2}$	0 7	0 $6\frac{1}{2}$
Scored and bolted to the stern timbers, and knee'd at each end with one iron knee, which is to be cast down under the gallery door, and continued long enough to receive three bolts afore it, the thwartship arm in length - - -	4 8	4 5	4 3	4 0
Bolted with bolts in diameter - - - - - - -	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 1	0 1
Scuppers. To have on the upper deck on each side lead scuppers in number	8	8	8	7
In diameter	0 $3\frac{1}{2}$	0 $3\frac{1}{2}$	0 $3\frac{1}{4}$	0 3
Standards. To have on the upper deck standards, number of pair -	12	12	10	10
Sided - - - - - - - - - - - - -	1 0	1 0	1 0	0 11
The up and down arm to reach the upper edge of the quarter deck and forecastle clamps or string in the waste.				
The thwartship arm long - - - - - - - -	4 2	4 0	3 10	3 9
Bolted with bolts, in number - - - - - - -	7	7	7	7
In diameter - - - - - - -	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{8}$
Ring and eye bolts. To have two ring and two eye bolts to each upper deck port, the bolts in diameter - - - - - -	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{8}$
The rings diameter in the clear - - - - - - -	0 $5\frac{1}{4}$	[illegible] $5\frac{1}{4}$	0 5	0 $4\frac{3}{4}$
The ring bolts on the deck in diameter - - -	0 $1\frac{1}{4}$	0 1[illegible]	0 $1\frac{1}{4}$	0 1[illegible]
The rings diameter in the clear - - - - - - -	0 5	0 $4\frac{7}{8}$	0 $4\frac{3}{4}$	0 $4\frac{5}{8}$

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons.	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Orestes.
Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
2	2	2	2	2	2	2	2	2	2	2	2
0 $4\frac{1}{4}$	0 $4\frac{1}{2}$	0 $4\frac{1}{2}$	0 4	0 4	0 $3\frac{3}{4}$	0 $3\frac{1}{2}$	0 3	0 3	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 3
0 2	0 2	0 2	0 2	0 2	0 2	0 $1\frac{3}{4}$	0 2	0 2	0 $1\frac{3}{4}$	0 $1\frac{3}{4}$	0 2
0 6	0 5	0 $4\frac{3}{4}$	0 $4\frac{1}{2}$	0 4	0 4	0 4	0 4	0 4	0 3	0 3	0 4
3 8	3 6	3 4	3 2	3 0	2 11	2 6	2 5	2 6			
0 1	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$			
7	6	6	6	5	5	5	4	4	3	3	4
0 3	0 3	0 $2\frac{3}{4}$	0 $2\frac{3}{4}$	0 $2\frac{3}{4}$	0 $2\frac{3}{4}$	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 $2\frac{3}{4}$
8	6	6	5	4	4	4					
0 10	0 9	0 $8\frac{1}{2}$	0 8	0 $7\frac{3}{4}$	0 $7\frac{1}{2}$	0 $7\frac{1}{4}$					
3 6	3 4	3 4	3 0	2 11	2 10	2 8					
7	7	7	7	6	6	6					
0 $1\frac{1}{8}$	0 1	0 1	0 1	0 1	0 1	0 1					
0 $1\frac{1}{8}$	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 $0\frac{1}{2}$	0 $0\frac{7}{8}$	0 1
0 $4\frac{5}{8}$	0 $4\frac{7}{8}$	0 $4\frac{1}{2}$	0 $4\frac{1}{2}$	0 $4\frac{1}{4}$	0 $4\frac{1}{4}$	0 4	0 4	0 4	0 3	0 3	0 4
0 $1\frac{1}{8}$	0 1	0 1	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 $0\frac{1}{3}$	0 $0\frac{7}{8}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{7}{8}$
0 $4\frac{1}{2}$	0 4	0 $3\frac{3}{4}$	0 $3\frac{1}{2}$	0 $3\frac{1}{2}$	0 $3\frac{1}{2}$	0 $3\frac{1}{4}$	0 $3\frac{1}{4}$	0 $3\frac{1}{4}$	0 $2\frac{3}{4}$	0 $2\frac{3}{4}$	0 $3\frac{1}{4}$

String

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.
String in the waſte. The ſtring thick - - - - - - -	0 4	0 4	0 $4\frac{1}{2}$	0 4
To give good ſcarph to the drifts, and to be locked by hook and butt into the quarter deck and forecaſtle clamps and to each other, let in between the timbers and ſecurely bolted by bolts, in diameter - - - - - - -	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 $0\frac{3}{4}$
Main jeer and topſail ſheet bitts. To be ſquare - - - -	1 2	1 $1\frac{1}{2}$	1 1	1 0
The croſs pieces to the bitts deep - - - - - -	0 8	0 $7\frac{3}{4}$	0 $7\frac{1}{2}$	0 7
Broad - - - - -	0 $10\frac{1}{4}$	0 10	0 $9\frac{3}{4}$	0 $9\frac{1}{2}$
Scored on the bitt pins - - - - - - - - -	0 2	0 2	0 $1\frac{3}{4}$	0 $1\frac{1}{2}$
The croſs pieces for the gallows ſided - - - -	0 11	0 $10\frac{1}{2}$	0 10	0 $9\frac{1}{2}$
Deep - - - -	1 $4\frac{1}{2}$	1 4	1 $3\frac{3}{4}$	1 3
Long - - - -	12 10	12 6	12 0	11 [illegible]
The upper ſide above the deck - - - - - - -	7 0	7 0	6 11	6 9
Quarter deck clamps. The quarter deck clamps to be ſtrakes, in number	2	2	2	2
Thick at the upper edge - - - - - - - - -	0 $4\frac{1}{2}$	0 4	0 $4\frac{1}{4}$	0 [illegible]
Bearded to at the lower edge - - - - - - -	0 $3\frac{1}{2}$	0 3	0 $3\frac{1}{2}$	0 $3\frac{1}{2}$
Quarter deck beams. The beams of the quarter deck to be ſided -	0 $9\frac{3}{4}$	0 $9\frac{1}{2}$	0 $9\frac{1}{2}$	0 $9\frac{1}{2}$
Moulded -	0 8	0 $7\frac{3}{4}$	0 8	0 $7\frac{1}{2}$
In number - - - - - - - - - -	28	24	25	21
Knees. Every beam of the quarter deck afore the mizen maſt, and every other one from the mizen maſt aft to be knee'd at each end with one hanging and one lodging knee.				
The hanging knees ſided - - - - - - - - -	0 7	0 $6\frac{1}{2}$	0 $6\frac{1}{2}$	0 6
The thwartſhip arm long - - - - - - -	3 6	3 4	3 2	3 2

4[illegible] Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons.	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Orestes.
Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
0 3¾	0 3¾	0 3	0 3½	0 3	0 3	0 3	0 3	0 3	0 2¾	0 2¾	0 3
0 0¾	0 0¾	0 0¾	0 0¾	0 0⅝	0 [illegible]	0 0⅝	0 0⅝	0 0⅝	0 0½	0 0½	0 0⅝
0 10½	0 11½	0 11	0 11	0 9½	0 9	0 8	0 7½	0 8	0 6½	0 6½	0 7½
0 6½	0 6	0 6	0 5½	0 5	0 4⅞	0 4¾	——	——	0 4	0 4	
0 9	0 8½	0 8	0 7½	0 7	0 6¾	0 6½	——	——	0 5½	0 5½	
0 1½	0 1½	0 1½	0 1½	0 1½	0 1½	0 1½	——	——	0 1½	0 1½	
0 9	0 8½	0 8½	0 8	0 8	0 7	0 6¼	——	——	0 5½	0 5¼	
1 2¾	1 2½	1 2½	1 2	1 1	1 0	0 10	——	——	0 7	0 7½	
[illegible]	10 10	10 6	10 0	9 6	9 0	8 10	——	——	8 0	7 10	
6 8	6 8	6 6	6 5	6 4	6 3	6 2	——	——	5 0	5 4	
2	2	2	2	2	2	2	——	——	1	1	
0 4	0 4	0 4	0 4	0 3¾	0 3½	0 3	——	——	0 2¾	0 2¾	
0 3	0 3½	0 3½	0 3½	0 3¼	0 3	0 2½	——	——	0 2½	0 2½	
0 7	0 8½	0 8	0 6¾	0 6⅝	0 6½	0 6	——	——	0 5½	0 5¼	
0 6	0 7	0 6½	0 5¾	0 5½	0 5¼	0 4¾	——	——	0 4½	0 4½	
24	19	21	22	20	19	18	——	——	9	13	
0 4⅞	0 [illegible]	0 5	0 4⅜	0 4¼	0 4¼	0 4	——	——	0 3¾	0 3½	
3 0	3 0	2 11	2 9	2 8	2 6	2 4	——	——	2 3	2 2	

Knees

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
Knees continued.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
The other to reach the spirketting below.				
Bolted with bolts, in number	7	7	7	7
In diameter	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$
The lodging knees sided	0 6	0 $5\frac{1}{2}$	0 6	0 $5\frac{1}{2}$
Thwartship arm long	3 6	3 4	3 3	3 4
Bolted with bolts, in number	5	5	5	5
In diameter	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$
Transom. The quarter deck transom deep	0 7	0 $6\frac{3}{4}$	0 $6\frac{1}{2}$	0 $6\frac{1}{2}$
Scored and bolted to the stern timbers, and knee'd at each end with an iron knee, the fore and aft arm of which to be of sufficient length to receive two bolts afore the gallery door.				
Waterways. The quarter deck waterways thick	0 4	0 4	0 $4\frac{1}{2}$	0 $4\frac{1}{2}$
Spirketting. The quarter deck spirketting thick	0 $3\frac{1}{2}$	0 3[illegible]	0 $3\frac{1}{2}$	0 3[illegible]
Ring and eye bolts. To have two ring and two eye bolts to each quarter deck port, the bolts in diameter	0 1	0 1	0 1	0 1
The rings diameter in the clear	0 $3\frac{3}{4}$	0 $0\frac{3}{4}$	0 $3\frac{3}{4}$	0 $3\frac{3}{4}$
Forecastle clamps. The forecastle clamps to be of breadth sufficient to work down to the upper deck ports, and in thickness	0 $4\frac{1}{2}$	0 $4\frac{1}{4}$	0 $4\frac{1}{2}$	0 $4\frac{1}{2}$
Forecastle beams. The beams of the forecastle to be sided	0 10	0 $9\frac{3}{4}$	0 $9\frac{1}{2}$	0 $9\frac{1}{2}$
Moulded	0 8	0 $7\frac{3}{4}$	0 $8\frac{1}{2}$	0 $7\frac{1}{2}$
In number	12	11	13	9
Knees. Every beam of the forecastle to be knee'd at each end with one hanging and one lodging knee.				
The hanging knees sided	0 $6\frac{1}{2}$	0 $5\frac{3}{4}$	0 $6\frac{1}{2}$	0 [illegible]

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons.	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Orestes.
Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.
7	7	7	7	6	6	5	—	—	5	5	
0 $0\frac{7}{8}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{5}{8}$	—	—	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	
0 $4\frac{7}{8}$	0 $4\frac{3}{8}$	0 $5\frac{1}{2}$	0 $4\frac{1}{2}$	0 $4\frac{1}{4}$	0 4[illegible]	0 4	—	—	0 $3\frac{3}{4}$	0 $3\frac{1}{2}$	
3 2	3 2	3 1	2 11	2 10	2 8	2 6	—	—	2 4	2 3	
5	5	5	5	5	5	5	—	—	5	5	
0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{5}{8}$	0 $0\frac{5}{8}$	0 0[illegible]	—	—	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	
0 6	0 $6\frac{3}{4}$	0 $6\frac{3}{4}$	0 7	0 6	0 $5\frac{3}{4}$	0 $4\frac{5}{8}$	—	—	0 $4\frac{3}{4}$	0 $4\frac{1}{2}$	
[illegible]	0 4	0 4	0 4	0 $3\frac{3}{4}$	0 $3\frac{3}{4}$	0 3	—	—	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	
0 3	0 $3\frac{1}{2}$	0 $3\frac{1}{2}$	0 3	0 3	0 $2\frac{3}{4}$	0 $2\frac{1}{2}$	—	—	0 $2\frac{1}{4}$	0 2	
0 1	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$						
[illegible] $3\frac{1}{2}$	0 $3\frac{1}{2}$	0 $3\frac{1}{2}$	0 $3\frac{1}{4}$	0 $3\frac{1}{4}$	0 3						
0 $3\frac{1}{2}$	0 4	0 4	0 4	0 $3\frac{3}{4}$	0 $3\frac{1}{2}$	0 3	—	—	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	
0 7	0 $8\frac{1}{2}$	0 $7\frac{1}{2}$	0 $6\frac{3}{4}$	0 $6\frac{3}{8}$	0 $6\frac{1}{2}$	0 6	—	—	0 $5\frac{1}{2}$	0 $5\frac{3}{4}$	
0 6	0 7	0 $6\frac{1}{2}$	0 $5\frac{3}{4}$	0 $5\frac{1}{2}$	0 $5\frac{1}{4}$	0 $4\frac{3}{4}$	—	—	0 $4\frac{1}{2}$	0 $4\frac{1}{2}$	
10	10	10	11	10	9	6	—	—	5	5	
0 5	[illegible] $5\frac{1}{2}$	0 5	0 $4\frac{3}{4}$	0 $4\frac{1}{4}$	0 $4\frac{1}{4}$	0 4	—	—	0 $3\frac{3}{4}$	0 $3\frac{1}{2}$	

Knees

Principal Dimenſions, &c.	100 Guns.		90 Guns.		74 Guns.		64 Guns.	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Knees continued.								
The lodging knees ſided	0	$6\frac{1}{2}$	0	$5\frac{3}{4}$	0	$6\frac{1}{2}$	0	$5\frac{1}{2}$
Their thwartſhip arm long	3	6	3	0	3	2	3	0
And each bolted with bolts, in diameter	0	$0\frac{7}{8}$	0	$0\frac{7}{8}$	0	$0\frac{7}{8}$	0	$0\frac{7}{8}$
Waterways. The forecaſtle waterways thick	0	4	0	4	0	$4\frac{1}{2}$	0	$4\frac{1}{2}$
Spirketting. The forecaſtle ſpirketting thick	0	3	0	3	0	3	0	3
Beam under the cat-heads. To be broad	2	4	2	3	2	4	2	3
Deep	0	10	0	10	0	10	0	$9\frac{3}{4}$
And knee'd at each end with one lodging and one ſtandard knee under the beam ſided	0	11	0	11	0	$10\frac{1}{2}$	0	10
Round houſe clamps. The round houſe clamps to be in breadth	1	1	1	1	1	2	1	2
Thick at the upper edge	0	4	0	4	0	4	[illegible]	[illegible]
Bearded at the lower edge to	0	3	0	3	0	3	0	3
Bolted with bolts, one under and one between each beam in diameter	0	$0\frac{3}{4}$	0	$0\frac{3}{4}$	0	$0\frac{3}{4}$	0	$0\frac{3}{4}$
Round houſe beams. The beams of the round-houſe to be ſided	0	$7\frac{1}{2}$	0	7	0	7	0	$6\frac{3}{4}$
Moulded	0	$5\frac{1}{2}$	0	5	0	$5\frac{1}{2}$	0	5
In number	19		13		22		17	
And thoſe beams th[illegible] are not knee'd to be tailed and bolted into [illegible]ps with bolts, in diameter	0	$0\frac{7}{8}$	0	$0\frac{7}{8}$	0	$0\frac{3}{4}$	0	$0\frac{3}{4}$
Knees. Every other beam of the round houſe to be knee'd at each end with one hanging and one lodging knee ſided	0	$5\frac{1}{2}$	0	$4\frac{3}{4}$	0	5	0	5
The hanging knees to reach within ſix inches of the ſpirketting, the thwartſhip arms long	2	6	[illegible]	6	2	8	2	6
Bolted with bolts, in number	5		5		5		5	

4[illegible] [illegible]s.	38 Guns.	36 Guns.	32 Guns.	28 Guns	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Oreſtes.
Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
0 4¾	0 5	0 4¾	0 4½	0 4¼	0 4⅛	0 4	——	——	0 3¾	0 3½	
2 8	2 10	2 9	2 7	2 6	2 5	2 3	——	——	2 4	2 3	
0 0¾	0 0¾	0 0¾	0 0¾	0 0¾	0 0¾	0 0⅝	——	——	0 0½	0 0½	
0 4	0 4	0 4	0 4	0 3¾	0 3¾	0 3	——	——	0 2½	0 2½	
0 3	0 3	0 3	0 3	0 3	0 2¾	0 2½	——	——	0 2	0 2	
2 0	——	——	——	——	——	——	——	——	1 6		
0 7½	——	——	——	——	——	——	——	——	0 5		
0 8¾	——	——	——	——	——	——	——	——	0 5		

Principal Dimensions, &c.	100 Guns.		90 Guns.		74 Guns.		64 [illegible]	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
Knees continued.								
Bolted with bolts, in diameter	0	$0\frac{3}{4}$	0	$0\frac{3}{4}$	0	$0\frac{3}{4}$	0	$0\frac{3}{4}$
Transom. The roundhouse transom deep	0	$8\frac{1}{4}$	0	$7\frac{3}{4}$	0	8	0	$7\frac{1}{2}$
Scored and bolted to the stern timbers, and knee'd at each end with an iron knee, the knee to be bolted with bolts, in number	7		7		7		7	
In diameter	0	$0\frac{3}{4}$	0	$0\frac{3}{4}$	0	$0\frac{3}{4}$	0	$0\frac{3}{4}$
The fore and aft arm of the knee to be of a length sufficient to receive two bolts afore the fore side of the gallery door.								
Waterways. The roundhouse waterways thick	0	$4\frac{1}{2}$	0	4	0	4	0	4
Counter Timbers. To have in the stern counter timbers, to form the stern lights, in number	6		6		6		6	
Sided	1	0	0	$11\frac{1}{2}$	0	11	0	10
To run down below the upper side of the wing transom	0	6	0	6	0	6	[illegible]	[illegible]
Scored and tailed half their thickness into the wing transom, and to step down on the upper side	0	$1\frac{1}{2}$	0	[illegible]	0	$1\frac{1}{4}$	0	[illegible]
And bolted with one bolt, in diameter	0	$1\frac{1}{8}$	0	$1\frac{1}{8}$	0	$1\frac{1}{8}$	0	1
Stern knees. To have proper knees fixed on the roundhouse for the security of the taff rail and ensign staff, in number	3		3		3		4	
Sided on the deck	0	$6\frac{1}{2}$	0	$6\frac{1}{2}$	0	$6\frac{1}{2}$	0	6
At the [illegible]nd	0	$5\frac{1}{4}$	0	5	0	5	0	5
Their fore and aft arms of a length sufficient to receive a bolt in the third beam from aft.								
Rother. The rother head to be made long enough to receive a tiller above the upper deck of the same bigness as that under the deck, that the spare tiller may serve for either places; to be thwartships at the head	2	4	2	[illegible]	2	2	2	1
Fore and aft	2	6	2	4	2	[illegible]	[illegible]	[illegible]

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Orestes.
Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
6	6	6	6	4	4	4	4	4	4	4	4
0 9	0 $9\frac{1}{2}$	0 9	0 8	0 7	0 $6\frac{1}{2}$	0 $5\frac{3}{4}$	0 $5\frac{1}{2}$	0 $5\frac{3}{4}$	0 $5\frac{1}{2}$	0 $5\frac{1}{2}$	0 6
0 5	0 $4\frac{1}{2}$	0 $4\frac{1}{2}$	0 4	0 $3\frac{3}{4}$	0 $3\frac{1}{2}$	0 3	0 3	0 3	0 2	0 2	0 $3\frac{1}{2}$
0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 $0\frac{7}{8}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{3}{4}$
0 1	0 $0\frac{1}{2}$	0 $0\frac{7}{8}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{3}{4}$	0 $0\frac{5}{8}$	0 $0\frac{5}{8}$	0 $0\frac{5}{8}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{3}{4}$
1 8	1 8	1 $7\frac{1}{2}$	1 6	1 $5\frac{1}{2}$	1 5	1 2	1 $0\frac{1}{4}$	1 1	0 11	0 11	1 1
1 10	1 10	1 $9\frac{1}{2}$	1 8	1 7	1 $6\frac{3}{4}$	1 3	1 3	1 3	0 11	1 0	1 2

Rother

Principal Dimensions, &c.	100 Guns.	90 Guns.	74 Guns.	64 Guns.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Rother continued.				
In breadth at the lower end	6 6	5 11	5 7	5 5
Ditto at the lower hance	4 6	4 4	4 0	3 10
The back to be in thickness	0 4	0 4	0 3	0 3
Rother irons. To have rother irons, number of pair	7	7	7	6
The upper brace to have straps sufficient in length so as to turn and meet round the standard against the post, and the second brace in length from the rabbet	5 4	5 0	4 8	4 3
The lower one in length, from the back of the post	8 0	7 6	7 0	6 6
The pintles in diameter	0 $4\frac{1}{2}$	0 4	0 $3\frac{1}{2}$	0 3
And in length	1 6	1 4	1 2	1 $0\frac{3}{4}$
The straps of the braces and pintles broad	0 $5\frac{1}{2}$	0 5	0 $4\frac{1}{2}$	0 4[illegible]
And thick in the shoulder at the return	0 $2\frac{1}{4}$	0 2	0 $1\frac{7}{8}$	0 1[illegible]
Fore jeer and topsail sheet bitts. To be square	1 $1\frac{1}{2}$	1 [illegible]	1 0	0 11
Their heads above the deck	4 6	4 0	3 10	3 7
The cross pieces deep	0 8	0 $7\frac{1}{2}$	0 7	0 6
Broad	0 $9\frac{1}{2}$	0 $9\frac{1}{4}$	0 9	0 $8\frac{1}{2}$
Scored on the bitt-pins	0 $1\frac{5}{8}$	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$	0 $1\frac{1}{2}$
Channel Knees. The knees in the fore and main channels, to be in number	14	13	14	12
Sided	0 $5\frac{1}{2}$	0 5	0 $4\frac{3}{4}$	0 $4\frac{1}{2}$
Bolted with bolts in each, in number	6	5	4	4
In diameter	0 1	0 1	0 1	0 $0\frac{7}{8}$
Knee of the head. The knee of the head at the upper side of the upper cheek thick at the stem	1 $7\frac{1}{2}$	1 6	1 $4\frac{1}{2}$	1 $3\frac{1}{2}$

44 Guns.	38 Guns.	36 Guns.	32 Guns.	28 Guns.	24 Guns.	Sloop 300 Tons.	Weazel 201 Tons	Cutter 273 Tons.	Royal Charlot Yacht.	Denmark Yacht.	Oreſtes.
Ft. In.	Ft. In	Ft. In	Ft. In.	Ft. In.	Ft. In.	Ft. In	Ft. In.	Ft. In.	Ft In.	Ft I	Ft. In.
5 0	4 8	4 6	4 1	4 0	3 10	3 6	3 6	3 5	3 4	2 10	3 0
3 6	3 2	3 0	2 11	2 10	2 9	2 7	2 7	2 7	2 4	1 10	1 9
0 3	0 3	0 3	0 3	0 $2\frac{1}{2}$	0 $2\frac{1}{2}$	0 2	0 2	0 2	0 2	0 2	0 3
6	6	6	5	5	5	5	4	5	5	5	6
3 6	4 2	3 8	3 2	3 0	2 9	2 6					
5 6	6 6	5 10	5 0	4 11	4 10	4 6	4 2	4 6	3 10	4 3	4 0
0 $2\frac{7}{8}$	0 3	0 $2\frac{1}{2}$	0 $2\frac{3}{4}$	0 $2\frac{1}{2}$	0 $2\frac{1}{4}$	0 2	0 2	0 $2\frac{1}{4}$	0 2	0 2	0 2
1 0	1 0	0 $11\frac{1}{2}$	0 $10\frac{1}{2}$	0 $9\frac{1}{2}$	0 9	0 $8\frac{1}{2}$	0 8	0 $8\frac{1}{2}$	0 8	0 9	0 11
0 [illegible]	0 4	0 $3\frac{3}{4}$	0 $3\frac{1}{2}$	0 $3\frac{3}{8}$	0 $3\frac{1}{4}$	0 3	0 3	0 3	0 3	0 $2\frac{3}{4}$	0 3
0 $1\frac{1}{2}$	0 $1\frac{5}{8}$	0 $1\frac{1}{2}$	0 $1\frac{3}{8}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{8}$	0 $1\frac{1}{8}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{8}$	0 $1\frac{1}{4}$
0 $9\frac{1}{2}$	0 10	0 $9\frac{1}{2}$	0 9	0 8	0 $7\frac{1}{2}$	0 7	——	——	0 $6\frac{1}{2}$	0 7	
3 6	3 6	3 4	3 3	3 1	3 0	2 6	——	——	2 3	2 3	
0 $5\frac{1}{2}$	0 $5\frac{3}{4}$	0 $5\frac{1}{2}$	0 5	0 $4\frac{3}{4}$	0 $4\frac{1}{2}$	0 4	——	——	0 $3\frac{3}{4}$	0 $3\frac{3}{4}$	
0 $7\frac{1}{2}$	0 8	0 $7\frac{1}{2}$	0 7	0 $6\frac{1}{2}$	0 6	0 5	——	——	0 5	0 5	
0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 $1\frac{1}{4}$	0 1	0 1	0 1	0 $0\frac{1}{2}$	——	——	0 1	0 1	
11	12	10	10	8	8	6	4	——	4	6	4
0 $4\frac{1}{4}$	0 $4\frac{1}{2}$	0 $4\frac{1}{4}$	0 4	0 $3\frac{3}{4}$	0 $3\frac{1}{2}$	0 3	0 3	——	0 3	0 3	0 3
4	4	4	4	4	4	2	2	——	2	2	2
0 $0\frac{3}{4}$	0 $0\frac{7}{8}$	0 $0\frac{3}{4}$	0 $0\frac{5}{8}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	——	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$	0 $0\frac{1}{2}$
1 $2\frac{1}{2}$	1 $1\frac{1}{2}$	1 1	1 $0\frac{1}{2}$	0 $11\frac{1}{2}$	0 11	0 $10\frac{1}{2}$	0 10	——	0 10	0 $10\frac{1}{2}$	0 11

Principal Dimensions, &c.		100 Guns.		90 Guns.		74 Guns.		64 Guns.	
Knee of the head continued.		Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
The two upper bolts in diameter in the knee		0	$2\frac{3}{4}$	0	$2\frac{5}{8}$	0	$2\frac{1}{2}$	0	$2\frac{3}{8}$
	Ditto in the stem	0	$2\frac{5}{8}$	0	$2\frac{1}{2}$	0	$2\frac{3}{8}$	0	$2\frac{1}{4}$
The third	diameter in the knee	0	$2\frac{3}{8}$	0	$2\frac{1}{4}$	0	$2\frac{1}{8}$	0	2
	Ditto in the stem	0	$2\frac{1}{2}$	0	$2\frac{1}{8}$	0	2	0	1
The fourth	diameter in the knee	0	$2\frac{1}{8}$	0	2	0	$1\frac{7}{8}$	0	$1\frac{3}{4}$
	Ditto in the stem	0	2	0	$1\frac{7}{8}$	0	$1\frac{3}{4}$	0	$1\frac{5}{8}$
The fifth	diameter in the knee	0	2	0	$1\frac{7}{8}$	0	$1\frac{3}{4}$	0	$1\frac{5}{8}$
	Ditto in the stem	0	$1\frac{7}{8}$	0	$1\frac{3}{4}$	0	$1\frac{5}{8}$	0	$1\frac{1}{2}$
The sixth	diameter in the knee	0	$1\frac{7}{8}$	0	$1\frac{3}{4}$				
	Ditto in the stem	0	$1\frac{3}{4}$	0	$1\frac{5}{8}$				
All the rest in diameter		0	$1\frac{3}{4}$	0	$1\frac{5}{8}$	0	$1\frac{5}{8}$	0	$1\frac{1}{2}$

All the holes ſhould be bored through with proper ſized augers, to receive the bolts in the leaſt drift, that no reeming may be afterwards from the ſtem in; the holes ſhould alſo be bored before the canvas is put on, and the knee ſhould be ſwung off to obſerve whether the holes are all good before any bolts are drove.

END OF THE FOURTH BOOK.

A TREA-

A TREATISE ON MARINE ARCHITECTURE.

BOOK V.

IN this book I ſhall endeavour to ſhew in what manner the true weight of any ſhip may be aſcertained, when ſhe is loaded to her deep water mark; that is, when all her ammunition, proviſions, men, &c. are on board, and the ſhip in all reſpects ready for ſea; by the knowledge of which, the ſtudent will be able to determine on the true place of the load water line in the draught, and conſequently know how high the lower deck ports may be placed above the water, which is of the greateſt conſequence in the conſtruction of a draught.

It may be demonſtrated by ſeveral experiments (as hath been before obſerved) that a floating body of any figure whatſoever, will juſt ſink ſo far into the water as to diſplace a bulk of that fluid of equal weight with itſelf. Hence it will ariſe, that if we obſerve what draught of water a ſhip draws when ſhe is laden, with every thing on board, and ſuppoſed to be at her deep water mark, or load water line, which is propoſed for her in the conſtruction, we have only then to find a method whereby we may come at the true number of cubic feet contained in the ſhip below the ſaid load water line, which conſequently will be the number of cubic feet in the bulk of water diſplaced by the ſhip in that poſition, and then by calculating the weight of ſo many cubic feet of water, we ſhall thereby come at the true weight of the ſhip, with every thing on board, and all that leans or preſſes upon her.

Therefore, as ſhips of the ſame number of guns, and tons, are nearly of the ſame dimenſions, we may, by knowing the weight of ſuch a ſhip, compare it with the weight of the ſhip which we have conſtructed, by examining the draught of water, and computing the weight therefrom; then if the weight of the ſhip ſo conſtructed agrees with the weight before known for ſhips of a ſimilar ſize, the water line upon the draught is rightly placed, and we ſhall know for a certainty how deep ſuch a ſhip would ſwim, when brought down to her load water mark, and in conſequence may determine on the height of the lower deck ports, by which we ſhould come at the true placing of the decks, &c.

But if the weight of the ſhip laid down in the draught, exceeds the weight firſt mentioned for ſhips of a ſimilar ſize, the water line in the draught is then placed too high, and muſt be lowered till both the weights are found to agree; and for the ſame reaſon, if the weight of the ſhip in the draught is found

to

to be lefs than the weight firft mentioned, the water line is then too low, and in like manner muft be rofe till both the weights agree with each other.

The pofition of the fhip in the draught may be either on an even keel, or to draw moft water abaft, but an even keel is judged to be the beft pofition in point of velocity, when a fhip is conftructed fuitable thereto; that is, when her natural pofition is fuch, for when a fhip is conftructed to fwim by the ftern, and when brought down to her load water mark to fwim on an even keel (as is the cafe with moft fhips that are built) her velocity is by that means greatly retarded, befides her ftrength being greatly diminifhed, for the fore part being brought down lower than it fhould be, and the middle of the fhip maintaining its proper depth in the water, the after part is by that means lifted, and the fhip is then upon an even keel; but in confequence of her being out of her natural pofition, the after part is always preffing downwards with a ftrain equal to the weight of itfelf, and which ftrain will continue till the fhip's fheer is entirely broke, and in time would fall into its natural pofition again; for which reafon we fee fo many fhips, after having failed a little while, with broken backs (as it is termed); that is, with their fheers altered in fuch a manner, that the fheer rounds up, and the higheft part is in the midfhips.

Such are the difadvantages arifing from not paying a due attention to thofe points in the conftruction of a draught; therefore, when the load water line is found to be fituated of a proper height on the draught, according to the weight given for fuch a fhip, and likewife drawn parallel to the keel, as fuppofing that to be the beft failing trim, the next matter is to examine whether the body is conftructed fuitable thereto, in order to avoid the above-mentioned ill confequences.

There-

Therefore, in the firſt place we muſt divide the ſhip equally in two, length-ways, between the fore and after perpendiculars, and the exact number of cubic feet in the whole bottom beneath the load water line being known, we muſt find whether the number of cubic feet in each part ſo divided are the ſame, which if they prove to be equal both in the fore and after parts, the body of the ſhip may then be ſaid to be conſtructed in all reſpects ſuitable to her ſwimming on an even keel, let the ſhape of the body be whatever it will, and which will be found to be her natural poſition at the load water line.

But if either of the parts ſhould contain a greater number of cubic feet than the other, that part which contains the greateſt will ſwim the moſt out of water, and the other in conſequence will ſwim the deepeſt, ſuppoſing the ſhip in her natural poſition to that conſtruction. Therefore, in order to render the ſhip ſuitably conſtructed to the load water line in the draught, (which is parallel to the keel) we muſt ſubſtract the number of cubic feet contained in the leſſer part, from the number contained in the greater part, and then fill out that part of the body which contains the leſſer quantity, till it has accumulated half the ſum of the difference, and draw in the other part of the body the ſame ſum, by which both parts will then be equal with reſpect to the number of cubic feet contained in them, and by that means the ſhip's body will become conſtructed in a manner ſuitable to her ſwimming on an even keel.

Alſo, if we propoſe that the ſhip laid down in the draught ſhall not ſwim on an even keel, but draw more water abaft than afore (as there are many that will ſtill hold good with that rule) we muſt then act as before, by comparing the fore and aft parts of the ſhip's body together, and ſwelling out that part of the body which contains the leaſt, and taking away from that which contains the greateſt, by which the ſhip will alſo be in her natural poſition when brought down to the load water mark, as was before obſerved.

Some

Some people imagine that to conſtruct a draught, is no more than to draw the ſeveral lines which compoſe the whole, and form the repreſentation of the ſheer draught, half breadth and body plans, at diſcretion, ſhaping them in ſuch a manner as they think may beſt anſwer the different purpoſes for which they deſign them, ſome for ſtowage, others for diſpatch, or ſome for both, where they mean to unite both qualities in one, never in the leaſt thinking of thoſe conſiderations which are the moſt eſſential to every claſs of ſhipping, and which I have already ſufficiently explained. A ſhip conſtructed in this manner, if put together as ſtrong as poſſible, and by the moſt ſkilful workmen, and likewiſe with the beſt of materials, ſuch a ſhip would not anſwer the wiſhed-for purpoſes ſo well as one that was put together in a more unſkilful manner, and likewiſe more unſound materials, but conſtructed ſuitable to every purpoſe for which ſhe was deſigned, as the latter would always wear eaſy, by being kept in her natural poſition and free of compulſion; whereas on the contrary, the former would by continual ſtrains, in conſequence of her body being formed irregularly and by no rule, be wearing of herſelf to pieces, and trying every part of her to the greateſt degree, and by the time the other's ſtrength began to decline, ſhe would not be in value equal to one half the value of the other ſhip: though notwithſtanding, it is not a general obſervation to be made, for it ſometimes happens that when chance interferes, they will find out the beſt ſailing trim in one ſhip ſuitable to her conſtruction and properties, and ſo make that a rule to govern themſelves by in ſhips of a ſimilar form; but when they have to do with ſhips different in ſhape and conſtruction, then they are utterly at a loſs, till they have put their ſhip in every poſition in order to find out the true one, and by the time their deſires are accompliſhed, the ſhip is worked and ſtrained to the greateſt degree.

 There-

Therefore, in order that the ſtudent may not fall into ſuch errors, I ſhall reduce the theory of what has been ſaid into practice, by which he may be able eaſily to go through the whole proceſs, and from thence be convinced of the great propriety of thoſe conſiderations in the conſtructing or forming of a ſhip's body.

Hence it will be neceſſary, firſt to calculate the weight of a ſhip, ready equipt for ſea, from the knowledge of the weight of every ſeparate thing in her, and belonging to her, as the exact weight of all the timber, iron, lead, maſts, ſails, rigging, and in ſhort all the materials, men, proviſions, and every thing elſe on board her, from which we ſhall be able to judge afterwards of the truth of our calculations, and likewiſe whether our load water line in the draught be placed agreeable thereto.

The draught I ſhall make choice of to make our computations from, will be the eighty-gun ſhip laid down in Book III. as a print of that draught will be given at or before the concluſion of the work, in order to elucidate this and many other matters in the courſe of this treatiſe.

In order to the weight of the hull, the timber is the firſt which comes under conſideration, we muſt therefore make a true calculation of every cubic foot of timber contained in the whole fabric, which we ſhall be able to do by the help of the draught, and the principal dimenſions and ſcantlings; obſerving to diſtinguiſh the different kinds of timber from each other, as they differ conſiderably in weight, and then reducing the number of cubic feet contained in the different ſorts of timber into pounds, and adding them together, the true weight of the timber will be found, and acting in the ſame manner with iron, lead, paint, &c. the true weight of the whole may be found.

In

In reducing quantity into weight it muſt be underſtood, that a cubical foot of oak is equal to ſixty ſix pounds, and the following bodies are to one another in this proportion, viz.

Water being —	1000.	Oak is —	891.89
Dry fir is —	648.64	Lead —	11345.
Dry elm is —	702.70	Iron —	7643.

It muſt be confeſſed that to come at the weight of a ſhip in this manner is a very laborious taſk, and that the difficulties ariſing in the trial thereof, may not be got over by many of our readers, who are not converſant in menſuration; as in the meaſuring ſo many pieces of timber which compoſe a ſhip, there are as many irregular figures as poſſibly can be deſcribed; and therefore as I cannot in this treatiſe find room to ſpeak at large upon that ſubject, I ſhall, for the better information of that part of my readers, as well as thoſe which are not diſpoſed to give themſelves the trouble of ſuch a trial, lay down the weight of the eighty-gun ſhip which I have calculated, as ſuppoſing her brought down to the load water line, with proviſions, ammunition, men, &c. on board, and in all reſpects fit for ſea.

An ESTIMATE of the Weight of the Eighty-gun Ship as fitted for Sea, with ſix Months Proviſion.

Weight of the Hull.

	No. of feet	Nº of lbs.	Tons	Pounds
Oak Timber at 66lb. to the cubical foot - - -	48497	3200802	1428	2082
Fir Timber at 48lb. to the cubical foot - - -	4457	213936	95	1136
Elm Timber at 52lb. to the cubical foot - - -	520	27040	12	160
Carve work and lead work - - - - - - - - -		4651	2	171
Iron work, rudder irons, chain plates, nails, &c. - - - -		88254	39	894
Pitch, tar, oakum, and paint - - - - - - -		17920	8	
Cook room fitted with fire hearth, &c. - - - - - -		16123	7	443
Total—		3568726	1593	406

Weight

Weight of the Furniture.

	Nº of lbs.	Tons	Pounds
Complete ſet of maſts and yards, with the ſpare geer	161000	71	1960
Anchors with their ſtocks, and maſter's ſtores	39996	17	1916
Rigging	69128	30	1928
Sails complete ſet, with ſpare	32008	14	648
Cables and hawſers	73332	32	1652
Blocks, pumps and boats	62056	27	1576
Total—	437520	195	720

Weight of the Guns and Ammunition.

Guns with their carriages	377034	168	714
Powder and ſhot, powder barrels, &c.	116320	51	2080
Implements for the powder	6500	2	2020
Ditto for guns, crows, handſpikes, &c.	21573	9	1413
Total—	521427	232	1747

Weight of the Officers Stores, &c.

Carpenter's ſtores	20187	9	27
Boatſwain's ſtores	21112	9	952
Gunner's ſtores	8964	4	4
Caulker's ſtores	5200	2	720
Surgeon and chaplain's effects	11096	4	2136
Total—	66559	29	1599

Weight of the Proviſions.

Proviſions for ſix months for 700 men with all their equipage	858970	383	1050
Water, caſks, and captain's table	933900	416	2060
Total—	1792870	800	870

Weight of the Men, &c.

700 men with their effects, including the officers and their effects	230214	102	1734
Ballaſt	1344000	600	
Total—	1574214	702	1734

RE-

RECAPITULATION.

	Nº of lbs	Tons	Pounds
The Hull - - - - - - - - - -	3568726	1593	406
The furniture - - - - - - - - - -	437520	195	720
Guns and ammunition - - - - - - - -	521427	232	1747
Officer's ſtores - - - - - - - - - -	66559	29	1599
Proviſions - - - - - - - - - -	1792870	800	870
Weight of the men and ballaſt - - - - - - -	1574214	702	1734
Total –	7961316	3554	356

We now find, agreeable to the above eſtimate, that the eighty-gun ſhip weighs, when brought down to her load water line, with every thing on board and fit for ſea, 7961316 pounds, or 3554 tons, and may therefore now know for a certainty if the load water line in the draught be properly placed, only by reducing the immerſed part of the bottom into cubic feet; for if the eighty-gun ſhip weighs, when brought down to the load water line, 3554 tons, ſhe muſt ſink ſo far into the water till ſhe has diſplaced a column of water weighing 7961316 pounds, or 3554 tons, and a cubic foot of ſalt water being ſupposed to weigh 74 lb. we ſhall therefore find, that if we divide 7961316 by 74, the quotient will be 110573 feet, which is the bulk of that column of water which ſhe ſhould diſplace when brought down to her load water line, or if ſhe diſplaces 110573 cubical feet, we may thence conclude that ſhe weighs 3554 tons.

We ſhould therefore always make an exact calculation of the contents of the immerſed part of a ſhip's bottom, before we determine on the place of the decks and other works, as there can be no dependance placed on their ſituation with reſpect to the water till then.

The ſolid contents of a ſhip's body, were it any regular figure, might be very eaſily found geometrically; but as it is quite otherwiſe, we muſt be ſatisfied

fied with taking the trouble of dividing it into ſeveral parts, of which we may have ſo many, that they may thereby be eſteemed as regular figures in the meaſurement thereof, and limited by ſtraight lines, though at the ſame time ſome of them are actually curves.

In the draught of the eighty-gun ſhip which I have laid down, the bottom is divided on the plane of elevation into ſeveral parts; in a vertical way by the lines that repreſent the frames, and in an horizontal way by the water lines; ſo that the whole may be ſaid to be divided into ſo many parallelopipedons limited at one end by a plane ſuppoſed to be erected vertically upon the keel, and at the other end by the round of the outſide of the ſhip, and their upper and lower ſurfaces by the water lines.

Now it is plain that the area of the ſurface which limits the lower part of this ſolid, is leſs than the area of the ſurface which limits the upper part, we muſt therefore add both the areas together, and take one half of the product for a mean area, which if we multiply by the depth of the ſolid, that is, the diſtance between the two ſurfaces, we ſhall have the contents of the ſolid in cubic meaſure; then by finding the contents of every ſolid in the ſame manner, and adding them together, we ſhall have the ſolid contents of one ſide, and by doubling that ſum, we ſhall have the ſolid contents of the whole bottom.

But as it is ſo very tedious in the operation to find the contents of every parallelopipedon ſingly, I ſhall introduce a method whereby we may find the contents of all the ſurfaces which are contained on the ſame plane at once; that is, by one operation, to find the area of the whole ſurface formed by the horizontal ſection or water line, except that part intercepted betwixt the aftermoſt frame and the poſt, and the part contained betwixt the foremoſt frame

and

and the ſtem, which on account of their forming ſuch irregular figures, muſt be meaſured ſeparately.

RULE. Take the lengths of every other one of the lines that repreſent the frames in the horizontal plane upon the upper water line, add them all together, except the foremoſt and aftermoſt, of which take only one half of each; then multiply that ſum by the diſtance between the frames ſo taken, and the product is the area of the water line contained betwixt the foremoſt and aftermoſt frames; then find the area of that part abaft the after frame which forms a trapezium, and alſo the poſt and rother; and likewiſe find the area contained in that part afore the foremoſt frame, and alſo the ſtem and gripe, then adding theſe laſt areas to the area firſt found, and the ſum doubled will be the area of the ſurface of the whole water line.

The areas of the other water lines may be alſo found in the ſame manner, and then by adding all their areas into one ſum, except the uppermoſt and lowermoſt, of which only one half of each muſt be taken, and multiply that ſum by the diſtance between the water lines (obſerving that the water lines in the plane of elevation be equally diſtant and parallel to each other) the product will be the ſolid contents of that ſpace contained between the lower and load water line.

In the next place, add the area of the lower water line to the area of the upper ſide of the keel, and multiplying half that ſum by the diſtance between them, the ſolid contents of that part will be found between the lower water line and upper ſide of the keel, ſuppoſing them parallel to each other, but if the lower water line ſhould not be parallel to the keel, then the diſtance between them muſt be taken at every other frame and added together, and then by dividing that ſum by the number of frames ſo taken, the quotient will be a mean diſtance to multiply the mean area by as before.

The

The ſolid contents of the keel may be next found, and then by adding that to the ſolid contents of the different parts before found, we ſhall have the whole number of cubic feet contained in the immerſed part of the bottom, or that part below the load water line.

The APPLICATION of this method in finding the Cubic Feet contained in the Bottom of the Eighty-gun Ship.

The fore body is divided into five, and the after body into ten equal parts, upon the horizontal plane, beſides the parts contained between the aftermoſt timber and the poſt, and the foremoſt timber and the ſtem.

The plane of elevation is alſo divided into five equal parts by water lines drawn parallel to the keel, all which are formed upon the horizontal plane.

Note. There muſt be five inches added to each line that repreſents the frames in the horizontal plane for the thickneſs of the plank, that being a mean between the thickneſs of the plank next the wales, and that on the lower part of the bottom.

Upper or Load Water Line, abaft Dead Flat.

	Ft.	In.
The breadth at Frame dead flat is 24 Ft. 10 In. one half of which is	12	5
Frame (4)	24	10
Frame 3	24	10
Frame 7	24	10
Frame 11	24	10
Frame 15	24	$9\frac{1}{2}$
Frame 19	24	5
Frame 23	23	10
Frame 27	22	9
Frame 31	20	11
Frame 35 is 16 3 the half of which is	8	$1\frac{1}{2}$
Total —	236	7
Multiplied by the diſtance between the frames, which is	10	11
Product —	2582	$8\frac{1}{2}$
Area of that part abaft frame 35	78	0
Rother and poſt	5	6
	2666	$2\frac{1}{2}$
		2
Area of the load water line from dead flat aft	5332	5

Se-

Second Water Line abaft Dead Flat.

	Ft.	In.		Ft.	In.
The breadth at Frame dead flat is	23	10½	one half of which is	11	11¼
Frame (4)				23	10½
Frame 3				23	10½
Frame 7				23	10½
Frame 11				23	10½
Frame 15				23	8½
Frame 19				23	3½
Frame 23				22	5
Frame 27				20	10
Frame 31				17	8
Frame 35 is	8	6	the half of which is	4	3
				219	7¼
				10	11
				2397	4
Area of that part abaft frame 35				31	7
Rother and post				5	5
				2434	4
					2
Area of the second water line from dead flat aft				4868	8

Third Water Line abaft Dead Flat.

	Ft.	In.		Ft.	In.
The breadth at Frame dead flat is	22	1½	one half of which is	11	0¾
Frame (4)				22	1½
Frame 3				22	1½
Frame 7				22	1½
Frame 11				22	1
Frame 15				21	5
Frame 19				20	8½
Frame 23				19	3½
Frame 27				16	5
Frame 31				11	2½
Frame 35 is	4	3	the half of which is	2	1½
				190	8¼
				10	11
				2081	8
Area of that part abaft frame 35				14	5½
Rother and Post				5	6
				2101	7½
					2
Area of the third water line from dead flat aft				4203	3

Fourth

Fourth Water Line abaft Dead Flat.

		Ft. In.		Ft. In.
The breadth at	Frame dead flat is	20 1	one half of which is	10 $0\frac{1}{2}$
	Frame (4)			20 1
	Frame 3			20 1
	Frame 7			19 11
	Frame 11			19 $7\frac{1}{2}$
	Frame 15			19 0
	Frame 19			17 $7\frac{1}{2}$
	Frame 23			14 10
	Frame 27			10 11
	Frame 31			5 11
	Frame 35 is	1 $11\frac{1}{2}$	the half of which is	0 $11\frac{1}{2}$
				159 0
				10 11
				1735 9
	Area of that part abaft frame 35			9 9
	Rother and post			5 0
				1750 6
				2
	Area of the fourth water line from dead flat aft			3501 0

Fifth or lower Water Line, abaft Dead Flat.

		Ft. In.		Ft. In.
The breadth at	Frame dead flat is	17 2	one half of which is	8 7
	Frame (4)			17 2
	Frame 3			17 2
	Frame 7			17 1
	Frame 11			16 4
	Frame 15			15 4
	Frame 19			13 1
	Frame 23			8 9
	Frame 27			4 10
	Frame 31			2 11
	Frame 35 is	1 $2\frac{1}{2}$	the half of which is	0 $7\frac{1}{4}$
				121 $10\frac{1}{4}$
				10 11
				1330 2
	Area of that part abaft frame 35			4 $8\frac{1}{2}$
	Rother and Post			4 $6\frac{1}{2}$
				1339 5
				2
	Area of the fifth or lower water line from dead flat aft			2678 10

			Ft.	In.
Half the area of the load water line - - -			2666	$2\frac{1}{2}$
Whole area of the second water line - - -			4868	8
Whole area of the third water line - - -			4203	3
Whole area of the fourth water line - - -			3501	0
Half the area of the lower water line - - -			1339	5
			16578	$6\frac{1}{2}$
Multiplied by the distance between the water lines - -			4	1
Product in cubic feet betwixt the lower and load water line -			67695	$8\frac{1}{2}$
Area of the lower water line - - - -	2678	10		
Area of the upper side of the keel - -	206	4		
Total —	2885	2		
The half of which is - - - -	1442	7		
Multiplied by the distance between lower water line and keel	4	1		
Cubic feet contained between lower water line and keel	5890	$6\frac{1}{2}$ —	5890	$6\frac{1}{2}$
Area of the keel, lower part of rother and false keel - -			464	3
Cubic feet abaft the midship frame under water when loaded -			74050	6

Upper or Load Water Line, afore Dead Flat.

	Ft.	In.		Ft.	In.
The breadth at Frame dead flat is	24	10	one half of which is - -	12	5
Frame E - - - - - - -				24	10
Frame I - - - - - - -				24	$8\frac{1}{2}$
Frame N - - - - - - -				24	0
Frame R - - - - - - -				21	$10\frac{1}{2}$
Frame W is	15	1	the half of which is - -	7	$6\frac{1}{2}$
				115	$4\frac{1}{2}$
				10	11
				1259	6
Area of the part afore frame W - - - -				80	3
Area of the stem and knee - - - - -				4	0
				1343	9
					2
Area of the upper or load water line from dead flat forward - -				2687	6

Second Water Line afore Dead Flat.

	Ft. In.	Ft.	In.
The breadth at Frame dead flat is	23 10½ one half of which is	11	0¾
Frame E		23	10
Frame I		23	5
Frame N		22	5
Frame R		19	11
Frame W is	11 11 the half of which is	5	11½
		106	7¼
		10	11
		1163	9
Area of the part afore frame W		50	9
Area of the stem and knee		3	0
		1217	0
			2
Area of the second water line from dead flat forward		2435	0

Third Water Line afore Dead Flat.

	Ft. In.	Ft.	In.
The breadth at Frame dead flat is	22 1½ one half of which is	11	0¾
Frame E		22	1
Frame I		21	8
Frame N		20	1
Frame R		16	1½
Frame W is	7 0 the half of which is	3	6
		94	6¼
		10	11
		1031	10
Area of the part afore W, with the stem and gripe		25	10
		1057	8
			2
Area of the third water line from dead flat forward		2115	4

Fourth

Fourth Water Line afore Dead Flat.

	Ft.	In.		Ft.	In.
The breadth at Frame dead flat is	20	1	one half of which is	10	0½
Frame E				20	0½
Frame I				19	3
Frame N				16	5
Frame R				11	2
Frame W is	2	9	the half of which is	1	4½
				78	3½
				10	11
				854	8
Area of the part afore W, with the ſtem and gripe				8	10½
Area of the fourth water line from dead flat forward				863	6½

Fifth Water Line afore Dead Flat.

	Ft.	In.		Ft.	In.
The breadth at Frame dead flat is	17	2	one half of which is	8	7
Frame E				16	9
Frame I				14	10
Frame N				10	9½
Frame R				2	6
				53	5½
				10	11
				583	7
Area of that part afore R				26	2½
Stem and knee				5	11½
				615	9
					2
Area of the fifth or lower water line from dead flat forward				1231	6

	Ft.	In.
Area of the upperſide of the keel	87	4
Area of the lower water line	1231	6
Total	1318	10
The half of which is	659	5
Multiplied by diſtance between lower water line and keel	4	1
Cubic feet contained between lower water line and keel	2692	7¼

	Ft.	In.
Half area of the load water line - - - -	1343	9
Whole area of the second water line - - - -	2435	0
Whole area of the third water line - - - -	2115	4
Whole area of the fourth water line - - - -	1727	$1\frac{1}{2}$
Whole area of the fifth, or lower water line - - -	615	9
	8236	$11\frac{1}{2}$
Multiplied by the distance between the water lines - - -	4	1
Product in cubic feet contained between lower water line and load water line - - - - - - -	33634	$2\frac{3}{4}$
Cubic feet contained between lower water line and keel -	2692	$7\frac{1}{4}$
Area of the keel and false keel - - - -	196	6
Cubic feet afore the midship frame under water when loaded -	36523	4
Cubic feet abaft the midship frame under water when loaded -	74050	6
Total number of cubic feet under water - - -	110573	10
Multiplied by the weight of a cubic foot of salt water, which is -	74 lb.	
Weight of the whole ship with every thing on board - -	7961316 lb.	

It now appears, according to the preceding calculation, that the weight of the whole ship, with every thing on board, and brought down to the load water line, is 7961316 pounds, which if we divide by 2240 (the number of pounds in a ton) will give 3554 tons 356 pounds, the exact weight of the ship before found by the estimate, by which we find, that the load water line in the draught is properly placed, and agreeable to the weight of the ship before found. Therefore in like manner may the weight of any ship be found from the load water line, and by reducing the bottom of the draught into cubic feet, we may always know if the load water line in the draught is properly placed.

The load water line being found properly placed, it now still remains to find whether the body is constructed suitably thereto; that is, whether the ship will be in her natural position when brought down agreeable to that line; we must therefore erect a perpendicular 27 feet and $\frac{1}{4}$ of an inch abaft dead flat, which will be the middle between the two perpendiculars, and the place

where

where the center of gravity ſhould fall in order to the ſhip's ſwimming on an even keel. Then calculate the ſolid contents of that part of the bottom between the ſaid perpendicular and dead flat, which we ſhall find to be 25846 feet 7 inches; and then adding that ſum to the number of cubic feet before found for that part of the bottom afore dead flat, we ſhall have the ſolid contents of the fore part of the bottom, and by deducting that ſum from the number of cubic feet before found, for that part of the bottom abaft dead flat, we ſhall thereby have the ſolid contents of the aft part of the bottom.

OPERATION.

	Ft.	In.
Number of cubic feet in the bottom afore dead flat - - -	36523	4
To which add the number of cubic feet contained in the bottom between the middle and dead flat - - - - - -	25846	7
Solid contents of the fore part of the bottom - - -	62369	11
Number of cubic feet in the bottom abaft dead flat - - -	74050	6
From which deduct the number of cubic feet contained in the bottom between the middle and dead flat - - - -	25846	7
Solid contents of the aft part of the bottom - - - -	48203	11

We now diſcover by this calculation that the after part of the eighty-gun ſhip's bottom is too lean, as its contents is leſs than that of the fore part, and the fore part is two full; we muſt therefore deduct the contents of the after body, which is 48203 feet from the contents of the fore body, which is 62369 feet, and we ſhall find the difference to be 14166 feet, and then half the difference which will be 7083 feet, we muſt then fill out the after part till it has accumulated 7083 feet, and draw in the fore part till it has loſt the ſame ſum, and the bottom will then be conſtructed ſuitable to the ſhip's ſwimming on an even keel.

We may in the next place, from the knowledge of the ſhip's weight when brought down to her load water line, be able to calculate her true burthen there-

therefrom, or what is called the tonnage, though it muſt be underſtood that we cannot by thoſe means find the tons in the common acceptation of the word, as by that is meant what is termed builders tonnage, for finding of which there is a fixed and eſtabliſhed rule in all ſhips, let them have full or ſharp bodies, for by that we find that the ſharpeſt cutter will meaſure as many tons as the fulleſt merchantman of the ſame dimenſions, which ſufficiently proves that it is a very erroneous method, and cannot be depended upon in the meaſuring of ſhips in general, as every ſhip that differs in conſtruction, muſt in conſequence differ in their real burthen, though their dimenſions may be juſt the ſame.

I ſhall therefore calculate the real burthen, or tonnage of an eighty gun ſhip from the weight, and likewiſe lay down ſome calculations of the real burthen of ſome other bodies, which differ in dimenſions and ſhape, and alſo their tonnage as caſt by the common rule, which will ſhew the preſent erroneous method in meaſuring of ſhipping.

In certainly will appear reaſonable that the real burthen, or tonnage of a ſhip, will be that weight which is required to bring the ſhip down to the load water line from the light water mark, and in conſequence it follows that if we conſtruct a ſhip, the body of which ſhall be rather full, and by that means draw but little water, and likewiſe conſtruct another ſhip of the ſame dimenſions, with the body much ſharper than the former, by which it will alſo ſink deeper in the water than the former, and their load water lines being the ſame height, by reaſon of their dimenſions being the ſame, it will require a greater weight to bring the full ſhip down to her load water line than it will the other, as there will be a greater diſtance between their light and load water lines in the one than in the other, and conſequently the ſhip which requires the moſt weight to bring her down to the load water line, will be of the greateſt burthen, in proportion to the difference of the weights ſo required.

There-

Therefore, in order to know the true burthen of a ſhip, we ſhall only have to find the place of the light water line, and from thence calculate the number of cubic feet of water ſhe then diſplaces, and deducting that from the number of cubic feet ſhe diſplaces when brought down to the load water line, the remainder will be the real capacity of the ſhip to caſt the tonnage from, which being multiplied by 74, and that product divided by 2240, the quotient will be the true burthen in tons.

Or, which is juſt the ſame thing, if we deduct the weight of the ſhip at her light water mark from her weight when brought down to the load water mark, the remainder will be the tonnage.

The General Rule obſerved for meaſuring the Tonnage of Ships, either in the King's or Merchants' Service.

1. Let fall a perpendicular from the fore ſide of the ſtem, at the height of the hawſe-holes*, and another perpendicular from the back of the main poſt, at the height of the wing tranſom.

2. From the length between thoſe two perpendiculars, deduct three-fifths of the extreme breadth †, and likewiſe as many $2\frac{1}{2}$ inches as the wing tranſom is high from the upper edge of the keel, and the remainder is accounted the length of the keel for tonnage.

Then multiply the length of the keel for tonnage by the extreme breadth, and that product by half the extreme breadth, and then dividing by 94, the quotient is the burthen in tons.

Or, multiply the length of the keel for tonnage, by the ſquare of the extreme breadth, and divide the product by 188, the quotient will be the burthen in tons.

* In the merchant ſervice this perpendicular is let fall from the fore ſide of the ſtem at the wing tranſom's height, by reaſon of the hawſe-holes being generally ſo very high in merchant ſhips, and their ſtems alſo having a great rake forward.

† By the extreme breadth is meant the breadth taken from timber to timber with the thickneſs of the bottom on each ſide added.

An Eftimate fhewing the Real Burthen of an Eighty-gun Ship.

	Nº of Tons	lb.
The weight of the fhip at her launching draught of water -	1593	406
The weight of the furniture - - - - - - - -	195	720
The weight of the fhip at her light water mark - -	1788	1126
The weight of the fhip at the load water mark - - -	3554	356
From which deduct the weight at the light water mark - -	1788	1126
Real burthen - - - - - - - - - - -	1765	1470

Calculation of the Burthen according to the Common Rule.

	Ft.	In.	Ft.	In.
Length from the fore fide of the ftem at the height of the hawfe-holes, to the aft fide of the main poft, at the height of wing tranfom - -			185	10
Three fifths of the extreme breadth is - - -	29	$9\frac{1}{2}$		
The height of the wing tranfom is 28 4 × 0 $2\frac{1}{2}$ = -	6	$8\frac{1}{2}$		
Total —	36	6	36	6
Length of the keel for tonnage —			149	4
Multiplied by the extreme breadth —			49	8
Product —			7416	$10\frac{1}{3}$
Multiplied by half the extreme breadth - -			24	10
Divided by - - - - - - -			94)184185	$8\frac{3}{4}$
Burthen in tons according to the common rule - - - -			1959	$\frac{39}{94}$

D I F F E R E N C E.

	Tons	lb.
Tonnage as cuftomary - - - -	1959	929
Real burthen - - - - - -	1765	1470
	193	1699

From this we may obferve, that the eighty-gun fhip will not carry the tonnage fhe is rated for by 193 tons, 1699 pounds, and by which we difcover the impropriety of fuch a rule being made general, it being only appli-

cable

cable to particular bodies. It will alſo be found by experiment, that all ſhips of war carry leſs tonnage than they are rated for by the common rule, and merchant ſhips carry a great deal more, by reaſon of the former bodies being very ſharp, and the latter ones very full. The body of the eighty-gun ſhip being fuller than ſhips of war in general, it conſequently comes nearer to the tonnage caſt by the common rule, but had it been by the general conſtruction of ſhips in the navy, the difference would have been conſiderably more; as an inſtance, I ſhall lay down the tonnage of a ſeventy-four gun ſhip calculated from the weight, and likewiſe by the common rule.

Calculations of the Tonnage of the *Audacious*, Seventy-four Guns.

D I M E N S I O N S.

		Ft.	In.
Length on the gun deck		168	0
Keel for tonnage		138	0
Breadth extreme		46	9
Depth in hold		19	9
Launching draught of water	Afore	12	0
	Abaft	17	4
Load draught of water	Afore	20	6
	Abaft	21	6

	Tons	lb.
The weight of the ſhip at her launching draught of water	1509	678
The weight of the furniture	120	1500
Weight of the ſhip at her light water mark	1629	2178
The weight of the ſhip at her load water mark	2776	498
From which deduct the weight at the light water mark	1629	2178
Real burthen	1146	560

By the Common Rule.

Keel for tonnage 138 feet multiplied by extreme breadth 46 feet 9 inches, is equal to 6451 feet 6 inches, which being multiplied by half the extreme

breadth

breadth 23 feet $4\frac{1}{2}$ inches, is equal to 150803 feet, and divided by 94, the quotient is $1604\frac{27}{94}$, the burthen in tons.

DIFFERENCE.

	Tons	lb.
Tonnage by the common rule as cuftomary -	1604	643
Real burthen - - - - - - -	1146	560
	458	83

By which it appears, that this ſhip doth not carry the tonnage ſhe is rated for by 458 tons 83 pounds, and ſo likewiſe will it be found in all ſharp bodies, and the ſharper the body the greater difference there will be in the tonnage. The bodies which increaſe upon the tonnage caſt by the common rule, are very full, and are chiefly merchant ſhips. I ſhall therefore calculate the tonnage of a merchant ſhip both ways, in order that the ſtudent may alſo ſee the great difference there is in thoſe bodies, as well as in ſhips of war, by which he will be further convinced of the errors he is liable to fall into by adhering to the common rule.

Calculations of the Tonnage of an Eaſt Indiaman.

DIMENSIONS.

		Ft.	In.
Length between the perpendiculars forward and aft -		132	8
Keel for tonnage - - - - - -		105	0
Breadth extreme - - - - - - -		38	0
Depth in hold - - - - - - -		16	0
Launching draught of water	Afore - - -	7	10
	Abaft - - -	11	10
Load draught of water -	Afore - - -	19	8
	Abaft - - -	20	8

	Tons	lb.
The weight of the ſhip at her launching draught of water - -	602	2116
The weight of the furniture - - - - - - - -	50	124
Weight of the ſhip at her light water mark - - - -	653	
The weight of the ſhip at her load water mark - - - - -	1637	1670
From which deduct the weight at her light water mark - -	653	
Real burthen - - - - - - - - - - -	984	1670

By

By the Common Rule.

Keel for tonnage 105 feet multiplied by the extreme breadth 38 feet, is equal to 3999 feet, which being multiplied by half the extreme breadth 19 feet, is equal to 75810 feet, and divided by 94, the quotient is 806 $\frac{46}{94}$, the burthen in tons.

DIFFERENCE.

	Tons	lb.
Real burthen - - - - - - - -	984	1670
Tonnage by the common rule as customary -	806	1096
	178	574

We now find that the East-Indiaman will carry 178 tons, 574 pounds more than she is rated for by the common rule, which plainly appears it is in consequence of her body being formed so very full; I shall therefore, in order to shew the great contrast there is between full and sharp bodies, with respect to their tonnage, calculate the burthen of a cutter, which will still throw a greater conviction on the erroneous method now in practice of casting a ship's tonnage.

Calculation of the Tonnage of a Cutter.

DIMENSIONS.

		Ft.	In.
Length of the keel for tonnage		58	0
Breadth extreme		29	0
Launching draught of water	Afore	5	10
	Abaft	9	8
Load draught of water	Afore	9	0
	Abaft	12	10

	Tons	lb.
The weight of the cutter at her launching - - - - - -	147	640
The weight of the furniture - - - - - - - -	9	199
Weight of the cutter at her light water mark - - - - -	156	839
The weight of the cutter at her load water mark - - - -	266	1970
From which deduct the weight at her light mark - - - -	156	839
Real burthen - - - - - - - - - - -	110	1131

By the Common Rule.

Keel for tonnage 58 feet, multiplied by the extreme breadth 29 feet, is equal to 1682 feet, which being multiplied by half the extreme breadth 14 feet 6 inches, is equal to 24389 feet, and divided by 94, the quotient is 259 $\frac{43}{94}$, the the burthen in tons.

DIFFERENCE.

	Tons	lb.
Tonnage as cuſtomary - - -	259	1024
Real burthen - - - - - -	110	1131
	148	2133

A TREATISE ON MARINE ARCHITECTURE.

BOOK VI.

HAVING now conducted the ſtudent through the moſt difficult parts of the theory, by which means he may be capable of making ſuch determinations as enable him to conſtruct a draught to anſwer the wiſhed for purpoſes; I ſhall in conſequence thereof proceed to the practical part, wherein I ſhall ſhew the methods that are uſed to delineate the ſhape of the different parts of the ſhip, in their proper ſize on the mould loft floor, with many other matters neceſſary to be known, in order to the riſing or building of this noble machine.

CHAP.

CHAP. I.

Of laying down the ſheer, half breadth, and body plans.

THE draught being drawn in readineſs upon the paper, for the purpoſe of laying it down in the mould loft, we muſt proceed to take off all the dimenſions for forming the body, in the ſame manner as was done in Book IV. and enter them in a little book provided for that purpoſe.

The mould loft floor being then clear, we may begin by drawing a ſtraight line from one end to the other, and in diſtance from the ſide of the loft about as much as the keel is deep; this line will repreſent the upper edge of the rabbet of the keel, and likewiſe the middle line of the half breadth plan, ſet off and erect the fore and after perpendiculars, and likewiſe ſet off and ſtrike in the intermediate timbers, taking their room and ſpace from the draught.

Deſcribe in the ſheer plan the ſtem and ſtern poſt, and alſo the upper and lower height of breadth lines, with the riſing line and toptimber line taken from the dimenſions, draw in the out lines for the body plan, letting the baſe line be repreſented by part of the line firſt drawn, and the middle line by one of the midſhip timbers, as it ſhould be obſerved throughout the whole, to have as few lines as poſſible, that there may be the leſs confuſion. The diagonal lines ſhould next be drawn in the body plan, taking their heights and diſtances from the dimenſions, and the ſtem and ſtern poſt ſhould alſo be drawn in, in the body plan.

Pro-

Proceed to get in the main half breadth line, toptimber half breadth line, rising half breadth line, and the diagonal lines in the half breadth plan, observing to make them as fair as possible.

Then the upper and lower height of breadth lines may be taken from the sheer plan, and their heights transferred to the body plan, striking of horizontal lines at each of their heights; the heights of the rising line may be also taken from the sheer plan, and set off in the body plan, striking of horizontal lines at their several heights. The heights of the toptimber line should also be taken off in the same manner, and transferred to the body plan, except that part of the toptimber line which comes in the bow (if it is a ship which has no beak head) as that must be altered from a fair curve in order to make it look fair on the bow of the ship.

Therefore to know how much the sheer requires to be lifted forward, we must proceed as follows: The circular sheer or toptimber line being run in the sheer plan, and likewise the half breadth of it in the half breadth plan, we must place a batten round the last mentioned line, and mark on it the stations of the timbers, and the side of the stem; then apply the batten to the sheer plan, placing it to the sheer of the ship, keeping the stations of the timbers on the batten well with those on the sheer plan, for several timbers afore dead flat where they will not alter; then mark the other timbers which alter from those in the sheer plan, and likewise the stem on the toptimber line produced, and level those spots aft till they intersect their respective timbers, and the stem likewise, which will give the spots for lifting the sheer of the ship forward, and the sheer may then be lifted and the heights taken off and transferred to the body plan as before.

The diagonal lines being run in the half breadth plan, but not ended, proceed to the ending of them; take the height from the base line in the body plan, to where the upper diagonal line interſects the ſide of the ſtem, and ſet it off on the ſtem in the ſheer plan, drawing a horizontal line, then take the half breadth of the ſtem in the body plan in the direction of the diagonal line, and transfer it to the half breadth plan, drawing a line parallel to the middle line, and where both edges of the rabbet of the ſtem in the ſheer plan interſects the horizontal line there drawn, ſquare them down to the line in the half breadth plan laſt drawn, there making of ſpots. There muſt then be a line drawn in the body plan parallel to the ſtem line and the thickneſs of the plank within in, which will repreſent the inſide of the rabbet; then take the diſtance of this line from the ſtem line in the direction of the diagonal line with a pair of compaſſes, and transfer it to the half breadth plan, fixing the legs of the compaſſes in the ſpots ſet off on the line there, and deſcribing an equiangular triangle, which will repreſent the rabbet of the ſtem in the half breadth plan, the aft ſide of which will be the ending of the diagonal line, the other diagonal lines may be ended in the ſame manner both forward and aft, only obſerving where the ſhape of the body occaſions the diagonal line to make an angle with the aft ſide of the rabbet, that there the diagonal muſt end in the middle of the rabbet; if it was then ended at the aft ſide of the rabbet deſcribed by an equiangular triangle, the ſhape of the body would be ſuch at that place, that not above half the thickneſs of the plank would be buried.

The height of breadth lines being ſtruck acroſs the body plan, we may take off the main half breadth line, and transfer it to the body plan, ſetting off the half breadth of the timbers from the middle line at their correſponding heights; ſquaring up a line at every ſpot, from the lower to the correſponding

upper

upper height of breadth line, and by taking the lengths of the lower breadth ſweeps we may ſweep the timbers from the lower breadth lines downwards as far as neceſſary. In the next place ſet off on the lines in the body plan which are ſtruck for the heights of the riſing, the half breadths of the riſing, and erect perpendiculars at every ſpot, then on thoſe perpendiculars ſet off the lengths of the riſing or floor ſweeps, and deſcribe the circles for the timbers at the floor heads; then take off from the half breadth plan the half breadths of the diagonals, and ſet them off from the middle line on their correſponding diagonal lines in the body plan, then by letting of curves paſs from the back of the lower breadth ſweeps through the ſpots ſet off on the diagonals to break in fair with the floor ſweeps, and likewiſe from the back of the floor ſweeps, down to the rabbet of the keel, the timbers in the body plan will then be formed below the breadth; take the lengths of the upper breadths ſweeps, and deſcribe circles above the upper breadth, and likewiſe take off the toptimber half breadths from the half breadth plan, and ſet them off from the middle line, at their correſponding heights in the body plan; then by letting of curves paſs from the back of the upper breadth ſweeps to interſect the ſpots ſet off on the toptimber height of breadth lines, that part of the body above the breadth will be alſo formed, by which the whole ſquare body will then be deſcribed.

The ſquare body being formed, and the timbers being exactly conformable to the lines laid down in the half breadth plan, we may alſo lay down ſome other fore and aft lines, in another direction, in order to prove the fairneſs of the body. Therefore, take off from the draught the water lines, and ſtrike them level acroſs the body; then lay a batten well with each line ſo ſtruck, keeping one end well with the middle line, and mark off all the timbers upon it; then ſet off the different ſpots from the middle line on their correſponding

tim-

timbers in the half breadth plan, and by letting curves paſs through thoſe ſpots, the water lines will be formed in the half breadth plan: with reſpect to ending of them, that is performed in the ſame manner as the diagonal lines are ended, only with this difference, that where the half breadth of the ſtem or ſternpoſt is taken in the direction of the diagonal line in the body plan, for the water lines it is taken level, in conſequence of their lying level. The water lines being run and made fair, we may now ſee if the body requires any alteration, which if any of the timbers ſhould be found either too full or too ſharp for the water lines, they muſt be altered agreeable thereto, and then the diagonal lines muſt be reconciled with the timbers, acting with the greateſt care and circumſpection, in order to preſerve the true ſhape of the body as near as poſſible; we may alſo prove the heels of the ſquare timbers in both the fore and after body, that they may want no alteration hereafter, which muſt be done by the bearding line; therefore ſet off from the middle line in the body plan, the half thickneſs of the outſide of the after dead wood, and draw a line parallel from the middle line, from about the height of the wing tranſom, down to the baſe line, and this line will repreſent the bearing in the body plan; then fix a batten in the direction and well with this line, keeping the lower end well with the baſe line, and mark off on it the interſection of all the timbers, and then ſet them off from the line repreſenting the upper edge of the keel, on their correſponding timbers in the ſheer plan; a curve muſt then paſs through the ſpots ſet off to break in fair with the fore ſide of the rabbet of the ſtern poſt, which curve will repreſent the bearding line in the ſheer plan, and the ſame muſt be performed in the fore body, letting the foremoſt end break in fair with the aft ſide of the rabbet of the ſtem aloft. It muſt be obſerved, that the aft thickneſs of the dead wood, or the diſtance of the bearding lines in the

body

body plan from the middle line muſt be the ſame as the half thickneſs of the of the head of the ſtem and ſtern poſt. The heels of the timbers being found to agree with the bearding line both in the fore and after bodies, the body plan may now be ſaid to be fair in all reſpects, and ready for the moulds of the ſquare timbers being made.

The cutting down line may now be run in the ſheer plan, taking the ſeveral heights from the dimenſions, alſo repreſenting the after dead wood in the ſame manner as drawn in the draught, the upper ſide of which is limitted by this line; the foremoſt dead wood muſt alſo be repreſented from the draught, and likewiſe the fore foot. The height of the lower deck port cills may be run in the ſheer plan, and likewiſe the upper edge of the main wales.

The ſheer half breadth and body plans are now laid down ready for forming of the different parts of the ſhip therein depending, wherein I have omitted the deſcription of thoſe points which immediately concur with the draught, as they have been mentioned before on that ſubject, and would therefore have been unneceſſary to repeat them.

C H A P II.

Of the moulds neceſſary to be made from the parts which are already laid down.

THE ſquare body being laid down, we may now proceed to making of the moulds in order to get the timbers of the ſquare body cut out. Therefore the firſt may be the fore foot, or foremoſt end of the keel, which muſt

muſt be limitted on the upper part by the upper edge of the rabbet of the keel, and aft ſide of the rabbet of the ſtem, and at the lower part by the under ſide of the keel. The after end may extend to about two frames abaft, where the curve of the rabbet breaks into a ſtriaght line. The ſtations of the timbers may all be marked upon the mould, and likewiſe the direction of the ſtraight line repreſenting the upper edge of the keel.

The mould for the after dead wood ſhould be limitted on the upper part by the cutting down line, the lower part by the upper edge of the keel, the after end by the fore ſide of the inner poſt, and the foremoſt end by the aft ſide of the after floor. This mould is generally made to regulate the whole of the after dead wood when the different pieces are put together, as there muſt alſo be made another mould for the dead wood knee, and one likewiſe for the piece of dead wood that comes upon it. Upon theſe moulds may be marked the ſtations of the ſquare timbers, and upon the whole dead wood mould muſt be marked the bearding line. There may be a mould made to the foremoſt dead wood marked on it the ſtations of the timbers.

We may now proceed to the moulds of the ſquare timbers, which are made from the body plan; in order to which, we muſt firſt ſet off the bigneſs of the timbers the moulding way at every head, at dead flat, and by letting a curve paſs through the ſeveral ſpots, the ſcantling line, or inner edge of timber dead flat, will be deſcribed. The midſhip floor moulds may then be made, proceeding in the following manner: make a mould, the outſide of which ſhall fay to the timber dead flat, from about a foot above the floor head down to where the height of the riſing line when levelled out ſhall interſect, and from thence to about a foot beyond the middle line the mould to fay to the horizontal or riſing line of dead flat; the inſide of the

mould

mould at the upper part muſt be made to the ſcantling line, and the lower part may run parallel to the outſide; then upon this mould, when laying in its place, mark the middle line from the body plan, the ſtation of the floor head, floor ribband, and likewiſe the lower ſirmark, which at that place we ſhall find the mould not to fay to the line of dead flat, we muſt therefore apply a ſmall ſquare to the outſide of the mould in order to get the true ſtation of the lower ſirmark; this being done, we may provide another mould exactly ſimilar to the former, with the ſame marked upon it, only obſerving to mark the contrary ſide; in the next place provide a batten about three inches wide, and of a length ſufficient to take the height of the cutting down at the after floor timber; then fit one end of this batten to the upper edge of the keel at every timber, marking on it the height of the cutting down line at each place as far aft as the after floor, and as far forward as the foremoſt floor, obſerving to mark the after body on one ſide, and the fore body on the other; this is termed the CUTTING DOWN BATTEN. We muſt then have provided a ſquare, the arms of which ſhould be of a length ſufficient to take the height of the riſing a little abaft the bearing of the ſhip; then apply one arm of this ſquare to the horizontal or riſing line of dead flat in the body plan, and upon the other arm mark the baſe line, or upper edge of the keel; then in the ſame manner apply the ſquare to every one of the horizontal or riſing lines, marking the baſe line on the other arm of the ſquare every time, letting the fore body be marked on one ſide, and the after body on the other, which being done, it is termed the RISING SQUARE. It is then cuſtomary to make a little ſlight mould to that part of the floor extending from the keel to the back of the floor ſweep, which the floor moulds does not take; it is termed the FLOOR HOLLOW, and on it muſt be marked the ſide of the keel, and likewiſe the lower ſirmark.

Theſe

Theſe moulds being made, we may now mould the floor timbers, which are repreſented by dead flat, as (1) (2), &c. which muſt be done as follows: Take the two floor moulds and lay on the timber, placing the end of one over the end of the other, and moving them till the middle lines of both are exactly well with each other, and the under part of both forming one ſtraight line, they may then be confined together in that poſition, either by a nail or gimblet juſt to hold them together for the preſent; then ſet off from the middle line on the moulds the half ſiding of the keel, at which place apply the riſing ſquare, keeping the arm which is not marked well with the lower part of the moulds; then to the ſide of the riſing ſquare apply the cutting down batten, keeping the lower end of it well with the line marked dead flat on the arm of the ſquare. We ſhall now ſee whether the piece will make the floor by moving the moulds downwards (taking the greateſt care not to alter their poſition) till the line marked dead flat on the cutting down batten is well with the upper part of the piece, then if there is wood ſufficient at the outſide of the moulds at both ends, and likewiſe whole wood below the cutting down according to the dimenſions, the moulds may be raced by on the piece of timber. Then by taking the floor hollow and keeping that line on the lower end marked for the ſide of the keel well with dead flat on the riſing ſquare, and the other end well with the floor mould, the true ſhape of the floor will be deſcribed from the head to the ſide of the keel; and we ſhall by that means ſee the ſize and ſhape of the chocks, which will be wanted to make the under ſides of the floor next to the keel.

We may in the next place apply the floor moulds of dead flat to the body plan, to ſee how many floor timbers may be moulded by them; which if the radius of the floor ſweeps are all of a length, then all the floors that are ſwept at the heads may be moulded by the ſame moulds. But if the radius of every

floor

floor ſweep increaſes in length as the floors go aft, (which is generally the caſe in the preſent mode of conſtruction) the moulds of dead flat will only mould the floors in the fulleſt part of the ſhip. Take one of the floor moulds and lay it on the body plan, and beginning from the after floor which is ſwept, apply the mould to every floor till the head of it will fay to the line, from the floor head to the floor ſirmark, letting the ſtraight part of the mould lie level, which floor will be the aftermoſt that can be moulded by the moulds of dead flat; then let the mould lay in that poſition, and mark on it the ſtation of the floor head, the floor ſirmark, and likewiſe the middle line of the body plan, marking the name of the timber at each place. Then take the riſing ſquare and apply one arm of it to the under part of the mould, and on the other arm mark the baſe line of the body plan, marking the name of the timber alſo *, this being done we may proceed to place the mould to the next floor timber, and ſo act in the ſame manner as before, and ſo on with every intermediate floor timber between that and dead flat; in applying the mould to the different timbers their reſpective ſtations of the floor head, floor ſirmark, and middle line will fall regularly between the ſtations of dead flat and the after floor on the mould, which will prove that the body is laid down fair in that part, then take the other mould and mark all the ſtations on it ſimilar to the firſt, obſerving to mark them on the contrary ſide.

The floor moulds are now only marked on one ſide, which is for the after body, we may therefore take one of them and apply the blank ſide of it to the fore body, marking on it as many floors as it will take, by acting juſt in the ſame manner as was done for the after body, and likewiſe mark the blank ſide

* This method of croſſing the riſing ſquare, is only uſed when the radius of the floor ſweeps differ in length, as in the body of the eighty-gun ſhip, for then till the floor mould is made, and applied to the body, we cannot tell what height the riſing of the mould will be at the different timbers.

ſide of the other mould agreeable thereto, by which thoſe two moulds will then be finiſhed, having all the timbers marked upon them that can be moulded by them; there muſt alſo be made a floor hollow mould to each of the timbers marked thereon, the operation in moulding the floors by this mould are all alike, and performed juſt in the ſame manner as thoſe of dead flat, only obſerving to leave ſufficient wood in the throats of thoſe floors which have bevellings.

The moulds being made for moulding the midſhip floors, we may now proceed to thoſe afore and abaft, which may all be upon one mould, which muſt be made as follows: Provide a piece of board about four inches wide, the outſide of which muſt ſay to the next floor timber abaft where the midſhip mould takes from the floor head down to the ſide of the keel. Provide another alſo to ſay to the after floor timber, from the head to the keel; then place a piece the breadth of the keel on the middle line, the lower end of which muſt be well with the baſe line, and the upper end may extend as high as the cutting down of the after floor, then let them lay in their places, and nail a ſtraight piece of batten at the floor head from one to the other, and well with the direction of the floor head diagonal; let another be nailed acroſs well with the floor ſirmark, another well with the lower ſirmark, and as many between them as may be thought neceſſary, narrower than the former ones, by which they will be diſtinguiſhed from them, as they repreſent, and ſhew the proper ſtations of the ſirmarks, and likewiſe the direction of the floor head, then upon all theſe croſs battens muſt be marked the intermediate timbers, and their cutting downs muſt be marked on that part of the mould at the middle line, and likewiſe the middle line muſt be marked thereon, then there muſt be pieces and battens put together juſt in the ſame manner, and

faſtened

fastened thereto for the other side of the ship, and the same lines also must be transferred to the other side, and the mould will then be compleat for moulding the after floor timbers. We may then lay the blank side of the mould to the fore body, and if the diagonal lines be similar to those of the after body, may mark the foremost floors across the mould as before, but if the diagonal lines be not similar to those of the after body, it will be then the best work to make another floor mould thereto.

The floor moulds being now compleat, we may proceed to the lower futtock moulds, beginning with the dead flat. Make a mould to the line of dead flat, in the same manner as the floor moulds were made, only letting the head extend as high as a foot above the diagonal, representing the first futtock head; therefore the lower part of this mould may be marked out from one of the floor moulds, which will be the exactest work, then mark upon it the side of the keel, the lower firmark, first futtock firmark, and first futtock head, likewise take the distance of the under side of it from the base line at the side of the keel, and mark it in figures on the line of the mould for the side of the keel, the mould may then be tried upon the other timbers, and those to which it will fay from the lower futtock head to the lower firmark, may be moulded by the same mould, and their respective firmarks may be marked thereon, with the line for the side of the keel, and likewise the distance of the under side of the mould from the base line; the mould will then be finished on that side, and the same marks must all be transferred to the other side of the mould, by which the mould will then mould the timbers which are marked on it for both sides of the ship. In the same manner proceed to make another mould for the fore body, marking as many timbers upon it as it will mould, observing the same restrictions as before. Then to mould the lower futtocks by these moulds, we shall only have to take the floor hollow of that timber we are going

to

to mould, and by keeping the floor ſirmark upon it well with the floor ſirmark on the lower futtock mould, and the heel in diſtance from the lower futtock mould, whatever is marked thereon, and the true ſhape of the lower futtock will be thereby deſcribed, by which we may act accordingly.

The lower futtocks which are afore and abaft thoſe on the midſhip mould are contrived various ways, ſome put them all on one mould made with battens in the ſame manner as the fore and after floor mould, others will make one ſlight mould to ſerve every two timbers, one edge of it to one timber, and the other edge of it to the other; and again, others will make a mould at every frame timber to the whole ſize of the futtock, that is, to the ſcantling line which they run for that purpoſe, but this is wholly unneceſſary for the lower futtocks, as the long double futtocks have only occaſion to have their moulds made in this manner.

The ſecond futtock moulds may next be made. Make a mould to the line of dead flat, to extend from the floor head to the ſecond futtock head, and let the inſide of it be made to the ſcantling line, mark on it the ſecond futtock heel or floor head, firſt futtock ſirmark, firſt futtock head, ſecond futtock ſirmark, and ſecond futtock head, apply it to the other timbers, and as many as it will conveniently take by being moved downwards, mark thereon, and then transfer the whole to the other ſide. Make alſo another to the ſcantling line for the fore body, marking the ſame ſirmarks and heads thereon to the other. Then thoſe timbers which are not upon theſe two moulds both afore and abaft, may be two timbers to one ſlight mould, letting one edge ſay to one timber, and the other edge to the other; upon theſe moulds muſt alſo be marked the heads and heels, and it will be likewiſe neceſſary to mark in figures at every head, the ſcantling or ſize of the timber the in and out, or moulding way.

Pro-

Proceed to the third futtock moulds, which, as they are exactly similar to those of the second futtocks, need no particular description, only observing they come on the head of the lower futtock, and extend to the third futtock head, we must therefore mark on them the second futtock heel or the lower futtock head, second futtock firmark, second futtock head, third futtock firmark, and third futtock head.

The fourth futtocks next demand our attention, the making of moulds for which requires a little consideration, for as they are the longest futtocks in the ship, and likewise of a very different shape from any of the rest, they are in consequence more troublesome to mould. Some artists employ more stuff and time about these moulds than all the others in the ship, but I shall shew a method that is practised by the more skilful, where, by one mould, very near all the fourth futtocks in one body may be moulded: let the mould be made to the line of dead flat, in length from the second futtock head to the fourth futtock head, and the inside of it made to the scantling line, then letting the mould lay in its place, mark on it the head, the upper and lower height of breadth lines, and the rest of the firmarks, which will compleat it for dead flat.

We shall now find, that that part of the mould from the breadth upwards will fay to every timber in the square body, which is in consequence of the radius of the upper breadth sweeps being all of a length. Therefore, take the mould and place the upper part of it well with the upper part of the after fourth futtock in the square body, keeping the upper breadth marked on the mould well with the upper breadth of the timber, then when the mould is in this position, if it entirely covers that part of the timber from the main breadth to the fourth futtock heel, the fourth futtock of this timber may be moulded by this mould, as it may then consequently be marked on it; but if not, then the

the mould muſt be moved to the next timber forward, placing it in the ſame manner, and ſo keep moving it and placing it in the ſame manner till that timber is found which it will mould, then keep the upper breadth marked on the mould well with the upper part of the timber, and the upper part of the mould well with the upper part of the timber alſo, and mark on the mould the lower breadth, and likewiſe the fourth futtock head; then take the third futtock mould for this timber, and lay it on the fourth futtock mould, as if in its place, keeping the heel of it well with the third futtock heel of the timber, then mark it by on the fourth futtock mould, and alſo mark the ſirmarks from it as it lays. Then go to the head of the fourth futtock mould, and obſerve whether it fays to the timber at that place, (which if the head runs higher than where the upper breadth ſweep falls into the topſide hollow, it will not, by reaſon of the topſide's falling home moſt in midſhips) and if not, meaſure the diſtance the head is from the line of the timber on a ſquare, and ſet it down in figures on the head marked on the mould; the mould will then be compleat for this timber, and muſt therefore be applied juſt in the ſame manner to all the intermediate ones, and by proceeding as before, they may all be marked upon this mould; when ſo done, it will be very neceſſary to have a ſmall hole made through the mould at every ſirmark upon every timber, by which means we ſhall be better able to get the true place of the line, and likewiſe the ſirmarks upon the timbers when moulding, and it will alſo be uſeful for a guide in transfering the timbers to the other ſide of the mould.

In the ſame manner there muſt be another mould made to dead flat, for the fore body, and as many timbers as it will take there likewiſe marked thereon. Then thoſe timbers of the ſquare body forward and aft that will not come on the moulds of dead flat, on account of their being ſo crooked, may be marked upon

upon one mould to each body, proceeding as before, only inſtead of making the mould to the ſcantling of the timber, the lower end muſt be made conſiderably broader, by which means the crookedeſt timbers will come thereon.

The toptimber moulds muſt next be made, in order to which, let a mould fay to the line of dead flat, and the inſide to the ſcantling line, to extend in length from the toptimber heel, to about five or ſix feet above the toptimber line; let there be marked on it the toptimber line, the upper futtock head, upper and lower heights of breadth, and likewiſe the toptimber heel, which will be all that is wanting for dead flat. In the next place, make a ſlight mould to fay to the hollow of the topſide, in length from the head of the mould already made, to a little below where the hollow breaks in with the upper breadth ſweep, not following the upper breadth ſweep, but keeping its own fair curve; this mould is called the Toptimber Hollow, then by theſe two moulds all the toptimbers of the ſquare body may be moulded, the lower part of the toptimber mould being the ſame with the upper part of the fourth futtock mould, it will therefore fay to all the ſquare timbers in the ſame manner; but as the upper part of the toptimbers in midſhips tumbles home much more than they do more forward and aft, it conſequently follows that the upper part of the mould will be further off from the line of the timbers, as it goes forward or aft. Place the lower part of the mould well with the after ſquare timber, keeping the upper breadth marked on the mould well with the upper breadth of the timber; mark on the mould as it lays the heel, lower height of breadth, fourth futtock head, toptimber line, and top of the ſide, then take the diſtance on a ſquare that the mould is from the line of the timber at the toptimber line, and mark it down in figures on the top line marked on the mould, and then take the toptimber hollow mould and move

move up or down till it ſays to the hollow of the line, and mark the toptimber line upon it alſo, and likewiſe the name of the timber; the poſition then that theſe two moulds lie in, deſcribe the proper ſhape of the toptimber, and muſt therefore be in that poſition when the toptimbers are moulded. In the ſame manner proceed with all the intermediate timbers, by which they may all be marked on the moulds, and likewiſe mark all the timbers on the other ſide of the moulds; we may then provide another mould to dead flat ſimilar to the former, and acting in the ſame manner as before, the timbers of the fore body may all be marked thereon, and we ſhall then have the toptimber moulds made for the whole body.

The moulds for the ſquare body being finiſhed, we may now have the moulds for the ſtem and ſtern poſt made. Therefore, in order to the firſt, let a mould be made from the head of the ſtem to the lower end, the ſides of which muſt be limitted by the fore and after ſides of the ſtem, and the rabbet may be deſcribed by a middle piece made to it from head to heel, then upon this mould muſt be marked the ſtations of the decks, and alſo the heights of the harpins, which may be done by taking the heights from the body plan, where the harpin or diagonal lines interſect the line for the ſide of the ſtem, and transfering thoſe heights to the ſtem in the ſheer plan, from which they may be marked level acroſs the mould. There muſt alſo be a perpendicular line on the mould for the purpoſe of ſetting the ſtem, which may be the perpendicular of the lower deck. The ſtern poſt mould may then be made to the lines repreſenting the fore and aft ſides of the ſtern poſt, and likewiſe to the head and heel, then upon it may be marked the height of the upper ſide of the wing tranſom at the middle line; another mould muſt then be made for the bearing of the poſt, the aft ſide of which muſt be fayed to the bearing line, from the upper ſide of wing tranſom down to where

the

the bearding line interſects the line for the fore ſide of the inner poſt, and the fore ſide to the fore ſide of the inner poſt, then upon this mould muſt be marked the ſtations of the upper edges of all the tranſoms, marking their reſpective names thereon.

CHAP III.

Shewing in what manner to take the bevellings of the timbers in the ſquare body.

THE moulds for the timbers of the ſquare body being made, I ſhall in the next place ſhew in what manner their bevellings may be taken, as till then the timbers which have bevellings cannot be cut out. It is a cuſtom with ſome to have only two bevelling boards, one to each body, and ſo making them very long in order that they may take all the bevellings, but this is a very unhandy way in large ſhips, where a great number of people are employed, and being ſo very confuſed, occaſion a great many miſtakes. Others will have a bevelling board to every ribband and head, which is altogether as unhandy as the former method, for then, when they want the bevellings for one futtock, they have to fly to ſix or ſeven boards before they can have them, beſides ſometimes taking a wrong board by miſtake, and ſo by that means ſpoiling the timber. Therefore the method I recommend would be to have one bevelling board for every futtock, and likewiſe one for the floors, each containing every ſquare timber in the body, the after body might be marked

marked on one ſide, and the fore body on the other, then for to take the bevellings for a floor, or a futtock, it would only be to look for the floor or that futtock bevelling board, where the bevellings would all appear regularly one after the other at one view, for their reſpective timbers, which might then be taken off with little trouble, and it would then be impoſſible to make a miſtake, unleſs the name of one timber was taken for another.

Provide a bevelling board for the floors, in breadth as much as the floor timbers are ſided, and in length ſufficient to take all the floor bevellings thereon. The firſt bevelling to be taken is from the cutting down line, therefore beginning at dead flat we ſhall find that to be a ſquare, and alſo all the other midſhip timbers, which may be marked as ſuch upon the board, then apply the ſtock of a bevel to the next timber abaft the midſhip ones, keeping it beneath the cutting down line, and place the tongue of it well with the cutting down line, and that will give the bevelling for that timber, and proceeding the ſame with every other timber, all the bevellings may be taken, and may then be marked on the board, diſtinguiſhing them by writing their reſpective names upon every line; theſe bevellings will all be ſtanding both in the fore and after bodies, and are for the purpoſe of trimming the throats of the floors.

In the next place, the bevellings for the outſide of the floors muſt be taken, which are always under bevellings in both bodies, in conſequence of the floors being always placed on that ſide of the joint that the body declines; thoſe bevellings are the lower firmark, floor firmark, and floor head; and in order to take them from the body plan, proceed as follows: the bevelling board being parallel, ſet off the breadth of it ſquare from each timber aft, on each of the floor diagonals in the half breadth plan; then take the diſtance of each

ſpot

ſpot ſet off from the middle line of the half breadth plan, and ſet them off on their correſponding diagonals, from the middle line in the body plan, making of ſpots; then take a pair of compaſſes and place one foot in each of theſe ſpots, and ſweep the other till it touches the neareſt place of its correſponding timber, and the radius of that ſweep will determine the bevelling of the timber at that place where taken, and ſhew how much it is under, or within a ſquare in the breadth of the bevelling board; the bevellings may then be taken in that manner for every ſirmark upon every floor timber, and from thence may be marked on the bevelling board.

In the next place, provide other bevelling boards, one for each futtock, and one for the toptimbers, obſerving to let the breadth of each be the ſiding of their reſpective futtocks or toptimber; then in order to take the bevellings for each, we muſt act as before deſcribed for the floors, only obſerving which futtocks are ſtanding bevellings, and which are under, as thoſe which are ſtanding the breadth of their bevelling board muſt be ſet off on the diagonal lines in the half breadth plan, at the fore ſide of the timber for the after body, and the aft ſide of the timber for the fore body, and ſo contrarywiſe for thoſe which are under.

Therefore obſerve, the floors are under, firſt futtocks ſtanding, ſecond futtocks under, third futtocks ſtanding, fourth futtocks under, and toptimbers ſtanding bevellings, the bevellings for which, at every ſirmark and every timber, may now be taken, and marked on their reſpective boards, placing one body on one ſide, and the other body on the other; the bevellings to be taken for each futtock and toptimbers are as follow:

For the firſt futtocks, lower ſirmark, floor ſirmark, firſt futtock ſirmark, and head; for the ſecond futtocks, ſecond futtock heel, firſt futtock ſirmark, firſt fut-

futtock head, ſecond futtock ſirmark, and ſecond futtock head; for the third futtocks, third futtock heel, ſecond futtock ſirmark, ſecond futtock head, third futtock ſirmark, and third futtock head; for the fourth futtocks, fourth futtock heel, third futtock head, main breadth, and fourth futtock head; and for the toptimbers, toptimber heel, main breadth, toptimber ſirmark, or fourth futtock head, toptimber line, and top of the ſide. The bevellings for the main and top breadths may be taken by applying the ſtock of the bevel to the timber, and the tongue to the breadth lines, obſerving that the breadth bevellings are ſtanding for the toptimbers, and under for the fourth futtocks.

CHAP. IV.

In which is ſhewn the nature and uſe of the cant timbers, with the method of laying them down by water lines.

IN order that the ſtudent may clearly underſtand the nature of the cant timbers, I ſhall deſcribe them in the following manner: obſerve in the half breadth plan of the eighty-gun ſhip, where the cant timbers interſect the middle line, at which place ſuppoſe them hung in a moveable manner, and alſo ſuppoſe the line drawn for the cant timber to repreſent the upper edge of a large ſurface, the breadth of which to be equal to the line of the cant timber, from the top of the ſhip to the upper edge of the keel, and ſuppoſing the horizontal view of that ſurface to be repreſented by that one line, it immediately follows that the ſurface muſt ſtand perpendicular from the upper edge

of

of the keel, and if we draw the proper ſhape of the cant timber according to the ſhape of the body, upon this ſurface from the keel to the top, (not moving its poſition) and then cut it out, we ſhall then have the true poſition of the cant timber as in its place on the ſhip, which will ſtand in a perpendicular direction, we may alſo (as ſuppoſing it to be hung) ſwing it either forward or aft, and it will ſtill maintain its perpendicular direction.

The canting of the timbers are of great utility, as they greatly contribute to the ſtrength of the ſhip in the fore and after parts, and likewiſe greatly aſſiſt the converſion of the timber. For in the firſt place, by canting the timbers gradually from a thwartſhip line, we thereby bring each timber nearer to a ſquare with the planks of the bottom, which is not only better for the ſecurity of the planks, but the timbers are alſo better able to bear that ſecurity. And, ſecondly, were all the timbers to be placed ſquare as thoſe of the ſquare body, though the ſcantlings of the timbers on a ſquare ſhould be equal to the ſcantlings of the timbers if canted, yet the bevellings of the timbers would be ſo great, that the conſumption in ſome places, in order to get the timbers clear of ſap, would be greater by one half than that in the timbers which are canted.

The cant timbers may be taken from the draught, and repreſented in the half breadth plan on the floor, both for the floor and after bodies; their room and ſpace on the main breadth line may be governed by that of the ſquare timbers, but at the heel or middle line of the half breadth plan they ſhould be placed as near together as conveniently can be, in order to make the bevellings of the timbers as near a ſquare as poſſible.

I ſhall take the fore body and explain the method of laying them off by water lines firſt, as that is the eaſieſt way, and beſt for the ſtudent to begin with.

In the firſt place, we muſt try whether the foremoſt end of the diagonal lines in the half breadth plan will make a fair bow, as they cannot be altered after the cant timbers are run, therefore draw two fictitious timbers in the half breadth plan, equally ſpaced between the foremoſt timber and the ſtem, take them off from the half breadth plan, and deſcribe them in the body plan, in the ſame manner as was done for the ſquare timbers; then if the lines run in the body plan from thoſe fictitious timbers prove to be fair lines, the foremoſt ends of the diagonal lines in the half breadth may be called well, but if not, then the diagonal lines muſt be altered till they will make fair lines in the body plan.

Proceed to lay down the foremoſt cant timber, which being moſt canted, will be eaſier underſtood. Take the diſtances from the middle line in the half breadth plan, on the foremoſt cant line to where each water line interſects, and transfer them to the body plan, by ſetting them off from the middle line on each correſponding line. Then where the cant timber in the half breadth plan interſects the main half breadth line, and toptimber line, ſquare them up to their correſponding lines in the ſheer plan, at which places take their heights and transfer to the body plan, drawing of horizontal lines, which will repreſent the main and top heights of breadth lines of the cant timber, then take the main and top half breadths from the half breadth plan, in the direction of the cant line, and ſet them off from the middle line in the body plan, on their correſponding heights juſt drawn; then there may be drawn acroſs the body plan two level lines between the upper height of breadth and toptimber line, which may be taken off and run in the half breadth plan, in the ſame manner as the water lines, after which they may be taken off from the half breadth plan, in the direction of the cant timber, and from thence ſet off on their correſponding level lines in the body plan; the ſpots in the body plan

plan which are now ſet off, will give the exact ſhape of the cant timber, but it yet remains to find the exact heeling of it, or termination of the lower part.

Take from the body plan the diſtance of the bearding from the middle line, and ſet it off from the middle line in the half breadth plan of the cant timbers, ſtriking a ſtraight line parallel thereto, which line will repreſent the bearding there; then where the line of the cant timber interſects that line, ſquare it up to the bearding line in the ſheer, which height take off and ſet up the middle line of the body plan, drawing a horizontal line; then take the diſtance from the middle line in the half breadth plan, to where the cant timber interſects the bearding line, in the direction of the cant line, and ſet it off from the middle line in the body plan, on the horizontal line there drawn, which will give the ſpot where the heel of the cant timber ends; then by letting a curve paſs from that ſpot through all the other ſpots, the ſhape of the cant timber will be thereby repreſented in the body plan, and by proceeding in the ſame manner with the reſt, they may alſo be deſcribed.

This method of laying down the cant timbers is much the eaſieſt, and attended with the leaſt trouble; but if done in this manner, the body ought to be laid down as fair as poſſibly could be, and the water lines ſhould be exactly conformable thereto; for as the water lines lay in an oblique direction from the timbers, the leaſt variation would cauſe a very great error in the ſhape of the cant timbers, when drawn in the body plan. I would therefore not recommend this method for the mould loft, for as the diagonal and horizontal ribbands muſt of neceſſity be run, it will be better to work from them, as the poſition of the diagonals are nearly ſquare from the timbers, and therefore will be leſs liable to errors; but the utility of underſtanding this me-

method of laying off the cant timbers by water lines, will be ſufficiently ſeen in the following inſtance: when a draught is deſigned, from which we are going to build, we may examine the ſhift of the timbers, and may perceive ſome diffi-culty ariſe in the long timbers that may make us apprehenſive the timber will not prove ſufficient to work ſo long as the ſhift deſigned, the ſquare timbers being much more hollow than the cant; then the water lines being generally drawn in the draught, and the ribband lines omitted, we may from the water lines lay off the cant timbers in the body plan, and from thence be capable of judging how the long timbers will agree with the convenience of the timber; or even ſuppoſe the ribband lines were run in the draught, it would be much the quickeſt method to make uſe of the water lines.

C H A P. V.

Of laying down the cant timbers by the horizontal ribband lines.

IN this chapter I ſhall proceed to lay down the cant timbers by the horizontal ribband lines, which is a method moſt in practice, and may always be de-pended upon. Therefore, the after cant timbers may be laid off in this man-ner; but we muſt prove the fairneſs of the buttock, or after part of the body, in order to which, proceed to run the ſhape of two fictitious timbers, equally ſpaced between the touch of the wing tranſom and the after timber, in the ſame manner as was done in the fore body; then that part of the body proving

fair

fair the thwartſhip way, we may then run ſome lines to ſhew the ſhape of the body in the ſheer plan, or fore and aft way, ſimilar to the bearding line; draw in the body plan five or ſix perpendicular lines, equally ſpaced between the bearding line, and the touch of the wing tranſom, (which may be found by ſetting off the half breadth of the wing tranſom in the body plan) then take the heights from the baſe line of the body plan, up thoſe perpendicular lines to where they interſect each of the timbers, and ſet them off from the upper edge of the keel on their correſponding timbers in the ſheer plan, and by letting of curves paſs through the ſpots ſo ſet off, the ſhape of the body at thoſe lines will be repreſented in the ſheer draught, and which are termed BUTTOCK LINES. Then if thoſe lines prove fair, the timbers in the body will be fair, and likewiſe the after part of the diagonal lines in the half breadth plan; but if they require to be altered, the timbers in the body plan muſt be altered alſo, and likewiſe the diagonal lines agreeable thereto.

The ending of the buttock lines I have not explained, as that is not material at preſent, but the buttock lines being of great uſe hereafter, in laying of the tranſoms, I ſhall then ſufficiently explain the manner of ending them. The buttock lines, timbers of the body plan, and likewiſe the diagonal lines in the half breadth plan, being found to agree with each other, we may now proceed to lay off the horizontal ribband lines, which may be done in the following manner: take the diſtance ſquare from the middle line in the body plan, to where the upper diagonal interſects each of the timbers, as far forward as the after timber of the ſquare body, and then ſet them off from the middle line on their correſponding timbers in the half breadth plan; then by letting a curve paſs through the ſpots ſo ſet off, the upper horizontal ribband line will be thereby repreſented in the half breadth plan; the ending of it may be performed like the ending a diagonal line, with only this difference, that inſtead of taking the half breadth of the poſt in the direction of the dia-

diagonal line, it muſt here be taken ſquare from the middle line to where the line for the ſide of the poſt interſects the ſaid diagonal, then by proceeding the ſame with the reſt of the diagonal lines, the horizontal ribband lines may all be deſcribed.

The horizontal ribband lines being now laid off, we may in the next place proceed to lay off the cant timbers from them, and as the after timbers has the greateſt cant it will ſhew the nature of laying down the cleareſt. Therefore, take the diſtance in the half breadth plan, from where the upper horizontal ribband line interſects the after cant timber, ſquare to the middle line, and ſet it off ſquare from the middle line in the body plan on the upper diagonal line, where it ſhall happen to interſect, at which place level a line out from the diagonal line; then take the diſtance in the half breadth plan from where the after cant timber interſects the middle line, to where it interſects the upper horizontal ribband, and ſet it off ſquare from the middle line in the body plan upon the line levelled out, which will give the ſpot for the cant timber at that diagonal, and proceeding the ſame with all the other horizontal ribbands, the ſpots for each will be given at their reſpective diagonal lines. The ſpots for the main and top breadths, and likewiſe the ſpot for the heel, may be found as before deſcribed in Chap. IV. then by letting a curve paſs through all the ſpots, the true ſhape of the timber will be deſcribed in the body plan, and by following the ſame method with the reſt of them, they may be repreſented alſo.

When the moulds are made and croſſed, it muſt be obſerved that the ſtations of the heads and firmarks are where the lines levelled out interſect the lines of the cant timbers.

CHAP.

CHAP. VI.

To lay down and take the bevellings of the cant timbers.

THE cant timbers being laid down, we may in the next place proceed to take the bevellings of them; a bevelling board may be provided for every cant timber both in the fore and after bodies, the breadth may be as much as the ſiding of the third or fourth futtocks, and of a length ſufficient to contain all the bevellings which are abaft the joint on one ſide, and thoſe which are afore it on the other, which will be as regular and compleat a method as we can purſue. Then to lay down a bevelling of any one timber, ſtrike a line on each ſide of it in the half breadth plan, of a parallel diſtance equal to the breadth of the bevelling board, the line afore it will be for the purpoſe of laying down the bevellings of the timbers which come afore the joint, and that abaft for thoſe which come abaft the joint; then from where the joint of the cant timber interſects the middle line, ſquare a line which ſhall interſect the lines drawn of each ſide, and we ſhall find that the foremoſt interſection will come within the middle line of the half breadth plan, and the after one without it; then take the diſtance from where the horizontal ribband lines interſect the line ſtruck at the fore ſide of the timber, ſquare to the middle line, and ſet them off ſquare from the middle line in the body plan, where they ſhall happen to interſect with their reſpective diagonals and levelling lines out at every ſpot: then take the diſtance from the ſame interſections again (but in the direction of the

the cant line) to where the ſquared line interſects above or within the middle line, and ſet off thoſe diſtances ſquare from the middle line in the body plan on their reſpective lines levelled out; a ſpot may then be got at the main breadth in the ſame manner as was done in laying down the joint, from which let a curve paſs through the ſpots on the level lines, and the ſhape of the line will be deſcribed which will give the bevellings for the fore ſide of the timber; then proceed in the ſame manner with the line abaft the joint, which will give the bevellings for the aft ſide of the timber; then at the places where the lines come without the joint of the timber in the body plan, the bevelling is ſo much without a ſquare, and where they come within, ſo much within a ſquare in the breadth of the bevelling board.

Proceed in the next place to take the bevellings, in order to which we will begin with the fore ſide of the timber; the heel bevelling muſt firſt be taken which gives the direction to trim the heels of the futtocks the fore and aft way, or faying to the dead wood; therefore the outſide of the dead wood being parallel to the middle line, we may apply the ſtock of a bevel well with the cant timber in the half breadth plan, and place the tongue well with the middle line, letting it teach forward, which will be an under bevelling, and may from thence be marked on the board; the bevelling of the heel may then be taken to trim it at the outſide, where it fays to the bearding line, which muſt be done as follows: where the cant timber interſects the bearding line in the half breadth plan, ſquare it up to the bearding line in the ſheer plan, and at that place let the tongue of the bevel be placed to the bearding line, teaching forward, and move the ſtock till it is in a perpendicular direction, which will give the ſaid bevelling, and may then be marked on the board.

Then take the bevelling at the lower diagonal, by placing one leg of a pair of compaſſes in the line of the cant timber in the body plan, where the

level

level line interſects, and extend the other to the line repreſenting the fore ſide of the timber, ſweeping it till you get the neareſt diſtance, and that will ſhew how much the bevelling is within or without a ſquare in the breadth of the bevelling board, and may then be marked thereon; then act the ſame with the other diagonal lines, and the bevelling at each may be taken, and alſo marked on the board; then to take the bevellings at the main and top breadths, and level lines between them, we ſhall only have to apply the ſtock of the bevel to the joint of the cant timber in the half breadth plan, and place the tongue in the direction of their reſpective half breadth lines, obſerving to let the tongue teach forward; the bevellings for this ſide of the timber will be found to be ſtanding bevellings, unleſs it is two or three of the lower ones, which on account of the leanneſs of this part of the bottom will be under.

The bevellings may then be taken for the aft ſide of the timber, which will be under bevellings, but the operation is performed the ſame as the former, only obſerving, that the ſquare line at the heel comes without ſide the middle line of the half breadth plan, and likewiſe when the bevel is applied to take the bevellings, the tongue of it muſt teach the contrary way from before; theſe bevellings may then be marked on the other ſide of the board, and the board for that timber will then be compleat.

In like manner may the bevellings be taken for all the other cant timbers, both in the fore and after bodies, and may then be marked on their reſpective boards.

CHAP. VII.

Explaining the utility of the tranſoms, with the manner of laying them down.

THE tranſoms compoſe the ſtern frame, of which there are as many in general as the form of the body will admit of a kindly growth, the uppermoſt of them is called the wing tranſom, and is the foundation upon which the whole ſtern is built; and therefore ſhould always be of the beſt timber that could be procured. The tranſoms below it are for the purpoſe of finiſhing the after part of the ſhip, termed the buttock, which muſt be allowed the ſtrongeſt method that poſſibly can be, for every tranſom croſſing the buttock, or aft part of the ſhip, and bolting through the ſtern poſt, may be eſteemed as ſo many breaſt-hooks athwart the bows, and when the planks are wrought on the buttock, and the wing tranſom knee bolted, it certainly may be admitted to be as ſtrong as the bows, or fore part of the ſhip's body, which is ſupported by the breaſt-hooks.

Take from the draught the heights of all the tranſoms, and deſcribe them on the floor in the ſheer plan, and ſtrike them alſo acroſs the body plan, draw alſo in the half breadth plan the round aſt of the wing tranſom taken from the draught, and likewiſe draw the round up in the body plan taken from the draught alſo; then the upper ſide of it being drawn in the ſheer, ſet down below that what the round is, and draw another level line, upon which ſquare

up

up the touch of the wing tranſom from the half breadth plan, and from thence draw a ſtraight line to the interſection of the upper ſide with the fore part of the rabbet, which will repreſent the upper part of the aft ſide of the wing tranſom in the ſheer plan; then in the body plan ſet off below the line for the upper ſide of the tranſom, the depth of the wing tranſom (or tuck) rail, and deſcribe another line parallel thereto, which is called the margin line, as from the upper ſide of the wing tranſom to this rail, is always trimmed by one bevelling right acroſs, which is the bevelling of the rake of the rabbet of the poſt; this margin line muſt then be deſcribed in the ſheer, by ſetting off the ſame depth there, and drawing another line parallel to the former, and likewiſe draw a line for the fore end of each parallel to the rabbet of the poſt. The margin line ſhould next be deſcribed in the half breadth plan, by ſquaring it down from the ſheer plan, and drawing it parallel to the wing tranſom there, it will come as much within the line drawn for the wing tranſom in the half breadth plan, as the bevelling of it in the ſheer plan is within a ſquare in the depth of the tuck rail.

The margin line being drawn in every plan, we may now proceed to end the buttock lines in a proper manner in the ſheer plan, in order to run the tranſoms from them; therefore, take off their diſtances from the middle line in the body plan, and ſet the ſame off from the middle line in the half breadth plan, ſtriking of parallel lines, by which they will be repreſented there; then from where the buttock lines interſect the margin line in the half breadth plan, ſquare up ſpots to the margin line in the ſheer plan, which will give the true ending of the buttock lines.

The tranſoms may now be laid off from the buttock lines, but if they are laid down in the half breadth plan, then only half or one ſide of them can be repreſented; the beſt method therefore will be to lay them down in ſome convenient place by themſelves, whereby both ſides of them may be repreſented, and there will not be then ſuch a confuſion in the lines.

Take from the half breadth plan the middle line, main half breadth line, wing tranſom line, buttock lines, cant line of the faſhion piece, and as many of the ſquare timbers as come abaft the heel of the faſhion piece, and repreſent them in ſome clear place, in the ſame manner as they are diſpoſed of in the half breadth plan, but deſcribing them on both ſides of the middle line; this for diſtinction may be termed, Plan of the Tranſoms: the ſhape of the wing tranſom is already deſcribed, to which the mould is to be made; the filling tranſom is next, which lays between the wing and the deck, and as it lays level or parallel to the upper edge of the keel, the deſcription of it will ſuffice for all the other tranſoms that are under the deck, which alſo lay level; draw on each ſide of the middle line in the plan of the tranſoms, the half thickneſs of the dead wood or bearding line, taken from the half breadth plan; then take the diſtance in the ſheer plan from where the upper ſide of the filling tranſom interſects the fore ſide of the rabbet of the poſt, to any ſquare timber, and ſet it off from the ſame ſquare timber at the middle line in the plan of the tranſoms, ſquaring a line acroſs to each bearding line, which line will repreſent the after part of the filling tranſom at the middle line; then take the diſtances in the ſheer plan from any ſquare timber, to where the filling tranſom line interſects the different buttock lines, and ſet them off from the ſame timber in the plan of the tranſoms, on their correſponding buttock lines on each ſide of the middle line; then take the diſtances from the middle line in the body plan, to where the line of the filling tranſom interſects the ſquare timbers, and ſet them off on both ſides of the middle line, on their correſponding timbers in the plan of the tranſoms; then by letting a curve paſs on each ſide of the middle line, from the aft ſide of the tranſom through the ſpots on the buttock lines

and

and square timbers, the true shape of the filling transom will be represented on the upper side.

The next is the deck transom, which is the most difficult transom to lay down of any, if executed in a proper manner, but the generality of artists lay it down by the same method as the rest, only considering the round up, which is a very great error, for if we suppose this transom to be level at the middle line, and lay it down as such, it consequently must be placed in that direction on the post, so that when the beams of the deck are in, we should be obliged to reduce one third of the transom at the fore side, in order to make it range well with the sheer of the deck; therefore, as the deck transom is confined to the sheer of the deck and round of the beam, we must, in order to lay it down in a proper manner so that it shall agree with the beams, and likewise answer the shape of the body, proceed in the following manner: draw in the sheer plan the under side of the lower deck at the middle line, and continue it from the rabbet of the stern post to about four or five square timbers farther forward, this line will then be supposed to represent the upper side of the deck transom at the middle line; then take the heights of this line at every square timber, and set them up on their corresponding timbers in the body plan, and also where the said line intersects the buttock lines in the sheer plan, take of the heights and transfer to their corresponding buttock lines in the body plan; then through those spots on the buttock lines and square timbers let a curve pass, which will shew the shape of the upper side of the deck transom in the body plan, supposing it had no round down at the side; then draw the round of the deck under the base line in the body plan, and where the line for the upper side of the transom in the body plan intersects the square timbers, square down spots upon the round of the deck line, and then take the distance from the said spots square up to the base line, (which is the round of the deck at each timber) and set them down below the upper side of

 the

the deck tranſom, on their reſpective timbers, and where the laſt ſpots interſect the ſquare timbers a curve muſt paſs through each, which will ſhew the deck, ſuppoſing it to be continued to the outſide of the timbers, and which is required, in order to find the exact form of the moulding edge of the deck tranſom.

Continue the buttock lines in the body plan down to the round of the deck underneath, and then take the round at each buttock line, and ſet it down below the deck at the middle line in the ſheer draught, on the correſponding buttock lines, and then transfer theſe ſpots to their correſponding buttock lines in the body plan; then through theſe ſpots on the buttock lines, and likewiſe thoſe on the timbers in the body plan, let a curve paſs which will repreſent the deck line at the ſide, if continued to the outſide of the timbers; then to find the deck at the ſide in the ſheer plan, take the height at every ſquare timber in the body plan, where they interſect the deck at the ſide, and transfer them to their correſponding timbers in the ſheer plan, then theſe ſpots with thoſe before made on the buttock lines, give the deck at the ſide in the ſheer plan, which is the level view of the moulding edge of the deck tranſom.

Then to lay down the deck tranſom in the plan of the tranſoms, proceed as follows: ſtrike a perpendicular line in the ſheer plan, which may be the perpendicular of the lower deck, letting it fall from where the line of the deck tranſom interſects the fore part of the rabbet of the poſt; transfer it to the plan of the tranſoms, and it will then ſerve to lay off all the tranſoms from, as well as the deck. Take the diſtance in the ſheer plan from the perpendicular, to where the line for the deck at the ſide interſects the buttock lines, and ſet it off from the perpendicular in the plan of the tranſoms, on the correſponding buttock lines; alſo take the diſtances from the middle line in the body plan, to where the line for the tranſom at the ſide interſects the ſquare timbers, and ſet

ſet them off from the middle line, on their reſpective ſquare timbers in the plan of the tranſoms, then by letting of a curve paſs on each ſide the middle line in the plan of the tranſoms, from where the perpendicular interſects the lines for the bearding, through the ſpots on the buttock lines and ſquare timbers, the form of the deck tranſom will be thereby repreſented.

This method may be practiſed as it is the leaſt trouble, and near enough to be uſed in general where diſpatch is required; but as I have been ſo particular in getting the exact ſhape of the deck tranſom as it appears both in the ſheer and body plans, I ſhall alſo ſhew the method to get the exact ſhape of it in the plan of the tranſoms, ſuppoſing it to lay with the hang of the deck, and the round of the beam, not that the alteration is very material, but only to ſhew thoſe who would wiſh to be very nice and particular in that point, the manner of performing it to the greateſt nicety that is poſſible.

Take the diſtance from the perpendicular in the ſheer plan, to one of the ſquare timbers afore the faſhion piece, in the direction of the line for the ſheer of the deck, and ſet it off ſquare from the perpendicular in the plan of the tranſoms, and we ſhall find that it will come ſomething farther forward than its original place there, from which we may call it a new ſquare timber in the plan of the tranſoms; then place a batten to the round of the deck under the body plan, and mark on it the middle line, the buttock lines, and the ſpots which ſhould be ſquared down from the deck at the ſide, on the ſaid timber, to the round of the deck, and transfer thoſe ſpots on the batten to the new timber in the plan of the tranſoms, whereby the ſpots will be given for ſtriking of new buttock lines; then proceed to take the diſtances from the perpendicular in the ſheer plan, in the direction of the line for the deck at the ſide, to the different buttock lines, and ſet them off ſquare

from

from the perpendicular in the plan of the tranſoms, on their correſponding new buttock lines, and then by letting of curves paſs through the ſaid ſpots as before, the moulding edge of the deck tranſom will be repreſented as it will be on the ſhip when trimmed, both to the hang of the deck, and round of the beams.

The tranſoms under the deck all laying level, may be laid down by taking the diſtances of the buttock lines from the perpendicular in the ſheer plan, on the upper edge of each tranſom, and ſetting them off on their correſponding buttock lines from the perpendicular in the plan of the tranſoms, which will give the ſpots through which the curves are to paſs to repreſent the moulding edges of all the tranſoms.

There ſhould alſo be ſpots ſets off in the plan of the tranſoms, to prove the interſection of the tranſoms with the ſide of the faſhion piece, which is the end of the tranſoms; therefore the cant of the faſhion-piece muſt be laid down in the body plan, which is performed juſt in the ſame manner as the reſt of the cant timbers; then take the diſtance from the middle line in the body plan, to where the different tranſoms interſect the cant of the faſhion piece, and ſet them off from the middle line in the plan of the tranſoms, on the cant faſhion piece there, which ſpots will give the exact ending of the tranſoms at the ſide of the faſhion piece.

CHAP.

CHAP. VIII.

Of taking the bevellings of the tranſoms.

THE bevellings of the tranſoms are generally taken from the buttock lines, in the following manner: apply the ſtock of a bevel to the line for the upper ſide of the tranſoms in the ſheer plan, and the tongue to the buttock lines, letting the tongue be well at the upper and lower ſides of the tranſom, which will give the exact bevellings of the tranſoms at their correſponding buttock lines; then when the tranſom moulds are made to the lines in the plan of the tranſoms, the buttock lines muſt be marked on the moulds in the direction they are laid down, which is parallel to the middle line.

When the bevellings are taken in this manner they may be very exact, but it requires to be very particular in applying them on the tranſoms, for the ſtock of the bevel muſt be kept in the direction of the buttock line at the upper ſide, and the tongue muſt teach to the buttock line at the lower ſide, which ſhould be marked there, then when this trouble is taken the tranſoms may be trimmed to a nicety; but by this method the bevellings are confined to the buttock lines, by which means ſome of the lower tranſoms will not have above one or two bevellings upon them, which will not be ſufficient to get the exact ſhape of the under ſide.

Therefore, the beſt method to find the bevellings will be to lay down the lower ſides of all the tranſoms, in the plan of the tranſoms, which may be done in the ſame manner as the upper ſides were laid down, then the diſtance from the upper to the lower ſides in the plan of the tranſoms, will ſhew how much the tranſoms are under from a ſquare in the depth, or ſiding of them, which muſt be the breadth of the bevelling board.

The lower ſides being laid down, we may now have an opportunity of placing as many bevelling ſpots on the lower tranſom as we pleaſe, without any confinement, which may be divided equally between the breech and the faſhion-piece; then fix one leg of a pair of compaſſes in each of the bevelling ſpots on the upper ſide, and ſweep the other till it takes the neareſt diſtance to the line for the lower ſide, which will ſhew how much the tranſom is under from a ſquare at each bevelling ſpot, in the breadth of the bevelling board; in the ſame manner may the bevellings be taken for the reſt of the tranſoms, except the wing and the deck, which is beſt taken from the buttock lines; the wing tranſom muſt be trimmed from the upper ſide to the margin line by one bevelling right acroſs, which bevelling is taken from the upper ſide and the rabbet of the poſt, from thence to the lower ſide the bevellings muſt be taken from the buttock lines, as before deſcribed. Then the bevellings for the deck tranſom may be taken, by applying the ſtock of the bevel to the hang of the deck at the middle line, and the tongue to each of the buttock lines, keeping the tongue well at the upper and lower ſide of the tranſom, which may be applied on the tranſom, by placing the bevel at each correſponding buttock line, and keeping the ſtock out of winding with the upper ſide of the tranſom at the middle line.

The bevellings for the breech of the tranſoms muſt be taken from the upper ſides of the tranſoms, and the bearding line in the ſheer plan, and the ends of all the tranſoms when moulded are trimmed ſquare from the upper ſide; but in applying the ſquare to the ends of the wing and deck tranſoms,

which

which round up, the ſtock of it muſt be lifted till it lays in an horizontal poſition, and ſhould be looked out of winding with a batten at the middle line; then to find the bevelling for the ends of the tranſoms when cut off, apply the ſtock of a bevel to the upper ſides of the tranſoms in the body plan, and the tongue to the line of the cant faſhion piece, which will give the bevelling required; but to take the bevelling for the end of the wing tranſom, we muſt take the diſtance ſquare from the middle line in the plan of the tranſoms, to where the end of the wing tranſom interſects the faſhion piece, and ſet it off ſquare from the middle line in the body plan, on the upper ſide of the wing tranſom, and level it out till it interſects the cant faſhion piece, from which level line the bevelling may be taken to the cant faſhion piece as before; the bevelling for the end of the deck tranſom may be taken from a level line in the ſame manner, but it muſt be obſerved in applying the bevel on the wing and deck tranſoms, to lift it up as much as the tranſoms round down at the ends, and look it out of winding with a batten at the middle line.

CHAP. IX.

To lay down and take the bevellings of the hawſe-pieces by level lines.

THE hawſe-pieces, when in their places, are ſuppoſed to ſtand perpendicular, and their ſides to look fore and aft, exactly ſimilar to the ſquare timbers, only their ſides looking fore and aft inſtead of thwartſhips. Take the hawſe-pieces from the half breadth plan in the draught, and ſtrike them in the

the half breadth plan on the floor, letting their lines end against the line of the foremost cant timber, which will represent the heels of them; then the water lines being run in the half breadth and sheer plans, they may be the level lines for laying off the hawse-pieces by, with the main and top breadths, and likewise another level line between the main and top breadths.

Where the foremost cant timber in the half breadth plan crosses the water lines, main and top breadth lines, and level line between, square them up parallel to any square timber, to their corresponding lines in the sheer plan; also where it crosses the bearding line in the half breadth plan, square it up to the bearding line in the sheer plan, from which let a curve pass through all the spots set off on the water lines, &c. and the thwartship view of the foremost cant timber will be represented in the sheer plan.

Where the lines for the knight head and hawse-pieces in the half breadth plan cross the water lines, main and top breadths, and level lines between, square them up to their corresponding lines in the sheer plan, which will give the spots through which the curves are to pass to represent the knight head and hawse-pieces in their proper places, and where the lines for the knight head and hawse-pieces meet at the foremost cant timber in the half breadth plan, square them up to the thwartship view of the foremost cant timber in the sheer plan, which will give the heels of the knight head and hawse-pieces in the sheer plan; and by drawing of lines from thence perpendicular upwards, will give the direction in which the heels are to be cut off to fay against the foremost cant timber; then by applying the stock of the bevel to the lines of the knight head and hawse-pieces in the half breadth plan, and the tongue to the line of the foremost cant timber, that will give the bevellings to be applied to the heels to trim them the thwartship way, to fay against the foremost cant timber.

The ſides of the knight head and hawſe-pieces being parallel to each other, and they likewiſe faying cloſe to each other when in their places, in conſequence the line of one will ſerve to countermould the other, and from thence the bevellings of each may be taken; therefore, the bevellings may be taken at every ſirmark, (that is at every harpin) which muſt be marked on the hawſe-piece moulds, and in order to find their proper ſtations, take off the knight head and hawſe-pieces from the half breadth plan, and repreſent them as ſo many ſtraight lines, parallel to the middle line in the body plan; then where the knight head and hawſe-pieces in the body plan croſs the diagonal lines, take off thoſe heights and ſet off on their correſponding knight head and hawſe-pieces in the ſheer plan, which will give the proper ſtations of the harpins on the knight head and hawſe-pieces; then fix one leg of a pair of compaſſes in the lines for the knight head and hawſe-pieces at the different ſirmarks, and extend the other to the line of the next hawſe-piece, ſweeping it till you have the neareſt diſtance, which will ſhew how much the bevelling is within a ſquare in the breadth of the bevelling board, which ſhould be in breadth equal to what its hawſe-piece is ſided. The bevellings at the heel to countermould them muſt next be taken, in order to which, take the heights in the ſheer plan where the knight head and hawſe-pieces interſect the thwartſhip view of the foremoſt cant timber, and ſet them off on the line of the foremoſt cant timber in the body plan, at which ſpots erect perpendiculars; then place the ſtock of the bevel againſt the perpendiculars, and the tongue to the cant timbers, which will give the exact bevelling to be applied on the heel when cut off for the counter moulding of the knight head and hawſe-pieces.

If there was only this bevelling for the heel ſet off, and another at the head for the knight head and hawſe-pieces, then the mould of their next hawſe-piece by being kept well at the head and heel, and likewiſe to its proper height, would conſequently countermould them exactly.

CHAP.

CHAP. X.

Of laying down and bevelling the hawſe-pieces, when they are required to be ſided leſs at the heels.

THE hawſe-pieces laid down in the laſt chapter were ſuppoſed to be ſided equally at the heads and heels, and their ſides to look fore and aft, or parallel to the middle line, and conſequently they appeared as ſtraight lines when viewed in the half breadth and body plans. The hawſe-pieces I am going to lay down now are intended to be ſided leſs at the heels than at the heads, but their ſides alſo to look fore and aft, that is, at any particular height their ſides are to be parallel to the middle line, but as the heels of them are to be ſided leſs than the heads, they therefore cannot appear as ſtraight lines in the half breadth plan.

Proceed to ſet off the ſiding of the heads of the knight head and hawſe-pieces in the body plan, at which place they may be repreſented by ſtraight lines, letting them taper towards the heels as much as may be thought neceſſary; then the thwartſhip view of the foremoſt cant timber which the hawſe-pieces are to end againſt, muſt be laid off in the ſheer plan, as before deſcribed.

In the next place, proceed to lay off the fore and aft view of the foremoſt cant timber in the body plan, which muſt be done as follows: where the foremoſt cant timber in the half breadth plan croſſes the water lines, bearding line,

line, main and top breadths, and level lines between, take thoſe diſtances ſquare to the middle line, and transfer them to the body plan, ſetting them off ſquare from the middle line on their correſponding lines. Then by letting a curve paſs through the ſeveral ſpots, the fore and aft view of the foremoſt cant timber will be repreſented, and where it interſects the lines of the knight head and hawſe-pieces, is the proper heights of their heels.

Take the height of the breadth lines and toptimber line, at the bearding in the ſheer draught, and ſet them off on the bearding, or half breadth of the ſtem in the body plan, whereby thoſe lines may be repreſented in the body plan, as they appear round the bow; we may now proceed to ſhew what form the hawſe-pieces will appear in, in the half breadth plan.

The knight head is already laid down, as it is repreſented by the bearding line, both in the half breadth and body plans. Take the diſtance ſquare from the middle line in the body plan, to the heels of the hawſe-pieces, or their interſection with the fore and aft view of the foremoſt cant timber, and ſet them off ſquare from the middle line on the foremoſt cant timber in the half breadth plan, which will give the heels of them there; then take the diſtance ſquare from the middle line in the body plan, to where the hawſe-pieces croſs the diagonal lines, main and top breadth lines, and level lines between, and ſet them off ſquare from the middle line in the half breadth plan, on their correſponding ſquare ribband lines, main breadth, &c. then letting of curves paſs through the ſpots ſo ſet off, they will ſhew the form the hawſe-pieces will appear in, were you right over them and looking down upon them, occaſioned by the different curves of the body when cut by theſe ſections.

In the next place, I ſhall proceed to ſhew the exact form of the body, ſuppoſing it to be cut by the different ſections of the hawſe-pieces, to which form the

the moulds are to be made to trim them. Where the hawſe-pieces in the half breadth plan croſs the water lines, main and top breadths, and level lines between, let them be ſquared up to their correſponding lines in the ſheer plan; alſo where they end againſt the foremoſt cant timber in the half breadth plan, let them be ſquared up to the thwartſhip view of the foremoſt cant timber in the ſheer plan, or where they interſect the fore and aft view of the foremoſt cant timber in the body plan, take thoſe heights and ſet off on the foremoſt cant timber in the ſheer plan, both of which will give the ſpots for the heels of them in the ſheer plan; then by letting of curves paſs from the laſt mentioned ſpots through the other ſpots ſet off, the moulding edges of the hawſe-pieces will be thereby repreſented in the ſheer plan, and ſhews them as they appear when in their places.

The method of bevelling theſe hawſe-pieces is done in the ſame manner as deſcribed in the laſt chapter, for although they do not appear the ſame in the half breadth plan, yet in the ſheer plan (their ſides looking fore and aft) you there ſee the form of them ſquare from the plans of their ſeparate ſides; therefore the diſtance as they appear from each other in the ſheer plan, at each harpin, is the proper bevelling of them, agreeable to their diſtance from each other, taken at their correſponding lines in the half breadth plan.

Where the heels of the knight head and hawſe-pieces ſtep on the thwartſhip view of the foremoſt cant timber in the ſheer plan, draw them up perpendicular, which gives the direction to cut off the heels to fay againſt the foremoſt cant timber, and to bevel the heels of them, the tongue of the bevel muſt be placed to the foremoſt cant timber in the half breadth, and the ſtock kept in a fore and aft direction, or parallel to the middle line.

To find the bevelling of the heel to be applied when the heel is cut off by the laſt bevelling, in order to countermould the hawſe-pieces, transfer the

heels

heels of the hawſe-pieces from the ſheer plan, to the joint of the foremoſt cant timber in the body plan, and draw the lines perpendicular, to which apply the ſtock of the bevel, and the tongue to the moulding edge of the cant timber, which will give the bevelling of the heel, in order to countermould the hawſe-pieces.

CHAP. XI.

Shewing in what manner to lay down and bevel the hawſe-pieces, by water lines, when canted.

THE method of laying down and diſpoſing of the hawſe-pieces, which I am going to ſhew in this chapter, is the moſt compleat of any, as it will be beſt for the ſtrength of the ſhip, and will likewiſe aſſiſt the converſion of the timber, for they will be canted, which will diminiſh them at the heels, whereby a leſs piece of timber will do the ſame ſervice as before, and as the canting, and diminiſhing of them at the heels, is performed by one operation, they conſequently muſt appear as ſtraight lines when viewed in the half breadth plan, and it muſt be allowed, that all timbers when canted nearer to a ſquare with the body are better for the ſecurity of the plank, and the timbers are not wounded ſo much by that ſecurity. The canting of the hawſe-pieces is alſo ſome advantage to the hawſe-holes, for though the hawſe-holes are generally cut nearly parallel to the middle line, yet this method leaves moſt wood at the ſide of the hawſe-hole which is fartheſt from the middle line, and is the wearing ſide of the hawſe-hole.

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Proceed to diſpoſe of the hawſe-pieces in the half breadth plan, giving them a proper cant, by letting the heels be ſided leſs than the heads, and repreſenting them by ſtraight lines; then ſhew the thwartſhip view of the foremoſt cant timber in the ſheer plan, as before deſcribed. In the ſame manner proceed with the hawſe-pieces, where in the half breadth plan they interſect the water lines, main and top breadths, and level lines between, ſquare them up to their correſponding lines in the ſheer plan, where they interſect the line of the foremoſt cant timber, ſquare them up to the line of the foremoſt cant timber in the ſheer plan, from which through the other ſpots ſet off let curves paſs, which will give the exact thwartſhip view of them ſuppoſing they were in their places, but as the ſides do not look fore and aft, theſe are not the proper lines to make the moulds to, but will be ſerviceable hereafter, to get the proper height of the harpins to be croſſed on the hawſe-piece moulds.

Take the diſtance from where the hawſe-pieces interſect the foremoſt cant timber in the half breadth plan, to where they interſect the water lines, main and top breadth lines, and level lines between, and ſet them off on their correſponding lines from the middle line in the body plan; then take the height where the heels of the knight head and hawſe-pieces interſect the foremoſt cant timber in the ſheer plan, and transfer to the middle line in the body plan, from whence let curves paſs through the other ſpots ſet off, and they will repreſent the proper form of the knight head and hawſe-pieces, and to which lines the moulds are to be made.

Then the proper ſtations of the harpins may be found in the following manner: take the heights in the body plan where the diagonal lines interſect the ſquare timbers, and transfer them to their correſponding timbers in the ſheer plan; alſo take the heights in the body plan where the diagonal lines interſect the half breadth of the ſtem, and transfer them to the bearding line in in the ſheer plan; then by letting of curves paſs through thoſe ſpots in the ſheer plan, the level thwartſhip view of the harpins will be repreſented, which is the exact height of them when in their places; then where they interſect the thwartſhip view of the knight head and hawſe-pieces, is the exact height to be transferred from the ſheer plan to their correſponding lines in the body plan, and which gives the exact ſtations of the harpins to be croſſed on the knight head and hawſe-piece moulds.

Theſe hawſe-pieces muſt be bevelled by laying down a parallel line as was done for the cant timbers; therefore draw a line parallel to the joint of the fourth hawſe piece in the half breadth plan, and where the line for the joint of the hawſe-piece interſects the foremoſt cant timber, ſquare a line from thence to the parallel line, which may be called the heel of the bevelling edge; then take the diſtance from the heel on the bevelling edge to where the water lines, &c. interſect, and ſet them off from the middle line on their correſponding water lines, &c. in the body plan, where the bevelling edge in the half breadth plan interſects the foremoſt cant timber, ſquare it up to the foremoſt cant timber in the ſheer plan, and from thence transfer that height to the middle line of the body plan; then take the diſtance from the heel of the bevelling edge in the half breadth plan to the foremoſt cant timber, and ſet it off from the middle line in the body plan, at the height laſt mentioned; then by letting a curve paſs through the ſpots ſo ſet off in the body plan, the bevelling edge of the fourth hawſe-piece will be repreſented; then whatever diſtance the moulding edge is from the bevelling edge in the body plan, ſo much is the bevelling under from a ſquare, at the different harpins, &c. in the breadth of the bevelling board, or diſtance from the moulding edge and bevelling edge in the half breadth plan; in the ſame manner proceed with the reſt of the hawſe-pieces, and likewiſe the knight head, and the bevellings of all may then be taken.

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When the knight head and hawſe-piece moulds are made, croſs the middle line of the body plan on the moulds, which will give the direction required to cut off the heels, in order to ſay againſt the foremoſt cant timber, and to take the bevelling to cut off the heels to ſay againſt the foremoſt cant timber the thwartſhip way, apply the ſtock of the bevel to the lines of the moulding edges in the half breadth plan, and the tongue to the foremoſt cant timber; and to find the bevelling of the heel to countermould them when cut off, proceed as before deſcribed in the former chapters.

CHAP. XII.

Of laying down the harpins to the ſheer of the ſhip.

IF we conſider the diſpoſition of thoſe harpins which are placed to the ſheer of the ſhip, we ſhall eaſily conceive that if moulds were made to the lines of the harpins in the half breadth plan, they would not anſwer the exact form of the ſhip's body when put in their places, neither would they anſwer the proper ſtations of the timbers. For to allow for the harpins hanging agreeable to the ſheer of the ſhip, the moulds muſt be longer than the lines of the harpins in the half breadth plan; but in order to convey a juſt idea of the alteration it will make in hanging to the ſheer of the ſhip, we may ſuppoſe the ſhip to be cut athwartſhips, in the direction of the curve of the upper harpin, as it appears in the ſheer plan, and a mould made to the upper harpin or diagonal line in the half breadth plan, and made broad enough to cut off

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at the middle line, with the ſtations of the timbers marked upon it; then apply the mould to the ſhip, ſuppoſing it to be cut off as before mentioned, keeping it well at the ſtem, and likewiſe at the middle line, then by preſſing it down to the curve of the ſheer of the ſhip, we ſhall perceive the ſtations of the timbers to draw before their proper ſtations as diſpoſed of in the ſheer plan, which conſequently will make the bows of the ſhip too full for the proper form of the body.

Where the cant timbers in the half breadth plan interſects the water lines, bearding line, main and top breadth lines, &c. ſquare them up to their correſponding lines in the ſheer plan, by which the thwartſhip view of all the cant timbers may be repreſented in the ſheer plan; then take the heights in the body plan, where the diagonal harpin lines interſect the ſquare timbers, and half breadth of the ſtem, and ſet them off on their correſponding ſquare timbers and ſtem in the ſheer plan, and through thoſe ſpots let paſs curves, which will repreſent the level view of the harpins in the ſheer plan; then where the thwartſhip view of the cant timbers in the ſheer plan interſect the level view of the harpins, ſquare them down to the harpin or diagonal lines in the half breadth plan, which will give the ſtations of the cant timbers on the harpin lines, as they are now laid down.

Then to lay them down in order to make the moulds, proceed in the following manner: where the ſpots for the ſtation of the cant timbers interſect the harpin lines, draw lines a little abaft, parallel to the middle line; then place one end of a batten to the aft part of the rabbet of the ſtem in the ſheer plan, and extend the batten to the curve of the harpins, marking on it the cant timbers; then keep the batten faſt at the rabbet of the ſtem, and lift the after end of it till it is in an horizontal poſition, or parallel to the keel; from which ſquare down the ſtations of the cant timbers to the lines which were

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levelled out in the half breadth plan. This gives the ſpots in the half breadth plan through which the curves are to paſs, that will repreſent the proper form of the harpins, and to which lines the moulds are to be made; thoſe ſpots are alſo the exact ſtations of the cant timbers to be marked on the harpin moulds.

The hawſe-pieces being drawn in the half breadth plan, there ſhould be alſo lines drawn aft parallel to the middle line, where they interſect the main breadth, &c. and performed in the ſame manner as the cant timbers, by this means we ſhould have the exact form of the mould round the bow, and the proper ſtations of the hawſe-pieces to be croſſed on the moulds.

CHAP. XIII.

Of laying down a ſquare tuck.

IT hath generally been underſtood that the laying down a ſquare tuck was one of the moſt difficult points to be performed on the floor; but this is a mere chimerical idea, and only riſes in conſequence of the ſquare tucks being ſo very ſeldom in uſe, that the generality of artiſts ſcarcely ever ſee the operation performed, and alſo when a deſcription of it hath been met with in books upon this ſubject, it hath been explained in ſuch an intricate and improper manner, that it hath afforded the artiſt no uſeful knowledge, but on the contrary, hath led him from one part to another, till he hath given up the whole, by finding no ſatisfaction in the ſtudy thereof.

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Therefore, in order to obviate ſuch diſadvantages, I ſhall proceed to explain, in as clear a manner as poſſible, the nature of a ſquare tuck, both in a flat and round ſtate, with the moſt approved methods of laying off and bevelling of the ſame, whereby the artiſt will be led progreſſively on, from the eaſieſt to the moſt difficult parts of the whole operation, and by that means may be able to improve himſelf, as having a juſt underſtanding of the whole conveyed in a clear and proper manner; I ſhall firſt propoſe a ſquare tuck, the ſides of which to be out of winding, or in the ſame direction as the rabbet of the poſt; in conſequence of which the wing tranſom muſt be ſtraight athwartſhips, and the whole will be one flat furface, it will be exactly ſimilar to the ſection of a ſhip cut athwartſhips, but not in a perpendicular direction, which is the only difference between it and the ſquare timbers, and as the ſection is ſuppoſed to be agreeable to the rake of the ſtern, it conſequently follows, that the laying it off muſt differ from the ſquare timbers in the operation.

The level view of the tuck muſt firſt be repreſented in the body plan, in order to which proceed in the following manner: ſtrike a level line in the ſheer plan, at the height of wing tranſom at the ſide, and likewiſe as many level lines below that as may be thought ſufficient, and where they interſect the aft part of the rabbet of the poſt, ſquare them down to the half breadth plan; then transfer them to the body plan, and where they interſect the ſquare timbers, take them off and run them in the half breadth plan, where the level lines in the half breadth plan interſect the lines ſquared down, take their diſtances from the middle line, and ſet them off from the middle line on their correſponding level lines in the body plan; and by letting a curve paſs through thoſe ſpots, the level view of the tuck will be repreſented in the body plan.

Then where the level view of the tuck in the body plan interſects the beard bearding line, take that height and transfer to the ſheer plan, drawing an horizontal line, which will repreſent the ſeating of the tuck; then take the diſtance from the ſeating of the tuck in the ſheer plan (in the direction of the rabbet of the poſt) to the reſpective level lines, and ſet them off from the ſeating of the tuck up the middle line in the body plan, drawing a new level line at every height; then where the level view of the tuck interſects the level lines firſt drawn, ſquare it up to their correſponding new level lines, which will give the ſpots through which the curve is to paſs that will repreſent the proper ſhape of the tuck, agreeable to the rake, and the line to which the faſhion piece mould muſt be made.

In the next place, the bevellings for the faſhion piece may be taken by proceeding as follows: the aft ſide of the rabbet of the poſt, in the ſheer plan, repreſents the aft ſide of the faſhion piece of the tuck, therefore take the ſiding of the faſhion piece and ſet off afore that, and by drawing a line parallel thereto, the fore ſide may alſo be repreſented; then from the ſeating of the tuck at the aft ſide ſquare a line to the fore ſide, from which take the heights of the level lines up the fore ſide, and ſet them off from the ſeating of the tuck up the middle line of the body plan, drawing of new level lines for the fore ſide of the faſhion piece; then where the fore ſide of the faſhion piece in the ſheer plan interſects the level lines, ſquare it down to their correſponding level lines in the half breadth plan, at which places take the diſtance ſquare to the middle line, and ſet off from the middle line on their correſponding new level lines, for the fore ſide of the faſhion piece in the body plan, through which ſpots let a curve paſs, and the fore ſide or bevelling edge of the faſhion piece will be repreſented.

The aft ſide and fore ſide of the faſhion piece appear now in their proper ſhape in the body plan, and of the ſame form as the faſhion piece will be

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when trimmed and laid flat with its aft ſide upwards, as then both edges will be ſeen in conſequence of its being a ſtanding bevelling: therefore the diſtance from the line of the aft ſide to the line of the fore ſide on a ſquare, will ſhew how much the bevellings are ſtanding, or without a ſquare in the breadth of the bevelling board, which muſt be equal to the ſiding of the faſhion-piece.

Then when the mould is made to the line of the aft ſide, the heel of it muſt be cut off well with the line for the ſeating of the tuck, and likewiſe well with the middle line, as the two faſhion pieces when in their places muſt meet at the middle line, in order to bolt into the ſtern poſt. The bevellings may be taken at the different ſirmarks, which ſirmarks ſhould be marked on the mould; therefore in order to get the true ſtations, obſerve where the diagonal lines interſect the level view of the tuck in the body plan, and ſquare them up to the line for the aft ſide of the faſhion piece, which will give the give their proper ſtations, and may from thence be marked on the mould.

I have now laid down and deſcribed the ſquare tuck, as ſuppoſing it to be a flat ſurface, with no round aft, in order that the artiſt may ſee the nature of it in that form, before he attempts to lay it down in a more difficult one, and as ſuppoſing it to be clearly underſtood, I ſhall in the next place proceed to lay down a ſquare tuck, the outſide of which is to round forward, and that the laying down of it may be clearly underſtood alſo, I ſhall firſt give a deſcription of it in its finiſhed ſtate.

Suppoſe a flat ſurface compoſed of thin deal, (in length from the wing tranſom to the keel, and in breadth equal to one ſide of the wing tranſom) was placed with one edge to the rabbet of the poſt, and the other edge bent round in a curve as much as the outſide of the tuck is intended to round forward, in which position suppose it to be confined; then from the upper edge at the outside set down the round down of the wing transom, from which place to the upper edge at the middle line, draw a curve, and cut it out; the upper part will then represent the upper edge of the wing transom; then from the part representing the end of the wing transom, draw the shape of the outside of the tuck down to the post, and cut that also; the true shape of the tuck now is shewn as it is to be trimmed, and as it will appear when in its finished state: then take it from its place and lay it flat, letting the round be unconfined, and it will then appear as it is required to be laid off in the body plan, in order to make the moulds therefrom.

Therefore proceed in the first place to represent the level view in the body plan as follows: draw a level line in the sheer plan at the height of the wing transom at the side, and likewise several other level lines at convenient distances below that, and where each level line intersects the aft part of the rabbet of the post, square them down to the middle line of the half breadth plan, making of spots; then upon the upper level line set off from the aft side of the rabbet post, the round forward of the wing transom, and square it from thence down to the half breadth plan, upon which set off the half breadth of the wing transom; then from the spot set off for the half breadth of the wing transom, draw a curve to the spot for the upper level line at the middle line, which will represent the aft side of the wing transom at the height of the upper level line; then from the other spots at the middle line draw curves also, exactly similar and parallel to the curve of the wing transom. The level lines may now be transferred from the sheer to the body plan, and from thence may be taken off and run in the half breadth plan; then take the distance square from the middle line in the half breadth plan, to where the level lines intersect their respective curves for the aft side of the

tuck,

tuck, and ſet them off from the middle line on their correſponding level lines in the body plan; a curve then paſſing through thoſe ſpots will ſhew the level view of the tuck in the body plan; alſo where the level lines in the half breadth plan interſect their reſpective curves, ſquare them up to their correſponding level lines in the ſheer plan, and by letting a curve paſs through the different ſpots, the thwartſhip view of the faſhion piece will be thereby repreſented in the ſheer plan.

The thwartſhip view of the aft ſide of the faſhion piece being ſhewn in the ſheer plan, we may perceive that it leaves the rabbet of the ſtern poſt at the head, in order to be conformable to the end of the wing tranſom, yet we muſt have a line drawn ſquare from the rabbet of the ſtern poſt, to lay the tuck down on the flat, the ſame as before, which will alſo be the ſeating of the tuck.

Therefore, take the neareſt diſtance from the ſquare line in the ſheer plan, to where each level line interſects the aft ſide of the faſhion piece, and ſet them off from the ſaid line in the body plan up the middle line, and draw horizontal lines at every height; then take the diſtance from where the level lines in the half breadth plan interſect their reſpective curves, to the middle line in the direction of the ſaid curves, and ſet them off from the middle line on their correſponding level lines laſt drawn; then a curve paſſing through theſe laſt ſpots, will give the form of the aft ſide of the faſhion piece, that will agree with the other timbers when in their places, and to which line the faſhion piece mould muſt be made.

The line in the half breadth plan for the aft ſide of the wing tranſom, is not the line to make the wing tranſom mould to: therefore where the curve

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of the wing tranſom interſects the level line in the half breadth plan, ſquare out a ſmall line; then take the diſtance from the middle line of the body plan, to where the level view of the tuck interſects the upper level line, on the round up of the tranſom, and ſet it off ſquare from the middle line of the half breadth plan on the ſmall line ſquared out, which will give a ſpot for the end of the tranſom; then where the upper ſide of the wing tranſom at the middle in the ſheer plan, interſects the aft part of the rabbet of the poſt, ſquare it down to the half breadth of the poſt in the half breadth plan, from which let a fair curve paſs to the ſpot before made for the end of the tranſom, and the upper ſide of the wing tranſom will be repreſented, to which line the mould muſt be made; the bevelling of the wing tranſom will be the ſame right athwartſhips, and which is the bevelling of the rake of the rabbet of the poſt.

The aft ſide of the faſhion piece not being ſtraight, it would be more troubleſome than uſeful to run lines to trim it by bevellings, therefore the beſt way will be to make a mould to the fore ſide, and trim a ſpot to ſay to the ſide of the poſt, and ſet off a bevelling likewiſe at the main breadth, the mould for the fore ſide may then be kept well at the main breadth, and likewiſe at the heel, by which the fore ſide may be moulded.

Therefore proceed to lay down the fore ſide of the faſhion piece: whatever the faſhion piece is to be ſided, ſet it off ſquare from the rabbet of the poſt in the ſheer plan, and ſee what it will be in the direction of the level lines, which muſt be ſet off from the aft ſide on the level lines, by which the fore ſide may be repreſented in the ſheer plan; take the neareſt diſtance from the ſquare line for the ſeating of the tuck in the ſheer plan, to where the level lines croſs the fore ſide of the faſhion piece, and ſet them up the middle line

line in the body plan, from the line for the ſeating of the tuck there, and draw horizontal lines; then where the fore ſide of the faſhion piece croſſes the level lines in the ſheer plan, ſquare it down to their correſponding level lines in the half breadth plan, from which take the diſtances to the middle line in the direction of the curves, and ſet them off from the middle line on their correſponding horizontal or level lines in the body plan; this will give the ſpots through which the curve muſt paſs that forms the fore ſide of the faſhion piece agreeable to the propoſed ſcantling, and to which line the mould for the fore ſide of the faſhion piece muſt be made.

Proceed to make a mould to the aft ſide of the faſhion piece in the body plan, the upper end of which may run a little above the wing tranſom, and cut off in a level direction, and the lower end may cut off to the level line for the ſeating, and likewiſe well with the middle line; then the mould for the fore ſide may be made to the line for the fore ſide in the ſame manner: another mould ſhould then be made to round aft on a ſquare, which muſt be to that line firſt drawn for the aft ſide of the wing tranſom in the half breadth plan, let it be of a parallel breadth, equal to the ſiding of the faſhion piece, let the inner end be cut off at the ſide of the poſt, parallel to the middle line, and let the outer end correſpond well with the level line or outſide of the faſhion piece; then when the faſhion piece is going to be trimmed, it may be roughly ſided on the aft ſide, ſo as to lay the mould of the aft ſide on it to cut off the head and heel nearly, the head may then be cut off by the mould the thwartſhip way, and the fore and aft way may be cut off ſquare; then faſten the round aft mould that is made to the ſcantling on the head of the faſhion piece, by which the fore and aft ſides may be trimmed out of winding, by lines parallel to the middle line, we ſhall then have the beſt opportunity of ſeeing how to convert the piece, by ſeeing both ſides at once, and the faſhion piece will then be of a parallel thickneſs from one end to the other, by all lines that are parallel, whether perpendicular or level.

The bevelling may then be taken at the main breadth, or end of the wing tranſom, by applying the ſtock of the bevel to the curve of the tuck, and the tongue to its correſponding level line; another bevelling may then be taken at the level line, neareſt the heel of the faſhion piece, in the ſame manner as the other bevelling, then when thoſe two bevellings are applied to the faſhion piece, care muſt be taken to keep the ſtock of the bevel in the direction of the level lines, which directions ſhould be marked on the mould; then when the faſhion piece is trimmed to thoſe two bevelling ſpots, the mould for the fore ſide may be applied, and the fore ſide by that means may be trimmed exactly.

In ſmall veſſels or boats, the planks of the bottom generally run through to the aft ſide of the tuck, but in larger veſſels the faſhion piece is generally left big enough to admit of a rabbet at the fore ſide to receive the ends of the plank, which is the beſt and ſtrongeſt method. The faſhion piece, as I have laid it down, is conformable to the timbers of the body, both at the fore and after ſides, for reaſon that it might be eaſier underſtood; but when the faſhion piece is moulding, care ſhould be taken to leave wood enough without ſide the moulds to allow of a rabbet ſufficient for the planks of the bottom.

CHAP.

CHAP. XIV.

Of laying down the ſeveral parts of the head.

THE head being drawn in the draught, it may be taken off from thence and repreſented on the mould loft floor, in its proper place in the ſheer plan, letting the rails, cheeks, knee, and every other part, be exactly ſimilar to the lines of the draught: this will be the exact horizontal and thwartſhip view of the head; that is, as it appears on the ſhip, when the rails, &c. are in their places, and viewed in an horizontal and thwartſhip direction. The firſt thing required will be to find the exact form of the rails, as they will appear when viewed in a direction ſquare to their ſides, which conſequently will be the form to which the mould muſt be made.

Continue the middle line of the half breadth plan as much farther forward from the ſtem as the length of the whole head; then ſquare down from the ſheer plan to the middle line of the half breadth plan, the fore ſide of the figure, and the foremoſt end of the upper rail, and ſet off on it the half breadth of the lacing; from which place to where the beak head line interſects the top breadth line, draw a ſtraight line, which will repreſent the inſide of the main rail in the half breadth plan, as ſuppoſing we were right over it, and looking down upon it; then ſet off the ſiding of the rail at the

the fore and after end, and represent the outside by another straight line, and as the outside is the sight side, or that part which appears when viewed on the ship, it will therefore be the properest side to lay down.

In the next place, let a level line be struck in the sheer plan, at the height of the upper part of the foremost end of the main rail, and let it be continued as far aft as the after end of the said rail; then square up the aft sides of the head timbers to intersect the said level line, and one or two lines may likewise be squared up between them from the main rail, and also one or two between the after head timber and the after end of the rail, disposing of them all in such a manner as to be nearly of equal distances; then square the said lines from the level line of the sheer plan down to the middle line of the half breadth plan, and where they intersect the line for the outside of the main rail, square them out from the said line; then take the distance from the level line in the sheer plan, to the upper and lower edges of the main rail at each square line, and set them off from the line for the outside of the rail in the half breadth plan, on their corresponding squared lines; a curve then passing through those spots for the upper and lower edge, will shew the exact form of the upper rail; and the rail being made agreeable to those lines when put in its place, will appear exactly the same as the main rail represented in the sheer plan.

Then where the lines squared out from the middle line in the half breadth plan intersect the line for the inside of the main rail, draw them from thence square from the line for the outside, to the rail already laid down, and take the distance from the line for the outside on these lines, to the upper part of the rail, and set them down from the level line in the sheer plan,

plan on their correſponding ſquared lines, which will give ſpots that will ſhew the inſide of the main rail in the ſheer plan, and which is ſeen only from the middle of the rail forward, becauſe the aft part falls below the outſide, and therefore cannot be in view. The inſide of the rail at the lower edge ſhould alſo be ſet off in the ſame manner in the ſheer plan, in order to lay down the timbers of the head.

Set off from the line repreſenting the inſide of the rail in the half breadth plan, the thickneſs of the under ſide of the rail, as it will be when champher'd, and draw a ſtraight line, which line muſt be laid down in the ſheer plan, becauſe in a thwartſhip view this is the proper ſight of the lower edge of the rail; therefore the lower part of the rail in the ſheer plan, which was firſt drawn in order to lay down the rail at its proper cant in the half breadth plan, may now be rubbed out, as the rail is now ſuppoſed to be champher'd or wrought.

Where the lines ſquared out from the middle line in the half breadth plan interſect the ſtraight line laſt drawn, draw them from thence to the lower part of the rail laid down ſquare from the ſtraight line for the outſide of the rail; then take the diſtance from the line for the outſide of the rail, to the lower part of the rail laid down, on each of the lines ſquared out, and ſet them off from the level line on their correſponding ſquare lines in the ſheer plan, which will give the lower part of the rail at the champher, as it will appear when trimmed and in its place.

In the next place, we muſt proceed to lay down the after head timber, as we cannot, till that is determined, get the ſpread of the lower rails in the half breadth plan; draw a level line in the moſt convenient place that is clear of the other lines, which level line may repreſent the lower part of the after head tim-

timber, or upper part of the upper cheek, at the line for the aft ſide of the after timber in the ſheer plan; take the height from the upper ſide of the upper cheek at the aft ſide of the timber in the ſheer plan, to the upper and lower parts of all the rails, and ſet them up from the ſaid level line laid down, drawing of other level lines; then from the firſt level line ſquare up a line, which will repreſent the middle line of the head timber, and then take the diſtance from the middle line in the half breadth plan, at the line ſquared down from the aft ſide of the head timber, to the outſide of the main rail, and likewiſe the inſide, and alſo the line for the champher of the rail at the under ſide, and ſet them off from the middle line of the head timber on their correſponding level lines, and draw the thwartſhip ſection of the main rail: ſet off in the half breadth plan the half breadth of the knee of the head, and draw the upper cheek; then take the diſtance from the middle line of the half breadth plan at the line for the aft ſide of the head timber, to the outſide of the cheek, and ſet it off from the middle line of the head timber on the lower part, from which to the ſection of the main rail at the upper part, draw a curve with an agreeable hollow, and the after head timber will then be repreſented.

The after head timber being laid down, we may now determine on the ſpread of the lower rails in the half breadth plan; therefore take the diſtance from the middle line of the after head timber to the ſides of the lower rails, and ſet them off on the line ſquared down for the aft ſide of the head timber, from the middle line in the half breadth plan, and draw the lower rails there the ſame as the main rail was done; then by proceeding to draw a level line for each in the ſheer plan, at the height where their foremoſt ends interſect the fore ſide of the hair bracket, they may be laid down in the half breadth plan juſt in the ſame manner as the main rail was laid down, to which lines the moulds for each of them muſt be made.

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The bevelling for the after head timber may next be taken, by proceeding in the following manner: ſet off the ſiding of the timber in the ſheer plan, and draw the fore ſide, and ſquare the fore ſide down to the half breadth plan, then from where the aft ſide of the timber in the ſheer plan interſects the upper ſide of the upper cheek, ſquare a line to interſect the fore ſide of the timber, which line may be termed the baſe line in the ſheer plan, as it agrees with the baſe line of the aft ſide of the timber laid down; take the height from the baſe line in the ſheer plan, up the fore ſide of the timber, to the upper and lower ſides of the rails, and ſet them up from the baſe line of the head timber laid down, drawing of level lines; then ſet off the fore ſide of the foremoſt timber in the half breadth plan, and where it interſects the outſide of each rail, take the diſtances to the middle line, and ſet them off from the middle line of the head timber laid down on their correſponding level lines, a curve then paſſing through the ſeveral ſpots ſo ſet off, will ſhew the exact form of the fore ſide of the head timber; then whatever diſtance the fore ſide is from the aft ſide on a ſquare, ſo much is the bevelling of the timber under from a ſquare in the ſiding of it. The other head timbers may then be laid down and bevelled in the ſame manner, and the bevellings for the heels of the timbers may be taken by applying the ſtock of a bevel to the aft ſide of the timbers, and the tongue to the flight of the upper part of the cheek.

The knee of the head comes next under conſideration, the mould for which is to be made ſimilar to the lines already laid down, which are exactly conformable to thoſe in the draught, therefore all that is now required, is to find proper ſections at certain places in order to ſide it, which ſections are generally deſcribed on the mould by the battens or braces which hold it together, and the knee is ſuppoſed to be trimmed exactly conformable to the ſize and ſhape of thoſe battens in the direction, and at the heights of their upper ſides:

let

let fall a perpendicular from the interſection of the lower ſide of the lower cheek, with the fore ſide of the rabbet of the ſtem, to the middle line of the half breadth plan (or to ſave confuſion in the lines, it may be let fall to the line for the upper edge of the keel, when that and the former line are not one) at which place ſet off the half breadth of the ſtem; then let fall another perpendicular from the fore ſide of the knee of the head to the ſaid line alſo, and ſet off the half breadth that the knee is intended to be at that place, from which draw a ſtraight line to the half breadth of the ſtem ſet off at the other perpendicular, and that will repreſent the ſiding of the knee from the lower ſide of the lower cheek upwards, agreeable to any perpendicular lines; then from the lower ſide of the lower cheek and figure, downward and outwards, it muſt be bearded in the following manner: draw the lines acroſs the knee where the upper ſide of the battens are intended to be, letting them be as near as poſſible in a ſquare direction from the fore ſide of the knee, and where thoſe lines interſect the upper ſide of the upper cheek, let fall perpendiculars to the lines firſt drawn for the ſiding of the knee, at which places take the diſtance between the two lines, and ſet them off at the interſecting of their correſponding lines, with the upper ſide of the upper cheek, and ſquare from the lines, and this will give the ſiding of the knee at thoſe places.

Alſo where the lines on knee interſect the lower ſide of the lower cheek, fore ſide of the figure, and the fore part of the rabbet of the ſtem, let fall perpendiculars as before, to the lines for the ſiding of the knee, and take the half breadths at thoſe places, and ſet off at their correſponding places from where they were ſquared down, which will give the ſiding of the knee at each place: next determine on the ſiding of the knee at the fore part at the lower line, and then pen a batten from the upper part of the knee round the fore ſide, marking all the lines on the batten; then fix the upper end of the batten well with the

the upper part of the perpendicular at the fore ſide of the knee, and mark on the ſaid perpendicular all the lines taken off from the knee, and alſo ſet off the half breadth of the knee at the upper part of the perpendicular, and likewiſe what it was determined to be at the lower part, or at the lower line taken from the knee, and then draw a ſtraight line from thoſe two ſpots at the ſide of the perpendicular, which will be the ſiding of the fore part of the knee: then take off the diſtance from the ſaid line to the perpendicular line, at each line which was taken from the knee, and ſet them off from their correſponding lines at the fore part of the knee, which will give the ſiding of the knee at each line: then from theſe ſpots to the ſpots at the lower ſide of the lower cheek, and fore ſide of the figure, and from thence to the upper ſide of the upper cheek, and to thoſe at the fore ſide of the rabbet of the ſtem, draw ſtraight lines which will give the ſiding of the knee at any part, being the half breadth of the knee at thoſe places, ſo that by nailing the battens on the mould agreeable to the two lines, the half breadth of the knee is given what it ſhould be at the upper ſide of the battens, and in their direction.

To mould the cheeks to their proper flight, a mould muſt be made to the cheeks in the ſheer plan, then when moulded the mould muſt be faſtened to the fore and aft arm of the cheek, and the cheek be trimmed out of winding by thwartſhip lines, or lines ſquare to the mould, and we ſhall then be certain that when the cheek is throated there will then be no angle in the throat, as there is ſometimes by the uſual method in a full bowed ſhip, where the ſheer ſprings more than the flight of the cheeks.

CHAP. XV.

Of laying down the ſtern timber.

THE ticked lines in the draught repreſent the ſtern timber, as it appears on the ſhip when viewed in a level direction, it is therefore now required to find that form which if the mould was made to, and put up in its place on the ſhip, and kept to the tumbling home of the ſide, would then appear the ſame as the ſaid ticked lines on the draught.

In the firſt place, take off the ſtern timber from the draught, and repreſent it in the ſame manner on the floor, and then proceed as follows, to repreſent it in the body plan. Draw ſome level lines acroſs the ſtern timber in the ſheer plan, one at the upper ſide of the wing tranſom at the ſide, one at the knuckle of the lower counter, and upper counter alſo, one or two between the upper counter and top breadth, and likewiſe two or three between the knuckle of the lower counter and wing tranſom, as that part will be rather more difficult than the others to find the exact ſhape; transfer theſe level lines to the body plan, and ſtrike them there, then take off the half breadth of all the level lines in the body plan at every ſquare timber, and ſet them off on their correſponding ſquare timbers in the half breadth plan, and run their curves, and where the level lines in the ſheer plan interſect the aft part of the ſtern timber, ſquare them down to their correſponding level lines in the half breadth plan, from which take the diſtances ſquare from the middle line, and ſet

ſet them off from the middle line on their correſponding level lines in the body plan, a curve then paſſing through theſe ſpots will ſhew the form of the aft ſide of the ſtern timber, agreeable to the lines of the ſheer plan, but if theſe ſpots ſhould not make a fair timber in the body plan, then thoſe in the half breadth muſt be altered, which ſeems moſt to require it, in order to make them correſpond and make a fair line in the body plan.

In the next place, draw the fore ſide of the ſtern timber in the ſheer plan, and where it interſects the level lines, ſquare it down to their correſponding level lines in the half breadth plan, from which take the diſtances ſquare to the middle line, and ſet them off from the middle line on their correſponding level lines in the body plan, through which ſpots let a curve paſs, and the fore ſide of the ſtern timber will alſo be repreſented in the body plan.

Let a ſtraight line be drawn in the body plan from the level line of the wing tranſom, up as high as the upper part of the ſtern timber, let it be as near to the line for the fore ſide of the timber as to touch it in the roundeſt place, which is between the wing tranſom and the lower counter, and alſo keep it nearly in the direction of the tumbling home of the timber; then place a batten to this line, keeping the lower end of it well with the level line of the wing tranſom, and mark on it all the other level lines, and then carry the batten to the ſheer plan, keeping the end of it well with the level line of the wing tranſom, and ſet up the heights of all the level lines perpendicular, and ſtrike new level lines. Where the level lines firſt drawn in the ſheer plan interſect the fore and aft ſides of the ſtern timber, ſquare them up to their correſponding new level lines, through which ſpots the lines muſt be drawn in order to get the true ſhape to which the mould of the ſtern timber muſt be made; and the laſt heights which were ſet up are the proper heights of the knuckles and level lines to be marked on the mould.

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The lines laſt drawn in the ſheer plan, to which the mould is to be made, are ſuppoſed to be the ſtraight lines in the body plan, ſtanding faſt at the wing tranſom, and the head lifted up till it ſtands perpendicular, which if let fall again in the direction of the ſtraight line in the body plan, would appear exactly the ſame as the ſtern timber firſt drawn in the ſheer plan, which is the form of the timber required when trimmed and in its place.

In the next place, the mould muſt be marked, and in ſuch a manner that the ſtern timber ſhall be trimmed both ways by this one mould; that is, the ſhape it appears in the ſheer plan, and likewiſe the fore and aft view as it appears in the body plan. Therefore proceed in the following manner: lay the mould in its place to the lines it was made to, and mark on it the new level lines, in the ſame direction as they are laid down, diſtinguiſhing them by their proper names on the mould, as lower counter, upper counter, &c. then take the diſtances from the ſtraight line in the body plan to the fore ſide of the ſtern timber at every level line, and in the direction of the level lines, and ſet them down in figures on their correſponding level lines on the fore ſide of the mould, and at thoſe level lines between the wing tranſom and lower counter, where the ſtraight line touches the line for the fore ſide of ſtern timber, let them be denoted on the mould by the word "well"; then proceed in the ſame manner and ſet down the diſtances or ſpilings on the aft ſide of the mould. Then to mould the timber the general method is to lay the mould on it, and lift the lower end till the mould, as it lays on it, anſwers the ſame tumbling home as the ſtraight line in the body plan, and likewiſe at the direction of the level lines the mould ſhall be level; then every ſpiling marked on the mould may ſet down from the mould to the timber in a perpendicular direction, which will give the exact ſtations of the knuckles, &c. and likewiſe give the exact ſhape of the timber at the fore

and

and aft ſides agreeable to the lines in the body plan; but if the timber be broader than the mould (as undoubtedly will be the caſe) then a ſtraight batten muſt be applied on the mould, in the direction of the level lines; for inſtance, ſuppoſe the ſpiling down from the mould at the upper counter was ſix inches at the fore ſide, and ten inches at the aft ſide, the difference would then be four inches, then lift the batten up four inches at the fore ſide upon a perpendicular, and cloſe down to the mould at the aft ſide, and then the ſpiling is ten inches parallel to the batten upon a perpendicular, let the timber be as broad as it will.

This method of lifting up the lower end of the timber in order to mould it, is attended with a great deal of trouble before it can be got in its proper poſition, I therefore would not recommend it for practice, as it can be moulded equally as true and exact without it, in the following manner: let the timber lay flat, or in any poſition whatever, then lay the mould upon it, and juſt try the ſpilings in a rough manner, in order to get the mould nearly in its right poſition, the ſpilings cannot as yet be ſet off to a nicety, becauſe they muſt not now be ſet off perpendicular, for the timber laying flat, and the level lines in the body plan not being ſquare from it, it conſequently follows, that if the ſpilings were ſet off perpendicular, that the ſtations of the knuckles, &c. would be too low, and likewiſe the timber by that means would have too much wood taken away, and the ſhape of it alſo would be quite altered: therefore as the ſpilings are not to be ſet off perpendicular, we muſt find what direction they are to be ſet off in; apply the ſtock of a bevel to the ſtraight line in the body plan, and place the tongue to the level lines, which, if the ſtock of the bevel is placed upwards, will be an under bevelling; then apply the bevel upon the mould with its ſtock upwards, and that will give the exact direction that every ſpiling is to be ſet off in both at the fore and aft

 ſides

ſides of the timber, and will give the exact ſtations of the knuckles, &c. and the true ſhape of the timber equally as nice as when the greateſt trouble is taken to lift the lower end of the timber up in order to get in a right poſition.

Then to take the bevellings of the ſtern timber, the round aft of the ſtern at the counters, wing tranſom, and toptimber line muſt be laid off in the half breadth plan, taken from the lines of the ſheer plan on a ſquare; then the tongue of a bevel may be placed to the different round aft lines, and the ſtock kept in a fore and aft direction, which will give the bevellings at the different places, and may be applied ſquare from the mould; or the bevellings may be taken in another manner to be applied on the timber when its outſide is properly trimmed, which is only by running the level lines in the half breadth plan ſquare from the ſtern timber in the ſheer plan, and placing the tongue of the bevel to the round aft lines as before, and the ſtock to the level lines, which will be the bevellings to be applied on the ſide and ſquare from the timber.

CHAP. XVI.

Containing obſervations and remarks upon timber, with the methods made uſe of to meaſure it, and alſo the rules to compute the contents.

HAVING in the foregoing chapters of this book, laid down and explained whatever is neceſſary to be underſtood in the laying down of a ſhip in the mould loft, and from which all the moulds may be made, in order to con-

convert the timber into its proper ſhape, I ſhall, in conſequence thereof, proceed to lay down a few obſervations and rules for the meaſurement of timber, that the artiſt may thereby make himſelf acquainted with that part of his buſineſs, as ſuppoſing him now qualified, from what has been ſaid in this treatiſe, to build and compleat a ſhip of any dimenſions.

In ſhipbuilding, this part is as abſolutely neceſſary to be known, as any other throughout the whole art; for without the knowledge of which, let the artiſt be ſkilled in every other point whatever, he would cut but a poor figure when he has the materials to procure for the purpoſe of building the fabric, as he would then be at a loſs to diſplay thoſe good abilities he was already in poſſeſſion of.

Timber is generally divided into three ſorts, viz. ſquare timber, thick ſtuff, and plank. By ſquare timber, is underſtood the full ſize of the tree as it grows, only having its ſides ſquared: by thick ſtuff, is meant ſquare timber cut into different thickneſſes, from ten inches down to four inches and half, but the whole depth of the timber the other way; and plank is that which runs from four inches down to one inch and half in thickneſs, and all under that thickneſs is termed board.

Oak, elm and beech timber are always ſquared by the merchants, before they are ſerved into the King's or other yards for the purpoſe of ſhipbuilding, and by their contract with the King's yards, they muſt be ſquared in ſuch a manner, that the ſum of the breadth of the ſlabs taken off are not to be leſs than twice the ſum of the wanes; if they ſhould be leſs, then the King's meaſurers cauſe the upper ſides to be pewed, until the dimenſions are reduced to the terms above-mentioned; then when the timber is meaſured, the ſides of it thus ſquared are taken by a pair of callipers (or large compaſſes, whoſe legs

legs are bent inwards ſo that the points will meet) each way, and the two ſquares ſo taken are added together, the half of that ſum gives a mean which being multiplied by itſelf, and then into the length, produces the contents.

Aſh timber is received into the King's yards unſtript of its bark, and when it is meaſured, the circumference is taken by a ſmall cord or line, and that circumference divided by four, is termed the girt, and eſteemed as though it was the ſide of a ſquare, whoſe area was equal to a ſection of the tree at the place where it was girted, therefore the ſquare of that girt multiplied by the length, it accounted the contents.

All timbers is bought and ſold by the load, and a load is reckoned to be forty feet of unhewn or rough timber, and fifty feet of hewn timber, which is ſuppoſed to weigh a ton, or twenty hundred weight: for, ſay they, hewn timber is meaſured by the ſquare, and is very near exact; but rough timber by the girt, (or quarter compaſs) which is about one-fifth leſs than exact; therefore in the buying and ſelling of timber, it amounts to much the ſame, whether it be meaſured by the girt, at forty feet ſolid to a load, or meaſured exact, at fifty feet to a load. In the King's yards forty feet of hewn timber is reckoned a ton, and fifty feet of ſuch timber goes to a load.

Thick ſtuff and plank is always ſerved from the merchant ſided to its various thickneſſes, which is always cut in the wood or foreſt where it grows, and when meaſured the ſuperficial contents only taken, which is done by meaſuring the breadth exactly in the middle, and multiplying that by the whole length, then the number of ſuperficial feet in a load is according to the thickneſs of the different plank or thick ſtuff, as may be ſeen in the following table.

Thick-

Thickneſs of the thickſtuff or plank - - - -	Inch 10	Inch 9	Inch 8	Inch 7	Inch 6	Inch 5	Inch 4	Inch 3	Inch $2\frac{1}{2}$	Inch 2	Inch $1\frac{1}{2}$
Number of ſuperficial feet to a load - - - -	Feet 60	Feet 66,66	Feet 75	Feet 85,71	Feet 100	Feet 120	Feet 150	Feet 200	Feet 240	Feet 300	Feet 400

There are ſeveral other articles that occur in the meaſuring of timber for ſale, all of which I ſhall ſufficiently explain under their different heads or examples.

1. To compute the ſolidity of round timber, when the tree is ſtraight and the ends equal, or nearly ſo.

RULE. Multiply the ſquare of one-fourth of the circumference by the length, and the product is the ſolidity, or the contents.

EXAMPLE.

What is the ſolid contents of a tree, whoſe circumference is 64 inches, and the length 24 feet?

One-fourth of 64 in. is 1 ft. 4 in. multiplied by 1 ft. 4 in. is equal to 1 ft. 9 in. 4.

Then 1 ft. 9 in. 4 multiplied by 24 ft. is equal to 42 ft. 8 in. the ſolidity.

Note. But if the tree ſhould not be ſtraight, then the length muſt neither be taken on the concave or convex ſide, but in the middle.

2. To compute the ſolidity of round timber, when the tree tapers, or is unequally thick.

RULE. Girt the tree in as many places as are thought neceſſary: then the ſum of the ſeveral girts divided by their number, gives (as ſuppoſed) the mean circumference, and the fourth of that ſquared and multiplied by the length, gives the ſolid contents.

EXAMPLE.

A tapering tree is girted in four places, the girts being as follow: firſt 3 ft. 9 in. ſecond 4 ft. 5 in. third 4 ft. 9 in. and fourth 5 ft. 9 in. the length is 20 ft. what is the ſolidity?

3 ft. 9 in. add 4 ft. 5 in. add 4 ft. 9 in. add 5 ft. 9 in. is equal to 18 ft. 8 in. divided by 4 is equal to 4 ft. 8 in. the mean compaſs.

Then 4 ft. 8 in. divide by 4 is equal to 1 ft. 2 in. multiplied by 1 ft. 2 in. is equal to 1 ft. 4 in. 4. 1 ft. 4 in. 4. multiplied by 20 is equal to 27 ft. 2 in. 8. the ſolidity.

3. To compute the ſolidity of ſuch trees as have their bark on.

In meaſuring ſuch timber for ſale, it is common to make an allowance to the buyer on account of the bark, which is generally 1-12th part of the circumference deducted. This deduction being made, is supposed to reduce the compass to that which the tree will have when the bark is stripped off.

RULE. From the given circumference, deduct the allowance for bark; and with the remaining compass find the solidity as before.

EXAMPLE.

A tree is 40 ft. long, and 2 ft. 8 in. quarter compass: required the solid contents, allowing 1·12th for bark?

12) 2 ft. 8 in.(2 in. 8. allowance then from 2 ft. 8 in. deduct 0 ft. 2 in. 8. is 2 ft. 5 in. 4. reduced quarter. Then 2 ft. 5 in. 4. multiplied by 40 ft. is equal to 97 ft. 9 in. 4. the solid contents.

4. To measure and compute the solidity of square timber as received into the King's and other yards.

Because of the great irregularity in the growth of timber which is most useful in shipbuilding, the taking of a mean out of several girts or dimensions not being sufficiently accurate, the method that is used in the King's and other yards, is to measure the tree into as many lengths as the measurers shall judge proper, (that is, they mark off the different lengths as far as the tree tapers regular) and then find the contents of each length separately, and adding the whole together, by that means get the contents of the whole tree, and branches or boughs measuring 2 ft. in compass, or 6 in. girt are reckoned as timber, and their solidity in computed and added to that of the tree, but so much of the trunk, boughs or branches that measure less than 6 inches, are not esteemed timber, and therefore not added to the other contents.

RULE. Measure the tree into as many lengths as may be judged proper, then find the contents of each length as follows: when the lengths are set off take the size of the tree upon the parts that are squared both ways, and exactly in the middle of each length, then add the two squares together, and take one half, which will give a mean square, multiply the mean square by itself, and that by the respective length, the product will be the contents: then add the contents of every length so found, and the total will be the solidity of the whole tree in feet, which being divided by 50, the quotient will be the number of loads contained in the whole tree.

EX-

EXAMPLE.

Required the ſolidity of a tree, whcſe dimenſions are as follow: firſt length 18 ft. the ſquare 16 in. by 18 in. ſecond length 12 ft. ſquare, 14 in. by 12 in. third length 10 ft. ſquare 10 in. by 8 in. one branch 9 ft. ſquare 8 in. by 6 in. and another branch 8 ft. ſquare 9 in. by 7 in.?

	Ft. In.		Ft. In.		Ft. In.		Ft. In.		Ft. In.	Contents of
Mean ſquare	1 5	multiplied by	1 5	is equal to	2 0 1	multiplied by	18 0	is equal to	36 1 6	firſt length
Ditto	1 1	ditto	1 1	ditto	1 2 1	ditto	12 0	ditto	14 1 0	ſecond length
Ditto	0 9	ditto	0 9	ditto	0 6 9	ditto	10 0	ditto	5 7 6	third length
Ditto	0 7	ditto	0 7	ditto	0 4 1	ditto	9 0	ditto	3 0 9	of one branch
Ditto	0 8	ditto	0 8	ditto	0 5 4	ditto	8 0	ditto	3 6 8	the other branch
								Solidity of the tree	62 5 5	

The calculating of the dimenſions by figures as above, ſhews the exact contents of the tree (according to the rule obſerved) to the twelfth part of an inch; but as that would be ſo very tedious in meaſuring of timber for ſale, or in receiving of it into ſtore, the meaſurers therefore for quick diſpatch make uſe of the ſliding rule, by which they calculate no nearer than to the half of a foot in the contents of each length, but that is of little or no conſequence, as the loſs thereby will not be more than the odd inches in the above tree: then after finding the contents of each length by the ſliding rule, they proceed as before, by adding them all in one ſum for the contents of the whole.

To find the contents of each length by the ſliding rule.

As 12 on the girt line, is to the *length* on the ſlider; ſo is the *mean ſquare* on the girt line, to the *contents* on the ſlider.

5. To meaſure and compute the ſolidity of thickſtuff and plank, as received into the King's and other yards.

RULE. Multiply the whole length of the plank by the breadth taken exactly in the middle, and the product will be the ſuperficial contents: then to find the ſolidity or number of loads contained therein, look for the thickneſs of the plank or thickſtuff, in the before-mentioned plank table, under which will be found the deviſor to divide the ſuperficial contents in feet by, in order to give the ſolidity in loads.

EX-

EXAMPLE I.

Required the number of loads contained in a piece of 10 in. thickstuff, whose length is 49 feet, and the breadth taken in the middle 1 ft. 9 in.?

49 ft. 0 in. multiplied by 1 ft. 9 in. is 85 ft. 9 in. which divided by 60 is 1 load 25 ft. the solidity required.

EXAMPLE II.

There are ten $2\frac{1}{2}$ planks, each measuring 24 ft. in length, and 13 in. broad in the middle, required the the number of loads contained therein?

24 ft. 0 in. multiplied by 1 ft. 1 in. is 26 ft. 0 in. which multiplied by 10 is 260 ft. 0 in. superficial contents. Then 260 ft. 0 in. divided by 240 is equal to 1 load 20 ft. the solidity required.

By the sliding rule.

As 12 on the slider, is to the *breadth* on the rule, so is the *length* on the slider, to the *contents* on the rule.

In the foregoing examples are contained all that generally occurs in the measuring of timber for sale: but when timber is regularly and smoothly hewn, the solidities of such pieces had best be computed by the rules given for prisms, pyramids, cones, &c. and the frustums; for which the reader may refer to books on that subject.

Although the foregoing method of computing the solidity of round, or unsquared timber by the fourth part of the circumference, is commonly used on account of its ease, yet in fact it is very erroneous, for the fourth part of the circumference of a circle cannot be equal to the side of a square of equal area to that circle. Thus, if the circumference of a circle be one, the sides of a square of equal area to that circle is 0,2821; whereas by the false method of the girt, it is but 0,25.

Now the solidity of a round tree may be found by either of the following rules. 1. Multiply the square of the tree's compass by the length; and this product by 0,07958 will give the solidity.

Or, multiply the square of the tree's compass by one-twelfth of the length; divide this product by 24; to the quotient add a tenth of itself; and this sum substracted from the former product will leave the solidity.

In

EXAMPLE.

Suppoſe a tree to be in length 30 ft. and the quarter compaſs 16 in. required the ſolidity ?

By the firſt rule.

1 ft. 4 in. multiplied by 4. is equal to 5 ft. 4 in. the whole compaſs or girt.
Then 5,333 ſquared, is equal to 28,440889, which multiplied by 30, is equal to 853,226670.
853,226670 multiplied by 0,07958, is equal to 67,8997 the ſolidity.

By the ſecond rule.

Square of the compaſs 28,440889 multiplied by 2,5 the twelfth of the length is 71,1022225.
71,1022225 divided by 24 is equal to 2,9625926, which divided by 10, is ,2962592.
2,9625926 add ,2962592 is 3,25, which deducted from 71,10 leaves 67,8 the ſolidity.

By the common rule.

1 ft. 4 in. multiplied by 1 ft. 4 in. is equal to 1 ft. 9 in. 4.
Then 1 ft. 9 in. 4. multiplied by 30, is equal to 53 ft. 4 in. the ſolidity.

By each of the two firſt rules the reſult is about 67 ft. 10 in. but by the common method the ſolidity is only found to be 53 ft. 4 in. making a difference of above 14 ft. which is too conſiderable to be neglected.

In converting timber in the foreſt, great care ſhould be taken to preſerve it as large, and as circular as poſſible, from a conſideration of the great uſe of large and compaſs timber; but it ſhould be obſerved at the ſame time to adhere to the cuſtom of ſquaring it by the rule before-mentioned, as, was it not ſo ſquared, the detriment would not only be in the falſe meaſure, but would alſo be the means of ſometimes hiding the defects which might appear was the timber truly ſquared. And as the defects in timber are of the greateſt conſequence, they ſhould always be well examined when timber is received, that the buyer may have an opportunity of having ſomething abated in proportion to the nature of the defect. The defects in timber are various, but it is chiefly owing to the barrenneſs of the ſoil, as in looſe and broken ground the timber is generally ſhaky, which is a very pernicious defect, and alſo lopping of timber often occaſions it to rot and decay: ſound timber is generally produced in thoſe places where the earth conſiſts of a ſtrong clay, for which reaſon, timber of Engliſh growth is found to be far preferable to that of other countries; for though ſome of the beſt ſort of Eaſt-Country plank is very flexible, and conſequently uſeful in many purpoſes, yet where one is found to be very good, there are ten that are not ſerviceable, as they are either ſhaken, druxy, worm eaten, or full of rotten knots; therefore timber of Engliſh growth certainly has the preference, even after it hath ſtood ſo long that age hath made it pliable and paſt the time allowed for growth, it is then allowed to be as durable as any other in its full ſtrength.

AN EXPLANATION OF THE TECHNICAL TERMS, RELATING TO SHIPBUILDING.

With other Obſervations.

A

ABAFT, ſignifies the hinder part of the ſhip, or that part neareſt the ſtern.

AFORE, is applied to any thing placed nearer the head than ſtern.

AFT, that part of the ſhip from the midſhips to the ſtern.

AFTER, is a term applied to any thing belonging to the aft part of the ſhip, as after body, after timbers, &c.

ANCHOR STOCK, a method of working planks, whereby the butt of one plank comes nearly over the middle of anoth r plank, and the planks being broadeſt in the middle, and tapered to the butts, they thereby appear in ſhape like an anchor-ſtock.

A

APRON, is a part brought on to the aft ſide of the ſtem, in order to ſtrengthen it, the ſcarphs therefore ſhould always be diſpoſed clear of thoſe of the ſtem; when the rabbet of the ſtem is at the aft part, the apron is frequently ſided more than the ſtem, that it may receive the faſtenings of the fore hoods; but as the faſtenings muſt all be drove nearly in one direction, they are liable to ſplit the apron, therefore it is much ſtronger work when the rabbet of the ſtem is in the middle, becauſe then the apron is ſided the ſame as the ſtem, and the knightheads are fayed cloſe to the ſtem and apron, and bolted through both; the butt end bolts may then be drove into the knight-heads, which are broad enough to admit of their being croſs bored, and alſo ſecures the butts of the fore hoods much better than when they are faſtened to the apron.

BACK-

B

BACKSTAY-STOOLS, are ſhort pieces of plank, fitted for the dead eyes of the back ſtays, the ſame as the channels.

BALCONY, the gallery in the ſtern, which is chiefly in large ſhips.

BEAK-HEAD, is a ſmall platform in large ſhips at the fore part of the upper deck, it ſerves occaſionally for the uſe of a gun, for which reaſon it ſhould be placed the ſame height as the port ſills; but it is chiefly for the conveniency of the men.

BEAMS, are the large pieces of timber placed acroſs the ſhip under the decks, their ends are lodged on the clamps and fayed to the timbers, and being bound to the ſide by knees, they therefore ſupport and keep the ſhip together.

BEARDING, is a term applied to the diminiſhing of any piece of timber or plank from a given line, ſuch as the bearding line of the dead wood, bearding of the clamps, plank ſheers, fife rails, &c.

BELLY, the inſide or hollow part of compaſs timber, the outſide of which is called the back.

BEND, the form of the ſhip's body from the keel to the top of the ſide, at any particular place, as at the broadeſt part of the ſhip it is termed the midſhip bend.

BEVELLING, is a term applyed to any alteration from a ſquare: there are two ſorts of bevellings, viz. Standing, and under; by a ſtanding bevelling is meant that which is without a ſquare, and an under bevelling, that which is within a ſquare.

BINDING-STRAKES, are two ſtrakes of oak in the decks, generally wrought near the comings, and worked all fore and aft, they are thicker than the reſt of the deck, and let down between the beams and ledges, ſo that the upper ſide ſhall be even with the reſt of the deck, the deſign of them is to ſtrengthen and bind the deck ſo well together as to prevent its drawing.

BIRTHING, is a term generally uſed in the working of planks, as birthing up a bulkhead, topſide, &c.

BITTS, or BITT PINS, thoſe large pieces of ſtraight timber to which the cables are faſtened, their heads are placed on the ſame deck with the hawſe holes. There are alſo ſmall ones fitted near the maſts, for the conveniency of the topmaſts and rigging.

BLACK STRAKE, is that ſtrake which is worked upon the upper edge of the wales, which is to aſſiſt the ſtrength of the ſhip in that part; and in ſhips where there are no ports near the wales, there are generally two black ſtrakes wrought.

BOBSTAY HOLES, are thoſe holes in the fore part of the knee of the head, for the ſecurity of the bobſtay under the bowſprit.

BOLTS, the iron or copper faſtenings by which the different parts of the ſhip are faſtened together.

BOWS, the round part of the ſhip forward on both ſides.

BOXING, the projection left on the hawſe-pieces in the wake of the hawſe-holes, where the planks do not run through.

BRACES, that ſecurity to the rother, which is fixed to the ſtern poſt, and bottom of the ſhip, and to which the rother is hung.

BREAST-HOOKS, are large pieces of compaſs or knee timber, placed acroſs the bows of the ſhip, into which they are bolted; they are the chief ſecurity to keep the bows together, and thoſe below the decks ſhould always be placed ſquare with the body of the ſhip.

BREAST-

B

BREAST-RAIL, the upper rail of the balcony, or of the breaſt-work on the quarter deck.

BREAST-WORK, are thoſe ſtantions with rails on the foremoſt end of the quarter deck, and after end of the forecaſtle.

BREECH, the angle formed by knee timber, the inſide of which is called the throat.

BULGE, that part of the ſhip ſhe bears on, when on the ground.

BULGEWAYS, thoſe pieces of timber which are placed under the bulge of the ſhip to ſupport her when launching: their extreme diſtance is generally one third the breadth of the ſhip, but this ſhould wholly be governed by the form of the midſhip bend.

BULKHEADS, the ſame with partitions in a houſe.

BUMPKINS, are thoſe pieces fitted above the main rail, and extend outwards, for the purpoſe of hawling down the fore tack.

BUTT, the opening between the ends of two planks when worked, it alſo ſignifies the ground end or biggeſt end of all timbers.

BUTTOCK, that part of the body abaft, bounded at the upper part by the wing tranſom, and below by the upper or ſecond water line.

C

CAMBER, a term for any thing that rounds.

CANT, any thing that does not ſtand ſquare is ſaid to be on the cant.

CANT-TIMBERS, thoſe timbers afore and abaft which do not ſtand ſquare from the middle line of the ſhip.

C

CANTING, the act of turning any thing from one ſide to the other, as canting of plank, timber, &c.

CAPS, pieces of oak laid on the upper blocks under the keel, which are for the purpoſe of ſpliting out when the ſhip is nearly finiſhed to put the falſe keel under, they therefore ſhould be of the free'ſt oak, and ſhould be in thickneſs ſomewhat more than the fale keel, in order to allow for the ſettling of the ſhip, and likewiſe for wedges to be drove under the falſe keel to preſs it cloſe to the main keel.

CAPSTAN, a piece of mechaniſm for heaving up the anchor, or for other purpoſes which require a great ſtrain.

CARLINGS, are ſquare pieces of timber which lie fore and aft from one beam to another, and are the main pieces of the framing of the decks, being ſcored into the beams.

CATHEADS, are large pieces of timber fixed one on each ſide the ſhip at the fore moſt end of the forecaſtle, and are for the purpoſe of heaving up the anchor, one end of them is faſtened to the forecaſtle, and the other projects without the bow, ſo far as to keep the anchor clear of the ſhip when it is heaving up by a tackle, the block of which is called the cat block, and the tackle is called the cat-fall.

CAULKING, the act of filling the ſeams of the planks full of oakum to prevent the ſhip from leaking.

CHAINS, are links of iron from the dead eyes to the ſhip's ſide, for the purpoſe of ſecuring the rigging.

CHAMPHER, the taking of a ſharp edge from any piece of timber or plank.

CHAN-

C

CHANNELS, are broad planks fitted to the ſhip's ſide, for the purpoſe of fitting the dead eyes; they are generally fayed cloſe to the ſhip's ſide, by which they harbour a great deal of wet and dirt, and by that means help to rot the ſide, and likewiſe the channel; they ſhould therefore have an opening between them and the ſide, about one inch and half or two inches, letting them be cloſe to the ſide only at thoſe places where the bolts go through, ſo that there would always be a paſſage for wet, dirt, &c. and would likewiſe admit of the air paſſing through, which is another very neceſſary matter.

CHANNEL-WALES, are thoſe ſtrakes worked between the gun deck and upper deck ports of large ſhips, for the ſtrength of the topſide, and are generally placed in the beſt manner poſſible, to admit of the deck bolts paſſing through them.

CHEEKS, are thoſe pieces of knee timber upon the ſhip's bows, for the ſecurity of the knee of the head.

CHESTREE, is a piece fitted to the topſide abaſt the fore channel, with a ſhiver fixed in its head for the conveniency of hawling home the fore tack.

CHINE, that part of the water way which is left the thickeſt, and is above the deck, in order that the lower ſeam of ſpirketting may be more conveniently caulked.

CHOCKS, are any pieces that are fitted to make a deficiency; as at the heads and heels of timber, &c.

CIELING, a term ſometimes uſed to ſignify the inſide plank on the flat of the floor.

CLAMPS, are thoſe ſtrakes worked within ſide, upon which the ends of the beams are placed.

C

CLEAN, is a term generally uſed to expreſs the ſharpneſs of a ſhip's body; as when a ſhip is very ſharp forward, and the ſame aft, they ſay ſhe is clean both forward and aft.

COCKPIT, that part of the after platform between the ſtore rooms, where the wounded are taken down to be dreſſed in the time of action.

COMPANION, is the birthing round the ladder way leading to the great cabin, and is chiefly in ſmall ſhips for the purpoſe of preventing the ſea from beating down.

COUNTER, lower, is that part of the ſtern between the wing tranſom and the rail above; and between that and the rail under the lights, is called the upper counter.

COUNTER-TIMBERS, are thoſe ſhort timbers in the ſtern, put in only for the purpoſe of ſtrengthening the counter.

CROSS CHOCKS, are pieces fayed acroſs the dead wood in midſhips to make good the deficiency of the heels of the lower futtocks.

CROSS-PIECES, are thoſe pieces of timber bolted to the bitts athwartſhips, and are for the purpoſe of belaying the cables, &c.

CROSS-PAULS, are thoſe pieces of fir timber or deals which keep the ſhip together whilſt in her frames.

CROWS FOOT, is a crooked or caſt piece of timber, extended from the ſide of a beam to the ſhip's ſide, to ſupply the place of a beam as in the main hatch, main maſt room, &c.

CRUTCHES, thoſe pieces of crooked timber placed within ſide the ſhip abaft, for the ſecurity of the heels of the half timbers.

DAG.

D

DAGGER, a piece of timber that crosses the poppets of the bulgeways to keep them together, and the plank that secures the heads of the poppets, is called the dagger plank.

DAGGER-KNEES, are knees supplying the place of hanging knees, and their side arms are brought up with a cast to the under side of the lodging knees; they are chiefly in the lower decks of merchant ships, in order to preserve as much stowage in the hold as possible.

DEAD-DOORS, are doors fitted to the outside of the quarter gallery doors, in case the quarter gallery should be carried away.

DEAD-EYES, are round pieces of elm fixed in the channels with three holes in them, through which the lanyards of the shrouds are reeved.

DEAD FLAT, a name given to that timber or frame which has the greatest breadth and greatest capacity in the ship, and generally termed the midship bend: in those ships where there are several frames or timbers of the same breadth or capacity, that which is the middle one should always be reckoned as dead flat.

DEAD LIGHTS, shutters made to the stern and gallery lights, and fixed to the outside in bad weather.

DEAD WOOD, are pieces of timber placed fore and aft on the keel, for the purpose of seating the floor timbers, and afore and abaft the floor timbers it is continued as high as the cutting-down line, for the purpose of receiving the heels of the cant timbers.

DECKS, are those parts in a ship which are similar to floors in a house, and are denominated according to their situation, as lower, middle, upper, &c. The lower deck of large ships is wholly laid with oak plank, nailed to the beams, and treenailed to the ledges; the other decks are laid with deal, only at those parts where the bolts of the standards pass through, which are oak.

DOWSING-CHOCKS, pieces fayed a cross the apron, and lapped on the knightheads or inside stuff above the upper deck.

DRAUGHT, the drawing or delineation of the ship upon paper, describing the different parts, and from which the ship is built; it is generally drawn by a scale of one quarter of an inch to a foot.

DRAUGHT of WATER, is a term signifying the depth of water a ship displaces when swimming or lying therein.

DRIFTS, are those parts where the rails are cut off, and ended with a scrole.

DRIFT-PIECES, the pieces fitted to form the scroles at the drifts.

DRIVER, a name given to the foremost spur in the bulgeways, the heel of which is fayed to the fore side of the foremost poppet, and the sides of it look fore and aft.

DRUXY, timber in a state of decay, with white spungy veins.

DUB, a term signifying to work with an adze.

E

EEKING, any piece fitted to make good a deficiency in length, as at the end of a knee, or at the lower part of the supporter under the cat-head, where it is only put to continue the shape and fashion of that part, being of no other service.

EVEN-KEEL, a ship is said to swim on an even keel, when she draws the same draught of water both afore and abaft.

F

FACE-PIECE, a piece on the knee of the head, which is wrought on the fore part to aſſiſt the converſion of the main piece, and likewiſe to ſhorten the upper bolts.

FALSE-KEEL, is compoſed of pieces of elm, fitted under the main keel to preſerve it from being rubbed, and alſo if the ſhip ſhould happen to ſtrike the ground, the falſe keel will give way, and by that means ſave the main keel; it will likewiſe make the ſhip hold a better wind.

FALSE-POST, a piece brought on at the aft part of the main poſt for the ſame purpoſe as the falſe keel, that is, to ſave the main poſt, in caſe the ſhip ſhould happen to ſtrike in that part.

FALLING-HOME, a term generally applied to the upper part of the topſide when it is very much within a perpendicular.

FASHION-PIECES, thoſe timbers which are ſecured to the ends of the tranſoms.

FAY, a term ſignifying to join any one piece ſo cloſe to another, that not the leaſt opening ſhall be ſeen.

FENDERS, are two pieces upon the topſide, abreaſt of the main hatchway, to prevent the ſhip's ſide from being rubbed by hoiſting in goods.

FIFE-RAIL, a rail wrought on the timber heads above the quarter deck and forecaſtle, ſimilar to the plank ſheer.

FIGURE, the principal piece of carve work in the head, placed as an ornament to the fore part of the ſhip.

FILLINGS, pieces of fir fayed between the cheeks of the head.

F

FILLING-TIMBERS, are thoſe timbers which are put up after the ſhip is in her frames and ſhored, and are not bolted together as thoſe which compoſe the frames.

FINISHINGS, the carved ornaments of the quarter gallery; thoſe below are called the lower finiſhings, and thoſe above the upper finiſhings.

FLATS, a name given to all the timbers in midſhips, which are ſimilar to dead flat.

FLAIRING, ſignifies oppoſite to falling home, as when a ſhip's ſide forward falls out from a perpendicular, they ſay ſhe has a flairing bow.

FLOORS, the lowermoſt timbers of the ſhip, upon which the whole frame is erected; they generally extend as far forward as the fore maſt, and as far aft as the after ſquare timber, in the after part of the ſhip; they are very difficult to procure, and in large ſhips are made in three pieces, which occaſions a great conſumption of timber to little purpoſe; for the floor being deſigned to go in its uſual place, two of the pieces are made to butt at the middle line, then a large chock is placed acroſs them and bolted to each, the upper ſide of which chock is kept well with the cutting down, ſo that from the upper part of the chock to the head of the floor timber, there is very little ſhift of timber to bolt the frame, becauſe the lower futtock muſt be ſhortened to ſtep on the chock; it would therefore be ſtronger to have a floor of natural growth, even if one arm was no longer than the diſtance from the chock to the floor as before mentioned, for then the lower futtock would extend to the dead wood, and might thereby be bolted through the ſhort arm of the floor; but if a floor of natural growth with one ſhort arm was not approved of, it would be beſt to ſecure the floor ribband as far

F

far as the aft part of the ſquare body, and then put in the lower futtocks, which might be bolted through the dead wood, and placing the chock at the aft ſide of the lower futtocks it might be bolted to them; this would require the ſecond futtocks to be ſomewhat longer at the heels, in order for them to ſtep on the chock, which in this part of the ſhip might be very eaſily procured. This method would increaſe the ſhift of timber, be much ſtronger, and alſo favour the converſion of timber, for the halves of the floors muſt be cut from the butt of the tree to gain ſubſtance at the lower end, and therefore might at the ſame time be converted to a lower futtock; the regular bolting of the floors would alſo be preſerved, as the chock would be in the place of the floor, and this would always be of ſufficient ſtrength in this part of the ſhip, when floors of a proper growth could not be obtained.

FOOT SPACE-RAIL, that rail in the balcony in which the balluſters ſtep.

FORE and AFT, a term generally uſed to expreſs the direction from head to ſtern.

FORE CASTLE, the ſhort deck above the upper deck forward.

FOREMOST, a term generally applied to any thing nearer to the head than another.

FOOTWALING, the inſide plank of the bottom.

FORE-FOOT, a name given to the foremoſt piece of keel.

FORWARD, the fore part of the ſhip.

FRAMES, thoſe bends of timber which are bolted together, and riſen up to ſhape the body of the ſhip.

H

FURRENS, pieces to ſupply the deficiency of the timber the moulding way.

FUTTOCKS, the ſeperate pieces of timber of which the frames are compoſed; as firſt futtock, ſecond futtock, third futtock, &c.

G

GAMMONING HOLE, a hole cut through the knee of the head, for the uſe of gammoning or ſecuring the bowſprit.

GARBOARD STRAKE, that ſtrake of the bottom which is wrought next to the keel.

GRATINGS, the lids or covers to the hatchways which are made with croſs battens and ledges.

GRIPE, that part below the knee of the head which bolts to the ſtem, and connects with the end of the fore foot.

GROUNDWAYS, the pieces of timber which are laid in the ground acroſs the dock or ſlip, in order to make a good foundation to lay the blocks on.

GUNWALE, that plank which covers the heads of the timbers between the main and fore drifts.

H

HAIR-BRACKET, the moulding which comes at the back of the figure, and breaks in with the upper cheek.

HALF-PORTS, ſhutters made of ſlit deal and fitted to the ports, with a hole cut in them to point the gun through.

HALF-TIMBERS, the timbers in the cant bodies, which are anſwerable to the lower futtocks in the ſquare body.

HANCE, a term generally meant to expreſs the breaks in the rother, or thoſe places where it becomes ſmaller of a ſudden.

HANG-

H

HANGING, a term ſignifying any thing whoſe middle part is below a ſtraight line, as the hanging of the decks, hanging of the ſheer, &c.

HARPINGS, thoſe pieces of oak which hold the timbers of the fore and after cant bodies together till the ſhip is planked.

HATCHES, the covering for the hatchways when made with ledges, and oak or deal fayed cloſe together and caulked.

HATCHWAYS, thoſe ſquare openings in the middle of the decks for conveyances from one part of the ſhip to another.

HAWSE-PIECES, thoſe timbers which compoſe the bows of the ſhip when their ſides look fore and aft, or nearly ſo, contrary to the other timbers whoſe ſides look athwartſhip.

HAWSE-HOLES, holes cut through the hawſe-pieces for the cable or hawſers to paſs through.

HEAD, a term ſignifying the upper end of any thing; it is alſo applied to all the work that is fitted afore the ſtem, as the figure, knee, rails, &c.

HEAD-RAILS, thoſe rails in the head which extend from the back of the figure to the cat-head and bows, intended chiefly as an ornament to the head.

HEAD-LEDGES, thoſe thwartſhip pieces which frame the hatchways aud ladder-ways.

HEEL, a term ſignifying the lower end of any piece of timber, it is alſo meant to expreſs the poſition of a ſhip when ſhe is not upright, as they then ſay, ſhe heels.

HELM, a term meant to expreſs the whole apparatus which ſteers or guides the ſhip, as the rother, tiller, wheel, &c.

HELM-PORT, that hole in the counter through which the head of the rother paſſes.

I

HELM-PORT TRANSOM, the piece of timber which is placed acroſs the lower counter withinſide, at the height of the helm port, and bolted through every timber for the ſecurity of that part.

HOOD, a name given to all the foremoſt and aftermoſt planks of the bottom, both withinſide and without.

HOOD-ENDS, thoſe ends of the plank which fit into the rabbets of the ſtem and ſtern poſt.

HOOKING, the act of working the edge of one plank into that of another, in ſuch a manner as they cannot be drawn aſunder.

HORSE, that round bar of iron which is fixed to the main rail in the head, with ſtantions and netting, for the ſafety of the men which have occaſion to be in the head.

I

IN and OUT, a term ſometimes uſed for the ſcantling of timbers the moulding way, but more particularly applied to thoſe bolts in the knees, which are drove through the ſhip's ſide, which are termed In and Out bolts.

INBOARD, a term uſed to ſignify any thing that is within the ſhip; as the inboard works, &c.

INNER-POST, a piece brought on at the fore ſide of the main poſt to ſeat the tranſom upon; it is a great ſecurity for the ends of the planks, as the main poſt is ſeldom ſufficient afore the rabbet for that purpoſe, and is a great ſtrengthener in that part of the ſhip.

JOINT, a term ſignifying the place where any two pieces are joined, but more particularly is meant to expreſs thoſe lines which are laid down in the mould loft for the purpoſe of making the moulds for the timbers, as thoſe lines are the ſhape of the body between every two timbers, which conſequently is the joint.

K

KEEL, thoſe pieces of timber which are joined together endways, and are firſt laid down, upon which the whole ſtructure is erected; the keel is generally of elm, except the after piece, which is ſometimes oak, the number of pieces in the keel is not very material, ſo as they give a good ſhift to the pieces of keelſon, and likewiſe the main maſt, the ſcarphs of the keel are ſecured with a hook in the middle, which ſhould fay very cloſe, being deſigned on purpoſe to bear the ſtrain of caulking the butts that the bolts in the ſcarphs may not be ſtrained.

KEELSON, pieces of timber placed within ſide the ſhip exactly over the keel, for the purpoſe of binding and ſtrengthening the lower part of the ſhip, it is bolted through the floors, and likewiſe the keel: the ſcarphs ſhould be diſpoſed between the ſcarphs of the keel, and if poſſible ſhould likewiſe be diſpoſed clear of the main maſt and fore maſt, and alſo the main hatchway; as every other floor timber is bolted through the keel, and every other through the keelſon and keel together, it requires that the middle of the ſcarphs of the keelſon ſhould be diſpoſed over floor timbers that is deſigned to be bolted through the keelſon.

KEVELS, are ſmall pieces fixed within ſide on the ſpirketting of the quarter deck, to anſwer the purpoſe of timber heads where they are deficient.

KNEES, are thoſe crooked pieces of timber which ſecure the beams to the ſhip's ſide: in thoſe parts of the ſhip afore and abaft, where knees of wood cannot be procured of a good growth, knees of iron are generally placed, but iron knees muſt by no means be placed in other parts which require any great ſtrength, for the bolts cannot be drove tight in the iron knees, therefore if the ſhip ſtrains they conſequently will work; the lodging knees are generally diſpoſed on that ſide of the beam which makes them without a ſquare, and the hanging knees muſt be placed ſo as to be clear of the ports, and likewiſe of the ſtandards on the deck below; they ſhould alſo be placed on that ſide of the beam, where riders may be occaſionally introduced in their ſtead, the lodging knees are generally hooked into the beam, near the toe of the knee where the wood is ſhort grained, it is therefore better to leave a tenon in the crown part of the knee at a proper diſtance from the end of the beam, which will bear the greateſt ſtrain, and be much the ſtrongeſt method.

KNEE of the HEAD, that part which is bolted to the fore part of the ſtem, and ſupports the figure, rails, &c. It is compoſed of ſeveral pieces, by reaſon of its great breadth, and is ſecured on each ſide by large knees called the cheeks of the head.

KNIGHTHEADS or BOLLARD TIMBERS, thoſe timbers on each ſide which are next to the ſtem, and whoſe heads are continued ſufficiently high to be a ſecurity to the bowſprit.

KNUCKLE TIMBERS, thoſe toptimbers in the fore body, whoſe heads ſtand perpendicular, and form an angle with the hollow of the topſide.

L

LACING, the name of one of the pieces in the knee of the head, which runs up as high as the top of the hair bracket, and to which the figure is ſecured.

LADDERS in a ſhip are for the ſame purpoſe as ſtair-caſes in a houſe, for the conveniency of going from deck to deck.

LADDER-WAYS, the openings in the deck where the laddersare placed.

LAUNCH,

L

LAUNCH, ſignifies a ſlip for the purpoſe of building.

LAUNCHING, the act of conveying the ſhip from the ſlip into the water.

LAUNCHING PLANKS, thoſe planks which are fitted in the ſlip on each ſide, for the purpoſe of launching the ſhip.

LAYING DOWN, the act of drawing out the body of the ſhip upon the mould loft floor, for the purpoſe of making the moulds.

LAYING OFF, the ſame with laying down.

LAZARETTO, a name given to an hoſpital ſhip, which is for the reception of the ſick. It is alſo the name of a place parted off at the fore part of the lower deck in ſome merchant ſhips, for the conveniency of laying up the proviſions, ſtores, &c. neceſſary for the voyage.

LEAN. See Clean.

LEVEL, the ſame with horizontal.

LEVELLED OUT, any line continued out from a given ſpot in a bevel or horizontal direction.

LEDGES, the thwartſhip pieces in the framing of the decks, which are let into the carlings.

LIMBER BOARDS, ſhort pieces of plank, one edge of which is fitted into a rabbet in the limber ſtrake, and the other edge to the ſide of the keelſon; the limber ſtrake being of ſome diſtance from the keelſon thereby forms a paſſage all fore and aft, which admits of the water's having a fair run to the pumps, the uſe of the limber boards is therefore to form the upper part of that paſſage, whereby every thing is kept out, ſuch as dirt or rubbiſh, which might fill it up; and they are fitted in ſhort pieces for the conveniency of taking up at any particular place, to clear away any thing that may happen to be in the limber paſſage: when the limber boards are fitted care ſhould be taken to have the butts in thoſe places where the bulk-heads come, as there will then be no difficully in taking thoſe up which come near the bulk-heads.

LIMBER PASSAGE, a paſſage formed on each ſide by the limber ſtrake and the keelſon, for the purpoſe of the water's having a free communication with the pumps.

LIMBER-STRAKE, that ſtrake on each ſide next the keelſon, which forms the limber paſſage, from the upper ſide of this ſtrake the depth in hold is always taken.

LOAD WATER LINE, the mark ſuppoſed to be made on the ſhip's bottom when ſhe is loaded.

LONG TIMBERS or DOUBLE FUTTOCKS, thoſe timbers in the cant bodies which extend from the dead wood to the run of the ſecond futtock head.

LUFF, a name given to the roundeſt part of the bow of the ſhip.

M

MAIN BREADTH, a term ſignifying the broadeſt part of the ſhip, at any particular timber or frame, which is diſtinguiſhed on the draught by the upper and lower height of breadth lines.

MAIN KEEL, a term of diſtinction between it and the falſe keel.

MAIN POST, the ſame with ſtern poſt.

MAST-CARLINGS, thoſe carlings which are placed at the ſides of the maſt-rooms for the purpoſe of framing the partners.

MAIN-

O

MAIN-WALES, the lower wales which are generally placed on the main breadth, and likewiſe ſo as the lower deck knee bolts ſhall come in them.

MIDSHIPS, a term ſignifying the middle part of the ſhip.

MIDSHIP-BEND, that bend which is called dead flat.

MOULDS, pieces of deal made to the ſhape of the lines on the mould loft floor, for the purpoſe of cutting out the different pieces of timber in the ſhip.

MOULDED, a term ſignifying the ſize of the timber that way which the mould is laid.

MOULDING, the act of marking out the true ſhape of any timber from the mould, it is alſo a name given to any ornamental projection from the ſide or other, as part the rails, &c.

MUNIONS, the pieces that part the lights in the ſtern and quarter gallery.

N

NAVEL-HOODS, thoſe hoods wrought above and below the hawſe-holes.

NOG, a treenail drove through the heels of the ſhores for to ſecure them.

NOGGING, the act of ſecuring the heel of the ſhores.

O

ORLOP, a temporary deck below the lower deck of large ſhips chiefly for the conveniency of ſtowing away the cable, there is alſo a platform in midſhips in the ſmaller ſhips called the orlop, and for the ſame purpoſe.

OVER-HANGING, a term ſignifying any thing of great projection, as the over-hanging of the ſtern, &c.

P

OVER-LAUNCHING, a term ſignifying to run the butt of one plank of a ſufficient diſtance from the butt of that underneath it, in order to make the ſtronger work.

OUT-BOARD, a term ſignifying any thing without ſide the ſhip, as the out board works, &c.

P

PARTNERS, thoſe pieces of thick plank fitted into a rabbet in the maſt carlings, for the purpoſe of wedging the maſts, alſo any plank that is thicker, or above the reſt of the deck, for the purpoſe of ſteadying whatever paſſes through the deck, as the partners of the capſtands, partners of the pumps, &c.

PILASTERS, thoſe fluted columns which are placed upon the munions between the lights, for the purpoſe of ornamenting the ſtern and quarter galleries.

PILLERS, thoſe ſtraight pieces of timber which are fixed under the middle of the beams in order to ſupport the decks.

PINS, thoſe little pieces of iron that are fixed in the drumheads of capſtands, through the ends of the bars, to prevent their unſhipping, and alſo thoſe put through the ends of the ſmall bitts to belay a rope, and called belaying pins; ſometimes the main bitts are called bitt pins.

PLANK, a name for all timber which is four inches thick and under, except one inch, which is generally termed board.

PLANK SHEERS, pieces of plank laid over the timbers heads of the quarter deck, forecaſtle, and round houſe, for the purpoſe of covering the top of the ſide.

PLUMB, a term ſignifying the ſame with perpendicular.

POOP, a name given to the deck over the roundhouſe.

Q

POPPETS, thoſe pieces which are fixed perpendicular between the bottom and the bulgeways at the fore and aftermoſt parts of the ſhip.

PORTS, the ſquare holes in the ſhip's ſides for the purpoſe of putting the guns out.

PORT-LIDS, ſignifies the ſhutters to the ports.

POST, the ſame with ſtern poſt.

PREVENTER-PLATES, thoſe plates of iron bolted to the ſhip's ſide for the greater ſecurity of the dead eye chains.

PREVENTER BOLTS, thoſe bolts drove through the lower end of the preventer plates, to help the ſtrain of the chain bolts.

PUMPS, thoſe machines fitted in the well for the purpoſe of drawing the water out of the ſhip's hold.

PUMP-DALES, pipes fitted for the purpoſe of conveying the water from the pump ciſterns through the ſhip's ſides.

PUMP-CISTERNS, ſmall ciſterns fitted over the heads of the pumps for receiving the water from which it is conveyed through the pump-dales out of the ſhip.

Q

QUARTER, the upper part of the topſide abaft is generally termed the quarter.

QUARTER DECK, that deck in ſhips of war which extends from the main maſt to the ſtern.

QUARTER-GALLERIES, thoſe parts which project from the quarter abaft, fitted with lights and ballufters, and intended both for conveniency and ornament to the aft part of the ſhip.

QUARTER-PIECES, thoſe carved figures at the after part of the quarter gallery which connects with the taff-rail, and forms the outward boundary of the ſtern.

QUICKWORK, thoſe ſhort pieces of inſide ſtuff worked between the ports.

R

RABBET, is a place made in any piece of timber for the purpoſe of putting the edge or ends of planks in for the better ſecurity of it, as in the keel, ſtem and ſtern poſt, where it is cut for the plank of the bottom to fit into.

RACE, the act of marking by a mould on a piece of timber, on any mark with a tool called a racing knife.

RAILS, narrow pieces of fir or oak with a moulding ſtruck on them and faſtened to the ſhip's ſides as ornaments, likewiſe in the head and ſtern; their names are as follows: the lower rail on the ſide is termed the waiſt rail, and the next above it the ſheer rail, which is generally placed well with the toptimber line, the rails next above the ſheer rail are termed drift rails, and the rail above the plank ſheer the fiſe rail, the rails of the head are known by lower, middle and main or upper rails, and the rails of the ſtern are named from the parts where they are fixed, as lower counter rail, upper counter rail, &c.

RAKE, a term ſignifying any part that forms an obtuſe angle, as the rake of the ſtem, ſternpoſt, &c.

RAM LINE, a ſmall rope or line, ſometimes uſed for the purpoſe of forming the ſheer or decks, or ſetting the decks fair.

RANGES, pieces fixed to the inſide of the ſhip with pins or pegs in them for the purpoſe of belaying of ropes: it is ſometimes meant to expreſs thoſe pieces of oak with holes in them placed

R

placed between the ports for the uſe of putting ſhot in.

RIBBANDS, thoſe pieces of fir nailed to the timbers of the ſquare body to aſſiſt in holding the ſhip together whilſt in her frames, and under which the ſhores are always placed.

RIDERS, large bends of timber bolted within ſide the ſhip, for the purpoſes of ſtrength.

ROOMS, a term uſed to expreſs the different vacancies between the beams, as the maſt rooms, hatch rooms, &c.

ROOM and SPACE, ſignifies the diſtance from the moulding edge of one timber, to the moulding edge of another: the room and ſpace in all ſhips that have ports ſhould be ſo diſpoſed, that the ſcantling of the timber on each ſide the lower ports, and the ſize of the ports fore and aft may be equal to the diſtance of two rooms and ſpaces.

ROUNDHOUSE, that part of the ſhip abaft, which is above the quarter deck, fitted up with cabins, &c. for the accommodation of the officers.

RUDDER or ROTHER, that part which is hung on the ſtern poſt by irons for the purpoſe of ſteering the ſhip; it is compoſed of ſeveral pieces of timber, the main piece which extends from the bottom up and forms the head is generally of oak, and likewiſe the bearding piece which forms the fore part, but the reſt is fir.

RUDDER-IRONS or PINTLES, the irons which are faſtened to the rudder for to hang it to the ſtern poſt, ſometimes two of them are cut ſhort and ſo work in a ſocket in the brace, by which means the rudder works much eaſier.

S

RUN, a term ſometimes uſed to ſignify the drawing or marking of a line on the ſhip, or mould loſt floor, as to run the wale line, deck line, &c.

S

SADDLE, a piece fitted on the upper end of the lacing to ſecure the foremoſt ends of the main rails.

SCANTLING, the dimenſions given for the timber and plank.

SCARPH, the end of one piece of timber or plank lapped over the other, and let into each other in ſuch a manner as both may appear one ſolid and even ſurface, as keel pieces, ſtem pieces, &c.

SCUPPERS, holes cut in the ſhip's ſide for the purpoſe of carrying off the water from the decks.

SCUTTLES, ſquare openings cut in ſeveral parts of the decks leſs than ladder ways or hatchways, chiefly for the purpoſe of handing ſmall matters up from deck to deck; there are alſo holes cut through the ſhip's ſide called ſcuttles, for the purpoſe of admitting the air into the cabins between decks.

SEAMS, the opening between the edges of the planks when wrought.

SEATING, that part of a floor, tranſom, &c. which reſts upon the place it is bolted to.

SEAT-TRANSOM, that tranſom which is bolted to the counter timbers above the upper, at the height of the port ſills.

SHAKEN, a term applied to plank or timber which is full of ſplits or clefts, and will not bear faſtening or caulking; generally called ſhaky.

SHANK-PAINTER, a chain bolted to the top ſide abaft the cat-head, for the purpoſe of lowering the anchor.

SHEER,

S

SHEER, a term ſignifying the hanging of the ſhip's ſide in a fore and aft direction.

SHEER STRAKE, that ſtrake in the topſide, the upper edge of which is generally wrought well with the toptimber line, it being a whole ſtrake all fore and aft, as not being cut by the ports it is the chief ſtrength of the upper part of the topſide, and is therefore always worked thicker than the other ſtrakes, and ſcarphed between the drifts.

SHEER WALES, thoſe ſtrakes of thick ſtuff in the topſide of three deck ſhips wrought between the middle and upper deck ports.

SHIFT, is a term applied when one butt of a piece of timber or plank overlaunches the butt of another piece, without either being reduced in length for the purpoſes of ſtrength; ſuch are the timbers of the frame, plank of the bottom, &c.

SHIFTING, the act of ſetting off the length of the planks in the bottom, topſide, &c. in order to make a good ſhift.

SHIVERS or SHIVES, thoſe wheels placed in the blocks for the purpoſe of traverſing the ropes.

SHOLES, pieces of oak or plank put under the heels of the ſhores where there are no ground ways to enable them to bear the greater ſtrain.

SHORES, thoſe pieces of fir timber fixed under the ſides and bottom of the ſhip for the ſupport of her.

SIDED, a term applied to the dimenſions of a piece of timber the contrary way to which the mould is placed.

SILLS or CELLS, thoſe ſmall pieces of plank or timber which is put to form the upper and lower ſides of the ports, ſcuttles in the ſide, &c.

S

SLEEPERS, thoſe pieces of crooked timber placed within ſide the ſhip abaft, for the ſtrength of the buttock, one arm is bolted through the timbers in the buttock, and the other through the tranſom.

SLIP, a place fitted up for the purpoſe of building the ſhip and launching her.

SNYING, a term applied to the edge of a plank when it rounds upwards, as thoſe planks in the bottom round the bows where their middle appears above a ſtraight line.

SPANSHACKLE, a large bolt drove through the forecaſtle and upper deck, and forelocked under the decks, which has a large ſquare ring to its head for the purpoſe of fixing the end of the david in.

SPIRKETTING, a thick ſtrake wrought within ſide on the ends of the beams: in ſhips that have ports it is all the ſtuff worked between the decks and the ports, which is generally two ſtrakes wrought anchor ſtock faſhion, in which caſe the middle of the planks ſhould always be got to work as broad as poſſible, admitting the butt underneath or above to be ſix inches.

SPURS, large pieces of timber, the lower ends of which are fixed to the bulgeways, and the upper ends bolted to the ſhip's bottom, they are for a greater ſecurity to the bulgeways in caſe any other part fails.

SQUARE-TUCK, a name given to the after part of a ſhip's bottom when terminated in the ſame direction up and down as the wing tranſom contrary to a buttock, which is round or circular, and the planks end at the faſhion-piece.

STANDARDS, large pieces of knee timbers with one arm bolted upon the deck through the beams, S

beams, and the other through the ſhip's ſide for the purpoſe of ſtrengthening the ſhip's ſides againſt any ſudden or violent ſhock.

STANDING, a term applied to a bevelling which is without a ſquare.

STANTIONS or STANTIENTS, the upright pieces in a bulk head, breaſt work, &c.

STARBOARD and LARBOARD, terms uſed to diſtinguiſh the two ſides of the ſhip, that ſide to the right, with one's face looking forward or towards the head, is the ſtarboard, and that to the left, the larboard ſide, the ſtarboard ſide is always ſhewn on the draught.

STEELER, a name given to the foremoſt or aftermoſt plank in a ſtrake, which drops ſhort of the ſtem and ſtern poſt.

STEERING WHEEL, a wheel fixed on the quarter deck, to which a rope is conveyed from the tiller, for the purpoſe of ſteering the ſhip.

STEM, the foremoſt piece of timber into which the bows unite, the ſame with the keel to the bottom.

STEMSON, a piece of timber wrought on the aft part of the apron within ſide, the lower end of which is ſcarphed to the keelſon, and the upper end is continued as high as the middle or upper deck, it is for the purpoſe of ſtrengthening and binding that part of the ſhip, the ſame as the keelſon for the bottom.

STEPS, large pieces of timber fitted acroſs the keelſon, into which the heels of the maſts are fixed; the holes into which the maſts ſtep ſhould be cut in proportion to the ſteps, ſo as to leave ſufficient wood on each ſide the hole to anſwer in ſtrength to the tenon left at the heel of the maſt, and if that ſhould be rather too little the

S

hole may be cut more thwartſhips, to anſwer the deficiency the fore and aft way: there are likewiſe pieces fixed on the decks called ſteps of the capſtans, and likewiſe thoſe pieces in midſhips nailed from the top of the ſide to the water's edge, for the conveniency of getting on board, are called ſteps.

STERN, the after or hinder part of the ſhip, extending from the wing tranſom upwards, and the chief ornament to that part of the ſhip.

STERN-FRAME, the frame of timber compoſed of the ſtern poſt, tranſom, and faſhion pieces, and is the baſis of the whole ſtern.

STERN-POST, the principal piece of timber in the ſtern frame to which the tranſoms are bolted, with its lower end tenon'd into the keel.

STOOLS, pieces of plank faſtened to the ſhip's ſide abaft, for the purpoſe of forming and erecting the galleries.

STOPPER BOLTS, large ring bolts which are drove in the deck before the main hatch, for the uſe of the ſtoppers.

STRAKE, a term ſignifying one breadth of plank wrought from one end of the ſhip to the other, both within and without board.

STRING, is a ſtrake within ſide under the gunwale, and anſwering to the ſheer ſtrake without ſide, it is ſcarphed in the ſame manner as the ſheer ſtrake, and bolted through the ſhip's ſide into the ſheer ſtrake between the drifts, for the purpoſe of greater ſtrength, as this part requires all the ſecurity that is poſſible to be given in order to aſſiſt the ſheer.

SUPPORTERS, thoſe circular knees placed under for the ſecurity of the cat-heads.

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SYPHER'D, one edge of a plank lapped over the edge of another in ſuch a manner that both planks ſhall make a plain ſurface.

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TABLING, the act of letting one piece of timber into another, ſomething ſimilar to to hooking of planks ſo that they cannot be pulled aſunder lengthways.

TAFF-RAIL, the carved ornaments at the upper part of the ſtern, the end of which correſpond with the quarter pieces.

TEACH, a term applied to the direction that any line, &c. ſeems to point out.

TERM-PIECES or TERMS, pieces of carved work placed under each end of the taff-rail upon the ſide ſtern timber, and extending down as low as the foot rail of the balcony.

THICK-STUFF, a name for ſuch ſided timber which is under one foot and exceed four inches in thickneſs.

THROAT, the middle inſide part of compaſs or knee timber.

THWARTSHIPS or ATHWARTSHIPS, a term uſed to expreſs the direction from one ſide of the ſhip to the other.

TILLER, a piece of ſtraight timber fitted into the head of the rother, for the purpoſe of moving it either to one ſide or the other, in order to ſteer the ſhip.

TIMBERS, a name generally given to the pieces of timber which compoſe the whole frame of the ſhip, as top timbers, ſtern timbers, floor timbers, &c.

TONNAGE, a term generally meant to expreſs the burthen a ſhip is to carry when brought down in the water, to the load draught of water intended in the conſtruction. See Book V. of this Treatiſe.

TOP-SIDE, a name given to all that part of the ſhip which is above the main wales.

TOP-TIMBERS, thoſe timbers which are in the top-ſides, the firſt general tier of timbers which reach to the top of the ſide, are termed the long top timbers, and the others the ſhort top-timbers.

TOP and BUTT, a method of working Engliſh plank to make good converſion: it is done by diſpoſing of the top end of every plank within ſix feet of the butt end of the plank above or below it, letting every plank work as broad as it will, by which means only every other ſeam is a fair one.

TRAIL-BOARDS, a term for the carve work between the cheeks of the head.

TRANSOMS, the thwartſhip pieces of timber which are bolted to the ſtern poſt in order to form the buttock.

TRANSOM-KNEES, the ſame with ſleepers.

TRIM, a term denoting to work any piece of timber or plank into its proper form or ſhape.

TUCK, a term applied to the upper part of the buttock, and when the after part of the bottom is formed not circular, or with no bottom, it is call a ſquare tuck. See ſquare tuck.

TUCK-RAIL, the rail which is wrought well with the upper edge of the wing tranſom.

TUMBLING-HOME, a term applied to the falling in of the topſides into midſhips: the topſides of three deck ſhips have the greateſt tumbling home, for the purpoſe of bringing the

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the upper guns nearer the center of the ſhip, to prevent her frcm being top-heavy.

U

UNSHIP, a term ſignifying the act of taking any thing out of its place.

UNDER, a term applied to any bevelling that is within a ſquare.

W

WALES, thoſe ſtrakes of thick ſtuff wrought on the ſhip's ſides upon the breadth or broadeſt part of the body, likewiſe thoſe which are wrought between the ports, are called wales.

WAISTE, a name given to all that part of the topſide which is above the upper deck, between the main and fore drifts.

WALL-SIDED, a term applied to the ſides of a ſhip which continues the breadth very low down, and likewiſe very high up, ſo that when the ſhip is in the water her ſides appear ſtraight and upright like unto a wall.

WATERWAYS, thoſe planks of the decks which are wrought next to the timbers.

WELL, a place parted off in the hold round the main maſt, in which the pumps are fitted.

WING-TRANSOM, the uppermoſt tranſom in the ſtern frame, upon which is let in the heels of all the counter and ſtern timbers.

WINDING, a term applied to any thing that twiſts, and makes an uneven ſurface.

WITHIN-BOARD, ſignifying within ſide the the ſhip.

WITHOUT-BOARD, without ſide the ſhip.

WROUGHT, a term applied to any thing which is worked.

OBSERVATIONS and REMARKS

Upon the MASTING of SHIPS in general;

With DIMENSIONS of the MASTS and YARDS,

Of the ſeveral Rates of Ships laid down in Book IV.

ALL ſhips have generally three ſtanding maſts, which are, firſt, the main maſt, or that which is near the middle of the ſhip; ſecondly, the fore maſt, which is near the fore end of the keel; and, thirdly, the mizen maſt, which is between the main maſt and the ſtern; they have alſo a bowſprit which runs out over the ſtem, and generally ſtives ſo as to make an angle of thirty ſix degrees with an horizontal line, or nearly ſo. Theſe maſts have top-maſts and top-gallant-maſts, and each of theſe maſts have their particular ſails, all of which are denominated according to the names of their reſpective maſts.

The true and exact place of the maſts hath already been ſhewn both in the proportions and the principal dimenſions and ſcantlings, it therefore only remains to find ſuch proportions whereby the maſts and yards are caſt, that is, with reſpect to their lengths and diameters, but as thoſe proportions are found to be very erroneous, as I ſhall prove hereafter, and it being a difficult matter to ſubſtitute others ſo ſimple and eaſy in their room, I ſhall not trouble the reader with a detail of them; I ſhall only proceed to lay down ſome obſer-

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vations and remarks, whereby I ſhall endeavour to prove that the common rules for maſting of ſhips are defective, and as a ſubſtitute for the proportions ſhall conclude with introducing a compleat ſet of dimenſions for the maſts and yards of a ſhip of every claſs in the navy.

One very great and principal defect is the over maſting of ſhips, that is, giving the maſts too great a length, for we find that the main maſt of a third rate, when all its parts are up an end, is 208 feet high, ſometimes more, which is an aſtoniſhing height, and it is proportionably ſo in leſſer ſhips, and from whence it follows, that the dimenſions of the ſails are regulated by that of the maſts and yards, therefore it will be a very eaſy matter to prove, that if the maſts were ſhortened conſiderably, and the yards lengthened to gain what was loſt in the maſts, it would be a very great advantage; for a ſmall ſail when placed very high, will have more power to make a ſhip heel than to go a-head, becauſe being placed at the end of ſo long a lever, it is removed at a very great diſtance from the center of gravity, and whereas a larger ſail when placed low has leſs power to heel the ſhip, yet it does not hinder it from exerting all its effort in reſpect of ſailing.

All that they have to plead for this rule of over maſting is, that experience is on their ſide, but in that they are very much miſtaken, for experience, inſtead of favouring them, appears in general quite againſt them, for we hear daily inſtances of ſhips being diſmaſted at ſea, and when they have got jury maſts, have ſailed faſter than with their proper maſts, on the contrary, when they give a ſhip taunter maſts ſhe will not ſail ſo faſt as before; an inſtance of this happened a few years back in his Majeſty's ſhip the Myrmidon, a veſſel conſtructed ſeemingly ſuitable in every point for velocity, they maſted her beyond the common rules, or perhaps only obſerved them to the utmoſt rigour, and when they came to put her to ſea, ſhe immediately loſt thoſe peculiar advantages ſhe was purpoſely conſtructed for; they then brought her back and had her maſts conſiderably ſhortened, and when put to ſea again they found her to be one of the faſteſt ſailing veſſels in the whole navy; this was a certain mark, and far beyond a doubt, that the maſts at firſt were too high, which ſufficiently proves that the over maſting of ſhips is as prejudicial as any ill property they can be in poſſeſſion of.

Beſides this, there is another error which attends the common rules, that is, they do not conform to the laws that ſhould be obſerved in ſhips of different dimenſions, for if one ſhip was twice as long and twice as broad as another, they would make the ſails of one double the dimenſions of the other, but as all ſhips are allowed to heel, a ſmall ſhip ſhould have a great deal leſs ſail in proportion than a large ſhip; ſuppoſing one ſhip half the dimenſions of another, the ſmall ſhip will only be the eighth part of the ſolidity, and the eighth part of the weight of the great one; and as it is the weight that oppoſes the wind when it makes its effort to overſet, or at leaſt to heel the ſhip, ſhe will have but the eighth part of the abſolute force which is neceſſary to ſuſtain the ſail, but this ſame force which is diminiſhed to one eighth part is collected in the center of gravity, and applied with double diſadvantage, ſeeing all the dimenſions are leſs by one half, the center of gravity will be but half the diſtance below the decks, or load water line, ſo the relative force by which the weight of the ſhip oppoſes the effort of the wind, is only the ſixteenth part of what the large ſhip has. In order to judge whether theſe rules be good or bad, we have only to examine if the relative force which the wind has to overſet a ſmall ſhip, be likewiſe diminiſhed to a ſixteenth part, and if they agree, the equilibrium will not be deſtroyed; this will be a mark that the rules are perfect, and we may continue to make the maſts proportionate to the other dimenſions of ſhips.

But when the dimenſions of the ſails of ſmaller ſhips are half the dimenſions of the large, the ſurface of the ſails is only diminiſhed one quarter: it

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is true, the center of that effort is but half the height above the ſhip, and of conſequence, applied to the lever of only half the length, but when all is conſidered, the relative force which tends to overſet is only diminiſhed to one eighth part, whereas the other is diminiſhed a ſixteenth part, as I have already proved; it is therefore plain that the force of the wind will predominate, being two fold too great, ſo that if the great ſhip be properly maſted, the ſmall one cannot be ſo likewiſe, but will be in great danger of overſetting.

To ſpeak in more general terms, the relative force with which the ſhip oppoſes the effort of the wind, is diminiſhed in proportion to the ſquare of the ſquare of the keel, or of the breadth and the weight, or the abſolute force is diminiſhed in proportion to the cubes: but the relative effort of the wind is not diminiſhed, but as the cube of the keel, or as the cube of the breadth; ſince the abſolute force of the wind, which is proportioned to the ſurface of the ſails, is diminiſhed but as the ſquare; and that the height of the maſt, which ſerves as a lever to that force, diminiſhes only in proportion to the keel, or to the breadth; ſo in ſmall ſhips the force which they have to ſuſtain the preſſure of the ſails is always diminiſhed in a greater proportion than the relative force of the wind to overſet them; and of conſequence, if there be an equilibrium betwixt theſe two forces in large ſhips, it cannot ſubſiſt in ſmall, the firſt being too little and the force of the wind too great. Hence it follows, that the common rules are defective, and will be at leaſt ſubject to one of theſe two inconveniences; for the ſmall ſhips being over maſted will not be able to carry ſail with ſafety; or on the contrary, the large ſhips for want of ſufficient maſts would loſe the advantages that taunt maſts would procure.

The common rules being thus found defective, we ſhould find it a difficult matter, as I obſerved before, to ſubſtitute others ſo ſimple in their room; but if we had but one ſhip properly maſted, we might by that regulate all the maſts of ſimilar, or nearly ſimilar ſhips. The relative force which ſhips have to ſuſtain the preſſure of the ſails, is as the ſquare of the ſquare of their ſimple

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dimenſions, and the relative force which the maſts have to overſet, is as the breadth of the ſails multiplied by the ſquare of their height, ſince the height augments the extent of the ſails, and at the ſame time makes the center of their effort higher; on the other hand, we can ſcarce diſpence with regulating the breadth of the ſails by that of the ſhip, we make them more or leſs, but they ſhould always depend on one another, ſo ſince the relative force of the ſhip to ſuſtain the preſſure of the ſails, is as the ſquare of the ſquare of the breadth, the relative force which the ſails have to make her heel, is as the product of that ſame breadth, by the ſquare of the height of the maſt; but if there be an equilibrium betwixt theſe two forces, there will be an equality of ratios betwixt the two quantities that expreſs them; and this equality will ſubſiſt if the two quantities be divided by the breadth. Hence it follows, that to have two ſimilar ſhips properly maſted, the ſquares of the heights of their maſts muſt be as the cubes of their breadths, or of their lengths. This theorem may ſerve as a rule, and it will always be eaſy to determine the dimenſions of the maſts of any ſhip, provided we have another properly maſted, which may ſerve as a ſtandard.

The dimenſions of the maſts of a third rate are found to bear the beſt proportion of any ſhip whatever, therefore ſuppoſe we were to regulate the maſts of all other ſhips by this, we ſhould only have to make this ſimple proportion; as the cube of the length of the third rate is to the ſquare of the length of her main maſt, ſo is the cube of the length of a ſecond ſhip, to the ſquare of the length of her main maſt; but if the ſecond ſhip is not ſimilar to the firſt, that is, if ſhe be either broader or narrower, deeper or ſhallower, the maſt muſt undergo a ſecond change in proportion to the breadth, for ſuppoſing that the breadth of the ſails is regulated by that of the ſhip, and that the height of the maſt is likewiſe changed in proportion to the ſame breadth of the ſhip, the extent of the ſails, and in conſequence, the abſolute impulſion of the wind,

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will be in proportion to the ſquare of that breadth, and its relative force in proportion to its cube, at the ſame time that the relative force with which the weight of the ſhip reſiſts the inclination, is proportioned to the ſame cube, and not to the ſquare of the ſquare, ſince the length of the ſhip is ſuppoſed ſtill the ſame; for it follows from thence, that the alterations made in the ſails, anſwer exactly to thoſe made in the breadth of the ſhip, and that the equilibrium is no ways altered. If the breadth be doubled the ſails will be doubled, both in breadth and depth; ſo the ſurface will be quadrupled; and when the height of the center of gravity is likewiſe doubled, its force will be eight times greater; but if the relative force of the wind to overſet the ſhip, be eight times greater, on the other hand, the weight of the ſhip which oppoſes that, has eight times greater force, and then we ſhall have nothing to fear. The ſhip in effect has the ſame number of vertical ſections perpendicular to the keel, which are the elements of the ſolidity, but each will be quadrupled, and the quadrupled weight of the ſhip being ſituated twice as low, or with double advantage, ſince the depth is likewiſe doubled, will have eight times the force preciſely as is neceſſary always to retain an equilibrium with the effort of the wind. We now perceive the propriety of joining the ſecond rule with the former, which every one may eaſily do who has one ſhip properly maſted, by which to determine the dimenſions of the maſts of all other ſhips, even of thoſe which are not ſimilar, provided the vertical ſections of the immerged part be ſimilar.

The firſt rule is, that the ſquare of the heights ſhould be as the cubes of the ſimple dimenſions. The ſecond is, that the heights of the maſts ſhould be proportionate to the breadth of the ſhips, provided they be the ſame length.

Theſe two rules being admitted, we may then uſe the beſt we can pick out of the common rules, and examine the heights of the maſts of each ſhip, as if ſimilar to thoſe of the third claſs, and then we need only enlarge or diminiſh the ſails, and the heights of the maſts already found, according as the ſhip is great or ſmall.

We may find other rules which tend to the ſame end with the preceding: as for example, a third is, that in ſhips of the ſame breadth, but of different lengths, the heights of the maſts ſhould be as the ſquare roots of their lengths; for the relative force which theſe ſhips have to ſuſtain the preſſure of the ſails, or to oppoſe the inclination, is proportionate to their lengths, ſeeing the other dimenſions are no ways altered; the center of gravity is neither raiſed nor lowered, it is only the whole weight that is greater or leſs according to the length, and the relative force will always be in the ſame proportion; but when the breadth of the ſhip continues the ſame, that of the ſails will likewiſe be the ſame, and the relative force they have to make the ſhip heel, depends wholly on their height, but that is two ways: the firſt is, becauſe the height of the maſt will increaſe the ſurface of the ſail expoſed to the wind; the ſecond is, becauſe the center of effort is raiſed, or the lever is longer, ſo the relative force of the ſails increaſes the ſquare of their heights, and in caſe of an equilibrium, the ſquare muſt be proportionate to the length of the ſhip, which expreſſes the other relative forces, and of conſequence the height of the maſts and ſails ſhould be proportionate to the ſquare root of the length. Suppoſing that without altering the breadth and depth, we ſhould make the ſhip four or five times longer, we then need only, according to that rule, double or treble the heights of the maſts. Laſtly, if we add this third to the ſecond above-mentioned, namely, that in ſhips of the ſame length, but of different breadths, the heights of the maſts ſhould be proportionate to the breadth, and we may from thence deduce the following fourth theorem.

That ſhips of different lengths and breadths, the heights of the maſts ſhould be in a compound proportion of the breadth, and of the ſquare root of the length,

length, or they ſhould be as the products of their breadths, by the ſquare roots of their lengths.

Such of our readers as are not converſant in geometry, may be eaſily convinced of the truth of what hath been ſaid on this ſubject, by trying experiments; for if the heights of the maſts ſhould have the ſame proportion in all ſhips, it muſt hold in the ſmalleſt as well as in the largeſt; and on the contrary, if thoſe rules are erroneous, the true way to diſcover the fault will be to maſt a very large ſhip by theſe rules, and likewiſe a very ſmall one, about one or two feet long, and we ſhould then be able to bring the rule to ſuch a proof as might be deemed a true touchſtone.

DIMENSIONS of the MASTS and YARDS,

Dimensions, &c.	Ship of 100 Guns		Ship of 90 Guns		Ship of 74 Guns	
	Length	Diam.	Length	Diam.	Length	Diam
	Ft. In.	Inch.	Ft. In.	Inch.	Ft. In.	Inch
Main Mast - - - -	116 8	$38\frac{5}{8}$	112 0	$3\frac{1}{4}$	111 0	37
Ditto Yard - - - -	102 4	24	97 0	22	96 3	23
Main Top mast - - - -	68 10	$20\frac{5}{8}$	66 0	$19\frac{3}{4}$	66 7	20
Ditto Yard - - - -	73 8	$15\frac{1}{2}$	69 6	$14\frac{3}{4}$	72 0	15
Main Top-gallant Mast - -	34 5	$11\frac{5}{8}$	33 0	11	33 3	$11\frac{1}{4}$
Ditto Yard - - - -	48 9	10	46 6	$9\frac{3}{8}$	46 6	$9\frac{1}{2}$
Fore Mast - - - - -	103 6	$34\frac{1}{2}$	100 6	$33\frac{1}{2}$	98 4	$32\frac{3}{4}$
Ditto Yard - - - -	89 1	$20\frac{7}{8}$	84 0	20	86 2	20
Fore Top Mast - - - -	62 10	$20\frac{5}{8}$	59 0	$19\frac{3}{4}$	58 8	20
Ditto Yard - - - -	64 6	$13\frac{3}{4}$	60 6	$12\frac{7}{8}$	62 10	$13\frac{5}{8}$
Fore Top-gallant Mast - -	31 0	$10\frac{3}{4}$	28 6	$9\frac{1}{2}$	29 4	$9\frac{3}{4}$
Ditto Yard - - - -	42 8	$8\frac{5}{8}$	40 6	$8\frac{1}{4}$	40 6	$8\frac{1}{4}$
Mizen Mast - - - -	101 4	23	96 8	$22\frac{1}{4}$	94 6	$22\frac{3}{4}$
Ditto Yard - - - -	87 0	$15\frac{7}{8}$	82 7	15	90 0	16
Cross Jack Yard - - -	64 6	$13\frac{3}{4}$	60 6	$12\frac{7}{8}$	60 3	$13\frac{5}{8}$
Mizen Top Mast - - -	49 5	$13\frac{3}{4}$	47 6	$13\frac{1}{4}$	48 7	$13\frac{1}{2}$
Ditto Yard - - - -	49 0	$10\frac{1}{8}$	47 0	$9\frac{3}{4}$	47 2	$9\frac{7}{8}$
Bowsprit - - - - -	73 6	$36\frac{7}{8}$	70 10	$35\frac{5}{8}$	67 6	35
Ditto Yard - - - -	67 6	$13\frac{7}{8}$	64 10	$13\frac{3}{4}$	62 10	$13\frac{5}{8}$
Flying Jibb Boom - - -	52 6	$15\frac{1}{4}$	50 0	$14\frac{1}{2}$	50 4	$14\frac{1}{2}$
Ditto Yard - - -	43 6	$8\frac{5}{8}$	40 6	$8\frac{1}{4}$	40 8	$8\frac{1}{4}$

of the following SHIPS, viz.

Ship of 64 Guns		Ship of 44 Guns		Ship of 38 Guns		Ship of 36 Guns		Ship of 32 Guns	
Length	Diam.	Length	Diam.	Length	Diam.	Length	Diam.	Length	Diam.
Ft. In.	Inch.	Ft. In.	Inch.	Ft. In.	Inch.	Ft. In.	Inch	Ft. In	Inch.
101 0	33½	88 0	26¼	90 0	27	88 11	26	85 0	24¾
90 4	21	80 2	18½	81 9	18⅞	79 5	18⅝	74 4	17⅛
58 6	17⅝	53 0	15¾	54 0	16⅛	53 4	15¾	51 0	15⅛
65 4	13⅝	57 6	11⅞	59 0	12¼	57 2	12	55 0	11⅜
29 3	9¾	26 6	8¾	27 0	9	25 8	8⅜	25 6	8½
39 0	7⅞	36 6	7⅜	37 6	7½	34 9	7¼	33 6	6⅝
89 7	29¾	78 0	23⅜	79 8	23⅝	80 0	23⅜	75 0	21⅞
79 5	18½	69 10	16¼	71 5	16⅜	69 4	16	64 10	15
52 9	17⅝	46 10	15¾	47 10	16⅛	46 11	15¾	45 0	15⅜
57 5	12⅛	52 2	10¾	53 4	11½	51 9	11	48 5	10
26 4	8⅜	23 4	7¾	23 5	7¾	22 5	7½	22 6	7½
34 5	7	32 2	6⅜	32 11	6½	31 6	6⅜	29 6	5⅞
85 10	19¾	74 4	16⅞	75 7	17⅛	74 8	16¾	71 3	16
81 0	14⅝	71 10	12⅞	73 2	13⅛	71 6	12⅞	66 11	11½
57 5	12⅛	51 4	10¾	53 4	11½	51 9	11	48 5	10
42 9	11⅞	40 2	11¾	41 0	11⅞	40 0	11⅛	38 3	10⅝
43 2	9	39 6	8	40 8	8¼	39 4	7⅜	36 9	6⅞
60 4	31¼	52 6	26	54 6	26½	55 2	26⅜	52 8	25
55 5	11½	47 8	9⅞	49 6	11	51 9	11	48 5	9⅞
43 9	13¼	38 10	11¼	39 5	11¾	38 7	11⅛	36 10	10¾
34 5	7	36 6	7⅜	37 6	7½	31 6	6⅜	20 6	5⅞

DIMENSIONS of the MASTS and YARDS,

Dimenſions, &c.	Ship of 28 Guns.			Ship of 24 Guns			Sloop 300 Tons		
	Length		Diam.	Length		Diam.	Length		Diam.
	Ft.	In.	Inch.	Ft.	In.	Inch.	Ft.	In.	Inch.
Main Maſt - - - -	81	4	$23\frac{5}{8}$	75	0	$22\frac{1}{4}$	63	0	$18\frac{3}{8}$
Ditto Yard - - - -	71	3	$16\frac{3}{8}$	65	6	15	55	0	$12\frac{3}{4}$
Main Top-maſt - - - -	48	9	$14\frac{3}{8}$	45	0	$13\frac{1}{4}$	37	6	$11\frac{7}{8}$
Ditto Yard - - - -	52	9	11	47	7	$9\frac{3}{4}$	39	6	$8\frac{1}{4}$
Main Top-gallant Maſt - -	24	4	8	22	3	$7\frac{1}{4}$	18	9	$6\frac{1}{4}$
Ditto Yard - - - -	32	1	$6\frac{3}{8}$	30	4	$6\frac{1}{8}$	25	0	5
Fore Maſt - - - - -	71	9	$20\frac{7}{8}$	66	0	$19\frac{1}{2}$	56	9	$16\frac{3}{8}$
Ditto Yard - - - -	62	2	$14\frac{1}{4}$	57	8	13	48	5	$11\frac{7}{8}$
Fore Top Maſt - - - -	43	0	$14\frac{3}{8}$	40	3	$13\frac{1}{4}$	33	9	$11\frac{1}{4}$
Ditto Yard - - - -	46	4	$9\frac{3}{4}$	41	11	$8\frac{5}{8}$	35	0	$7\frac{3}{8}$
Fore Top-gallant Maſt - - -	21	6	7	19	8	$6\frac{1}{2}$	16	10	$5\frac{5}{8}$
Ditto Yard - - -	28	4	$5\frac{5}{8}$	26	10	$5\frac{3}{8}$	22	0	$4\frac{5}{8}$
Mizen Maſt - - - -	68	0	$15\frac{1}{4}$	64	0	$14\frac{1}{8}$	48	0	12
Ditto Yard - - - -	64	2	$11\frac{1}{2}$	57	0	$10\frac{1}{8}$	Gaff 23	0	$6\frac{3}{4}$
Croſs Jack Yard - - -	46	4	$9\frac{3}{4}$	41	11	$8\frac{5}{8}$	35	0	$7\frac{3}{8}$
Mizen Top Maſt - - -	36	7	$10\frac{1}{8}$	33	9	9	26	7	$7\frac{3}{8}$
Ditto Yard - - - -	35	2	$6\frac{5}{8}$	31	5	$5\frac{7}{8}$	26	3	$5\frac{3}{4}$
Bowſprit - - - - -	48	9	$23\frac{7}{8}$	45	10	$22\frac{1}{4}$	37	6	$17\frac{7}{8}$
Ditto Yard - - - -	45	8	$9\frac{3}{4}$	41	11	$8\frac{5}{8}$	35	0	$7\frac{3}{8}$
Flying Jibb Boom - - -	35	3	$10\frac{1}{4}$	35	0	$9\frac{3}{8}$	27	0	$8\frac{1}{8}$
Ditto Yard - - - -	28	4	$5\frac{5}{8}$	26	10	$5\frac{3}{8}$	22	0	$4\frac{5}{8}$

of the following SHIPS, viz.

Weazel 201 Tons		Cutter 273 Tons		Royal Char. Yat.		Denmark Yacht		Oreftes.	
Length	Diam.	Length	Diam.	Length	Diam.	Length	Diam.	Length	Diam.
Ft. In.	Inch.	Ft. In.	Inch.	Ft. In.	Inch.	Ft. In.	Inch.	Ft. In.	Inch.
56 0	18¼	96 0	25	62 9	19	60 6	18	70 0	23
41 6	9½	64 9	10¾	51 6	12	49 6	11¼	56 0	12¾
32 0	10	——	——	37 9	11¼	35 6	11	35 0	11
32 0	7	——	——	39 9	7¼	36 6	7½	45 0	9⅝
24 0	6⅛	50 4	10½	16 0	6	15 0	5¼	21 5	6½
23 6	5	49 1	8¾	20 0	4⅞	18 0	4¾	31 6	6¼
47 9	17	——	——	56 6	16	54 6	15½	62 6	21
41 6	9½	——	——	44 6	10¾	42 6	10½	54 6	12¾
31 0	10	——	——	35 5	10⅝	34 0	10½	35 0	11
32 0	7	——	——	34 4	6¼	33 0	6½	45 0	9⅝
24 0	6⅛	——	——	14 6	5⅞	13 0	5½	23 6	6½
23 6	5	——	——	18 0	4¼	16 0	4¾	31 6	6¼
Main Boom	——	Main Boom	——	51 0	11	48 0	10	Main Boom	
45 0	10⅛	73 6	16½	26 9	6½	24 9	6¼	60 8	13⅜
Gaff		Gaff						Gaff	
25 0	7	46 5	12	26 5	7¼	25 0	7	36 0	10
——	——	——	——	26 8	7¼	24 6	7		
				26 8	5½	24 5	5¼		
——	——	——	——						
39 0	17½	69 6	22	38 4	15¼	36 6	14½	41 4	21
32 0	7	——	——	30 2	6⅜	28 0	6¼	45 0	9⅝
23 0	8¼	61 0	10½	25 4	7¼	23 0	7	30 4	8⅜
——	——	——	——	——	——	——	——	31 6	6¼

Of

Of the proper Figure of MASTS and YARDS.

IN order to make the dimenſions of the maſts and yards more uſeful, I ſhall alſo ſhew in what manner their true ſhape or figure is to be found, for though they are round like a cylinder at any particular place (except the hound and head,) yet their ſides are not ſtraight, but form a regular curve, and their biggeſt place (which is the diameter expreſſed in the dimenſions) is at the partners, or ſlings: the partners of a maſt for a three deck ſhip is at that place where the middle deck comes, and for all other ſhips maſts, the place of the upper deck; then between the partners and the hounds, or lower part of the head, the maſt is divided into four equal parts, which are termed the quarters, and at every one of theſe diviſions the true ſize of the maſt muſt be known, and for a topmaſt the quarters are divided between the cap and the hounds, the cap being the part for which there is a given diameter: the ſlings of a yard is exactly the middle, and between that place and the end of each arm, it is alſo divided into quarters.

The following TABLE will ſhew the Proportion every Part of a Maſt or Yard bears towards the given Diameter in the Tables of Dimenſions.

	Quarters.			Heads.		Heels
	1ſt.	2d.	3d.	Lower Part	Upper Part.	
Standing Maſts that are cheeked - -	,98360	,93333	,85714	,85714	,625	,85714
Standing Maſts that head themſelves -	,98360	·93333	,85714	,75	,66666	,85714
Top-maſts and Gallant Maſts - - -	,97560	,92857	,83333	,69230	,54545	
Mizen Yard: Lower arm - - -	,96774	,91666	,83333	,66666		
Mizen Yard: Upper arm - - -	·96774	,875	,7	,4		
Yards in general - - - - -	,96774	,875	,7	,42856		
Bowſprit - - - - - -	,97560	,91666	,8	,55555		

Length of the cheeks 6-20th of the length of the maſt.
Length of the head of the main and fore maſt, five inches to every yard the maſt is long.
Length of the head of the mizen maſt, four inches to every yard.
Length of the hounds of all maſts 2-5ths of the length of the head.