HE BUILDING GAZETTE

OLUME 2 | MARCH 15, 1949 | NUMBER 3

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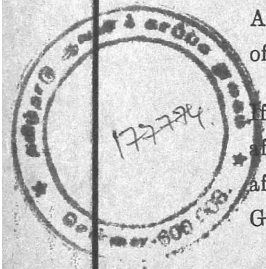

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THE
BUILDING
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1/11, MUKKER NALLAMUTHU STREET, G.T., MADRAS.

THE BUILDING GAZETTE

AN INDEPENDENT MONTHLY JOURNAL DEVOTED TO THE INTERESTS OF BUILDING INDUSTRY

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THE BUILDING GAZETTE

I/II, MUKKER NALLAMUTHU STREET

G.T., MADRAS.

EDITED BY T. N. SUBRAMANIAM

Associate, Faculty of Surveyors of England

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PRINCIPAL CONTENTS

BANKS AND BANKING

INTRODUCED THROUGH THE BUILDING GAZETTE

Figures indicate the current rates per cent of interest to new investors. Investors are advised to communicate direct with the Bank of their choice so that they may obtain full details of any special advantages which are available.

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KUMBAKONAM BANK: Kumbakonam.—S. MAHALINGA IYER, B.A., B.L., *Managing Director*, 6 months 3; 1 year 3; 2 years 3¾.

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SOUTH INDIA BANK: Tinnevelly.—6 months 2½; 1 year 2¾; 2 years 3.

TRAVANCORE BANK: Trivandrum.—Dr. LUDWIK ARONSON, *Managing Director*, 6 months*; 1 year*; 2 years—.

BUYERS' GUIDE

NEED FOR ACTION

If everything we needed were to hand, it would be quite easy to sit down and devise ideal schemes of housing. Different areas need different treatment and those who are to execute only one scheme talk more in terms of various other schemes and thus multiply the number which cannot provide the answer.

True, we are short of money, short of materials, and above all, short of specialists. The fact remains, however, that we have not yet done all that can be done with less money, with indigenous materials and with few specialists.

Unfortunately a planned programme of concerted action is not yet the genius of official mind. The official likes to do more and more cement concrete roads and make more elaborate plans for prefabricated cement concrete labour camps. He rests more on the support of his first preference for cement and steel.

Generally then when it comes to the distribution of materials, the common man stands far down on the list, and have to wait long for a still inadequate supply.

The only course the Governments should adopt without further delay is to set up a Housing Board with at least half of its members drawn from the building industry and must bestir itself in seeking every rough and ready means at its disposal to increase the present output of clay products and lime and make available more timber. Particularly this "Board" must inspect and advise all building programmes to adopt the best methods to avoid excessive use of cement and steel, in a practical way.

Prefabs will never be the only answer for our housing problem. We maintain that the only way to get results is by applying the principle : local materials and local craftsmen.

We wonder how far the local authorities are making use of their engineers, and whether they have found that particular type of quick-minded intelligence very suitable to apply to large-scale housing projects.

The loud call for low-cost houses, and the standard advice which are available to all, are of little avail if they remain only on paper. The public have therefore looked upon the suburban garden-houses through the Exchequer as schemes of luxury and extravagance.

NOTES & TOPICS

Industrial Expansion

Sir M. Visvesvaraya, presiding over the ninth annual conference of the All-India Manufacturers' Organization held in Bombay recently, said that the present Government policies, unless modified, would deprive the country of the strength and support which all civilised countries received in emergencies from national industrial firms. Early steps should be taken to bring into existence firms of consulting engineers and chemical engineers. It was necessary to take correct census of industries once in three years, as was done in England. The result of each year's work in a region should be collected in reports and statistical tables and placed on record. Such a record could not fail to stimulate thought and help both management and labour to step up production.

Army develops Kashmir.

Hundreds of miles of new and better roads, a net-work of telegraph and telephone communications, two all-weather air-fields and two radio stations, one in Srinagar and another in Jammu, are the permanent amenities brought to the people of Kashmir in 15 months by the presence of the Indian Army in their midst.

Rs. 75 lakhs were spent by the Army in building winter huttings and Rs. 3·4 crores for roads and pony-tracks.

National Planning Committee.

The question that was generally asked these days, said Dr. J. C. Ghosh, Director-General of Industries and Supplies recently, was as to what had happened to the planning programme which was outlined by the National Planning Committee under the chairmanship of Pandit Nehru in the pre-independence era. To this question (he having been a member of the committee) there could be only one reply—the Committee had never tried to base their plans on actual realities which accounted for the recommendations being put into cold storage.

No Electrical Engineer for New Delhi.

New Delhi Municipality has a vacancy for an Electrical Engineer in the grade Rs. 1,300–60–1,600. None of the five candidates who had applied for the post were found suitable. Due to the difficulty of finding a man with suitable qualifications the City Council has authorised its President to get in touch with the Ministry of Works, Mines and Power to find whether they could help find a suitable person for the post.

Perfumed Paint.

The smell of fresh paint which makes many people allergic will shortly give way to delicate perfumes. Paint experts at Birmingham who have been experimenting for months have announced a new paint known as "Glammel", and believe it will revolutionise painting. The perfume in it fades after the paint has dried but there is no 'fresh-paint' smell. Another advantage is new paint leaves no brush marks. It is available in 16 pastel tints as well as black and white.

Timber Houses.

From the timber houses that have been built in the United States, Canada and the United Kingdom, it has been proved that timber houses are a practical proposition—economical, comfortable, and the speediest of all in erection. But though it has already been demonstrated that timber house construction is well within the capacities of all capable builders, the maximum advantage should be taken of the latest technique. It is of course not suggested that all houses should be of timber, but as timber is probably the best material for building quickly, as well as being efficient and economical, particularly with prefabrication methods, timber houses could play a major role in solving the present housing problem.

College News.

The Government of Bombay has decided to recognize the degrees in Electrical Engineering and Mechanical Engineering awarded by the College of Engineering and Technology, Jadavpur, West Bengal, as equivalent to the corresponding degrees of the Bombay University.

The Government of Madras has recognized the Diploma in Civil Engineering of the Mysore University as equivalent to the Licentiate in Civil Engineering Diploma of the College of Engineering, Guindy; and B.E. (Mech.) degree of the Mysore University as equivalent to B.E. (Mech.) degree of the Madras University.

A Rent Comparison.

The rent which the Russian Embassy in New Delhi is paying for the A and B blocks in Travancore House on Curzon Road, which it is occupying is Rs. 3,845 per month, it is learnt. It was disclosed in the Union Parliament recently that the monthly rent of the Indian Embassy in Moscow is Rs. 8,720.

U.N. Secretariat.

Construction is under way on the 39-storey building that will house the U.N. Secretariat as its permanent headquarters in New York. U.N. Secretary-General Trygve Lie has awarded a $23,809,573 contract for construction of the first of the three main buildings to be built on the six-block site to a firm representing the combination of four construction companies joined for the U.N. project. The contract is the largest financial obligation the U.N. has undertaken since it was founded three years ago. The design is the product of an international committee of experts.

Vaitarna-Cum-Tansa Project.

The Rs. 16-crore project to increase Bombay's water-supply was

inaugurated in the village of Vaitarna, 80 miles from Bombay, by the Mayor of Bombay, recently.

The project involves the construction of a five-mile long tunnel to carry water from the Vaitarna River to the Tansa Lake, the city's present main source of water-supply.

Mr. N. V. Modak, Special Engineer to the Bombay Municipality who played the role of *purohit*, went to the foot of a hillock to perform *pooja* at the mouth of the proposed tunnel and to break a coconut on the rock to be blasted by the Mayor.

The Mayor pressed an electric button which blew up a charge of dynamite.

A.M.I.E. (India).

The retiring President, Mr. K. K. Nambiar, of the Institution of Engineers (South India) has urged the Government of Madras to recognise the A.M.I.E. qualification as at least equivalent to B.E. degree. If this qualification is to be treated as equivalent to the degree why should degree-holders respond to the invitation of its new President, Mr. K. V. Karantha, who at the same meeting invited Engineers to become members and raise the Institution as quickly as possible to the high status that similar institutions enjoyed in other countries.

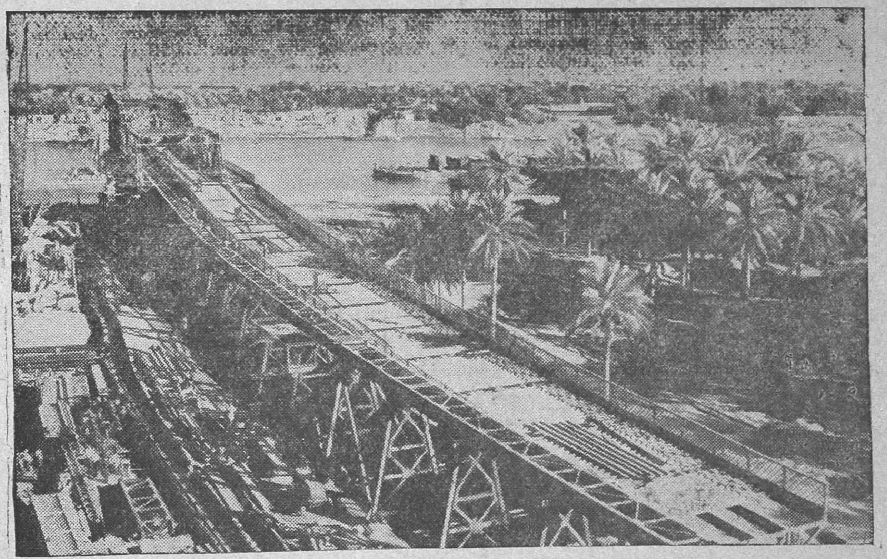
It is to be seen during the current year from the working of the Institution if Mr. Karantha has investigated as to how the sister institutions in foreign countries assert themselves. One of the main lessons to be taken from the sister institutions is that the qualification of a professional body is never subordinated to a University degree.

Slum Clearance.

The first attempt at clearing slums in the City of Madras has been made by the local Improvement Trust recently by laying the foundation stone for a housing scheme of four blocks at Cox Cherri which will provide accommodation for 132 families. The Chairman of the Improvement Trust has, it is learnt, requested the Government to raise the contribution to the Trust to Rs. 10 lakhs. If the Trust is to justify its existence it must have a turnover of at least Rs. 50 lakhs on building schemes per annum, which shall however include both executed as well as planned improvements.

Principle of Valuation. Electricity Supply Concerns.

In valuing an electricity supply concern on the "revenue" principle, it is proper for the assessor to take as the basis of his valuation the average profits of the concern over a period of the five preceding years, and that notwithstanding the fact that in one of those years the profits appear to have been exceptionally large.



RAIL BRIDGE FOR IRAQ

The first railway bridge ever to span the river Tigris, being built by British contractors at Baghdad, when completed will form a vital new link between the rail systems of the West bank—carrying traffic to Mosul, Basra and Turkey—and that of the East bank which extends to the important Kirkuk oil fields. The new bridge will carry a metre-gauge railway, and an 18 ft. wide roadway. The new bridge from the West bank, showing the approach viaducts on steel trestles leading up to the main steel-girder spans. This bridge will supersede the old railway wagon ferry now in use.

HOW BRITAIN REACHED HOUSING TARGET

S. GORDON COLLER

Britain's housing programme for 1949, and the long-term plan which will follow, are now being closely studied by experts. With the passing of the first post-war target set by the Coalition Government in 1945—the provision of 750,000 new homes—the Ministry of Health staff in charge of rehousing Britain's homeless and the building industry have been left free to concentrate on a new task.

The task is threefold: first, to assess the numbers of those who are still waiting for a home of their own after the fulfilment of the first target and whose needs will probably have first claim on the 1949 programme; secondly, to develop housing in those sections of the national recovery programme which are most vital, such as Agriculture, Mining and Development Areas, and thirdly, to evolve long-term objectives which are now to be set before the people.

New Types.

Some indications of the lines which the long-term plan will follow have already emerged from official statements in the past year. Local Government Authorities, which are the executives of the Central Government plan for housing still have long waiting lists for homes in most parts of the country and these lists must first be sifted to obtain a reliable estimate of the urgent demands still to be met. At the same time, the long-term plan is likely to provide for the gradual introduction of a greater variety of new types of houses.

So far, new housing has consisted mainly of two types—the two-bedroom temporary house and the three-bedroom permanent house—and the programme must now be widened gradually to include bigger houses for large families and smaller houses for small families as well as flats and bungalows for single or aged people. Designs for some of these new types of accommodation will be included in the new Housing Manual now being prepared.

Another feature which the Government hope to incorporate in the long-term programme as resources permit, is the resumption of slum clearance, and more liberal provision for the maintenance and improvement of existing houses. Finally, Local Authorities will be encouraged to see that the best possible use is being made of houses on their existing estates, cases of "under-occupation" being remedied by the transfer and exchange of tenancies and so on.

1948 Achievements.

If the British people are able to start lifting their eyes from their most pressing housing needs in 1949 and to resurrect some of the hopes of brighter cities and homes which have been buried for three years in the rubble of war it is because of the magnificent housing achievements of 1948.

The preliminary target of 750,000 new homes was passed last September and—with the returns for December still to be issued—a grand total of 812,406 new dwellings had already been provided by the end of November. Of this total, 406,368 were permanent houses, 156,991 temporary houses and 249,047 other additional homes (but excluding those found by requisitioning or in Service camps and huts).

Year by year, as the housing campaign developed, and despite occasional critical shortages of materials, the total of new dwellings has climbed towards this formidable total: 1945—84,695; 1946—222,535; 1947—242,593 and 1948—262,583 (first 11 months only). The post-war programme for prefabricated temporary houses (157,270) was only 279 houses short of completion on November 30 and the number of these houses has, therefore, declined steadily from 83,050 in 1946 to 18,170 in the first 11 months of 1948

Permanent Houses.

The number of permanent houses built has risen rapidly to take their place: from 3,014 in 1945 to 55,369 in 1946, 139,690 in 1947, and a record total of 208,295 in 1948 (11 months only).

Thus, within three-and-a-half years of VE-Day, Britain passed last year the annual completion rate of 200,000 permanent houses. After World War I, it was not until eight years later, when 273,229 houses were built in 1927, that this level was passed. That is some measure of the progress which Britain has made in the past year in rebuilding her cities.

Thanks to this progress, it has also been possible for the Government to relax some of the stern controls which have been necessary to achieve these results. Thus, the complete ban which had to be placed on private building in August 1947 in order to concentrate

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HOUSING PROBLEM IN INDIA

G. V. RAO, B.Sc., A.M.I.C.E.

Retired Sanitary Engineer to the Government of Madras.

I have read with considerable interest the article published in *The Building Gazette* dated 15th February 1949 by Dr. S. Kamesam of Bangalore under the caption "Solving Housing Problem in India". His observations on the type of constructional details utilising locally available materials and more or less banning the imported material, to solve the housing problem all over India are quite laudable, if it is a practical proposition judging from various aspects. The whole question as an All-India problem has to be carefully examined on a top level in the light of financial resources, availability of local materials, administrative facilities, organisation and execution, etc. It may be interesting to know the outlines of the magnitude of work involved in the solution of this Nation Building Scheme.

The number of different types of houses in the urban and rural areas will be in the neighbourhood of 20 million to accommodate the lower, middle and upper middle classes needing accommodation all over India including Indian States, costing over Rs. 12,000 crores. Assuming a ten-year programme, the annual expenditure on housing will be about Rs. 1,200 crores, and not less than 60% of this will be the cost of materials, no matter what materials are used. As such the country will have to find a regular supply of materials costing about Rs. 70 crores per year. It is therefore obvious that a proper survey of regular supplies of indigenous material available together with their sufficiency will have to be made, methods of proper distribution and movement of such material to different parts in India where it is not available, relative costs, durability and adaptability of such materials, will have to be worked out, to establish the dependability of the essential local building materials for an All-India programme.

Organisation.

The responsibility to solve the All-India Housing problem is interlinked with the Dominion and Provincial Governments and also the employers of Labour. An organised co-ordination of housing policy between these bodies seems essential if the housing problem is to be solved on effective lines. The promotion of an All-India Housing Committee, co-ordinated by the respective Provincial Housing Committees to assist the Local Bodies and employers on a decentralised administrative basis with necessary powers to overcome all possible obstructions in working the scheme, entrusting executive powers to a single authority, should be able to speed up the progress of housing schemes.

Finance.

The financing of large scale National Schemes is one of the problems facing most Governments in the country. It is extremely doubtful for several years to come whether the Central and Provincial Governments would really be able to bear the burden of financing housing schemes in view of various commitments under the present policy, though the inauguration and working of housing schemes would solve inflation to a considerable extent. At the same time the financial problem is not unsurmountable provided private enterprise is forthcoming combined with Government support. For all practical purposes the financing of housing schemes may be classified into two categories, namely (*a*) Schemes coming under uneconomic rents and (*b*) those under economic rents. The Central and Provincial Governments, and the employers of labour will have to undertake the work under category (*a*) and subsidise a portion of the capital cost of these schemes to bring them within the economic rental values to provide houses for such of their employees whose earning capacity is too low to pay the premiums based on the Capital cost of the houses in which they will be housed, or disproportionate with their rental values.

Housing Schemes for the majority of lower, middle and upper classes who are equally in need of housing accommodation all over India and who can afford to pay economic rents based on Capital cost, in the shape of monthly or annual premiums for a certain number of years with a view to possess a house of their own in due course, would come under category (*b*) above. The financing, organisation and execution of these schemes the cost of which may be about 50% of the total expenditure on housing schemes should be left to private enterprise with necessary moral support from the respective Governments. The several operations underlying the successful working of these schemes should be entrusted to quasi-Government Co-operative Societies which are functioning here and there though not quite satisfactorily for lack of finance and proper organisation, and to the Building Societies incorporated as Public Limited Liability Companies. Thus the financial problem can be

solved to a very large extent. When once these crucial points are tackled in a businesslike manner, other matters such as economical designs, technical staff, the appointment of Special Committee of Engineers, organisation, execution and the like are only a matter of administrative detail which is within the reach of Engineers experienced in administration. In the light of the foregoing administrative and financial hurdles the problem does not appear to be within the reach for a solution by the Engineers or Engineering Institutions, except as a matter of academical interest at the present moment. On the other hand, it is high time that the Government ought to invoke the active help of experienced Engineers as suggested by Dr. Kamesam to solve this gigantic problem. Apart from this, it is never too late if the Engineers in service and private practice could take initiative to throw their weight as to how best the housing problem could be solved, and contribute their mite to the call of Dr. Kamesam; and also to give their considered opinions or offer constructive comments on the various points raised in his article in the matter of utilisation of indigenous materials and types of construction advocated by him. A wide range of comments would considerably help the Engineering practice particularly in these days of serious economic conditions prevailing in the country.

It is my considered opinion that any type of construction put up either by Government or by private enterprise on hire purchase system should be strong, sound-proof, weather-proof and should withstand severe shocks, fire and termite proof, durable and adoptable to any kind of architecture, lest the private enterprise may be reluctant to throw its weight in undertaking house building schemes.

"Alcrete Houses."

From a special study and experience of the various types of prefabricated structures, I share the opinion of Dr. Kamesam that "Alcrete Houses" reviewed in his article are not suitable for Indian conditions. I am afraid it is a costly experiment they are launching, and time alone will prove its utility or otherwise. At the same time, I reserve my comments for lack of details in the matter of structures to be built with treated jungle wood. It would have considerably helped the readers if Dr. Kamesam had given a plan and section of a building, perhaps the one put up by him 12 years back at the Lucknow Exhibition, showing the details of the type of construction advocated by him together with comparative costs on a plinth area basis, and it is not too late even now if he could do so in the public interest.

As to the construction of walls of buildings with hollow cement blocks, I am afraid their sphere is very limited in the Engineering field, and much less with regard to the use of hollow blocks made of a mixture of clay and cement. I would invite the kind attention of the Engineers in service and private practice to give their considered opinion in the matter of hollow cement block construction for durable and permanent houses.

After several years of spade work extensive touring in foreign countries and in India, and discussions with various foreign and Indian Engineers and careful study of the housing problems, I have come to the conclusion that the only course left to solve the housing problem is partly through well organised Co-operative Societies, and mostly through Building Societies with the aid of financial corporations. There are now more than 1,000 such Building Societies incorporated as Limited Liability Companies in Great Britain working for the last more than 30 years, and they have built several million houses on hire purchase system. If India wants to be benefited by experience, she ought not to launch costly experiments for results which are already available, as sometimes done to the detriment of the Tax-payer—but on the other hand a variable adjustment of results is all that may be necessary to suit local and prevailing conditions without sacrifice of efficiency.

How Britain Reached Housing Target

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the resources of the building industry on the completion of houses then under construction, could be lifted again in June last year throughout England and Wales; although it has still proved necessary to restrict the number of houses built for sale to private owners to one-fifth of the total built (the rest being constructed by Local Government Authorities for letting).

At the same time, however, the maximum size permitted to private owners who have their houses built was increased from 1,000 to 1,500 square feet of superficial area, and the maximum price left to the discretion of the Local Authorities instead of being fixed at £1,300 (Rs. 17,333)—£1,400 (Rs. 18,666) in London. Higher production has also made it possible to increase the maximum expenditure on repairs permitted to owners without a special licence each year from £10 (Rs. 133) to £100 (Rs. 1,330).

Freed from Control.

Materials whose supply has increased sufficiently have been freed from control, such as building bricks, which can now be bought and sold without a special permit. Materials still in short supply must, however, remain strictly controlled: in 1947, for instance, 45.6 per cent of the soft wood imported into Britain came from dollar areas (compared with 20.1 per cent before the war).

Despite all these difficulties, however, Britain has now rehoused more than 2,500,000 people since the war and her people are facing their next tasks in 1949 with the confidence of solid achievement.

TEAK RESOURCES OF INDIA

L. S. KRISHNAN, M.A. (Hons.).

Teak, the timber par excellence of India and the East, has been known to the outside world at least from the times of Solomon. Since those early days a steady export in increasing volumes had been maintained in this wonder timber of the world. The uses of teak are many and varied and even today it is a common sight to see the railways in this country using this valuable timber as sleepers. With the arrival of the European nations in this country and the East, the export of teak, particularly for ship-building went up by leaps and bounds, and about the middle of the 19th century we were practically poached out of our natural resources of teak. The British Government who were the biggest individual importers of Indian teak in those days found that very soon they would be short of teak for ship building and ultimately a programme of teak planting was initiated in India at the instance of H.M.'s Government and the first teak plantations were started in Nilambur (Malabar) in 1842. Very soon after Burma had also been discovered as a teak bearing area, very much virgin in those days, and attention was diverted to that country by British exploiters, the earliest being Wallace & Co. Further Siam and Indo-China, the entire range of the Netherlands Indies came under the control of the European nations and the trade in teak was more than ever their sole monopoly. Therefore it was not surprising that exploitation was based on a policy of "cut out and get out", leaving the question of regeneration to ensure a sustained yield to chance and dame Nature.

Now let us see the result of this reckless exploitation. The inexorable law of supply and demand is acting and we find we are dangerously running short of adequate supplies of this valuable timber. Few realise that this timber is distributed even in the finest teak-growing areas of Burma, the Valley of the Upper Chindwin, at the rate of just ONE TREE PER ACRE and nothing more. And an average tree is about one ton or 50 c. ft. And when it is a fact that in the teak areas the average solid stand of timber of all ages and classes is about 200 tons, the percentage composition of teak is a miserable ½%! Therefore, it is obvious, we should take steps to stop this drainage on our teak resources, both indigenous and imported. In spite of the fact that Nature has been bountiful in growing no less than 2,500 distinct species of timber in this vast subcontinent, every one useful for some purpose or other, it is surprising to see that these are classified into three species, namely, teak, rosewood and "junglewood". Even the scientific forest officer is guilty of this nomenclature and speaks volumes for his knowledge of timber. Fact is, there was a time when everything Indian, including Indians as a class, were considered to be inferior to the imported article, from humans to vegetables. Teak, owing to its inherent qualities which made it fool proof, could not be ignored and asserted itself against the oak of England. Not so with the "junglewoods" condemned out of hand as a result of the ignorance of the foreign trained expert regarding Indian botany and forestry. So he called them "miscellaneous species," "inferior species." "katcha timber" and so on. In fact they are the "depressed classes" of our forest population, on whom our future timber supplies depend to a considerable extent. Such being the case it becomes a matter of absolute necessity that we restrict the use of teak to satisfy purely essential demands and nothing more. One such demand is the *ship building industry*. We are bound to launch into a big programme of ship-building both naval and mercantile marine. While there is no hope of the meagre teak resources of India meeting this demand, we must conserve from the large volume of our annual teak imports from Burma sufficient teak for this purpose and in the matter of issues should give the highest priority to ship-building. Railways also are consuming large volumes of imported teak and this should be prohibited in future, particularly for use as track sleepers for which there are very good substitues from other species.

Strict economy and conservation of our teak resources automatically calls for the utilisation of the host of other species for purposes for which teak is not absolutely necessary. How best can we use species other than teak? The answer is simple, namely, Seasoning. Seasoning holds the key for the proper utilisation of our natural timber resources. And once it is decided to use only seasoned timber practically all the major defects to which the majority of our timbers are subject will disappear and these timbers can be brought into popular use without much trouble. And therefore the starting of a Forest Research Institute at Coimbatore by the Central Government is doubly welcome. It should be one of the fundamental functions of this institute to carry on intensive research in timbers obtainable in this province, increase the extent of utilization of species already in use, and bring into popular use such as are not used. Yet again with the idea of ensuring a sustained yield of the various species, the sylvicultural characteristics of these species must receive close attention to enable us to lay down proper working plans based on

(*Continued on page 25*)

RAMAPADASAGAR PROJECT

"Despite unusually difficult river diversion and foundation excavation problems, construction of the Dam, unquestionably, is possible," is the opinion of the American Consulting Engineers, said the Premier of Madras at the Assembly, during the recent Budget session, and added :

It meant that modern engineering science can successfully tackle the project, but only if we can supply the required materials, men and money, adequately and in time. It meant that the world's latest mechanical appliances on dam construction should be made available ; as also hundreds of the

* Mr. J. L. Savage.

best technicians in the line; and all these we do not have in this country. We will have to import them ; for the science of high Dams has made such tremendous progress in America, that even our senior Engineers here, however talented they are, have yet to learn many things from abroad. Two hundred key men including one Chief Engineer have to come from America. The Contractor must come from America, machinery costing about Rs. 5 crores will have to be imported even to start with ; and some of the machines are rare to come by.

Then there is the question of construction of a Railway line from Kovur or Nidadavole to Polavaram for the transport of three million tons of materials. A town of the size of Rajahmundry will spring up at Polavaram, which will have to be planned and protected against epidemics. The daily output of all the cement companies in South India put together is only 1,000 tons while at peak periods the Dam would require 1,500 tons a day. About 300 lakhs tons of steel will be required, of which the bulk will have to be supplied in the earlier stage. A huge workshop, capable of fabricating and repairing the latest machinery in record time will have to be built. The supervision and control of expenditure cannot be exercised from the Fort St. George. An authority on the spot will have to be created by legislation. An engineering staff of two Superintending, 27 Executive and 100 Assistant Engineers and 400 Supervisors—a staff almost equal to the entire existing staff of the Public Works Department of this Province will be required for construction after the foundation has been laid by foreign experts.

More important than all these men, money and material is the time element. The Ramapadasagar Project has no parallel in the world. The waters of Godavari with ten times the annual discharge of the Cauvery or Tungabadra have to be diverted at the Mahanandi Hill exposing the river bed at the right arm ; and this is the crux of the problem. Engineers will be grappling with primordial forces of Nature—flood and erosion—during the first two years. The building of the Coffer dam above the danger level should be accomplished within two flood seasons at the most and all the time as the excavation in the deep bed lies exposed, bitter struggle will have to be carried on by pumps for survival against seepage. It is a period of great anxiety and great risks. Once started, the Project will have to proceed at break-neck speed and we should be duly prepared to meet the men, material and money requirements of Engineers without any delay.

* Mr. John Lucian Savage, to whose specifications Grand Coule Dam and some 60 other hydro-electric and irrigation projects have been built ; Mr. Harper who built the Grand Coule Dam ; Prof. Terzaghi, Soil Scientist of the Harvard University ; and Sir Murdoch MacDonnel of the firm who constructed the Assuan Dam in Egypt are the experts consulted by the Government of India for Ramapadasagar Project.

EXCAVATING PLANT

ROLT HAMMOND, A.C.G.I., A.M.I.C.E.

In the early days of railway, road and canal building, the navvy was the key man, and the old piecework "butty gangs" shifted enormous quantities of material, gruelling work which demanded more brute force than skill. To-day this brutalising toil has gone for ever, due mainly to the versatile skill and genius of the mechanical engineer in providing the civil engineer with a vast variety of specialised equipment to meet the needs of practically every type of work and carry through the job with speed and efficiency.

It is heartening to remember that the early development of excavating machinery was largely due to the efforts of British engineers, a fact brought out on more than one occasion by Mr. William Barnes, M.I.Mech.E., one of our leading authorities on this subject. When the author was serving his apprenticeship some twenty years ago he well remembers a Dunbar and Ruston steam navvy, built in the eighties, which gave excellent service even after a quarter of a century. The steam navvy had many advantages; reliability, extreme flexibility of operation under different conditions and simple rugged machinery. However, the disadvantages are many and serious; time is required for lighting up the boiler and raising steam, boilers must be washed out and inspected at regular intervals; labour and fuel costs are high and the machines are bulky and cumbersome. Nevertheless, some are still at work and giving reliable service.

Barnes has stated that an excavator and belt conveyor equipment was used by Lloyd's Ironstone Company in 1897, seven years before the Americans tried a similar type of conveyor and excavator; although it was generally believed that the first long boom stripper was made in the United States, this was not the case. The first was built and put to work by Lloyd's Ironstone Company in 1899, eleven years before the Americans produced their first stripper. The British machine was still at work, said Mr. Barnes, after 46 years; this is indeed a remarkable tribute to the soundness of British plant.

The advent of the successful high-speed compression ignition engine has provided a power unit for excavators which is practically ideal; it is efficient, compact, economical and reliable. It can be working in a few minutes and when combined with a fluid flywheel drive it cannot stall if the ground suddenly becomes difficult. Although petrol engines may be fitted under certain conditions, the compression ignition engine is preferable for this heavy work, and its low fuel cost is an important recommendation on public works contracts, where economics determine what machinery and plant shall be used.

The oil engine is a suitable power unit for single bucket excavators up to about 2 cubic yards capacity. The larger excavators for opencast coal mining, pit and quarry work are generally driven by electric motors deriving their power from a nearby public supply through a trailing cable, except in those cases where mobility is essential, when a powerful oil engine or diesel-electric plant will be more suitable.

Electric drive may take many forms. The driving motor may run at constant speed in the same way as an oil engine, or a diesel-electric system may be fitted, with individual motors for each drive obtaining current from the main generator. The Ward Leonard control has become increasingly popular for excavator drive; in this system an induction motor drives separate generators which are connected in closed armature circuits with the crowd, hoist and slewing motors. The system provides maximum voltage at low current and maximum current at low voltage whereby high torque is given at low speeds and low torque at high speed. Efficiency is high, maintenance cost is claimed to be low, and control at high operating speed or maximum bucket effort is greatly facilitated; moreover complete protection is ensured against overload currents in the armatures.

Another important feature for excavator drive is regenerative braking, which allows of high operating speed and reduced power consumption, making possible the elimination of certain clutches. A less expensive drive than the Ward Leonard system is the constant current system, where only one generator provides current to the various motors with armatures connected in series, control being effected by a separately excited field.

The mechanical navvy, "face shovel" or "forward shovel" is the most usual machine for heavy excavation and is now built in a range of sizes varying from a ¾ cubic yard to 40 cubic yards bucket capacity. The latter is only justified for very heavy works, such as large scale opencast coal mining, removing overburden from iron ore beds and similar tasks. The largest shovel in the world has a bucket capacity of 40 cubic yards and is now working a vein of bituminous coal from 20 to 50 feet thick along the working face and reaching a maximum

thickness of 100 feet. This coal seam is reported to be the thickest in the world and is at Elkol Mine, Wyoming, U.S.A., owned by the Hanna Coal Company.

An exceptionally large electric shovel is the Rapier 5361, this is the largest excavator in Europe and was built to the order of Messrs. Stewarts and Lloyds, Ltd., for removing the overburden from iron ore mines. It has a bucket capacity of 11 cubic yards, it can dump overburden to a height of 63 feet, has a dumping radius of 104 ft. 6 ins. and weighs 630 tons.

Electric Shovel.

A sketch of the Rapier 490 electric shovel is shown in Fig. 1. This machine is typical of the best type of large excavator suitable for heavy civil engineering and quarry duties; it has a bucket capacity of 2½ cubic yards and can be equipped either with electric or diesel electric drive operating on the Ward Leonard system of control. It can be fitted with a shovel or as a dragline, and steam drive can be provided where required. A general description of this machine will serve to bring out the main features of modern excavator design.

RAPIER 490 ELECTRIC SHOVEL

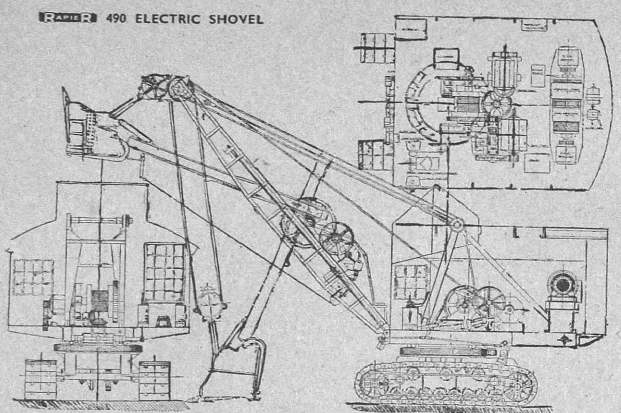


Fig. 1

The machine embodies the experience of seventy years in this field, an outstanding feature being the accessibility of all machinery. Cast steel construction is employed for the main upper frame, base frame and crawler frames; the rigidity of the cast steel base preserves the accurate alignment of all machinery and thus contributes towards freedom from breakdown. Great care has been taken with the design of the crawler tracks, the belts of which are made of high quality cast steel, the self cleaning pads being connected together by hardened steel pins; tensioning adjustment is provided at the idling roller end. Although the crawler tracks are proportioned to give low bearing pressure, crawlers of exceptional width may be provided for working in soft or marshy ground. The modern crawler track is a very reliable component of this type of machine and the author has seldon experienced trouble of any form with it during his experience.

In the all-electric shovel an induction motor of 100 horse-power, at 1,460 r.p.m., drives three direct current generators for the hoisting, slewing and crowding motions; their respective outputs are 55, 20 and 20 kilowatts. The machines are all mounted in line on a common bedplate. Standard equipment is provided for 3,000/3,300 volts three-phase 50 cycle alternating current, but suitable equipment for other voltages may be obtained. The exciter set comprises a 10 horse-power squirrel cage motor direct coupled to a generator of 6 kw., operating at 125 volts. The motor runs on a 440-volt three-phase supply stepped down from the mains supply of 3,000/3,300 volts by the auxiliary power transformer.

In recent years the universal type of excavator has become very popular in the smaller sizes, say, from ¼ up to 1¼ cubic yard bucket capacity; special booms and fittings serve to convert it quickly and easily from a face shovel to a dragline or skimmer shovel. When operating as a dragline, it will probably be provided with a lattice boom of longer reach than for the face shovel or skimmer. The latter is very useful for trimming a slope or skimming a road bottom to a definite surface.

The dragline originated in the U.S.A. and has become very popular (in England) in recent years, particularly in connection with opencast coal mining. It is built in sizes which range from ¼ to 20 cubic yards capacity and which have booms up to 250 feet in length; aluminium alloy booms and buckets have been employed with great advantage on large draglines working on the Mississippi levees. The dragline is particularly designed for excavating below the level on which it stands, as distinct from the face shovel, an outstanding advantage where the machine can stand on the original ground surface, which is generally in fairly good condition and undisturbed. Furthermore, it is very suitable for widening and clearing ditches, canals, drains, or rivers in which it would be impossible for any machine to operate at the bottom of the cut. A skilled dragline operator can do much to increase the value of his machine by throwing the bucket with a pendulum motion as he slews the jib and pays out the rope, operations which should all be

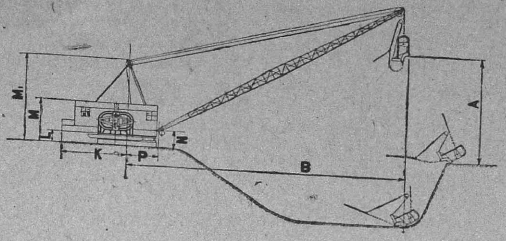


Fig. 2

done smoothly and in correct sequence to give the required result. On deep excavation this is extremely valuable and can also be employed to great advantage in cleaning out wide ditches or river channels.

Obviously a dragline gives best results in material which is easily excavated, the bucket being quickly filled and the operating cycle thereby being reduced. The author has had experience of these machines on opencast coal mining and similar work, where they were particularly suitable for excavating shattered rock after blasting. Draglines are also useful for excavating docks in the dry, the open-cut method having under certain circumstances superseded the older trench method. Digging effort at the teeth of a dragline is about 16,000 to 18,000 pounds per cubic yard of bucket capacity with a digging speed of 140 to 180 feet per minute.

The tendency for modern draglines to increase in weight has imposed tremendous loads on crawler tracks and for the larger machines this is not able to withstand such stresses especially in difficult ground. The problem has been solved in a most satisfactory manner by the walking dragline, the superstructure of which rests and revolves upon a flat circular base with a diameter ranging from 18 to 36 feet, giving a bearing pressure on the ground of from 5 to 9 lbs. per square inch.

Walking Dragline.

Fig. 2 shows Ruston-Bucyrus Monighan walking dragline in outline, with leading dimensions and capacities. The machine is moved forward by a pair of cam-operated side shoes, one of which is shown in the raised position in the sketch, which operate in such a manner that they lift the forward edge of the circular base to break the suction between its underside and the ground; the machine will then move forward in a series of hops of 6 or 7 feet, the circular base being lifted and lowered as the cams rotate. Direction of travel is controlled by the direction in which the machine

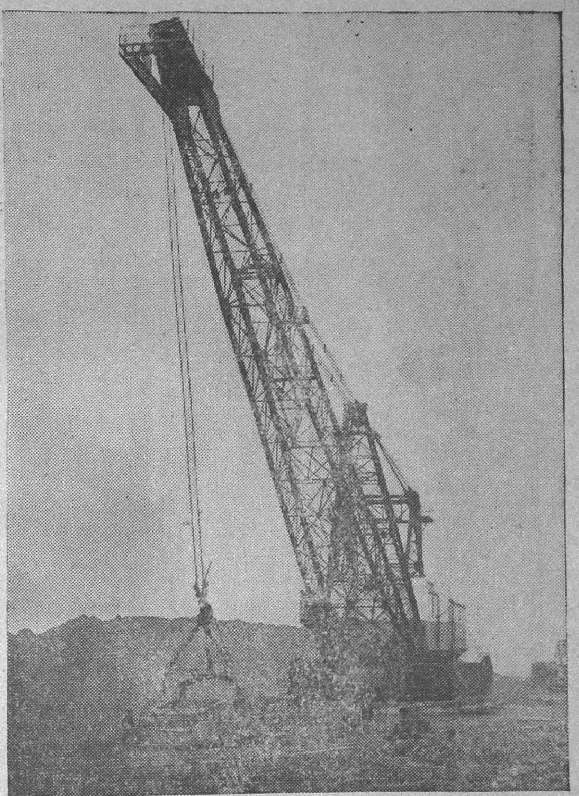


Fig. 3

At Ewart Hill in Newcastle, England, a potential field of 30,00,000 tons of coal awaits mining, but 2,80,00,000 cubic yards of earth has to be shifted first. For this, a huge 1,100-ton "walking dragline"—an excavator with a 180 ft. long derrick operating a 25 cubic yard bucket capable of shifting 25 tons in one bite in little over a minute and which travels a mile in 10 hours—is being used. Working 24 hours a day it is estimated this excavator will take five years to clear the site.

is pointing. Walking draglines are available in many sizes, ranging from a 90-ton machine with a bucket capacity of 2¼ cubic yards, to an 850-ton machine with a bucket capacity of 12 cubic yards. The application of the walking dragline in England is mainly confined to opencast coal mining, where it is giving excellent service and is an ideal machine for the removal of overburden; in the United States walking draglines are used for excavating canals and building embankments for flood control as well as for opencast mining on a large scale.

Excavation of large shallow areas, such as may be necessary for the construction of a large dam, may either be carried out by means of a slackline cableway or by a tower dragline. The latter consists of a main cable supported by a movable tower at each side of the excavation, and such equipment would be justified only where the quantity of excavation is considerable.

Trench Cutting Machine.

The "back acter" or "drag shovel" is an excellent equipment for digging pipe trenches (Fig. 4). This Rapier machine digs to a maximum depth of 18 ft. and dump to a maximum height of 19 ft. 6 ins.; it will tackle any material which can be excavated by pick and shovel. It provides greater digging effort than the dragline, because it is held into the working face.

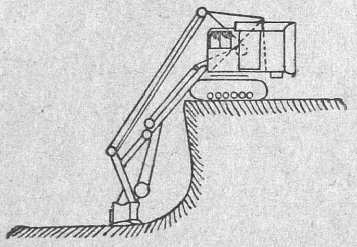


Fig. 4

The skimmer shovel, shown in Fig. 5, is another very useful excavating equipment; it can be applied to trimming a level formation as shown in full lines, or used for trimming slopes accurately up to the limit shown by the dotted outline. Both these Rapier machines have a range of four bucket capacities, namely 5 cubic feet and ⅝, ⅞ and 1¼ cubic yard respectively. These front-end equipments are interchangeable, and each machine can be easily converted to its corresponding type.

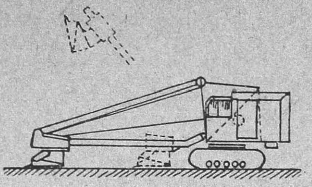


Fig. 5

In recent years there has been a remarkable development in multi-bucket excavators; the Lubecker type, for example, is a kind of land dredger originally developed for stripping overburden from lignite deposits in Germany. It has an endless chain to which excavating buckets are attached, the chain being guided by hinged ladders suspended by wire ropes from a carriage running on railway track laid parallel to the face being excavated. Excavation may be carried out either above or below track level, but the latter method is usually adopted; the moving buckets excavate as the machine is travelled slowly along the track, the buckets emptying into a chute discharging into wagons or to a belt conveyor discharging behind the machine.

Lubecker excavators can deal with any material that can be dug by hand or removed without the aid of explosives; but large quantities of boulders or tree stumps may completely nullify their use. Their capacities range from 20 cubic yards an hour with an engine of 8 horse-power to 2,160 cubic yards an hour, when driven by electric motors developing a total of 1,980 horse-power; such a machine may weigh 1,200 tons. Cost of slewing track is a heavy item to be borne by this plant, and a track slewing machine has been developed which reduces this cost.

The economical excavation of trenches for water drainage and cable services, and for many other purposes, is one of the most troublesome problems facing builders and civil engineers. The Aveling-Barford trench cutting machine has been specially designed for this task and is shown in Fig. 6; it can be operated by one man and will cut flat bottomed trenches with parallel sides from 11 to 18 ins. wide to a maximum depth of 3 ft.

Fig. 6

6 ins., cutting speed varying with the nature of the ground and with the width and depth of trench excavated.

The machine is pulled forward by winding in a wire rope anchored to a holdfast in front of it; cutting speed is varied by a ratchet drive operating a winding drum mounted on the machine; its compact design makes this equipment suitable for operating close to hedges, walls or kerbs. Soil can be discharged either to the left or to the right of the trench. There are several digging speeds, ranging from 25 up to 175 feet per hour, according to the nature of the soil and the size of the trench. The power unit is an 8 horse power industrial petrol engine, with automatic clutch coupling. The winding drum has 300 feet of $\frac{3}{8}$ inch diameter steel wire rope coiled around it. Steering is by handwheel through a worm and worm wheel and the machine weighs 3 tons; it is 12 ft. 9 ins. long, 7 ft. 3 ins. wide, 6 ft. high and has a width over the land wheels of 4 ft. 3 ins. Excavation is by means of an endless chain fitted with steel tines and spade plates; depth can be adjusted during operation.

The Calfdozer

Another interesting machine developed by Messrs. Aveling-Barford is the Calfdozer shown in Fig. 7; this machine has many uses, such as levelling and clearing sites, back filling trenches and excavations and the trimming of stock piles. It is claimed to do at less cost the work of ten men using picks, shovels and barrows. Output varies with length of travel and nature of material to be moved; a basic figure of 1,600 cubic yards per foot run per hour has been established.

Fig. 7

Simplicity is a prominent feature of the design, travelling and manoeuvring being controlled by two hand levers mounted on either side of the driving seat. Each track is driven through two independent quick reverse clutches, an arrangement which permits either track to be instantly engaged for forward or backward motion. The dozer blade is power operated and can be held at any point; for normal working it is allowed to "float" and thus to follow the irregularities of the ground. The angle of the hinged cutting edge can be instantly varied by pressure on a pedal, a patented feature which enables the blade to be suitably adjusted to the work in hand; the blade can be swung to right or to left in a few seconds so that the machine may operate as an angle dozer. Power is provided by an 8 horse power industrial petrol engine, the forward speed is 1·50 m.p.h. and the reverse speed 1·71 m.p.h.

It is extremely difficult to give any idea of excavation costs and it would be dangerous to do so because they might well be very misleading. So many factors have to be taken into account, such as the geology of the district, presence of groundwater—nature of the work, quantity of explosives used and so forth. Output of similar machines may show extraordinary variations which cannot be accounted for by any apparently rational explanation; nevertheless, the following figures have been given by the Ministry of Works as basic outputs in cubic yards per hour for draglines or face shovels:—

Bucket Capacity Cubic Yds.	Loading into Lorries.	Loading into Railway Trucks.	Discharging onto Ground.
$\frac{1}{4}$	8	8	10
$\frac{3}{8}$	13	13	16
$\frac{1}{2}$	18	18	22
$\frac{5}{8}$	27	27	32
$\frac{3}{4}$	31	31	37
1	41	41	48
$1\frac{1}{4}$	46	49	60
$1\frac{1}{2}$	50	58	70
2	55	72	90
$2\frac{1}{2}$	58	87	110

These figures form the basic outputs above which bonus is paid to the drivers. They assume excavation in moderately stiff clay measured in the solid, and therefore due allowance will have to be made for other materials; for loose soil or sand the basic rate may be doubled while for soft rock the basic rate may be taken as one-third of the above values. Such figures should be used with caution when making estimates and tendering for work.

Wherever mechanical excavation is carried out the importance of accurate and complete records cannot be over-emphasised. Future estimating may well depend upon such work.

(*With acknowledgements to "Machinery Lloyd".*)

PERSONAL

Dr. S. Kamesam.

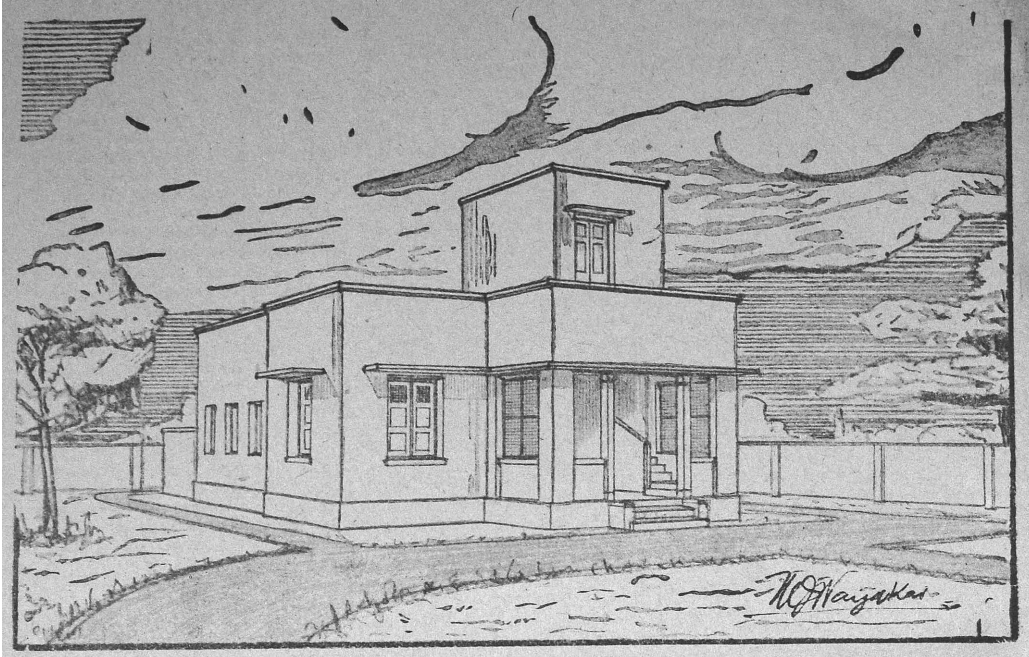
Dr. S. Kamesam, Hon.D.Sc., B.E., M.I.E. (Ind.), F.A.Sc., M.E. (Hons.), has been recently appointed by the Union Government as their Expert Consultant to report by the end of June, on the possibilities of the use of treated timber in this country with special reference to the replacement of steel by such timber. Government have also agreed to assist him to establish a timber treatment and engineering factory in North India.

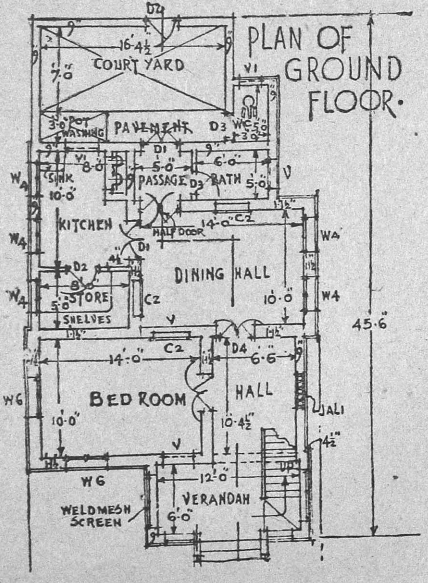
Mr. K. R. Karantha.

Mr. K. R. Karantha, M.A., M.I.E., Electrical Inspector to the Government of Madras, has been elected the President of the South India Centre of the Institution of Engineers for 1949-50.

Mr. D. P. Nayar.

Mr. D. P. Nayar, I.S.E., Superintending Engineer, East Punjab P.W.D., Ambala, is to lead a party of eight engineers from both Provinces as well as States for undergoing a course of 18 weeks of specialised training in U.S.A. in the modern methods of highway engineering.





Type C House designed by N. Jambulinga Nayakar, F.R.S.E., A.I.A.A., for the Co-operative Housing Society, Madras.

Plinth area—792, sq. ft.

LAW REPORT

Nagpur High Court

Before Mr. Justice Padhye.

Mohafazul Rahim (Defendant), Applicant *v.* Babulal (Plaintiff), non-applicant.

Contract Act, Indian (IX of 1872), section 23—Agreement between two persons not to bid against each other—Validity—Section 23, applicability of—Suit for enforcing the consideration, maintainability of.

The agreement between two persons not to bid against each other at an auction sale is perfectly lawful and is not opposed to public policy under section 23 of the Indian Contract Act. The consideration for such an agreement can be enforced in a Court of Law.

ORDER: Padhye, J. observed as follows: This is a revision by the defendant against the decision of the Small Causes Court, Nagpur, decreeing the plaintiff's claim. The plaintiff-non-applicant filed a suit for recovery of Rs. 500 alleged to be due on a receipt. The plaintiff's case was that Rs. 500 were advanced in cash to the defendant and that the same have not been returned by him as agreed. The defence in the case was that the receipt was not for cash consideration and in fact no amount was advanced by the plaintiff to the defendant. The plaintiff and the defendant both wanted to bid at an auction held by the District Council, Nagpur, regarding the right to recover market dues from the Sonegaon market. With a view to stifle the competition between the plaintiff and the defendant, the defendant persuaded the plaintiff not to compete and it was in consideration for that agreement that Rs. 500 were agreed to be paid to the plaintiff. The defendant's contention consequently was that this agreement and the consideration for the agreement were against public policy, and could not therefore be enforced in a Court of Law.

The learned Judge of the Lower Court held that the receipt was not for cash consideration and that no amount was advanced by the plaintiff to the defendant; on the other hand he found that Rs. 500 were agreed to be paid to the plaintiff in consideration of his not bidding at the auction referred to above. The learned Judge further held that such an agreement and consideration for the same were perfectly legal and that the plaintiff was therefore entitled to receive from the defendant Rs. 500 agreed to be paid by him to avoid competition on the plaintiff's part.

The right to bid at an auction is a valuable right and unless there is any law which prevents persons from entering into agreements not to bid, such agreement *prima facie* are legal, and the consideration of the agreement could be enforced in a Court of Law. It was, however, contended by the learned Counsel for the applicant that such an agreement implies fraud, either on the owner of the property or the right which is the subject-matter of the auction, or on some other person who is entitled to a ratable distribution in the auction price and therefore such agreement and the consideration for the same should be held to be illegal. The question has been decided in more than one decision.

There is no authority to show that an arrangement to retire from being a competitor is illegal.

It is perfectly conceivable that in certain cases such a combination might result in possible loss to public revenue. But that fact would not make the act, which is perfectly legitimate, opposed to public policy. It has not been suggested that the parties to this combination caused intimidation or coercion or perpetrated falsehood in keeping off bidders. The only charge which is possible to level against them is that the combination discouraged competition amongst the partners themselves. But the combination on that account could not be regarded as other than innocent.

In the present case it has not been suggested that the plaintiff and the defendant were the only bidders at the auction and that the agreement between them had the result of a restraint of trade and was on that account contrary to public policy. It is unfortunate that Monroe, J. did not think it necessary to deal with the Indian law and the Indian authorities on the subject. In any case there is a preponderance of authority in favour of the view that the consideration for the agreement between two bidders under which one of them should restrain himself from bidding leaving the auction open to the other is not against public policy.

It was next argued that the plaintiff's claim was based on a cash consideration which was found to be untrue and the lower Court should not have passed the decree on a case which was not actually pleaded by him. It is true that the plaintiff's claim was open to this objection but it is, as has been said in several cases, the habit with the people to describe a transaction as a cash transaction though in fact there is no cash consideration. It is always open for the parties to prove that the consideration of a particular transaction is otherwise than what has been stated in the document, as consideration is not one of the terms of document. The decision is after all a decision of the Small Causes Court and the question before me is whether substantial justice has been done. I find that the two parties with their eyes open entered into an agreement. The defendant has reaped the advantage of that agreement and he cannot shirk the responsibility of the payment of the consideration promised by him to the plaintiff.

The decree of the Small Causes Court is therefore maintained and the revision is dismissed with costs.

SPECIFICATION

WROUGHT ALUMINIUM AND ALUMINIUM ALLOYS.

The British Standards Institution has recently published the above British Standard, which is the first of a comprehensive series of British Standards for aluminium and aluminium alloys for general engineering purposes.

Certain of these materials are already covered by British Standards, but work has been in progress for a considerable time on schedules which would incorporate a comprehensive range of materials in various forms, adequate for the large majority of general engineering applications. The selection of grades of aluminium and the alloys to be included in the schedule has been the result of close collaboration between manufacturers, users, scientific organizations and others interested in the manufacture and utilization of light alloys, through the established machinery of the B.S.I.

Work is well advanced on similar schedules for aluminium and aluminium alloys in the following wrought forms, and for aluminium and aluminium alloy ingots and castings :—

Tubes
Forgings
Wire for rivets
Welding wire
Wire for general purposes.

A draft British Standard for aluminium and aluminium alloy bars, rods and sections has been circulated, and this will form the basis of a further British Standard in the series. Work is also in hand on a British Standard for aluminium and aluminium alloy plates.

One feature of the British Standard which is of particular interest is the system of nomenclature. The Institution has adopted a system of letters and numbers denoting material, form of product, heat treatment and condition ; this system will be used throughout the series of British Standards for aluminium and aluminium alloys for general engineering purposes. Great care has been exercised in the choice of the symbols to avoid ambiguity and confusion with other systems of identification. It is hoped that the system will be adopted throughout industry, and that care will be taken to ensure that the correct symbols are employed to avoid unnecessary delay and misunderstanding, especially at first when the system is unfamiliar. The method of using the nomenclature is clearly described in the opening paragraphs of the standard, and examples are included for a number of materials and conditions in the form of sheet and strip.

The standard is arranged in two parts. The first part contains the clauses relating to chemical composition, conditions in which the material is available and mechanical properties, for the three grades of aluminium and the eight alloys which have been standardized. The second part contains the general clauses applicable to all the materials. Tolerances are given in the form of six tables. Recommended sizes of aluminium and aluminium alloy sheet and strip are included as an appendix, and although these do not form a mandatory part of the British Standard, they should be of considerable use in practice.

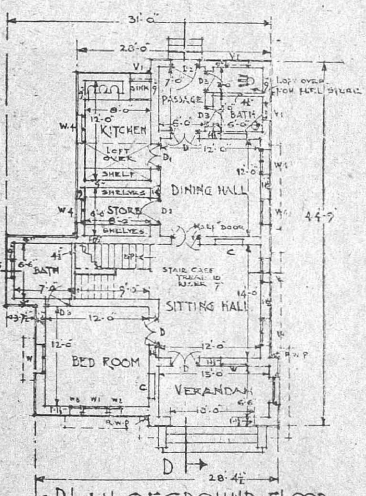
Copies of this British Standard (B.S. 1470 : 1948) can be obtained from the British Standards Institution, Sales Department, 24, Victoria Street, London, S.W. I., Price 3/6 post free.

NEED FOR SUBSTITUTES

In planning our houses whether for the poor, the rich or the Government, we had " necessarily to plan in a way that is suited not only to our climatic and natural conditions but also to our capacity to pay," said Mr. H. Sitharama Reddy, Minister for Industries, Madras, when he inaugurated the 26th annual session of the Institution of Engineers, South India Centre, recently.

Today, there was such a craze for the use of cement and steel that " we have not been using to the maximum extent the alternative materials. We must decide to use as far as possible the local materials whether it be for the construction of houses or roads. In this connection, the Minister said that even in places where granite-stone was available, he saw that road projects and buildings were sought to be constructed with steel and cement. " In view of great shortage of steel in India and the necessity of conserving the foreign exchange, we must cut down the use of iron and steel as far as possible in our plans and estimates whether it be for buildings or roads."

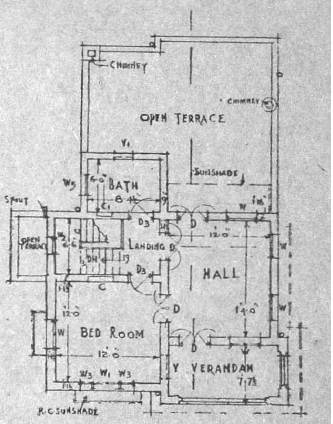
In this, engineers could set an example.



PLAN OF GROUND FLOOR

Plinth area—1,152 sq. ft.

Type A House designed by N. Jambulinga Nayakar, F.R.S.E., A.I.A.A., for the Co-operative Housing Society, Madras.



PLAN OF FIRST FLOOR

Plinth area—702 sq. ft.

BUDGET AND THE ROAD

MANECKJI N. DALAL,

President, Indian Roads and Transport Development Association.

Cheap transport is the basic need of the country, not only because 90 per cent of our population live in villages and depend for their economic pursuits on the availability of adequate, cheap and well-organised road transport, but also because industry today has no more valuable tool than the transport vehicle. It follows that a fuller development of the agricultural or industrial resources of the country can never be realised so long as the expansion of motor transport is retarded by heavy taxation. Particularly in the context of Government's attempts to fight inflation by increasing the productive capacity of the land, it is therefore regrettable that the Central Budget seeks to enhance the duties on motor spirit and tyres, which must inevitably result in higher transport costs.

Motor spirit is beyond doubt the most heavily taxed commodity of general utility in the country. The present incidence of petrol taxes and duties in India represents nearly six times its incidence in a country like the U.S.A., and it is note worthy that the pre-eminent position of the latter country in the world is to be attributed in no small measure to the part played by road transport in the economic and social life of the country.

That the taxable limit of motor transport has been exceeded was conclusively proved by the Technical Sub-Committee of the Post-War Policy Committee on Transport in 1943. That Committee pointed out that taxation on a motor lorry then amounted to a minimum of 6 pies per ton-mile, out of which the contribution leviable for the use of the road was 28 per cent, the balance of 72 per cent representing nett gain to the general revenues.

It was also pointed out that the contribution of road transport to the exchequer was three times as heavy as that of railway traffic.

Taxes and duties on the road vehicle and its fuel have steadily increased since then and it now exceeds 8 pies per ton-mile. What this means can be understood better by saying that the incidence of Government taxation on motor transport, by itself, exceeds the average amount charged for transportation on railways.

Cheap transport is the sine-quanon of the country's economic prosperity. We want cheap road transport, no less than cheap railway transport.

We would urge the Government of India to drop their proposals for the enhancement of motor spirit and tyre duties, and if it is too late to mend matters, let it be understood that these taxes will be removed in the next budget and that the proceeds will meanwhile be spent exclusively for road development. Discouragement of motor transport automatically leads to diversion of traffic to bullock carts, most of which have iron tyres which are very hard on road surfaces. The increased damage to roads does call for increased expenditure for reconstructing and maintaining the roads.

RESULTS OF TENDERS

Closed January 20.—Construction of Bridges over Pulleru Canal in Krishna district:—*Tenders received from Messrs. Gannon, Dunkerley & Co. (Madras) Ltd. are under consideration.*

Closed January 19.—Supply of Specials for Vijayawada Water Supply Scheme:—*As no tenders were received, the time for the receipt of tenders is extended up to 16-3-1949.*

Closed January 18.—Additions and alterations to Government College at Rupar:—*Lowest tender of R. B. Seth Ram Rathan of New Delhi at 169 per cent above the Schedule of Rates has been accepted. Time limit 11½ months. Work is being commenced by the contractor.*

Closed December 24.—Construction of Buildings at Niblett and Nilgaon districts for the Agricultural Engineer, Kanpur:—*Owing to the rates being 10 per cent to 25 per cent more than the Schedule of Rates, all the tenders were rejected and had to be called again.*

Closed December 21.—Construction of Infiltration gallery and allied works at Kochadai, for Madura Municipality:—*No contractors. The Municipality has taken up the works for execution through departmental agency and the work is proceeding.*

Closed December 20.—Construction of Research Laboratory for the Indian Association for the Cultivation of Science, Calcutta:—*Contract for the first stage of the work is being given to Martin-Burn Ltd. on "cost plus profit" basis.*

Closed December 17.—Construction of masonry aqueducts for Peechi Scheme of Cochin Government:—*There were 7 tenders and that of Mather and Mani is selected: Contracts value: Rs. 2,41,000 and Rs. 2,52,000.*

(*Continued on page 26*)

WOOD PRESERVATIVES

Wood Preservatives may be divided into three main groups :—

1. **Ta roil Type, e.g., Creasote.**
2. **Water-solution Type, e.g., sodium fluoride, zinc chloride, etc.**
3. **Organic Solvent Type, e.g., Copper napthenate in white spirit.**

Tar-oil Type was described in the February issue of this Journal.

Water Solution Type Preservatives

This type consists of preservative chemicals dissolved in water to give a solution free from deposit. Such preservatives are characterised by the following principal properties :—

(*a*) They are usually odourless ;

(*b*) they may be painted over, after the treated wood is dry;

(*c*) they are usually non-creeping and do not stain ;

(*d*) they are non-inflammable ;

(*e*) they are cheaper and easier to transport than other types, as they can be shipped in powder form ;

(*f*) some are corrosive to metals ;

(*g*) generally they are more likely to leach out of the wood when used in contact with the ground or in water. Some, however, produce water-insoluble substances in the wood ; these are suitable for external use ;

(*h*) re-drying of treated timber is generally necessary.

Sodium Fluoride.

This chemical is one of the most popular of the single salt preservatives in Europe. It is highly toxic to fungi and not very corrosive to metals (so that the usual steel treating plans can be employed).

It is not, however, very soluble even in soft water, being capable of making a 4 per cent. solution. But in hard water, or in contact with limestone or limewater it forms a precipitate of insoluble fluorides which is much less effective as a preservative. It has the same tendency to leach out as has zinc chloride and is not commercially used in Britain in its simple form.

Fluor-Chrome Mixtures.

The most notable examples are "Wolman" Salts which are non-corrosive, being used in iron pressure plants.

"Wolman" Tanolith preservative consists of a balanced mixture of sodium fluoride, dinitraphenol arsenate and chromate, and is strongly fixed in the wood on account of its water-insoluble chromate-arsenate complex formed in the wood. It is highly toxic to all fungi and insects and is particularly effective against termites, it is suitable for both interior and exposed situations, and for the Tropics.

"Wolman" Pyrolith contains ammonium phosphate in addition to the above, and is designed to give fire-resistant properties as well as protection against fungus and insects.

Discovered in 1904, "Wolman" Salts have been used increasingly ever since, and since 1930 extra chromate has been added to give the present high degree of fixation of chemicals in the wood.

Zinc Chloride (Burnettizing).

The advantages of zinc chloride are that it is cheap, easily available, uniform in quality and slightly fire-resistant. It should be used in a 3·5 per cent. solution ; higher concentrations should be avoided as they tend to disintegrate the wood. It is slightly corrosive, but ordinary steel treating plants may be used without being seriously affected. Pressure impregnation or open tank processes may be used. Originally the patent granted to William Burnett in 1838 covered simply the steeping of timber in a cold 2½ per cent. solution of zinc chloride for some three weeks or less according to the species, thickness, and penetrability of the wood. Air-dried wood was treated and the surface of it afterwards tended to be rather sticky if exposed to damp conditions.

Burnettizing today consists of the use of this salt up to a 5 per cent. solution with the full-cell process (described on page 26) until no more of it can be forced into the timber. This results in a net impregnation of dry zinc chloride salt of from ½ lb. to 1½ lbs. per c. ft. of wood.

For indoor use in buildings which may provide at some time conditions suitable for attack by fungi or insects and also for mining timber, the protection given is very good. But outside, of course, excessive leaching takes place so that the preservative life is greatly reduced. For this reason it is sometimes used in a two-phase process with creosote in America, although

it is not at all clear what it is hoped to gain over an ordinary creosote treatment.

Seeing that zinc chloride is made with hydrochloric acid the standard specification commonly used for the commercial salt states that it must be free from acid and shall contain not more than 6 per cent. of impurities of which not more than 0.1 per cent. shall be of iron.

Zinc chloride treated wood will take paint quite well if the wood is absolutely dry when painted, otherwise it tends to come up through the paint in a kind of efflorescence.

Chromated Zinc Chloride.

This contains about 20 per cent. sodium dichromate, the remainder being zinc chloride. The main object of this mixture is to promote resistance of the salt solution to leaching and thus give greater protection out-of-doors. Up to the present little is known about its qualities as revealed by long-term service tests. It has been used almost exclusively in the United States. Impregnation is the same as for zinc chloride.

Magnesium Silico-fluoride.

A very toxic chemical, especially against dry-rot. It has the disadvantage, however, of attacking both metals and glass and should be made up in a wooden container.

Copper Sulphate (Blue Vitriol).

This salt is seldom employed by itself but is frequently used with chromates and other compounds. It is highly toxic but in the simple state it is injurious to iron and steel and can be leached out by water action. These defects, however, disappear when it is combined with other salts and it therefore forms an important constituent of certain proprietary preservatives.

Copper Sulphate-Dichromate.

These two chemicals used together with fixing agents produce, after impregnation, a toxic compound insoluble in water in the wood; and therefore timber thus treated is suitable alike for use in interiors and in exposed situations subject to water action. Treated timber is non-injurious to foodstuffs. The proprietary preservative "Celcure" comes under this group.

Mercuric Chloride (Corrosive Sublimate).

This was one of the earliest timber preservatives ever used. It had been used for over a century before being patented as a steeping method in 1832 by John Kyan, whose process ultimately gave rise to Kyanizing in England. In more recent years a process using pressure was used in Germany and Czechoslavakia, telegraph poles so treated lasting some sixteen years as against at least twenty-five years when creosoted. Although extremely toxic to fungi, mercuric chloride tends to leach out when used in contact with the ground; also it is expensive, corrosive to iron and steel and deadly poisonous to human beings and animals. For these reasons it is not widely used.

Arsenic.

Arsenic, in various modes of combination, is used in a number of preservatives, and is recommended where protection from termites (white ants) is required.

The effectiveness of arsenic compounds against fungi (as distinct from insects) unless combined with other toxic substances, is questionable; some wood-destroying fungi being tolerant of arsenic.

It may be undesirable to use arsenic compounds alone as a preservative for timber in buildings because it has been shown that some moulds can convert arsenites and arsenates into a poisonous volatile compound (Trimethylarsine-$(CH_3)_3As$), provided that the conditions for fungal growth are otherwise sufficiently favourable. There is no reason to believe that the proprietary preservatives containing arsenic compounds are affected in this manner.

Zinc Meta Arsenite.

Zinc Meta Arsenite is a patented substance formed by dissolving zinc oxide and arsenic trioxide in a weak solution of acetic acid. It is claimed that after impregnation the acetic acid evaporates, leaving an insoluble salt behind, which does not leach out of the wood. However, opinions differ on this. The salt is said to become soluble in the presence of acids or enzymes secreted by fungi, thus killing them very economically. Although it has been used with varying success for about twenty years, evidence is too conflicting to enable a valuable judgment to be passed. It has been used principally in the United States.

Sodium Pentachlorphenate.

Although more commonly used as a dip against sap-stain, a 5 per cent. aqueous solution of this chemical is stated to give adequate protection against a number of wood-rotting fungi when the treated timber is not in contact with the ground,

Organic Solvent Type Preservatives.

This type consists of preservative substances dissolved in a volatile solvent (often white spirit or solvent naphtha), which, after treatment, evaporates and leaves the toxic chemical in the wood. Among the commonest of the toxic substances are copper and zinc salts of such organic acids as naphthenic, abietic and oleic acids; phenols, chlorinated phenols (trichlorphenols, tetrachlorphenols, pentachlorphenols, etc.) and chlorinated naphthalene.

Mobile Petroleum oils are also used, in which the toxic chemicals (such as pentachlorphenol) are dissolved, some of which include a non-volatile solvent to prevent crystallization of the phenols on the wood surface, and others a water repellant.

Preservatives of this type are characterised by the following main properties:—

(*a*) They are resistant to leaching and reasonably permanent, and so suitable for both interior and exterior use;

DESTROYS
WHITE ANTS,
BORERS, ETC

TRADE MARK REGD.

Spartan

HARDIPROOF

ROT PROOFING SOLUTION

FOR TIMBER AND TEXTILES

ARANTEED TO CONTAIN NOT LESS THAN 20% COPPER NAPHTHENATE

Here are the main properties of 'HARDIPROOF'.

1. A Concentrated Copper Naphthenate Solution containing not less than 20 per cent Copper Naphthenate.
2. This Concentrated Solution may be diluted 50—50 with mineral turpentine or kerosene for the application on building timber, ropes, fishing nets, Railway sleepers, Bridges, under water Timber, boat sheds, etc.
3. 'HARDIPROOF' may be used in its concentrated form on railway sleepers, fences, posts or other timbers and materials in heavily termite infested areas or for under water use.
4. 'HARDIPROOF' will penetrate deeply into timber rapidly and can be dipped, brushed on or sprayed.
5. For hard timber, a maximum submersion of 45 minutes is required while soft timber will be penetrated sufficiently within about 3 to 5 minutes.
6. 'HARDIPROOF' is applied cold and no heating up or pressure treatment is required.
7. 'HARDIPROOF' dries fully within 6 to 12 hours.
8. The film which 'HARDIPROOF' leaves on timber or any other material treated with 'HARDIPROOF' is non-water soluble.
9. 'HARDIPROOF' is used effectively for under water timber (boats, Jettys, wooden barges, etc.) and is suitably applied to fishing nets, ropes, canvas, and similar materials. The tensile strength of fish nets, ropes, canvas, etc., is considerably increased by the treatment with 'HARDIPROOF'.
10. 'HARDIPROOF' can be painted over as soon as the film is dried. That is, after approximately 24 hours from the time of application of 'HARDIPROOF'.
11. 'HARDIPROOF' will give **life long protection** from dry rot, wet rot, white ants, termites such as Marine borers; and is also effective against black ants.
12. Although 'HARDIPROOF' will not harm plants, the solvents contained in 'HARDIPROOF' are detrimental to plant life. 'HARDIPROOF' is therefore not meant as a plant spray.
    When spraying 'HARDIPROOF', care should be taken to protect the Operator from the fumes of Copper Naphthenate which if inhaled in excessive doses may be harmful.
13. Varying climatic conditions will have no adverse effect on 'HARDIPROOF'.
14. 'HARDIPROOF' does not blister, blush or bleed.
15. 'HARDIPROOF' is packed in :

4 Gals. @	5 Gals. @	45 Gals. @
Rs. 13–8–0 per Gallon.	Rs. 12–0–0 per Gallon.	Rs. 11–10–0 per Gallon.

We again draw attention to the fact that 'HARDIPROOF' is a **Concentrated Solution** which should be diluted 50—50 with mineral turpentine or kerosene. The final price of the ready solution is therefore comparatively low, while the advantages offered are outstanding.

Manufactured by:—

ADDISONS PAINTS & CHEMICALS LTD., MADRAS.

Distributor:

(*b*) they may be painted over when the solvent has evaporated ;

(*c*) they are usually non-creeping and do not stain ;

(*d*) they are not corrosive to metals ;

(*e*) they usually penetrate the wood rather better than other types (especially those containing solvent naphtha), and so are more suitable for brush application, spraying or cold dipping.

(*f*) they are usually highly inflammable, care is therefore necessary in use and in storage. After the solvent has evaporated, treated wood has no increased inflammability. Preservatives having a heavy petroleum oil base are less inflammable than those with more volatile solvents.

(*g*) they are usually more expensive than other types ;

(*h*) some have a strong odour which may be picked up by certain foodstuffs, even if not in actual contact with the wood ; others are free from this odour.

(*i*) with a suitable solvent swelling of wood does not occur and so can be used on wooden parts cut to accurate sizes.

Most of the organic solvent type preservatives are obtainable only in the form of proprietary brands, for example, "Cuprinol," the main toxic agent of which is a copper or zinc naphthenate. ("Hardiproof" is manufactured by Addisons Paints and chemicals Ltd., Madras and is reported to contain 20% of copper Naphthenate—*Ed. B. G.*)

Proprietary Preservatives.

There are a number of patent and proprietary preservatives and their effectiveness is very variable. Those made by reputable firms are effective if correctly used, and may be employed with confidence. It is important, however, to follow the manufacturers' instructions and to realise that there is no magic in patented preservatives which will make them effective if casually applied with a half-dry brush. It is valuable to know into which of the three types described any particular brand of preservative falls as this will suggest its suitability for the purpose in hand. Many brands are made up in small tins, suitable for the house holder, and frequently a range of colours is available. Both these factors necessarily increase the price and may discourage the liberal application which is vital for any surface treatment to be effective.

The preservatives of the coal or wood tar oil type are generally more refined than creosote. The use of lighter type oils permits better penetration and they may be more resistant to leaching and more toxic. Water solution types are also available and are generally sold in dry powder form to be dissolved in water ; they are, therefore, somewhat cheaper–volume to volume–than other types. The solvent types are often quick drying and may be useful for this reason, although they tend to be somewhat expensive.

Choice of Preservatives.

An examination of the characteristics of the different types of preservative makes it apparent that their suitability for different purpose varies–often considerably. Thus it is unwise to use a tar oil type on wood in contact with plaster. On the other hand a water-soluble type is not normally suitable for marine piling (unless it is of the type that is fixed in the wood) as it is liable to be washed out of the wood. More difficult however, is the choice of a preservative for wood used in contact with food stuffs. It must be realised that most wood preservatives are poisonous enough to human beings to make it necessary that treated wood is not placed in direct contact with food.

Teak Resources of India

(*Continued from page 11*)

scientific researches conducted at the institute. Even today we are not fully conversant with the sylvicultural requirements of even teak. This should not be. The selection of personnel for the institute must be such that only men with an aptitude for and an interest in, research should be recruited for this important work. Then many a problem which isnow facing us in respect of our timber resources could be easily tackled and successfully solved. It is a good augury that at last we are having a Forest Research Institute in this province. I pleaded for this in the press as early as 1937, when the then Congress Government were seriously considering to convert the Forest College at Coimbatore into either law courts or educational institutions, when they decided to close the Forest College. However it is never too late to mend and I congragulate the Centre on its vision in starting this institute in the South.

(*Continued from previous column*)

Wood to be used near growing plants, as in green houses, seed boxes, mushroom beds, etc., should not be treated with tar oil types, as these are often poisonous to plants. Either of the other types would generally be suitable, and a subsequent application of oil paint would prevent leaching and seal the wood surface.

Frequently protection from weathering is required rather than preservation in the usual meaning of the term, or in conjunction with it. Neither creosote nor other preservative is effective in preventing weathering ; a protective skin is necessary, and its most usual form is oil paint or, where it is desired to retain the natural appearance of wood, linseed oil.

(*With acknowledgements to Timber Development Association, London.*)

CONTRACTS OPEN

The dates at head of paragraphs are those for the submission of Tenders. Application for forms and particulars should be made to the address given at the end.

JUBBULPORE : College.

March 17.— Construction of Electrical Communication Block for the Government Engineeing College at Jubbulpore. Estimated cost Rs. 2.96 lakhs. The Superintending Engineer, Jubbulpore Circle, Jubbulpore.

JUBBULPORE : Staff Quarters.

March 17.—Construction of ten Staff Quarters for the Government Engineering College at Jubbulpore. Estimated cost Rs. 1.86 lakhs. The Superintending Engineer, Jubbulpore Circle, P.W.D., Jubbulpore.

KURNOOL : Bridge.

March 18.—Constructing a Bridge at Rallavagu in mile 86/1 of Kurnool-Guntur Road. The Divisional Engineer, Highways, Kurnool.

BOMBAY : Water Supply.

March 18.—Construction of a Cement Concrete Dam across the river Vaitarna. The dam will be about 1,700 ft. long and about 250 ft. high. The Special Engineer, Bombay Municipality, Bombay.

MANGALORE : Bus Stand.

March 18.—Construction of a Central Bus Stand at Mangalore. Estimated cost Rs. 64,000. The Commissioner, Mangalore Municipality, Mangalore.

HOSPET : Bank Building.

March 20.—Construction of building for the Hospet Co-operative Central Bank Ltd., at Hospet. The President, The Hospet Co-operative Central Bank Ltd., Hospet.

MASULIPATAM : Market.

March 21.—Construction of Market Stalls in the Robertsonpet Square, Masulipatam. Estimated cost Rs. 5 lakhs. The Commissioner, Municipal Council, Masulipatam.

POONA : Quarters.

March 22.— Construction of Quarters for the Staff of National Chemical Laboratory at Poona. Estimated cost Rs. 2,57,250. The Executive Engineer. Poona Central Division, Poona-4.

RATNAGIRI : Culverts

March 22.—Constructing 56 H.P. culverts of different diameters and rows in Khed Ambavali Birmani Road, O.D.R., costing Rs. 20,406. The Executive Engineer, Ratnagiri Division, Ratnagiri.

CHIDAMBARAM : School.

March 23.—Constructing a row of Class Rooms for the Pachaiyappa's High School at Chidambaram. The Secretary, Pachaiyappa's Charities, G.T., Madras.

TRICHY : Bridge.

March 24.—Constructing a Bow String Girder Birdge of 14 spans of 150 feet each across Coleroon near Anaickaranchattram on Chidambaram-Shiyali Road. The Superintending Engineer, Highways, II Circle, Tiruchirapalli.

HUBLI : School.

March 24.—Construction of Buildings for Technical High School at Hubli. Estimated cost Rs. 2,27,668. Executive Engineer, Dharwar Division, Dharwar.

COIMBATORE : Roads.

March 25.—Cement Concreting Trichinopoly-Coimbatore Road, miles 120/0 to 124/5. The Divisional Engineer, Highways, Special, Variety Hall Road, Coimbatore.

RAJKOT : Dam.

March 25,—Construction of an Earthen Dam across river Bambhan 8 miles south of Halvad. Estimated cost Rs. 46 lakhs. The Executive Engineer, Project Division, Wankaner, Sourashtra.

SATARA : Dam.

April 2.—Constructing an Earthen Dam, Masonry Waste Weir, etc. at Ranand, Taluka Man, District Satara. Estimated cost Rs. 14,43,831. The Superintending Engineer, Eastern Circle, Sholapur.

DHARWAR : Reservoir.

April 4.—Constructing Service Reservoir at Saraswat Colony, Dharwar, in connection with the Neersagar Water Supply Scheme. Estimated cost Rs. 1,25,700. The Executive Engineer, Karnatak Sanitary Division, Dharwar.

SURAT : Sewerage.

April 15.—Erection of Civil Works, and supply and erection of plant equipment for the Sewage Disposal Works for the treatment of d.w.f. of 10·5 m.g. a day to serve prospective population of 300,000 persons at 35 gallons/capita at Ajua or Parbat for Surat Municipality. The President, Surat Borough Municipality, Surat.

HYDERABAD : Pumps.

May 31.—Supply and erection of 10 units of Electric Driven Pumps complete with motors and necessary accessories each capable of delivering 225 c. ft per second at a gross head of 65 feet. The Superintending Engineer, P.W.D., Investigating Circle, Barkatpura, Hyderabad-Dn.

Results of Tenders

(*Continued from page 22*)

Closed November 16.—Construction of Quarters for B.N. Railway through the District Engineer, Titilagarh :—*Tenders for Waltair at 198 per cent; for Rayagadhe at 148 per cent; for Kantabanji at 134 per cent. But the number of quarters to be constructed at each station has been reduced to 40, 20 and 45 respectively.*

Closed October 20.—1,022 Miners Quarter of Bhuli Township, Dhanbad :—*Although tenders for 1,022 quarters were accepted in full by the Housing Board it is proposed to start only 744 for the present which have been allotted to the following contractors :—*

H. P. Agarwalla	108
Economic Builders	108
B. D. Mukherjee	108
V. G. Chawda	100
Ramnath Mehra & Sons	100
Prakash Chandar Ltd.	220

HOW WAS APRIL 1948

For Building

Rainfall in inches.

Ahmedabad	0.0
Ahmednagar	0.1
Alleppey	7.2
Ambala	0.3
Aurangabad	0·1
Bangalore	1·0
Baroda	0.0
Belgaum	2.5
Bellary	2.1
Benares	0.0
Bhopal	0:0
Bombay	0.0
Calcutta	0.7
Cherrapunji	26.6
Cocanada	0.0
Cochin	1.9
Colombo	10.0
Cuttack	0.7
Darjeeling	9.2
Dehra Dun	0.5
Delhi	0.0
Gauhati	6.0
Hyderabad	2.1
Jamshedpur	0.0
Jhodpur	0.0
Jubbulpore	0.6
Kodaikanal	2.0
Kurnool	1.3
Lahore	0.9
Lucknow	0.0
Madras	0.9
Madura	0.4
Mahabaleshwar	0.0
Mangalore	1.2
Mercara	6.9
Multan	0.5
Masulipatam	0.0
Mysore	2.2
Nagpur	0.5
Ootacamund	3.0
Peshawar	2.1
Poona	0.0
Raichur	1.0
Rajkot	0.0
Ranchi	0.1
Saugar	0.0
Sholapur	0.0
Simla	1.7
Surat	0·0
Trichinopoly	1·8
Trivandrum	4.2
Vizagapatam	0.3

FOR DISCUSSION

Experience is the name everyone gives to his mistakes.

Architect is not primarily an expert in statistical sociology.

There are many people whose work is of such a nature that they must live near it, whether they wish to do or not; and for them the only solution is a tall block of flats near their place of employment,

The building industry is said to provide more bankruptcies than any other, and conversely it affords scope for amassing great wealth.

Dr. A. E. Morgan, first chairman of T.V.A, suggests that it would be useful to take clear for what purpose the Damodar Valley Project would be a natural unit.

For planned programme it is better to have targets which can be realized than castles in the air.

People should think less about what they ought to do and more about what to they ought to be. If only their being were good, their works would shine forth brightly. Do not imagine that you can ground your salvation upon actions ; it must rest on what you are.—Eckhart.

Art is concerned not with botany but with flowers, not with root causes but with ultimate values, not with sex but with love. not with human nature but with human beings—Gerald Bullet,

PROPOSED NEW WORKS

Allahabad: The U.P. Government is considering to sanction Rs. 30 lakhs as a loan-cum-grant to Allahabad Municipality for the city's new drainage scheme, which is estimated to cost Rs. 1 crore. The work on the scheme is shortly to be undertaken.

Bombay: The Government of Bombay have decided to undertake the construction work on the Tapti Valley irrigation scheme after the monsoon. The first stage of this scheme is estimated to cost Rs. 6 crores.

East Punjab: Messrs. David Maxcy and Vincent Whit, hydro-electrical engineers of the Westinghouse Electric International Company, have arrived from U.S.A. to complete the signing of a Rs. 3 crore contract with the Government of India for the Naugal hydro-electric project in the East Punjab.

Gwalior: The Madhya Bharat Union Government has sanctioned Rs. 9 crores for the Chambal hydro-electric scheme.

Kalyan: The Government of India have approved the Bombay Government's scheme to build a new township for one lakh of refugees at Kalyan at an estimated cost of Rs. 8½ crores. The township with 20,000 tenements will be one of the largest to be built for refugees in India.

Malabar: The Government of India have, it is learnt, agreed to afford financial assistance to the Malabar Malampuzha reservoir project of the Madras Government, costing Rs. 3.8 crores. The project—the first of its kind in Malabar—is an attempt to store up the floods of the Malampuzha river, which now ravage crops during the monsoon.

Sourashtra: The Government of Sourashtra intend erecting 78 power houses. This was disclosed by the Sourashtra Minister for Industries and Commerce when he laid the foundation stone of an electric power house at Jaunjodhpur.

EDUCATIONAL

THE INDIAN INSTITUTE OF ENGINEERING TECHNOLOGY

The 'Social Day' of the Institute was held recently at the premises of the Sir M.C.T.M. High School, Purasawalkam, Madras, recently where the Institute is at present housed. The Institution was founded two years ago. The Principal, Mr. K. Sundararajan, M.A., presenting the annual report observed that they enrol Science Graduates and provide them with apprenticeship during the day through the co-operation of the Madras Electricity System, manufacturing and other industrial concerns in the City of Madras while they take the theory classes every day for three hours in the evening. Thus they get their theoretical training simultaneously with field experience in their profession.

The students by having worked and soiled their hands with regular workmen for three years in industrial concerns will come out as first rate finished products, who have the complete theoretical background and at the same time considerable practical experience and workmanship. The students on joining the Institution are enrolled as student members of the professional institutions such as the Institution of Engineers (India), The Institution of Electrical, Mechanical and Civil Engineers (England). They are given the coaching in the syllabuses laid down for the graduateship examinations of these bodies in sections A and B and are put through these examinations before they go out after three years. This gives an excellent opportunity to such of those young men, who are not able to secure one of the very limited seats that the few Engineering Colleges in the Presidency are able to offer.

To those applicants who do not possess the requisite initial qualification for the above, but who are still eager to obtain some technical knowledge and qualification in Engineering, the Institute offers courses leading up to the Government Technical Examinations (Lower and Higher), the City and Guilds of the London Institute preliminary, intermediate and final grades in the various subjects. This offers an excellent boon to persons already employed in the Engineering field in minor capacities, to improve themselves and attain better status in life. The present strength of the Institute is 179.

Presiding over the meeting Mr. A. R. Narayana Rao, B.A., B.E., A.M.I.E.E., M.I.E. (India), Superintending Engineer, Madras Electricity System, appreciated the efforts put in by the Principal and others in starting this Institution and said that he had been dreaming for a number of years about the salvation of the number of young men who were really not so fortunate as many of their other brethren who have been able to secure admissions to the Colleges. For every one of the students that found way in the Engineering Colleges and other Technological Institutions there were at least 100 young men who have not for some reason or other been able to get that opportunity. Therefore the starting of such an Institution really gladdened his heart because he knew that the number of young men who only found a dead-end had to go into some kind of employment to eke out a miserable livelihood. Every hour of the apprenticeship was worth ten times the theory of it or the absence of it in a plain teaching Institution. If they kept their eyes and ears open they will find that at every stage there is something to learn. He foresaw a bright future for such Institutions and the City of Madras itself could afford to have 10 such Institutions as India was in need of skilled men who would be able to take charge of the industries and projects for want of which they were held down and were unable to move ahead with the programmes. The primary duty of every manufacturing firm or industry should be to afford the necessary opportunities for them all to be employed during their non-teaching hours.

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- **Prices shown below are for sub-contract work, Labour only, for an average job in Madras.**
- **Labour includes use of craftsmen's and artisan's tools only.**

	Rs.	A.	P.
EXCAVATOR			
Excavating trenches for foundation per 1000 c. ft.	20	0	0
CONCRETOR			
Mass cement concrete any position laid and rammed per 100 c. ft.	20	0	0
R.C.C. band-course over plinth 4" thick any position and watering per 100 sq. ft.	15	0	0
R.C.C. slab 6" thick laid any position and watering per 100 sq. ft.	15	0	0
R.C.C. lintel cast *in situ* average size per R. ft.	0	6	0
R.C.C. sunshade 3" thick any position and watering per 100 sq. ft.	10	0	0
Granolithic floor 1½" thick laid and finished smooth per 100 sq. ft.	10	0	0
Brick-jelly concrete 4½" thick laid and rammed per 100 sq. ft.	8	0	0
BRICKLAYER			
Ground-floor superstructure 9" wall per 100 c. ft.	17	0	0
Do. 13½" wall per 100 c. ft.	16	0	0
First-floor superstructure 9" wall per 100 c. ft.	17	0	0
Do. 13½" wall per 100 c. ft.	18	0	0
Brick nogging in cement mortar per 100 sq. ft.	6	0	0
Half-brick wall in cement mortar per 100 sq. ft.	8	0	0
Floor rendering ½" thick in cement mortar per 100 sq. ft.	6	0	0
Do. but finished in coloured cement per 100 sq. ft.	10	0	0
Grinding lime mortar or pounding same per 100 c. ft.	10	0	0
Open terrace levelling course in brick jelly lime concrete and rawing per 100 sq. ft.	10	0	0
Open terrace flat tiles two courses per 100 sq. ft.	10	0	0
Open terrace flat tiles pointing per 100 sq. ft.	4	0	0
CARPENTER			
Panelled doors including housing shutters per sq. ft.	1	2	0
Glazed doors do. per sq. ft.	0	15	0
Panelled windows do. and cutting and fixing guard bars per sq. ft.	1	6	0
Glazed windows do. per sq. ft.	1	3	0
Glazed shutters only per sq. ft.	0	15	0
Fixing only door or window frames per each	1	0	0
Centering to R.C.C. slabs per 100 sq. ft.	13	0	0
Do. to R.C.C. stairs per 100 sq. ft.	16	0	0
Do. to R.C.C. sunshades per 100 sq. ft.	15	0	0
Wood work in scantlings per c. ft.	3	0	0
IRONWORKER			
Bending and fixing M.S. Reinforcements for R.C.C. work per cwt.	6	8	0
PLASTERER			
Wall-plastering in cement per 100 sq. ft.	6	0	0
Ceiling—plastering per 100 sq. ft.	6	8	0
Sunshade—plastering per 100 sq. ft.	7	0	0
Rounding internal or external angles per R. ft.	0	1	0
Moulding not exceeding 9" girth per R. ft.	0	8	0
White or colour washing 1st coat per 100 sq. ft.	0	10	0
Do. 2nd coat per 100 sq. ft.	0	8	0
Do. 3rd coat per 100 sq. ft.	0	7	0
GLAZIER			
Fixing only glass panes in window sashes per sq. ft.	0	2	0
Do. if cutting is necessary per sq. ft.	0	2	9
PAINTER			
Painting on wood or iron 1st coat per 100 sq. ft.	1	0	0
Do. 2nd coat per 100 sq. ft.	0	14	0
Do. 3rd coat per 100 sq. ft.	0	12	0
Do. if in narrow widths add 16 % extra.			
Tarring to door or window frames per 100 sq. ft.	0	8	0
SUNDRIES			
Fixing only round rain water pipes per R. ft.	0	4	0
Casting and fixing R.C.C. slabs for shelfs per sq. ft.	0	6	0
Fixing welded fabrics including cutting per sq. ft.	0	10	0

Note:—1. Water to be supplied at spot.
2. Scaffolding extra.
3. Setting-outs and making good extra.

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