TEACHING WITH FILMS

FERN and ROBBINS


UNITED STATES OF AMERICA

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FOREWORD

In meeting the emergency of training millions of men and women quickly for war production work and service in the Armed Forces in World War II, America has made educational history, and the methods by which this miracle of learning has been accomplished will not be forgotten. It will be remembered that the fundamentals of six years of elementary schooling were packed into a few weeks to prepare illiterates for military service; that highly skilled trades, requiring years of training and job experience to master, were broken down into specific payroll jobs and the training condensed into short, intensive courses by which men and women were placed on the production lines of war industries in a matter of weeks; and that much of this amazing instructional work was accomplished through the assistance of training films.

Millions of men and women have learned these skills for victory either on the production front or the fighting front, and have discovered the value of films for instruction; they will not be satisfied with teaching practices for themselves or their children which are less efficient. The school, business, industry, or lay group which attempts to instruct, or even to hold attention of people without the assistance of these modern

tools of education will find itself alone and its story unheard. People know how instruction and sales material should be presented, and it is wishful thinking to assume that they will ever return to obsolescent methods.

It is very important that all schools take advantage of new teaching aids and techniques for instruction which the Armed Forces and the War Production worker training program have utilized so effectively. The men and women who are returning to their home communities to become civilian home builders know from experience that the tempo of learning can be accelerated by instruction with films, and they will expect to find films used for teaching in the local school classrooms.

The responsibility for effective teaching with films does not fall upon the shoulders of school administrators alone, although much of the censure for failure to utilize this modern tool of education may be aimed in that direction. Neither can this responsibility be shifted to the classroom teacher and left to the whims or prejudices of that individual. If schools do not make effective use of films and other aids to improve instruction, the entire teaching profession will suffer.

Schools are not the only agency to which the doors of a new era of education have been opened. Industry, business, civic and cultural organizations, clubs, associations, professional groups — all who have a message to convey, a story to tell, a lesson to teach — must recognize that pre-war procedures will not be acceptable in a post-war world. They, too, must learn to utilize films effectively if their voice is to be heard by the people.

Those who are teaching with films, not merely showing pictures but skillfully using motion pictures, slide films, and slides as instructional tools, are in the vanguard of today's Educational March. They are armed with one of the most effective teaching aids yet devised. It is the purpose of this book to help those who are less experienced in the use of films for instruction, not those who have pioneered and developed the film as a teaching aid.

Who should use films for instruction? Why should instructional films be used? What is a good teaching film? Where are films and equipment to be obtained? When is the right time to use a film for instruction? How do you teach with films? These are some of the questions answered. There are suggestions for the person who would like to make his own instructional film, advice on the care and operation of projection equipment, tips on storage and repair of films, information on the organization and administration of an audio-visual aids program for instruction, and comments on financing such a program.

No attempt has been made to present an exhaustive treatment of any single phase of teaching with films. Instead, it has been the intent of the authors to bring together in one volume the practical information useful to one who sincerely desires to use films effectively. Where opinions are expressed, they are based upon observation and close experience with instruction and training of youth and adults over a period of years.

In fairness to this tool of education, the authors are

not of the opinion that films, alone, will solve all training problems. No man learns to operate a lathe merely by looking at motion pictures. Good textbooks, charts, models, demonstrations, and other instructional aids are the essentials of the efficient instructional program. Films supplement rather than supplant established teaching aids. Films will help to shorten the learning period.

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TEACHING FILMS — MACHINE TOOLS OF MODERN EDUCATION

Pictures have been the keystone in the bridge of learning since the days when a beetle-browed caveman traced crude figures in the sand to help a son understand the four-footed dangers that prowled the forests. Then, as now, the primary instructional problem was to stimulate a well-defined and accurate mental image in the mind of the learner.

Films supplement not supplant other teachings aids.

There has been a constant search for better ways to bring pictures into the learning situation, and the progress of education is linked with the discoveries of new aids to visualization. Textbooks are illustrated with photographs, charts, and drawings to vitalize the verbalism of the printed pages. Blackboard sketches have been the forte of generations of skilled teachers. The stereoscope added the realism of a third dimension to classroom pictures, and projected pictures have evolved from the black and white "stills" of the magic lantern to the lifelike motion pictures in natural color and

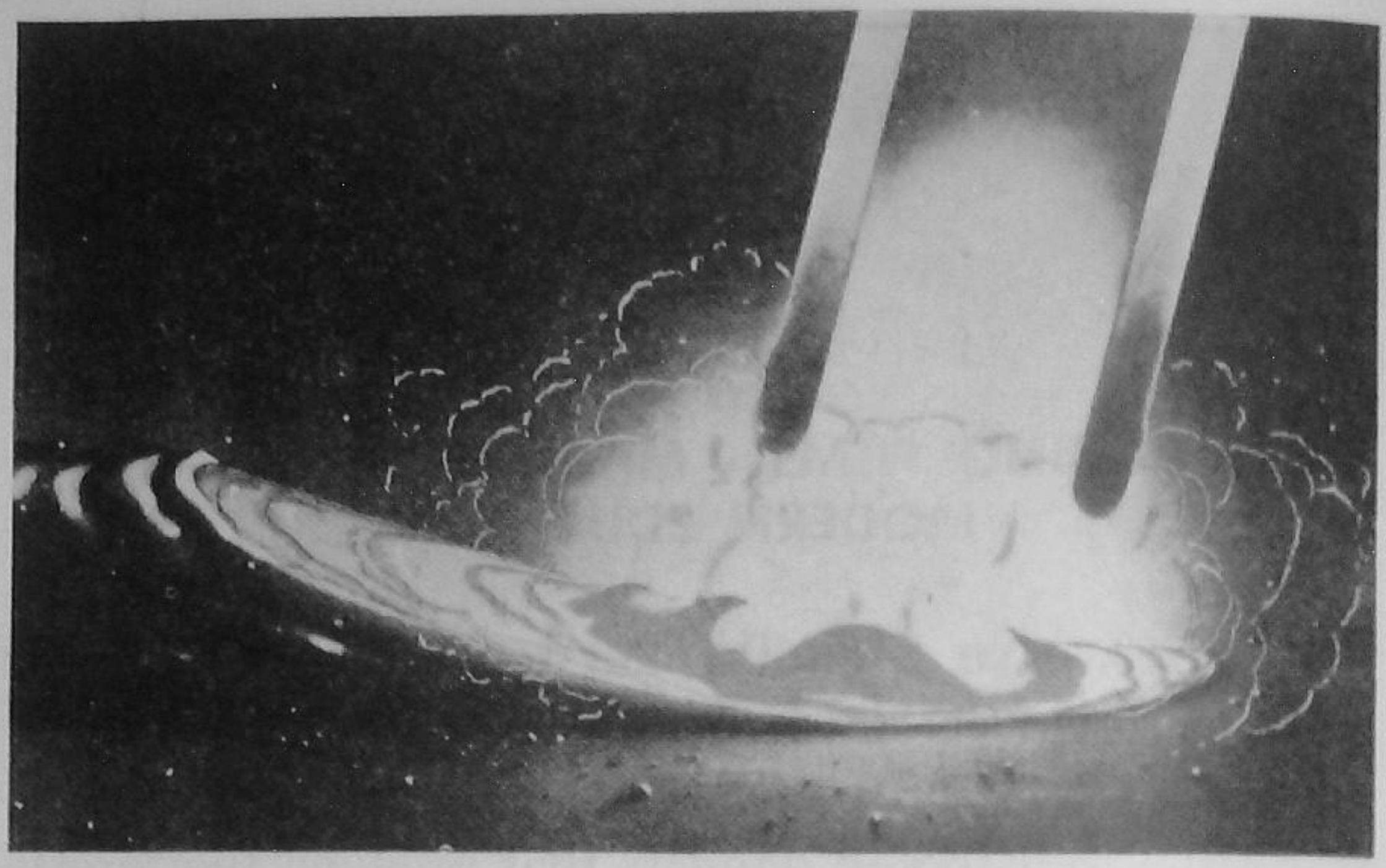

Fig. 1. In teaching films, the camera can overcome limitations of the human eye to see, for example, what goes on inside the blinding arc during electric welding.

sound. This, briefly, is the story of the development of films as a teaching device – a device which supplements and energizes other indispensable instructional aids.

We have drawn upon the miracles of photography and electronics to bring a marvelous new world into the modern classroom, a world in which the learner is endowed with the supernatural senses of a superman. He can watch the swift flight of a bullet, look inside the blinding arc of the electric welding torch (Fig. 1), see the internal strains and stresses of metals, and observe plant growth of months compressed into a few minutes of time. These are spectacular achievements, but the fundamental instructional qualities of the teaching film are not dependent upon the spectacular alone.

Projected pictures claim attention.

Projected pictures possess certain inherent characteristics that are definitely advantageous in a learning situation. One of the instructional problems in teaching a group is that of obtaining undivided attention, a problem which may be heightened in a lighted classroom where there are many things to be seen. Some of this element of distraction is eliminated with projected teaching films where the natural focal point of interest is the brilliant image on the screen, the principal highlight in the darkened room (Fig. 2).

While a skillful demonstration is not easily surpassed as a technique of instruction, the same demonstration

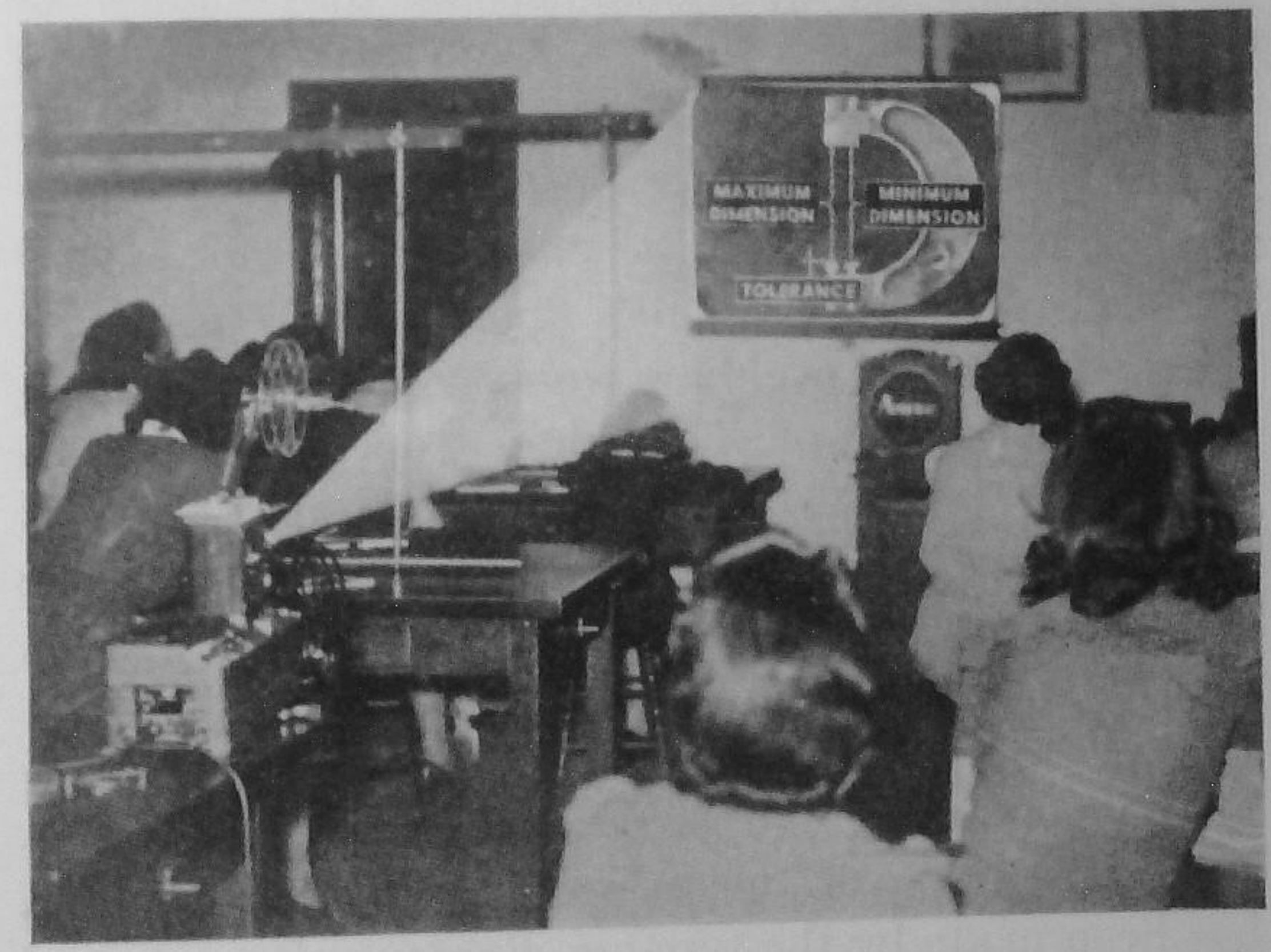

Fig. 2. With films for instruction, the point of interest for learners is the brightly lighted screen, an important factor in holding attention.

can be incorporated in a teaching film to utilize the inherent advantages of projected pictures. During a demonstration, there are times when only a few in the group occupy positions favorable to seeing the action from the most desirable point of view. Closeups and enlarged views of action from carefully selected points are features of well-made teaching films, so that all members of the class may see the action from the best perspective.

Pictures teach relationships and are accurate.

In addition to aiding the formation of an accurate and uniform mental image, teaching films are aids also in developing an understanding of the relation of these images; that is, in understanding continuity of action and sequence of ideas. One practical application of this is in the teaching of electric arc welding where the learner must master a sequence of co-ordinated manual skills, each of which is related to one of the key factors of the welding process. The correct technical performance of each manual operation and its relation to the total skill to be acquired are presented by a teaching film that has reduced learning time considerably.

Pictures teach quickly.

The most recent and, at the same time, most significant recognition of the value of teaching with films has been made by the training divisions of our Armed Forces. Their training problem at the outset of the war

was stupendous. Millions of civilians were to learn how to become efficient fighting men in the shortest possible time. The lessons had to be learned quickly and the penalty for inadequate instruction was to increase the natural hazards of war. Men's lives depended upon quick and efficient training.

In meeting this emergency, the training divisions of the Armed Forces utilized instructional films to a much greater extent than any extensive program of public education had attempted heretofore. The Bureau of Naval Personnel of the United States Navy Department listed the following six reasons for using instructional films as training aids: (1) to learn more, (2) to remember longer, (3) to increase interest, (4) to make training uniform, (5) to build morale, and (6) to save time.[1]

Mass education in war required efficient teaching.

Further recognition of the value of teaching films came from home front agencies of World War II. When the United States accepted responsibility as the arsenal for the United Nations, another vast program of adult education emerged to teach millions of workers new skills and to teach them quickly. Without this training, the rapid conversion and expansion of American industry for production of war material would have been futile effort.

Of these millions of war workers, some were to come from the ranks of the unemployed, some from industries

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[1]"More Learning In Less Time," U. S. Navy Training Aids Manual, NavPers 1300, p. 3.

Fig. 3. A production scene during the filming of a U. S. Office of Education training film. Here, educational visual aids specialists are supervising the filming of a scene.

converting from the manufacture of peacetime products to the goods of war, some from the fields of business and professions hard hit by a wartime economy, and even housewives were to don mechanic's aprons before the war industries' Gargantuan appetite for manpower was to be satiated. These potential war-production workers had one thing in common: All were in need of training.

Films developed specifically for war training.

As an aid to mass instruction for mass production of war material, the production of audio-visual aids in the form of a series of sound motion pictures, pointed specifically toward the needs of the nation-wide program of Vocational Training for War-Production Workers, was undertaken. Of this series, approximately thirty subjects on machine-tool operation and the use of precision measuring instruments were available at the time of Pearl Harbor. These proved to be invaluable aids during the harrowing days and nights that followed, when the vocational departments of America's public schools swung into operation on an around-the-clock schedule, unheard of previously in the history of education (Fig. 3).

Meanwhile, another army of adult Americans was experiencing the value of films for instruction through the training programs of various civilian-defense activties conducted by the states and the Nation. Films to help teach air-raid wardens, victory gardeners, airplane spotters, home canners, scrap collectors, and other civilians who were fighting on the home front, were produced and utilized in the training courses contributing to the national war effort.

But this war-born expansion of films for instruction did not limit itself to the motion picture and slide film for teaching in the classroom or shop.

Millions attending commercial theaters have seen the motion pictures produced by the War Department and

Fig. 4. Walt Disney's "Victory Through Air Power" brought the educational possibilities of films for instruction to millions of theater goers.

the Office of War Information to stimulate morale on the home front and to explain the problems peculiar to a wartime economy. It is significant that critics reviewing Walt Disney's production, "Victory Through Air Power," were as much impressed by the potential educational possibilities of the technique employed by the producer as by the content of the film (Fig. 4).

In a sense, it has taken a war to fulfill an inventor's dream. When Thomas A. Edison conceived the idea of projecting moving pictures on a screen, he foresaw his invention as a new tool for education (Fig. 5). But the wizard of Menlo Park did not live to see his dream materialize in anything approaching the proportions he envisioned. It was not until the emergency of war that motion pictures and other types of instructional films were fully recognized for what they are – machine tools of modern education – and utilized extensively in national programs of instruction.

Schools expected to keep abreast of teaching trends.

The impact of such widespread use of audio-visual aids in the Armed Forces, for instruction of adults in Vocational Training for War Production Workers, in civilian-defense activities, and through commercial theaters will be felt eventually in every schoolroom in the Nation. The millions of adults who have discovered the value of films for instruction will want to know that their sons and daughters are benefiting likewise through teaching with films.

THE CHANGING WORLD

(Mr. Edison predicts motion pictures will take the place of books in the schools.)

Instead of feeling this way—

Boys will want to go to school.

Instead of going reluctantly—

They will be waiting for the doors to open.

Instead of feeling this way—

They will feel like this.

Fig. 5. Twenty-two years ago Edison predicted motion pictures would be utilized in the classroom. McCutcheon of the Chicago Tribune saw this happening.

Films must be used, not shown.

It does not require a scientific study to prove that much remains to be accomplished before American schools will use teaching films most effectively for instruction. Many schools are making use of films to the extent that they are showing pictures. Some are actually teaching with films. There is a vast difference between these two conceptions of the use of audio-visual aids in education.

One of the fallacies to be corrected in the minds of both students and teachers is that films are primarily for entertainment. This conception stems quite naturally from the early exploitation of the motion picture as a medium of entertainment through commercial theaters. Our first and most frequent contact with the motion picture was related to entertainment and it is not easy to break away from this early conditioning.

Lack of equipment a retarding factor.

There is a great void of equipment and films which must be filled in part at least before schools can begin using teaching films effectively. As matters now stand, many instructors do not use teaching films, because the effort to obtain projectors or equipment and films is too great. There is a limit to the amount of time and energy a teacher can expend, and although it has been proven that teaching films can reduce instructional time, the use of films may not be justifiable under adverse circumstances. There is a point in the expenditure of teaching energy at which the law of diminishing returns applies.

Teachers must be taught how to use films.

Training teachers to use films for instruction is another problem that must be overcome before teaching films can be used effectively in school. There is a technique in teaching with films — a technique based upon the laws of learning and a recognition of the role of the film in the classroom. An in-service training program of only a few hours plus some practice are all that are required ordinarily for the average experienced teacher to master the technique of teaching with films.

Ideally, each school should have a library of instructional films comparable to the traditional library of books. Films should be as readily available as books, maps, and other instructional aids. Practically, the average school must continue to depend upon centralized film libraries for much of their material, especially in the field of motion pictures. The cost of teaching films has been reduced considerably during the war and more schools are developing their own film libraries. As the demand for teaching films increases, the cost of these films is likely to be reduced further.

Although the responsibility for successful utilization of teaching films is shared by all teachers in the school, there is a focusing of this responsibility upon the individual designated as the supervisor or director of audio-visual aids, wherever a school seriously attempts to adopt this teaching technique. Also, greater-than-ordinary responsibility rests upon the audio-visual aids committee which, in most instances, is mainly classroom instructors in the school.

Administration should lead in inaugurating use.

Finally, it is not enough that the school administration be sympathetic merely toward audio-visual aids for instruction. Nothing less than enthusiastic leadership is demanded of administrators if schools are to take full advantage of a wave of public demand for more effective teaching with films.

SUMMARY

1. Pictures are aids to learning in that they help stimulate a well-defined and accurate image in the mind of the learner.
2. Projected pictures tend to focus attention as the highlight in a darkened room.
3. Teaching films are aids in creating accurate mental images and in developing a relation of these images; that is, sequence of ideas or continuity of action.
4. Emphasis has been placed upon teaching with films for mass instruction of fighters and workers resulting from wartime emergency.
5. Schools must use teaching films effectively if they expect to keep abreast of developments in education.
6. Lack of equipment and films is retarding development of teaching with films in many schools.
7. In-service training programs can help instructors learn how to teach with films.
8. Centralization of responsibility for films and equipment is important for successful teaching with films.
9. Administration must lead any movement to vitalize instruction with audio-visual aids.

2

EQUIPMENT — ITS USE AND ABUSE

Equipment is the mechanical factor in teaching with films, and like all other mechanical factors in education, is subordinate to the human factor in the equation of learning. The motion-picture or slide-film projector never can take the place of the teacher in the classroom, any more than did the textbook or the blackboard. Projectors, screens, and films are tools of education and, like other tools, their effectiveness depends to a considerable extent upon the skill of the person using them.

Proper use of equipment first step.

Projection equipment common to the classroom does not require the services of a trained mechanic to operate; neither is it so foolproof that the careless or untutored operator cannot ruin film or damage the equipment. The ability to operate various types of film-projection equipment skillfully will mark the competent, well-trained professional instructor, just as skill at the lathe or other machine tool marks the master machinist, and dexterity with the scalpel identifies the manipulative skill of the surgeon.

The reason many teachers have little more than a nodding acquaintance with a sound motion-picture projector does not stem from a lack of desire to use this tool of modern education so much as from a lack of opportunity to learn the manipulation of the dials and levers. As more teacher-training institutions add courses of audio-visual aids to the required list of subjects, and more school systems introduce the use of instructional films in the classroom as a part of the in-service teacher training program, instructors will have the opportunity to master the mechanical skills of projector operation which are fundamental to effective use of teaching films.

Identification of types of films essential.

Learning to identify types of training films is a commendable starting point for an instructor's education in teaching with films, as it provides assurance and insurance — assurance for the learner, and insurance against the unpardonable sins of projector operation, such as running sound film on a silent motion-picture projector or attempting to project a 16mm film through an 8mm machine.

Two sizes of instructional films.

There are but two sizes of instructional films in common use in the classroom, 35mm and 16mm; and 16mm is motion-picture film while 35mm is slide film. The 8mm size motion-picture film, which is popular with home movie makers, is not used for professional production of teaching films.

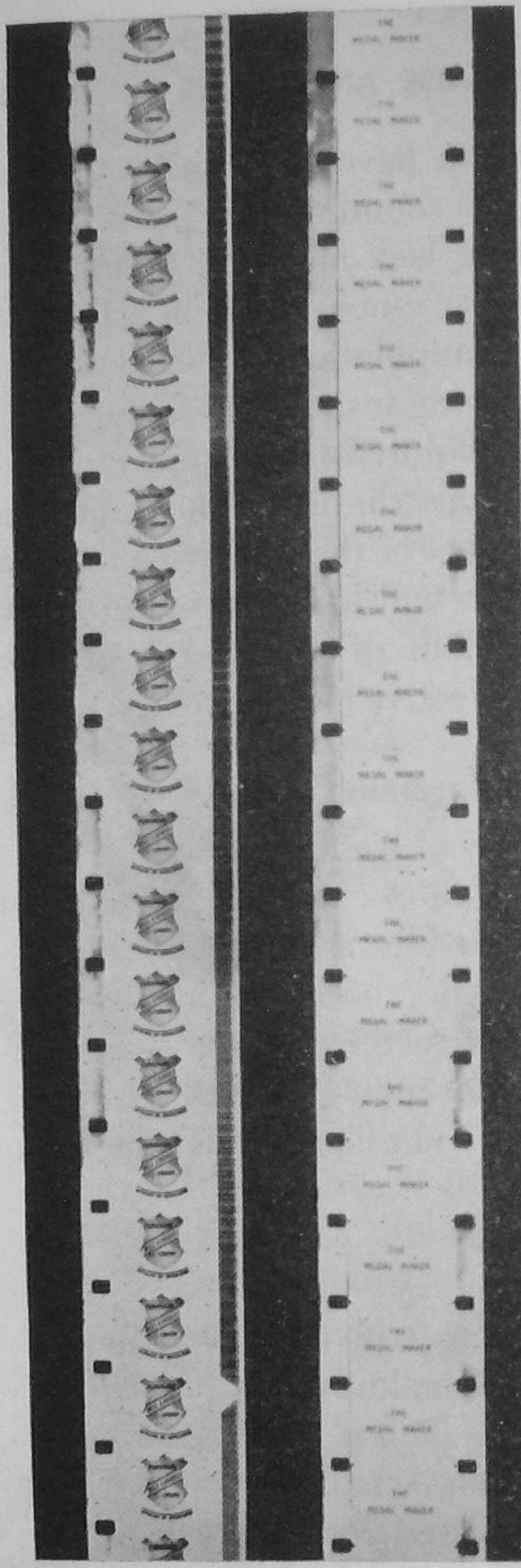

Fig. 6. In 16mm motion-picture film, sound films have sprocket holes on one side only and silent films have sprocket holes on both sides.

Fig. 7. With the 35mm slide film, a series of still pictures are projected in sequence on the screen.

Sprocket holes identify film and projector to use.

Sound motion-picture film, 16mm size, has perforations, or sprocket holes along one side of the film only, while silent 16mm film has sprocket holes along both sides (Fig. 6). The unperforated side of the 16mm sound motion-picture film carries the sound track and if a sound film is run through a silent motion-picture projector with sprocket teeth designed to engage *both* sides of the film, the result will be a new set of sprocket holes in the sound track and a ruined film.

The rule to be remembered is: You Can Run a Silent Motion-Picture Film on a Sound Projector, but Never Run a Sound Film on a Silent Projector.

Sound and silent slide films available.

The 35mm slide film is not a motion picture, but a series of positive transparencies on a strip of 35mm film that are projected as a sequence of still pictures on a screen (Fig. 7). The slide film may be designated as a film strip, Picturol, filmslide, or strip film. If a phonograph record with dialogue commentary and sound effects synchronized with each picture or "frame" of the film accompanies the slide film, it is a sound slide film. Otherwise, the film is a discussion slide film and the pictures are supplemented by captions or by a commentary in manuscript form which is read by a member of the group viewing the film.

Slide films promote discussion.

It may be misleading to refer to a discussion slide film as a silent slide film and convey the impression that

an aura of silence should prevail as the pictures are flashed on the screen. It is not an insult to the intelligence of the group if the captions are read aloud, provided the reader can pronounce the technical words correctly. Supplementary remarks by the instructor and general discussion of the pictures are likely to result in more effective instruction.

Slide films in two sizes.

Slide films may be double- or single-frame size, but the single-frame is most common. The frame size of the single-frame slide film is 1 by ¾ in., while the double-frame is 1 by 1½ in., the same as the negative size of the Leica, Contax, Argus, Eastman 35, and other popular 35mm cameras. Slide-film projectors, adjustable to both single- and double-frame films, are available.

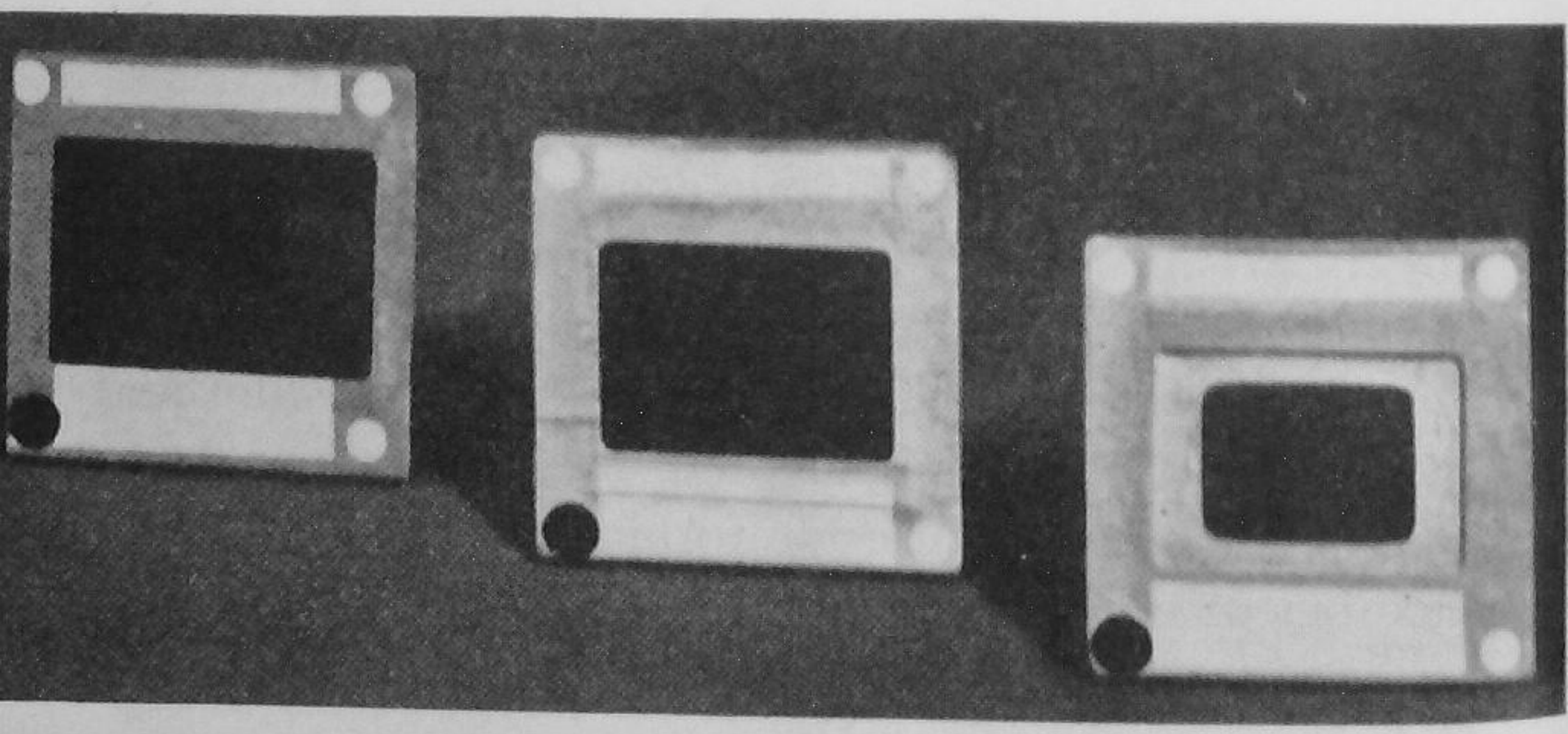

Fig. 8. Production of miniature, or 2 by 2-in. slides is ideally suited for teachers who are making their own teaching films.

Miniature slide popular for Kodachrome.

The miniature, or 2 by 2 slide, is a glass slide 2 in. square that has been popularized by the advent of Kodachrome transparencies. It is constructed by clipping a frame from a strip of transparencies and mounting it in a mask between squares of glass. Production of miniature slides in natural color is comparatively inexpensive and requires little more photographic experience than the ability to follow the manufacturer's instructions accompanying the film (Fig. 8).

Standard glass slides still used.

The standard glass slide, 3¼ by 4 in., was *the* teaching film before the advent of the motion picture and slide film, and it continues to hold a ranking place among instructional tools in the classroom despite the competition of newer methods for projection of pictures. Although Grandmother knew the standard slide projector as a magic lantern, it must not be assumed that this method of using pictures for teaching is entirely outmoded, nor that its potentialities as a classroom tool have been exhausted. One fact, alone, assures the standard size slide of a place among teaching films: the fact that it provides the best medium for teacher-made visual material. Glass, or lumarith, slides can be made by the instructor from typewritten copy; from pen, pencil, or crayon sketches; from photographic transparencies; and by other means that are limited only by the ingenuity of the individual.

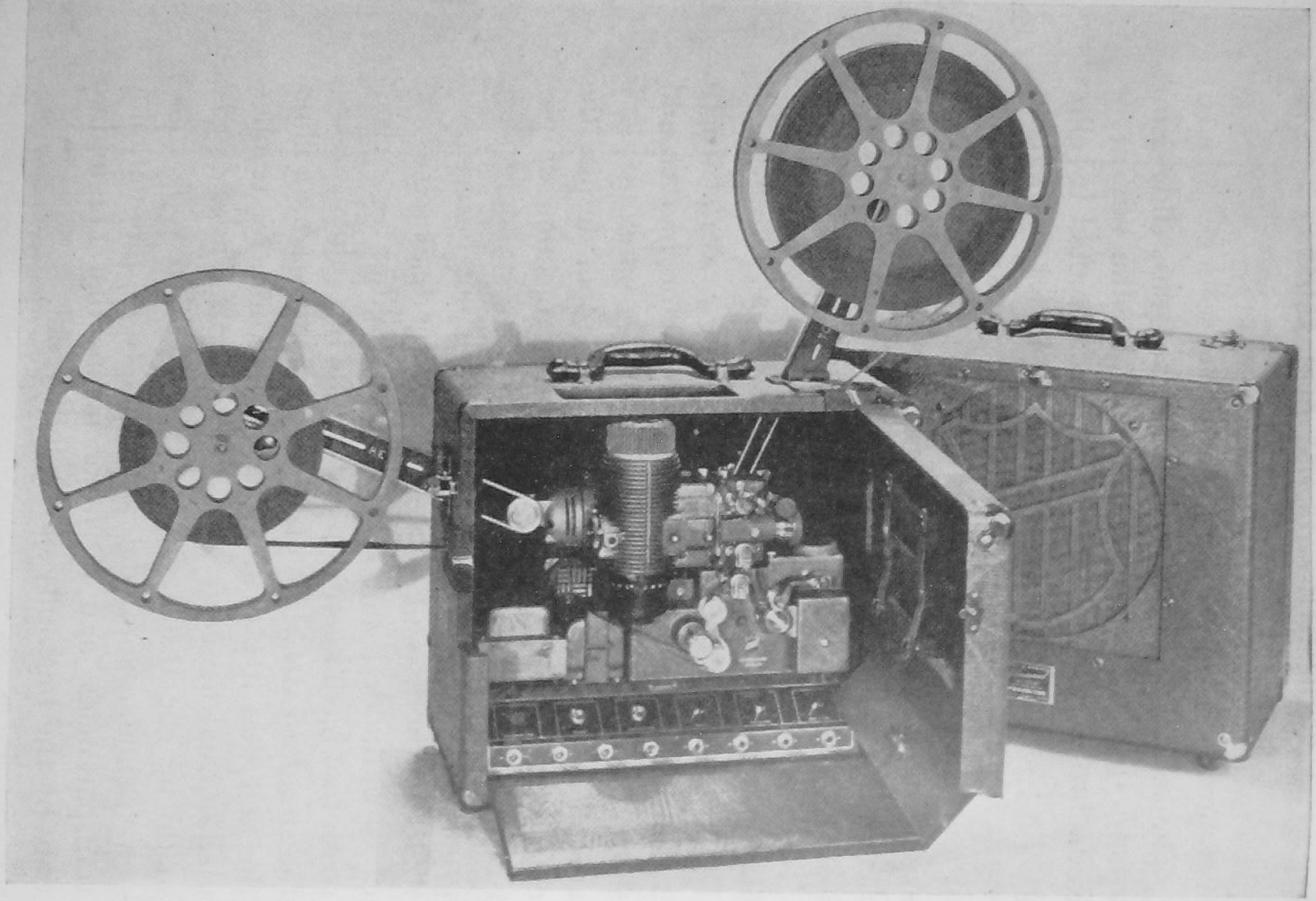

Fig. 9. The skilled operator of a sound motion-picture projector experiences the satisfaction of working with fine machinery.

THE SOUND MOTION-PICTURE PROJECTOR

The operation of sound motion-picture projector.

There is a fascination in fine machinery, in the precise meshing of gears, in wheels that spin effortlessly on slick bearings, and the instructor who is a skilled operator of a sound motion-picture projector experiences the satisfaction of working with a fine machine (Fig. 9). While there are more steps in the operation of this machine than with any other type of film-projection equipment, these steps become routine with practice so that manipulations which at first seemed complex, are accomplished in a darkened room.

The major steps in operation of a sound motion-picture projector are (1) setting-up, (2) threading, and (3) projecting. In addition to these, projection conditions and maintenance of equipment are items to be taken into consideration by the competent operator.

A survey of projection conditions is logically the first step in the sequence of operations and this includes acoustics, ventilation, seating arrangement, power outlets, location of screen and projector, and facilities for darkening the room.

Poor acoustics may be improved.

The key to good acoustics is the elimination of large areas of bare wall surface that tend to reflect sound waves as a mirror reflects light. If the room is to be used frequently for projection of sound motion pic-

tures, drapes and wall hangings can be introduced as part of the permanent decorations. The ideal treatment is sound proofing with an insulating wallboard that absorbs sound waves.

The size of the room with relation to the number of persons who will constitute the usual audience is another factor in planning for good acoustics. With other factors equal, an audience that comfortably fills a room will make far better acoustics than an audience of a few in a large room.

Good ventilation important.

Ventilation is a problem at one time or another in almost every projection room. The combination of stale, overheated air and a darkened room is too much for some members of the audience to overcome and they will get sleepy in spite of the interest of the picture or the enthusiasm of the instructor. Good architectural engineering provides adequate ventilation at all times by a constant flow of fresh air forced into the room. However, such ideal conditions are not always present, and if the instructor anticipates ventilation problems, he can reduce the bad effects somewhat by airing the room before showing the film.

Good seating arrangement desirable.

The location of the projector and screen is planned in terms of the seating arrangement of the room. The front row of chairs should not be so close to the screen that the picture is distorted, nor should the rows ex-

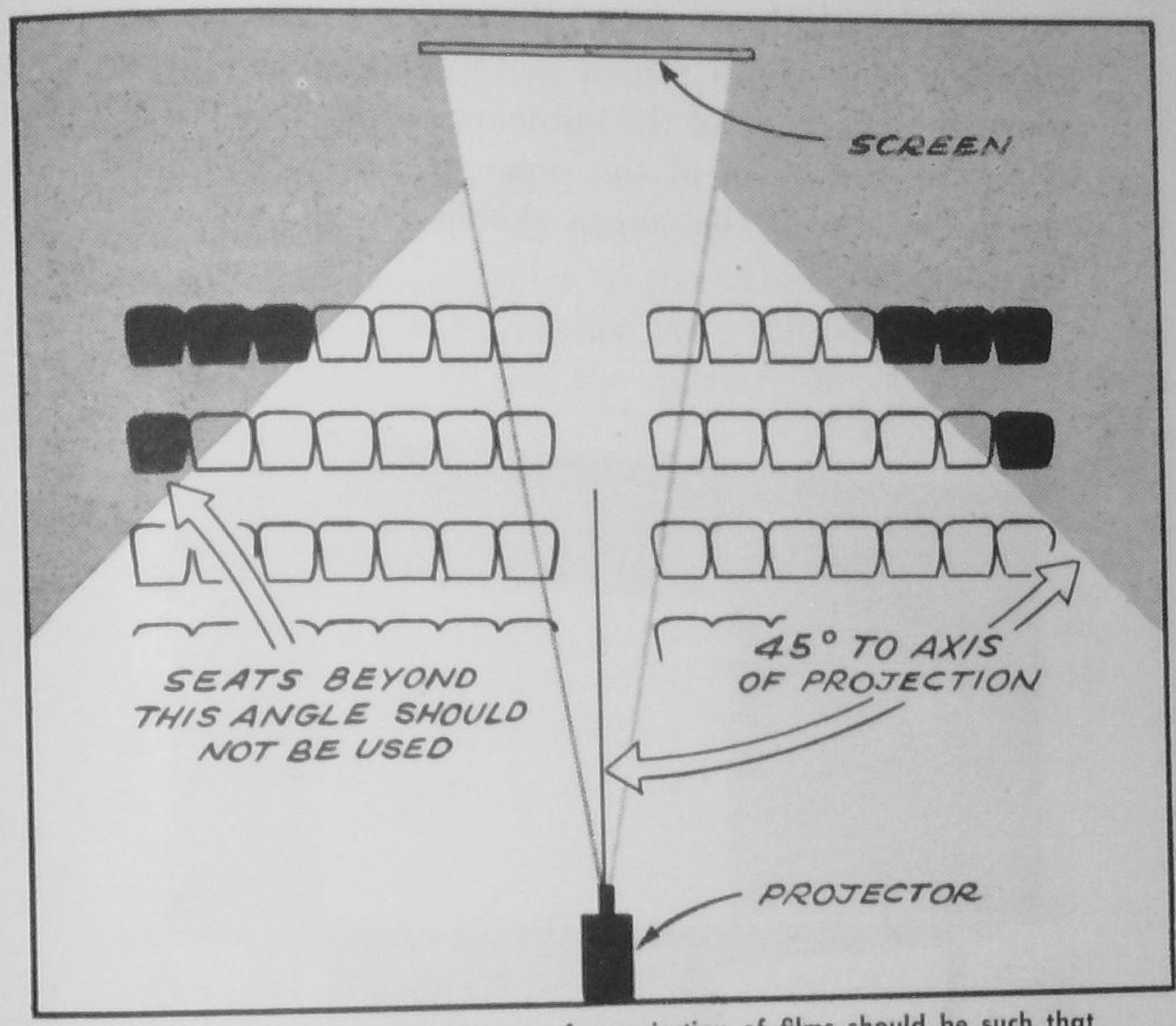

Fig. 10. The seating arrangement for projection of films should be such that no person sees the screen from an angle greater than 45 degrees from the axis of projection.

tend to the side so far that angle of vision produces distortion. The limiting distances in both instances can be determined easily by experimentation (Fig. 10).

Locate screen and projector.

The screen should be located so that its surface is at a right angle to the axis of the beam from the pro-

jector and with the center of the screen level with the projector lens. Both screen and projector should be above the eye level of the audience. If it is necessary to elevate the beam of the projector above the horizontal, the top of the screen should be tilted toward the projector.

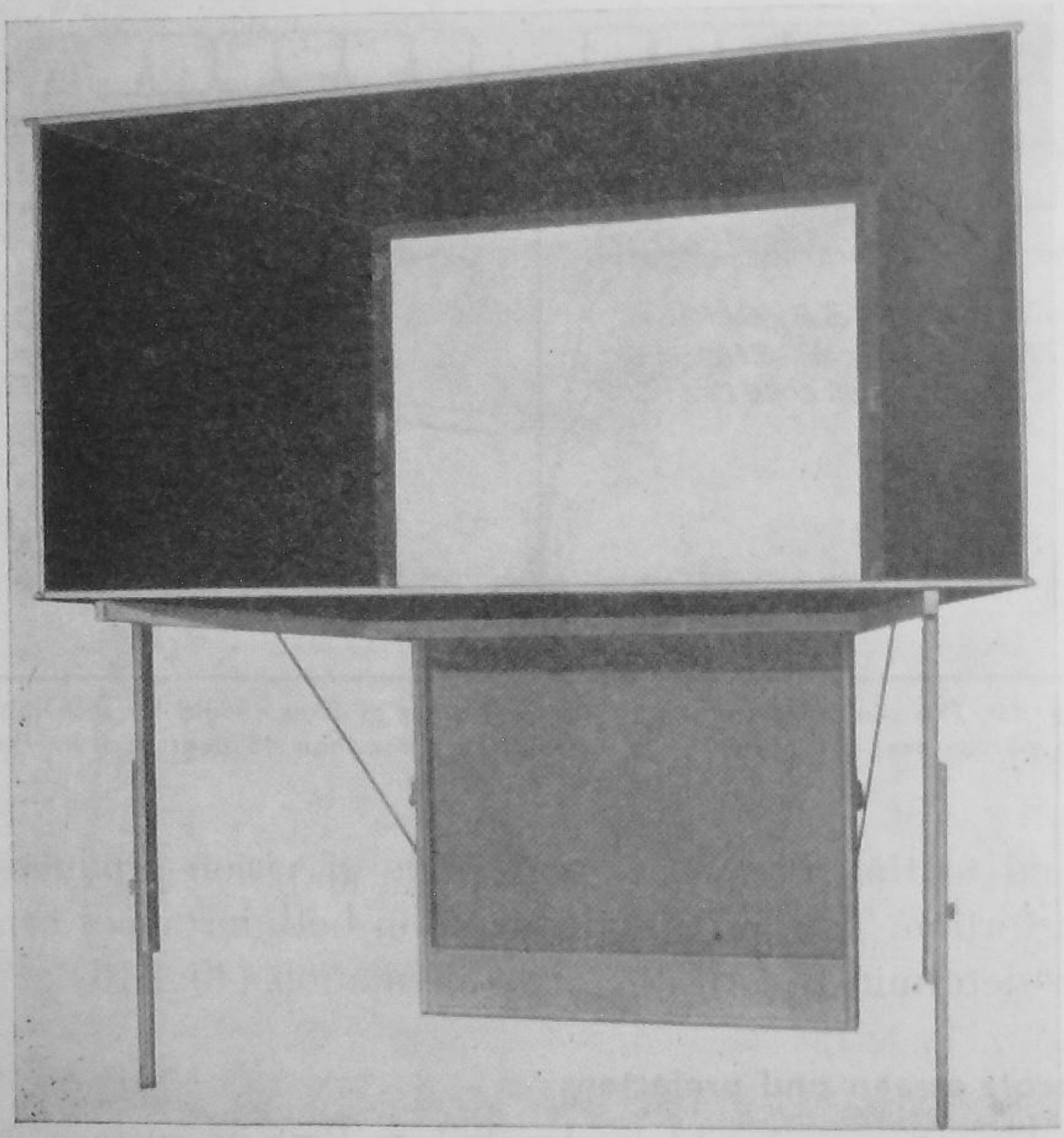

Fig. 11. By means of a shadow box, pictures can be projected satisfactorily in lighted rooms.

Place speaker correctly.

The speaker should be placed at one side and level with the center of the screen except in the case of special sound screens that are perforated for passage of the sound waves. Never place the speaker on the floor below the screen as much of the sound is absorbed by the first rows of the audience. As a rule, if all members of the audience can see the speaker, they can hear it also.

Keep projector inconspicuous.

The projector should be kept behind the audience, otherwise the machine will distract attention from the picture. If it is possible to project through a window or transom from a point outside of the room, machine noises are eliminated and the illusion of reality is heightened.

Room must be darkened.

A darkened room is essential for satisfactory projection of pictures, and the darker the room the better the quality of the picture will be. There is no such thing as a "daylight" screen, although a shadow box can be constructed to permit picture projection to a limited group in a lighted room (Figs. 11 and 12). Heavy cloth drapes or opaque window curtains on rollers with side frame channels to make them light-tight are most frequently used for darkening classrooms. Venetian blinds are sometimes acceptable for projection of black-and-white pictures, but they are seldom satisfactory for nat-

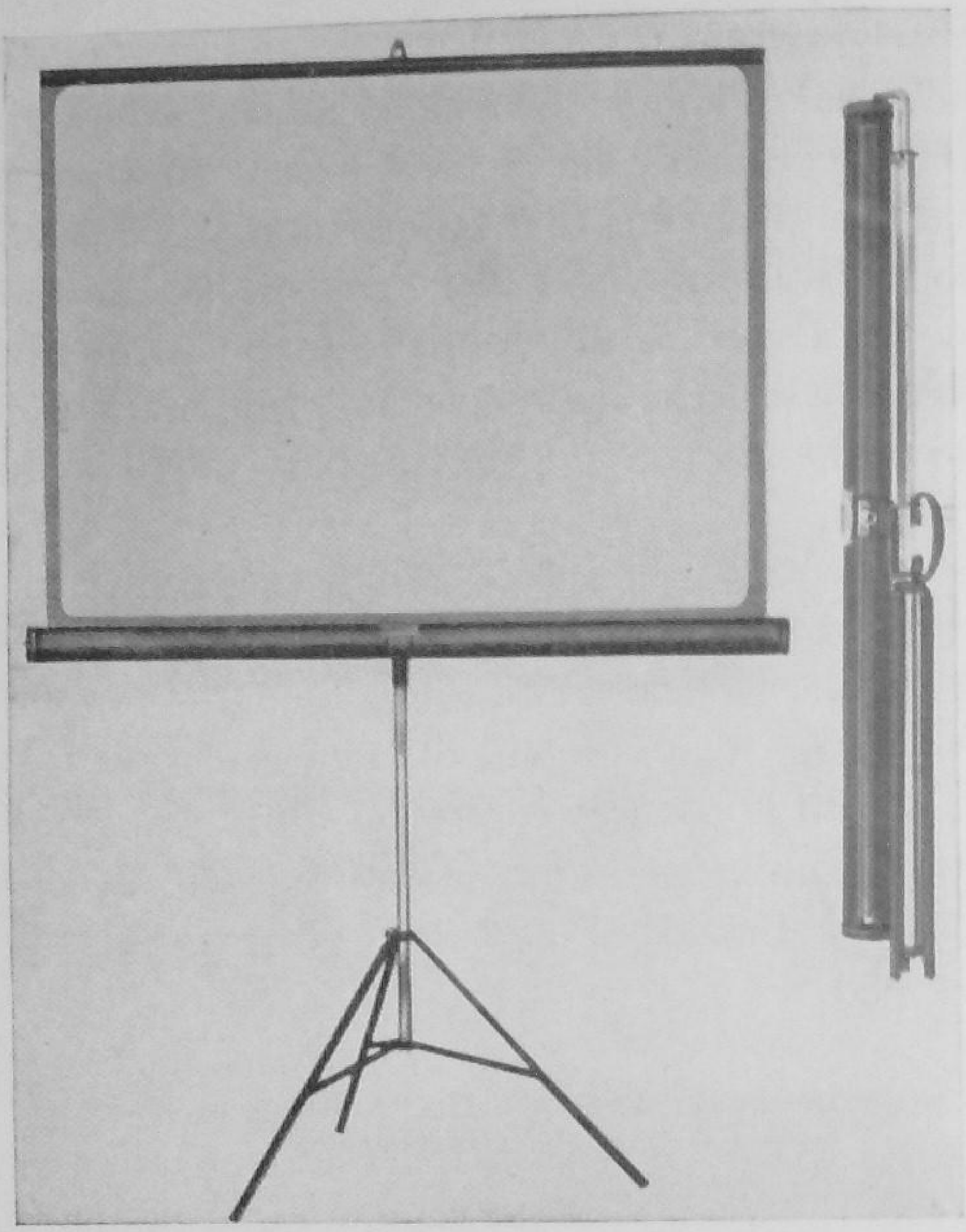

Fig. 12. The glass-beaded portable screen is a versatile item of equipment and provides a brilliant projection surface in a well-darkened room.

ural-color pictures as these require complete darkness to bring out the true color.

Always check current before "plugging-in."

Electric-power outlets should be located close to the projector and they should be wired on a separate circuit, apart from the room lights. Baseboard outlets at the

rear of the room are most convenient for the average classroom situation. If the operator is not familiar with the building, he should inquire about the voltage and nature of the current at the outlets before plugging in the projector. An operator is not likely to make the mistake more than once of connecting a projector designed to operate on alternating current into a direct-current line, because the mistake will be an expensive one. He will be fortunate if only the fuse in the machine is blown. Likewise, a machine designed for 110 volts will have a brilliant but brief career if connected to a 220-volt line.

Avoid delays by setting up in advance.

The work of setting up and threading the projector should be completed before the class enters the room in which the pictures are to be shown. There should be but a minute's delay and no confusion between the time when the group is ready for the film and the actual showing; otherwise the effect is similar to serving lukewarm coffee to a customer who wants it hot.

The mechanical preparations for projecting a sound motion picture are completed quickly if a routine procedure is developed, even though this routine may vary with the situation. For example, the routine of preparing for projection in a classroom in which the projector, screen, and speaker are semi-permanent installations is much simpler than in a classroom in which there is neither a table upon which to place the projector nor a convenient power outlet. But, while the routine of

setting up the projector and screen may vary, the steps in threading the machine and the operation of the equipment remain constant.

Check and clean projector parts.

Assuming that the instructor has made a survey of general projection conditions (acoustics, ventilation, location of screen with relation to the projector, seating arrangement, etc.), the first step is to place the projector on a sturdy table or projection stand and assemble any parts that are dismounted for packing, such as arms for feed and take-up reels. All belts should be checked, the film gate should be opened, and film channels cleaned with a lint-free cloth. If dirt or flecks of gummy residue adhere to the film channel, these can be removed after moistening a corner of the cleaning cloth in alcohol. Do not use a hairpin or other metal object to clean film-handling parts. Remove the projection lens and carefully clean the aperture with a small camel's-hair brush to remove any dust or fuzz on the edges. Before replacing the projection lens, breathe on the external glass surfaces and wipe them gently with a clean cloth. A well-laundered linen handkerchief makes an excellent cleaning cloth but domestic tranquillity may not be enhanced if it is added to the family laundry when soiled.

Oil regularly and judiciously.

Next, the machine should be oiled, but lightly (Fig. 13). One drop of oil at frequent intervals is better

Fig. 13. Regular lubrication is important for long life of the projector.

than long periods of drought followed by a deluge of lubricant from the fellow who believes that if a little is good, a lot must be better. In the event that the bearings are fairly dripping oil, the excess should be wiped away and the oil can left alone. Also, if a drop of oil should be inadvertently spilled on a film roller or in the film channel, it should be wiped off at once so that it will not spot the motion-picture film. These precautions may seem ridiculous, but managers of film libraries and projector repairmen believe otherwise.

Use precautions with cords and cables.

After cleaning and oiling the projector, the screen should be erected, and the speaker placed near it on an elevated bench, chair, or table. The speaker cable should be unrolled and the ends plugged into the proper receptacles on the projector and speaker. A 1600-ft. spare reel makes a convenient carrying device for both speaker and power cords, and most projector cases have a compartment for the large-size reel.

The speaker and power cords should be laid where they are least likely to be walked on or tripped over and, as an added precaution, a section of the cord should be looped and a simple hitch tied around a leg of the table or chair on which the projector or speaker is placed. This will reduce the damage in the event that the cord is jerked by someone tripping over it.

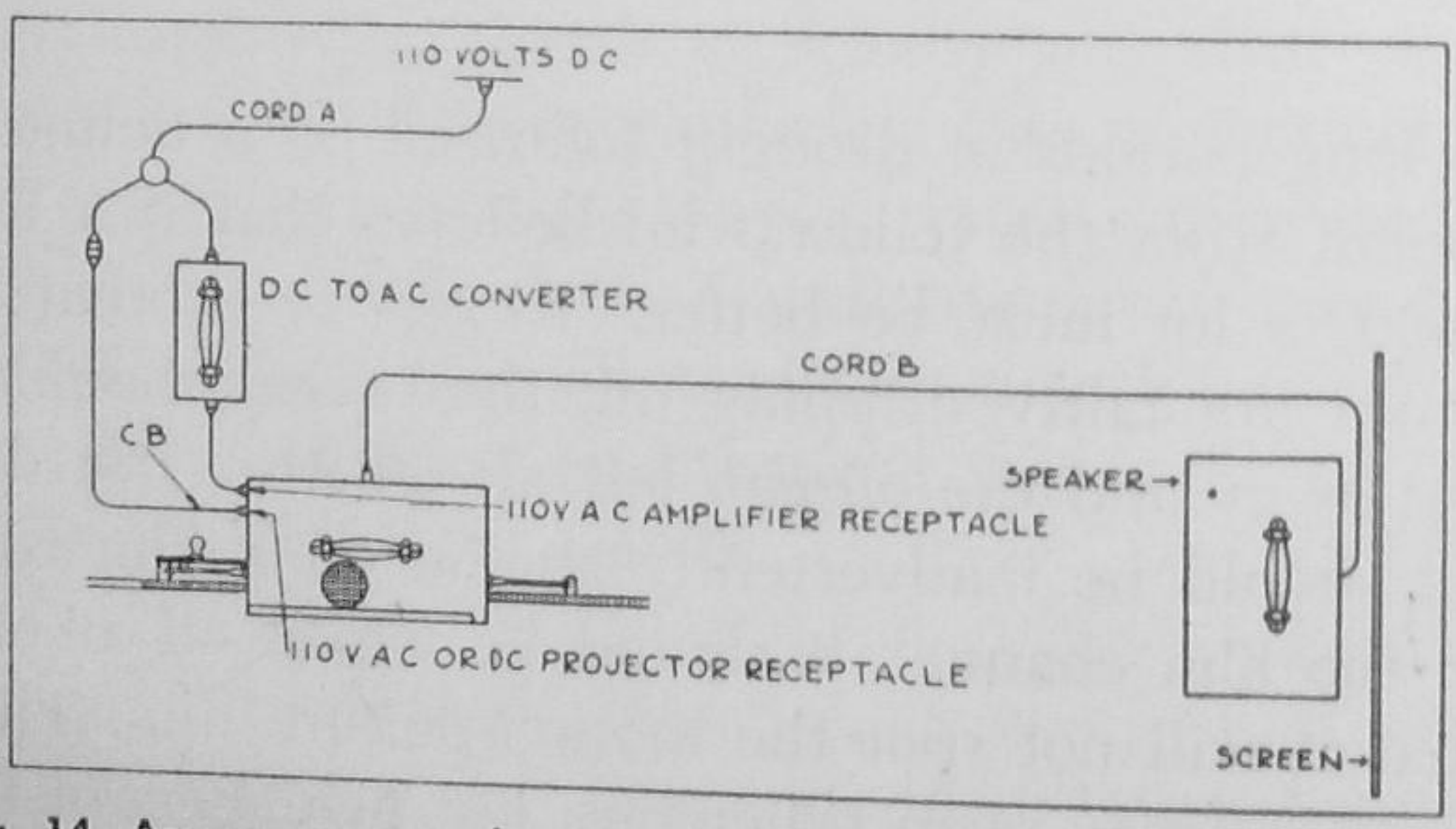

Fig. 14. Arrangement and connection of Filmosound units for operation on direct current.

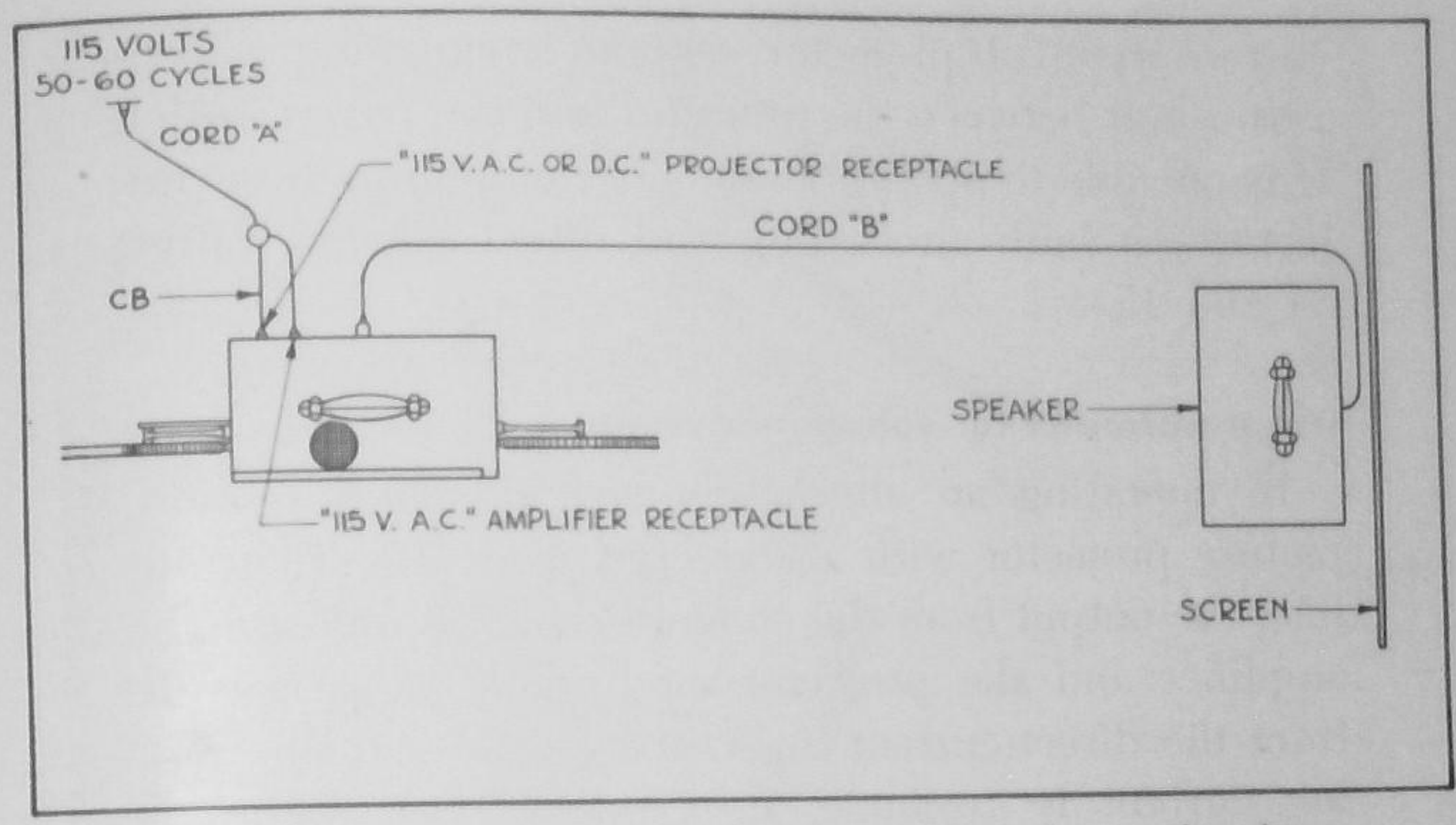

Fig. 15. Arrangement and connections for operation of a sound motion-picture projector on alternating current.

Check type of current.

Before plugging into the power circuit, the operator should make certain that the current is suitable for the projector. If there is any doubt, this matter should be taken up with someone who is familiar with the electric circuits in the building, such as the building custodian. It is better to spend a few minutes locating this individual than to spend hours searching for new projector bulbs or amplifier tubes, to say nothing of costs.

Use converter for current change.

Most motion-picture projectors are designed to operate on alternating current at 110 volts which is available in most classrooms. If only direct current is available, no attempt should be made to operate an alternating-

current type of projector without connecting a converter unit between the projector and the power outlet. It is possible to operate most silent motion-picture projectors on both alternating and direct current (Figs. 14 and 15).

Use transformer for voltage reduction.

In operating an alternating-current sound motion-picture projector with a converter on a direct-current line, the output from the converter is used only for the amplifier and the projector motor and lamp operate from the direct-current line. If only 220-volt alternating current is available, it is possible to operate a 110-volt alternating-current projector on this circuit by using a special transformer to reduce the voltage. The output from the transformer is fed into the projector in the same manner as in the case of a common 110-volt line.

Test projector and amplifier.

With the proper type of current and line voltage determined, all switches on the projector should be checked to make sure they are in the "off" position; then the power cord should be connected. The projector should be tested by starting the motor, switching on the lamp, and turning on the amplifier. A few minutes will be required to warm up the amplifier tubes after which a humming noise can be heard near the speaker when the amplifier control is turned to the position for maximum sound.

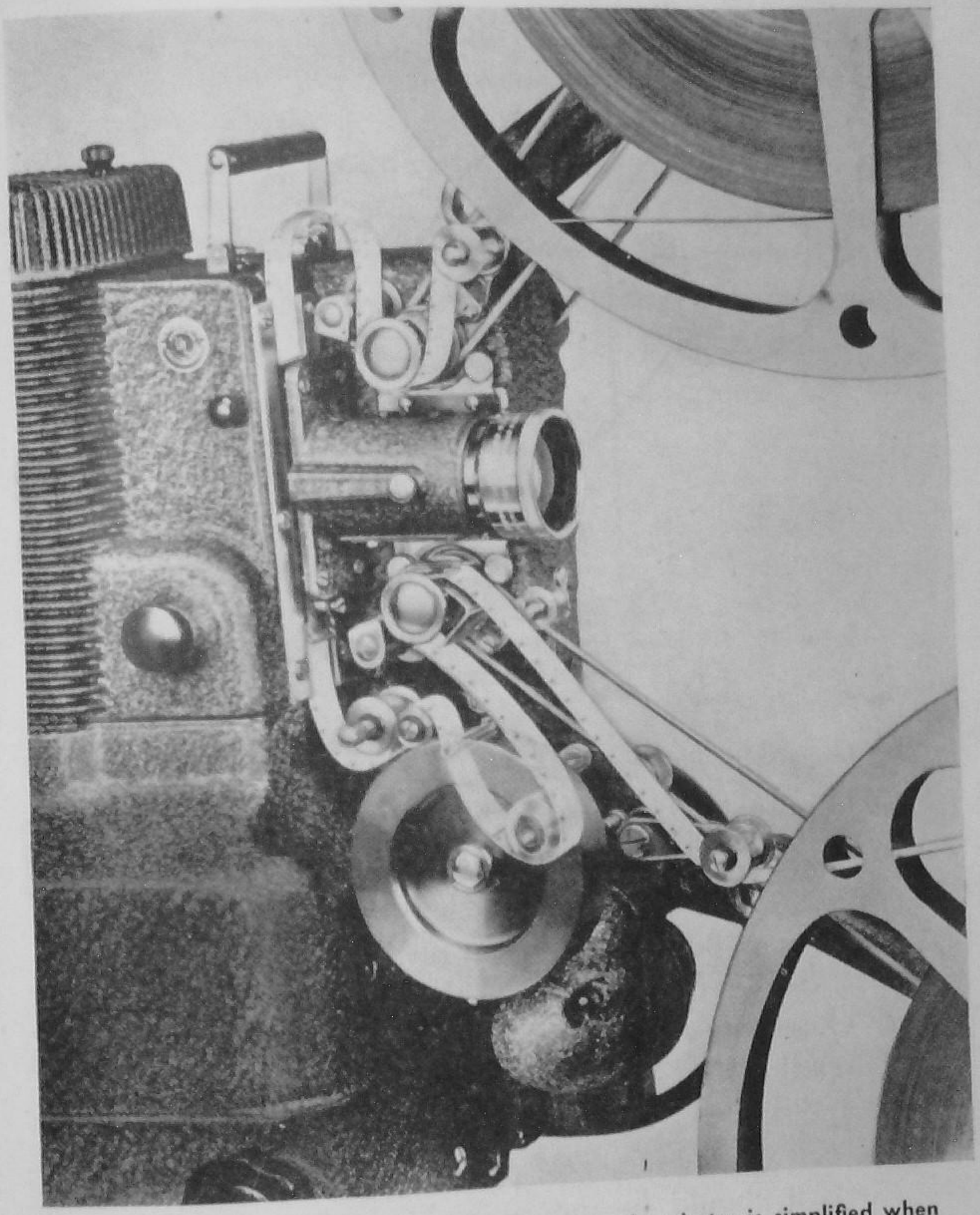

Fig. 16. The problem of threading a 16mm sound projector is simplified when one visualizes the path of the film through the projector.

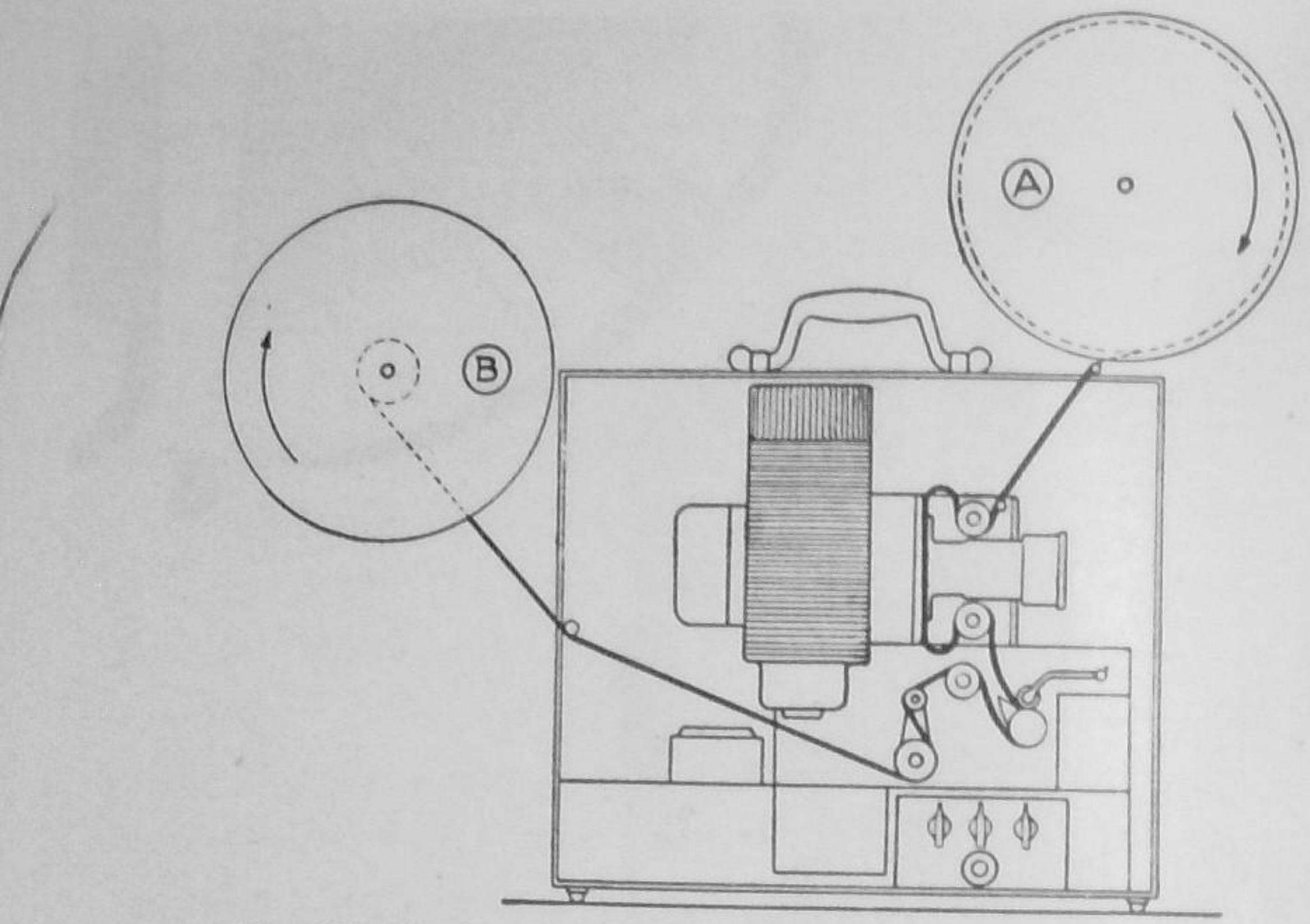

Fig. 17. The heavy black line shows the film's path through the Filmosound.

Test focus with film gate closed.

An approximate focus of the projector on the screen can be determined at this point by adjusting the projection lens with the motor and lamp in operation until the edges of the square of light on the screen are sharp and distinct. The film gate on the projector must be in the "closed" position to perform this test.

Threading the projector with the film is the next step, and while no two makes of projectors are threaded alike, certain fundamental principles apply to all.

First, it should be determined whether the film is wound correctly on the reel. The three common mistakes in winding motion-picture film on a reel are:

(1) reversing the film from end to end (pictures will appear upside down on the screen), (2) reversing the emulsion side of the film (images are reversed from left to right; on the sound film, sprocket holes are on the wrong side of film for correct threading of projector), (3) combination of both errors with film reversed from end to end and film upside down (pictures are right side up, but reversed from left to right, and motion is in reverse).

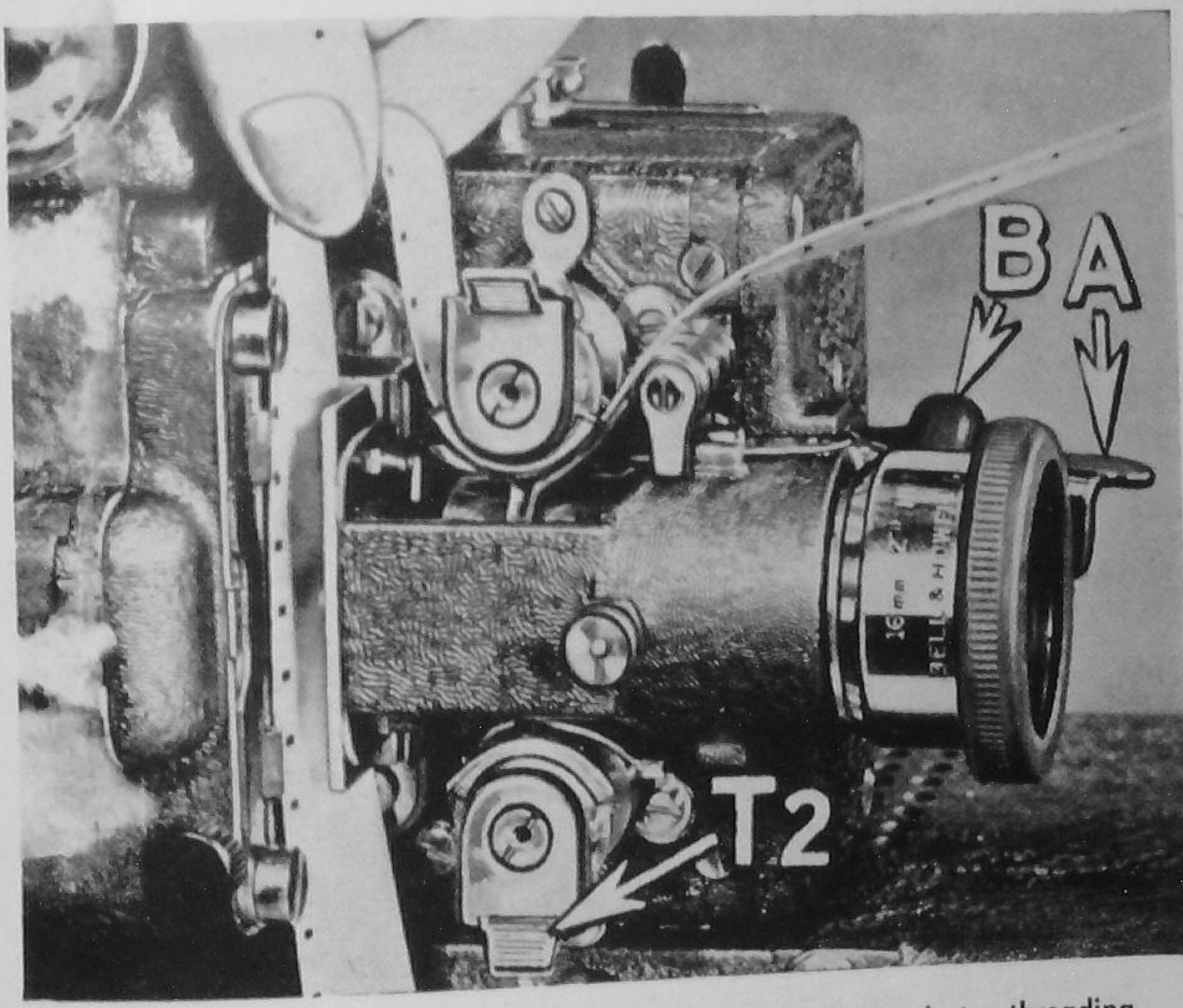

Fig. 18. Forming the upper loop is an important step in projector threading. Now, the film gate will be closed by the lever A. The film next passes through sprocket T2. The hand knob, B, is used to check the threading.

Detection of these errors before threading the projector is not so complicated as it might appear. In the case of black-and-white sound film, the full reel should be attached to the feed arm with the film unwinding toward the screen in a clockwise direction. If the emulsion (dull side of the film) is toward the screen and the sprocket holes are to the right of the operator as he faces the screen, the film is wound correctly on the reel. The procedure is the same for sound color film, except that the glossy side of the film should be outward on the reel. Errors in the winding of silent films can be detected by following the same procedure as for

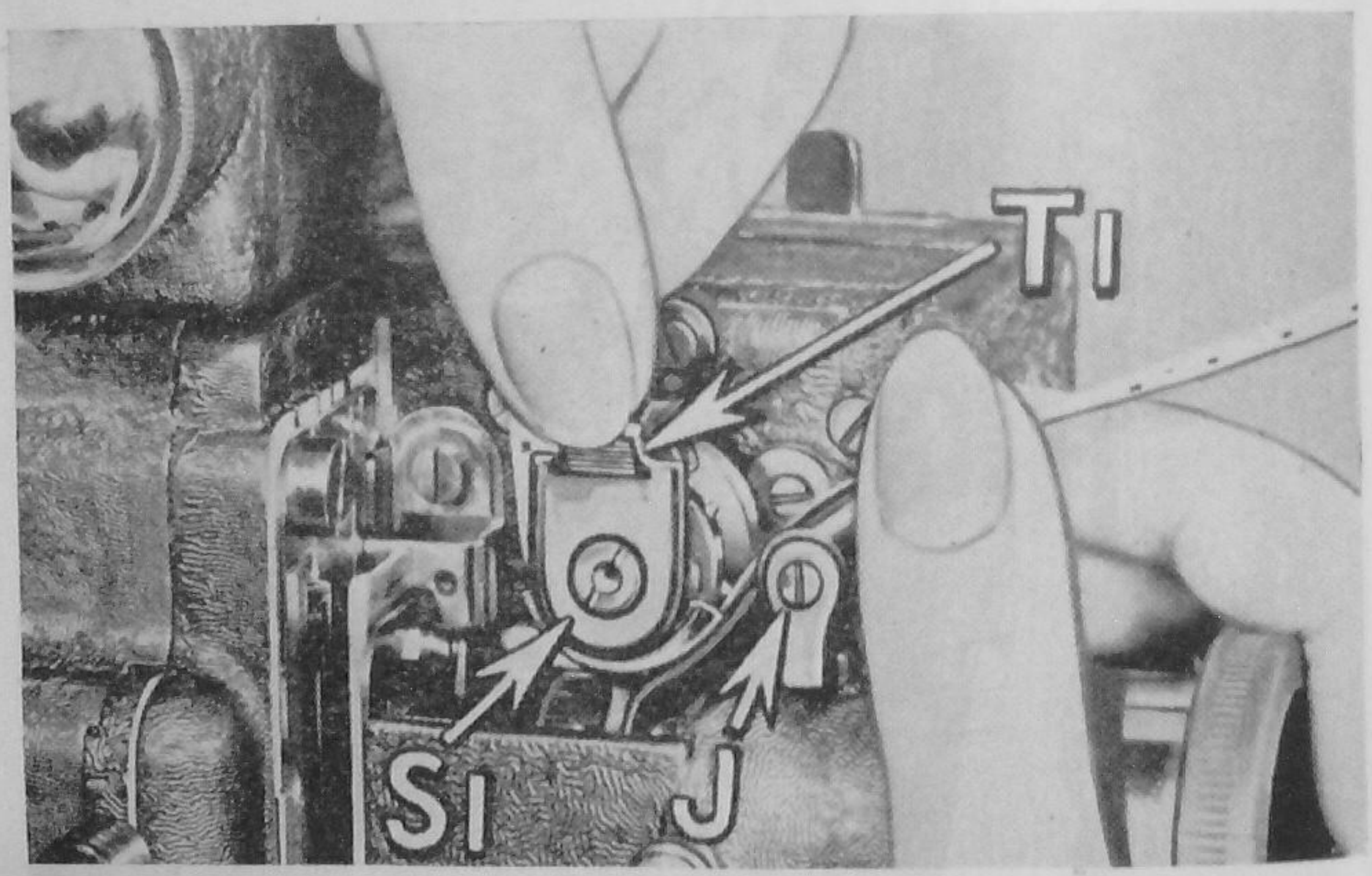

Fig. 19. The first step in threading this projector is to lift the catch TI, slide the film over the roller J, and under the sprocket SI so that the teeth and sprocket holes mesh.

sound, except that silent film has sprocket holes on both sides.

Threading projector should become automatic.

Each projector manufacturer provides specific instruction on threading film through the projector, and these instructions should be followed to the letter if satisfactory results are to be obtained. With practice, threading the projector becomes almost automatic and the skilled operator can perform this routine in the dark.

The illustrations in Figures 18 and 19 show the steps in correctly threading the Filmosound motion-picture projector.

Film loops required.

It is customary for the film to be moved through the projector by two or three power-driven sprocket wheels and a claw that engages the perforations on the film as it passes before the light aperture. There is a steady flow of film over the motor-driven sprocket wheels, but the movement is intermittent at the light aperture which requires loops of film on both sides of the aperture gate to absorb the film flutter created by this movement.

Production of sound.

In a sound motion-picture projector, the film passes over a large roller, or sound drum, after leaving the film gate at the light aperture. At this point, the sound

is created by a photoelectric cell that scans the sound track of the film as it is illuminated with a beam of light from the exciter tube.

An understanding of these basic principles of the motion-picture projector will help the projector operator to master correct threading technique and aid in "trouble shooting" the mechanism.

Test by hand and power operation.

After the projector has been threaded, the machine should be operated by hand to test the loops and film tension over the sound drum as well as to check on the correct seating of film at the light aperture on the motor-driven sprocket wheels. A manually operated control wheel makes hand operation possible. This test of correct threading should be followed by operating the projector for one or two seconds with the motor on, then checking loops, film tension, and seating of film. Not more than five seconds' time is required to make both of these tests, but they can save minutes of delay and many feet of damaged film.

Usually, the opening title of the film is preceded by from 5 to 10 ft. of leader film and this should be run through the machine until the opening scene or title appears at the light aperture. The film is now in position for showing.

"Warm up" amplifier.

When ready to show a sound movie, the amplifier tubes should be turned on for two or three minutes before attempting to project the picture. These tubes are

electronic elements, similar to the tubes in a radio set, and they require a few minutes to "warm up" before they will perform. When the tubes have been warmed sufficiently, a hissing noise can be heard from the speaker when the volume control is turned to the maximum output position.

Adjust volume of sound.

The sound volume should be reduced before starting the projector to prevent "blasting" when the sound track on the film reaches the sound drum. The operator should make certain that the light switch is at the "on" position, then start the motor, and bring the sound volume up slowly until the desired level has been reached. The pitch then should be adjusted to suit the projection conditions. As the sound level on some films may vary, the operator should be prepared to raise or lower the volume or adjust the pitch during the projection.

Test film frequently.

The experienced projector operator remains beside his machine during the entire time the film is being projected. He tests the film occasionally by letting a few feet slip between his fingers before it enters the takeup reel. If any rough spots are detected, he quickly checks the film at the feed reel and stops the machine if his projector is doing the damage. It is not advisable to attempt to project a film with torn or broken sprocket holes (Fig. 20).

Fig. 20. The experienced projector operator remains beside the machine during the showing of a picture.

Stop-motion and reverse useful.

Some motion-picture projectors are equipped with stop-motion and reversing devices, and the operator should understand the manipulation of these extras to obtain the special effects they make possible. The stop-motion device makes it possible to hold a single frame of a motion picture on the screen for discussion. This feature is not found on all types of projectors and has not yet been perfected to eliminate a dimming of the picture on the screen caused by the safety gate that protects the film from scorching under the intense heat of the projection bulb.

In addition to a dimming of the illumination on the screen, the stop-motion device may not give as sharp a picture as the still picture projected from a slide film. There are two reasons for this: (1) The shutter on the motion-picture camera operates at a relatively slow speed under normal studio conditions and may not be fast enough to "stop" action. (2) The 16mm motion-picture-film frame is enlarged to more diameters than the 35mm slide-film frame in producing the same size image on the screen.

Reversing devices are valuable additions to the regular motion-picture projector as they make it possible to repeat a scene at will. In use, the forward motion of the projector should be stopped before the film is reversed through the projector. It is advisable to turn off the projection light and sound during the reversing of the film to eliminate the comedy effect of motion and sound in reverse.

Turn off light and sound at end of film.

The skilled operator anticipates the conclusion of the film and is prepared to turn off the sound and light before the last few feet of film run through the projector. This prevents the brilliant flash of white light on the screen and the unpleasant speaker noises resulting when a film is permitted to run through in its entirety without attention to light and sound controls.

Watch tension in rewinding.

Most film libraries prefer that film be returned without rewinding as this eliminates one operation when the film is inspected. If the film is to be rewound for another showing, the projector operator makes certain that the film is wound correctly and snugly on the feed reel. Some films become warped and it is necessary to apply a slight drag on the take-up reel with the finger tips to increase the tension on the film as it is being rewound. The film never should be clinched or pulled tight on the reel to take up slack after it has been rewound as this will cause horizontal scratches in the film.

The following Emergency Trouble Guide is reprinted from the bulletin, "Instructions and Manual of Operation," published by Bell & Howell.

EMERGENCY TROUBLE GUIDE

1. Filmosound Will Not Operate. This may be due to:

a) Current-supply cord not making proper contact with house power outlet.

b) No current at the house outlet. Test with ordinary lamp.

2. No sound. See whether the exciter lamp lights.

A. If the exciter lamp fails to light, the absence of sound may be caused by:

a) Speaker cord not connected at both ends.

b) Amplifier switch turned off.

c) Fuse blown out.

d) Tubes in the wrong sockets, or one or more tubes not in socket.

e) Burned-out exciter lamp or defective 83 V or 42 tube.

B. Should no sound be produced even though the exciter lamp lights, the trouble may be caused by:

a) Volume control switch not advanced sufficiently far toward the "high" position.

b) Film incorrectly threaded.

c) Grid clip not attached to the cap on the 6C6 tube in the sound head.

d) Dirt, dust, oil, or other foreign matter obstructing the sound optical system. Turn off the amplifier switch and clean the sound optical system.

e) Absence or defectiveness of sound record on the film. To prove that the trouble is not with the Filmosound, remove the film and turn on the amplifier. Turn the volume control knob to the "high" position. Pass a card swiftly back and forth between the sound lens and the sound drum. If a loud "thumping" sound is

heard from the speaker, the Filmosound itself is shown to be operating properly, and the lack of sound is undoubtedly due to the film.

f) Defective tubes. Have all tubes tested and replace any which prove to be defective.

3. Inadequate Volume may be the result of:

a) Volume-control knob not advanced far enough.

b) Poorly made or dirty film. Compare resulting sound with that from a film known to be clean and well made. The practice film supplied with the Filmosound is recommended.

c) Dirt, oil, or other foreign matter partially obstructing the sound optical system.

d) Defective tubes. Have all tubes tested and replace any which prove to be defective.

e) Defective, or dirty, or poorly adjusted exciter lamp.

f) Excessively low line voltage.

4. Unsatisfactory Sound Quality may be caused by:

a) Dirty, oily, scratched, or poorly recorded or printed film. Compare results with those of a film known to be satisfactory. The practice film supplied with the Filmosound is recommended.

b) Incorrect film threading.

c) Sound optical system partly obstructed.

d) Defective tubes. Have them all tested and replace as necessary.

5. Noises Such as Humming and Whistling Sounds are usually traceable to defective tubes. Failure to fasten the sound head cover may cause noises, too, as

may the phototube or 6C6 tube or 6C6 tube clip lead touching the sound head casting, the sound drum shaft, or the flywheel. A.C. hum can sometimes be reduced by reversing the A.C. plug at the supply socket. Static-like sounds may occur if the tube base prongs are dirty. Clean them with 00 sandpaper and wipe them well.

6. No Picture. Should projection lamp not light when the projector motor runs, the lamp is burned out.

7. Insufficient Picture Brilliancy may be due to:

a) Extraneous light falling upon the projection screen.

b) Blackened projection lamp. Effective lamp life may terminate before the lamp actually burns out. Remove the lamp and replace if necessary.

c) Dirty projection lens, condenser, or lamp.

d) Abnormally low line voltage.

8. Blurred, Streaked Pictures are caused by loss of the loop below the projector aperture. Stop the machine and rethread correctly.

Picture size governed by lenses.

Chart I indicates picture sizes obtainable at various distances from the motion-picture projector to the screen with different focal-length projection lenses. Supplementary projection lenses should be obtained for the projector if abnormal projection conditions are encountered. Shorter focal-length lenses increase the size of the picture and are desirable where lack of space limits the distance between projector and screen. Longer focal-length lenses make it possible to project normal screen-size pictures in an auditorium or unusually large room.

Chart I. Projected Picture Sizes Obtained With Projection Lenses of Various Focal Length

Distance in Feet From Screen	Focal Length of Lens								
	.64″	¾″	1″	1½″	2″	2½″	3″	3½″	4″
	Width of Picture								
1′	0′7″	0′6″	....	....	....	....	....	....	....
2′	1′2″	1′0″	0′9″	....	....	....	....	....	....
3′	1′9″	1′6″	1′1″	0′9″	....	....	....	....	....
4′	2′4″	2′0″	1′6″	1′0″	0′9″	....	....	....	....
5′	2′11″	2′6″	1′10″	1′3″	0′11″	....	....	....	....
6′	3′6″	3′0″	2′3″	1′6″	1′1″	0′10″	....	....	....
8′	4′8″	4′0″	3′0″	2′0″	1′6″	1′2″	....	....	....
10′	5′10″	5′0″	3′9″	2′6″	1′10″	1′6″	1′3″	1′0″	....
12′	7′0″	6′0″	4′6″	3′0″	2′3″	1′9″	1′6″	1′3″	1′1″
16′	9′4″	8′0″	6′0″	4′0″	3′0″	2′4″	2′0″	1′8″	1′6″
20′	11′8″	10′0″	7′6″	5′0″	3′9″	3′0″	2′6″	2′1″	1′10″
25′	14′7″	12′6″	9′4″	6′3″	4′8″	3′9″	3′1″	2′8″	2′4″
32′	....	....	11′11″	8′0″	6′0″	4′9″	4′0″	3′5″	3′0″
36′	....	....	13′5″	9′0″	6′9″	5′4″	4′6″	3′10″	3′3″
40′	....	....	14′11″	10′0″	7′5″	6′0″	5′0″	4′3″	3′9″
45′	....	....	....	11′3″	8′5″	6′9″	5′7″	4′9″	4′2″
50′	....	....	....	12′6″	9′4″	7′6″	6′3″	5′4″	4′8″
64′	....	....	....	....	11′11″	9′7″	8′0″	6′11″	6′0″
75′	....	....	....	....	14′0″	11′3″	9′4″	8′0″	7′0″
100′	....	....	....	....	18′9″	15′0″	12′6″	10′8″	9′4″
125′	....	....	....	....	23′5″	19′8″	15′7″	13′4″	11′8″
150′	....	....	....	....	28′1″	22′5″	18′8″	16′0″	14′0″

MAINTENANCE OF FILM

Preventive maintenance is especially important in the care of motion-picture film. Film damage increases from inches to feet with each showing of the picture if the damage is not discovered and corrected. Two or three torn sprocket holes can cause a projector to "lose the loop" and the loss of this cushioning element in the intermittent movement of film past the light aperture may result in damage to several score of sprocket holes.

Bent and warped reels are a nuisance to good motion-picture projection and may be a source of film damage. The persistent scraping of film against the edges of a crooked reel is extremely annoying and usually can be corrected easily by bending the warped portions back into alignment. A crooked reel may damage film by distorting the correct directional movement of the film so that sprocket holes are split and torn.

New prints are easily damaged.

New, or "green," motion-picture film is especially susceptible to damage during the first showing. Greater than ordinary care should be taken in projecting a "green" print of a motion picture as the emulsion is relatively soft and tacky. When projecting a new print, the operator should clean the film channels carefully, being certain to remove any gummy residue adhering to the surfaces of the film gate. As the film is being projected, he should test the condition of the film at frequent intervals by letting a few feet of it slip between his fingers before it enters the take-up reel. If there is any indication of torn, split, or raised sprocket holes, the projector should be stopped immediately.

Some projectors are particularly damaging to "green" prints despite the fact that they are in good mechanical condition and have been cleaned thoroughly. The fault lies in too little clearance in the channel behind the film gate. Films that have been "seasoned" with several showings will project satisfactorily because the emulsion has been hardened from the heat of the projection lamp.

If a projector is damaging new films, it should be inspected by a skilled repairman as any adjustment of the film-gate channel is a precise operation.

Emergency repair of broken films.

If a film breaks during the projection of a picture, do not attempt to repair it by clipping the broken ends together with a pin or paper clip. A piece of Scotch tape or of surgeon's tape will hold the ends together so that the film can be wound on the take-up reel, or one broken end can be tucked under the other on the take-up reel and held by another turn of film. A small slip of paper should be inserted at the spot and a note reporting the damage should accompany the film when it is returned to the library.

Repair of broken or damaged motion-picture film is a job for the trained worker at the film library (Fig. 21). This worker is equipped with the tools to make a smooth and accurate film splice, and knows how much damaged material can be removed without seriously impairing the continuity of the picture. Film splices are made either diagonally or at right angles across the film, depending upon the type of film splicer used, and either type of splice is satisfactory if well made.

In splicing a 16mm motion-picture film, the torn edges are cut so that sprocket holes will match and a narrow strip of emulsion is removed from one edge by scraping it with a sharp-edged tool. Film cement is applied evenly over the scraped portion, and the shiny side of the adjacent edge to be spliced is pressed firmly

Fig. 21. Repair of broken or damaged film is a job for the trained worker at the film library.

into place and held there for several seconds to permit the cement to harden. This operation is simplified by splicing machines that hold the film in correct position for cutting, scraping, and cementing.

Removing damaged film depends on continuity and sound.

Torn sprocket holes are a constant problem for the film-repair service. Sometimes, a single damaged sprocket hole can be repaired by trimming the split edges to form a "V." This will not suffice, however, if several adjacent sprocket holes have been damaged. Then it is necessary to cut out the damaged portion entirely and splice the film. The amount of damaged film that can be removed without interfering with the continuity of the picture depends upon the action and sound at the particular point. If it is necessary to remove a foot or more of film at one point, the repaired section should be screened to determine the value of the film. It may be necessary to obtain a new section from the producer of the film if the omitted portions are so obvious as to attract attention or confuse the commentary or action. When ordering a replacement section, the damaged portion of the print should be included with the order so that the film-production laboratory can locate the footage to be provided.

Causes of scratched film.

Black lines and "raindrops," that sometimes appear on the screen during the showing of a motion picture are caused by scratches or perforations in the film emulsion. There is little that can be done to repair this damage once it has occurred, but steps can be taken to prevent it.

Scratches are the result of a dirty or faulty projector or careless handling of the film. If residue is permitted

to accumulate in the film channels, a bit of grit may become embedded in the dirt and scratch the film. Cleaning film channels with a sharp metal tool may gouge the finely finished surface and raise a minute chip of metal that will scratch film. Tightening a loosely wound reel by "cinching" the film will produce scratches.

A "raindrop" effect is created on the screen as the result of perforations in the film emulsion. These perforations are caused by film passing over sprocket-wheel teeth as a result of improper threading of the projector or a faulty projector that permits film to jump from its track. Care in threading the projector and periodical inspections of the machine by a skilled repair service will prevent this type of film damage.

Clean film periodically.

Once a year or more frequently, depending upon the amount of use, motion-picture film should be cleaned. This can be done without any special equipment other than a bottle of film-cleaning fluid and a soft cloth. The cloth is moistened with the cleaner and the film is drawn through the cloth. This removes dust, finger prints, and other surface accumulations on the film. It will not take out scratches or perforations in the emulsion, however.

Many new prints of films are being given a special protective treatment to harden and season the emulsion before they leave the production laboratory. The Vaporating process is one such treatment for saving film.

SLIDE-FILM PROJECTORS

The trend in audio-visual instructional aids indicates that slide-film projectors increasingly will become more familiar pieces of equipment in the classroom. They are light, compact, relatively inexpensive, and simple to operate. One popular type will project single- and double-frame slide films and miniature slides. Only a few minutes of instruction are required to explain the operation of the projector and it is practically impossible to damage film if the operator is careful (Fig. 22).

Simple mechanism.

The silent slide-film projector consists basically of a projection bulb in a lamp house, a system of condensing lenses, a hand-operated dual-sprocket wheel arrangement to move the film through the projector, and a projection lens. An electric phonograph is added to make the unit a sound slide-film projector.

Although the equipment is simple to operate, the instructor should not overlook projection conditions such as ventilation, light control, power outlets, screen location, and acoustics. All of these are factors in effective presentation of instructional slide films.

Preparing for projection.

In using slide films in the classroom, as with motion pictures, the equipment should be set up, film threaded, and the projector focused on the screen before the class arrives. Great care should be exercised in threading the

Fig. 22. With this slide-film projector, single- and double-frame slide films and miniature slides can be projected.

film to make certain the sprocket holes engage the teeth of the sprocket wheels correctly. The film is then advanced to the focus or title frame and the projection lens is brought into focus on the screen.

Single frames are held for discussion.

While one of the advantages of the discussion slide film is that individual pictures can be held on the screen for discussion, it is not advisable to leave a single frame exposed to the heat of the projection lamp for more than a few minutes. One film distributor limits this length of exposure to one minute, although the authors have witnessed demonstrations in which a single frame of the film was exposed to the projection light for fifteen minutes and more without apparent damage to the film.

Never force film through projector.

A new slide film is more likely to stick in the projector than one that has been used, and warm, humid weather has a tendency to soften the emulsion on the film. If a slide film sticks in the projector, the film-advance knob should be reversed slightly and then turned forward. The operator should not attempt to force the film as this will tear the sprocket holes. Before showing a new slide film to a class (and during damp, warm weather) it is advisable to run the film through the projector once or oftener and somewhat faster than normal to dry the moisture from the emulsion.

Keep film clean.

If the projector is not equipped with an automatic rewind device, care should be taken to prevent the film from unwinding on the floor. If dirt or fingerprints collect on the film, these can be removed by

drawing the film gently through a clean, lint-free cloth moistened with a few drops of film cleaner.

When rewinding film by hand, the film should be grasped with the edges between the thumb and forefinger and the roll of film wound to fit its container without additional cinching. If the finished roll is too large, it should be unwound and rewound into a smaller roll.

Synchronize frames and sound.

Operation of the film projector on a sound slide-film unit is the same as for the silent slide film (Fig. 23).

Fig. 23. The sound slide-film projector is a compact, versatile projection unit.

The film is placed in the projector and advanced to the the title frame where it is in synchronization with the start of the recorded accompaniment. The record is placed on the turntable and after the amplifier tubes have warmed up, the needle is lowered carefully and the projector light is turned on. At each bell note, or other signal in the accompanying recording, the film is advanced one frame.

Adjust speed of turntable.

The "pacing" of the recorded accompaniment is important and this is controlled by adjusting the speed of the phonograph turntable. Sound slide-film recordings are produced for reproduction on a turntable revolving at exactly 33⅓ revolutions per minute. The experienced operator judges turntable speed by the quality of sound from the recording, but it can be determined exactly by making a chalk mark on the edge of the turntable and counting its revolutions for one minute. The revolutions then can be adjusted, if either too fast or too slow.

A worn needle produces poor quality of sound and it is advisable to replace the needle after each playing of a 15-minute recording.

Check records for "Lateral Cut."

While the starting point on most recordings is on the outside edge of the record and the needle progress is from the outside to the center, many sound slide-film recordings are made to be played from the inside out.

The needle is placed at the inside of the record and moves toward the outside edge. Such a recording is usually labeled "Lateral Cut." If there are no directions or instructions on the record, it is advisable to start the needle at the outside edge, but if it does not feed into the groove smoothly, the chances are that the record is a lateral cut.

Recordings are fragile.

All sound slide-film recordings are fragile and must be handled with care. They may not be placed on hot radiators or in the direct sunlight as heat will warp the record. Books or other objects must not be piled on them and they should be laid where they are least likely to fall on the floor. Records should be stored upright in racks or flatwise with the centers supported.

STANDARD-SIZE GLASS SLIDE

The basic elements of a slide projector are similar to the slide-film projector except for a device to change slides. This may be in the form of a sliding or rotating carrier, or a channel through which the slides are fed into the projector. The standard-size slide projector is bulkier than the miniature slide projector.

Slides should be marked for inserting.

Operation of the slide projector is extremely simple, and the only difficulty likely to be encountered is that of placing the slides in the carrier correctly. Commercially produced slides usually have a small dot or

some similar marking to indicate that the thumb of the right hand should be placed at this point when inserting the slide in the carrier. These can be added to school-made slides to eliminate the possibility of error in projecting. To place the dot correctly, the slide should be held before a source of light so that the observer sees the picture as it is to appear on the screen. The dot should be placed at the lower left-hand corner of the surface next to the observer.

While glass slides are the most durable of all types of instructional film, they must be handled with care to prevent dropping on a hard surface. Even this danger is eliminated by the cardboard mounts of miniature Kodachrome slides as they are returned from the processing laboratory. It is advisable, however, to replace the cardboard with glass mounts if the slides are to be used frequently.

Use correct size bulb.

A word of caution should be added regarding the maintenance of slide projectors. When replacing a burned-out projection bulb, the operator must make certain that it is the type and size recommended for the projector. Replacement with a bulb more powerful than that for which the equipment was originally designed will produce too much heat and will result in rapid deterioration of the slides.

Charts II and III explain picture sizes obtainable with various focal-length projection lenses in film-slide

projectors.[1] The double-frame and single-frame film sizes of slide films have been explained previously.

Chart II. Picture Sizes (in feet) When Horizontal Double Frame Film Is Shown (The proportions are reversed when showing vertical frames)

Equivalent Focal Length of Lens	Distance From Screen								
	10′	15′	20′	25′	30′	35′	40′	45′	50′
3″	3.0	4.5	6.0	7.6	9.1	10.5	12.1	13.6	14.9
	4.6	6.8	9.0	11.4	13.6	15.8	18.2	20.4	22.4
4″	2.3	3.4	4.5	5.8	6.8	7.9	9.1	10.2	11.2
	3.4	5.0	6.8	8.8	10.2	11.8	13.6	15.2	16.8
5″	1.8	2.7	3.6	4.6	5.4	6.4	7.3	8.2	9.0
	2.6	4.0	5.4	7.0	8.0	9.6	11.0	12.4	13.6
6″	1.5	2.3	3.0	3.8	4.5	5.3	6.1	6.8	7.5
	2.2	3.4	4.6	5.8	6.8	8.0	9.2	10.2	11.5
7″	1.3	1.9	2.6	3.3	3.9	4.5	5.2	5.8	6.4
	1.9	2.9	3.9	4.9	5.9	6.8	7.8	8.7	9.6

Chart III. Picture Sizes (in feet) When Single Frame Film Is Shown

Equivalent Focal Length of Lens	Distance From Screen								
	10′	15′	20′	25′	30′	35′	40′	45′	50′
3″	2.3	3.4	4.5	5.7	6.8	7.9	9.1	10.2	11.2
	3.0	4.5	6.0	7.6	9.1	10.5	12.1	13.6	14.9
4″	1.7	2.5	3.4	4.4	5.1	5.9	6.8	7.6	8.4
	2.3	3.4	4.5	5.8	6.8	7.9	9.1	10.2	11.2
5″	1.3	2.0	2.7	3.5	4.0	4.8	5.5	6.2	6.8
	1.8	2.7	3.6	4.6	5.4	6.4	7.3	8.2	9.0
6″	1.1	1.7	2.3	2.9	3.4	4.0	4.6	5.1	5.6
	1.5	2.3	3.0	3.8	4.5	5.3	6.1	6.8	7.5

[1]Charts courtesy of The Society for Visual Education, Inc.

Movable projection cabinet convenient.

A movable projection cabinet containing the slide-film projector and sets of slide films is a most convenient item of furniture for the classroom. Plans for the construc-

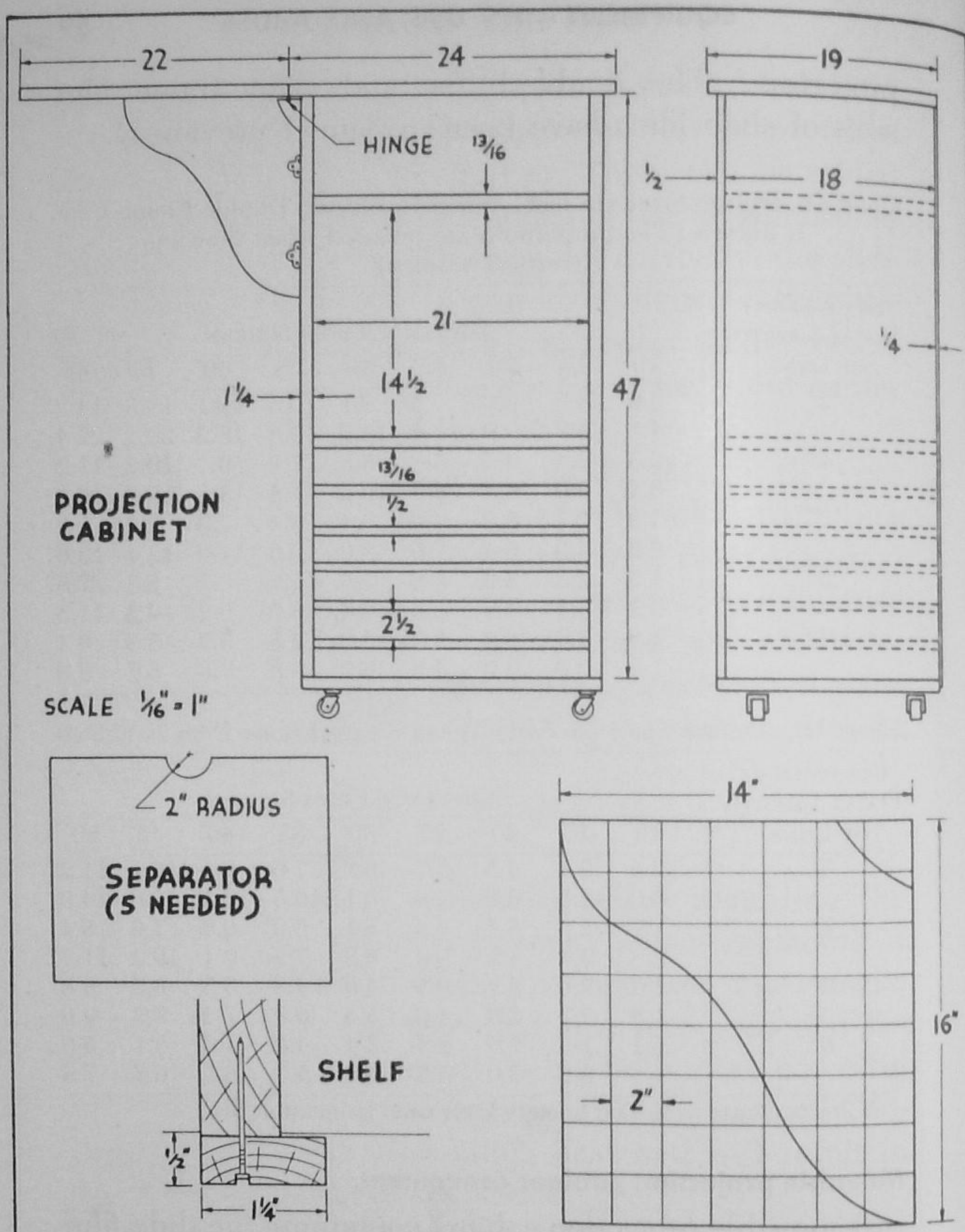

Fig. 24. A projection cabinet provides space for storage of slide-film kits. The slide-film projector can be placed on top of the cabinet for projection in the classroom.

tion of such a cabinet have been prepared by the Jam Handy Organization, producers of audio-visual aids for instruction, and a copy of the plans is reproduced in Figure 24. Provisions have been made to add a folding top to the cabinet so that it may be used as a stand for a motion-picture projector and a slide-film machine.

The cabinet should be mounted on casters to permit easy movement about the room. If desired, a door may be added so that the projector and slide-film kits may be locked. The cabinet may be made of redwood, if it is available in the necessary widths, or of plywood. Standard cabinet construction should be followed in assembling the parts. The cabinet should be finished to harmonize with either the furniture or the woodwork in the room.

BILL OF MATERIAL

	No. of Pieces	
Top	1	13/16 x 19 x 24
Bottom	1	13/16 x 18 x 23½
Folding top	1	13/16 x 19 x 22
End	2	13/16 x 18 x 47
Shelf	2	13/16 x 18 x 21½
Bracket	1	13/16 x 14 x 16
Separator	5	½ x 18 x 21½
Back	1	¼ x 22 x 48
Facer strip	2	½ x 1¼ x 47
1 Pair 2½ butt hinges		
1 Pair butterfly hinges		
4 Casters		

SUMMARY

1. Ability to operate film-projection equipment is the mark of a competent instructor.

2. Identification of types of film is the starting point for an instructor's education in teaching with films.

3. Projection conditions and maintenance of equipment are important items for the competent operator.

4. The major steps in operation of a sound motion-picture projector are (1) setting up, (2) threading, and (3) projecting.

5. Factors conditioning projection are acoustics, ventilation, seating arrangement, power outlets, location of screen and projector, and facilities for darkening the room.

6. The proper steps in operating a sound motion-picture projector become automatic with practice.

7. Slide-film projectors are light, compact, relatively inexpensive, and simple to operate.

8. An electric phonograph with a turntable speed of 33⅓ r.p.m. provides the sound for a sound slide-film projector.

9. Operation of the slide projector is extremely simple.

CHARACTERISTICS OF THE INSTRUCTIONAL FILM

When our rugged ancestor discovered the use of the lever as a means to multiply the power of his muscles against the forces of the physical world, it is unlikely that he envisioned either the basic principle of his discovery or the adaptations of future generations. Nor is it likely that we moderns foresee with clarity the eventual form of some of our newly discovered tools, such as films for instruction.

The evolution of the instructional film is proceeding apace largely as a result of the stimulus of wartime demands for training many people quickly. Now, a discernible pattern is emerging out of the experiences of both those who use and those who produce films for teaching. We can anticipate refinements and improvements in this pattern, but it is probable that the basic characteristics of the good teaching film will remain constant. These characteristics are: (1) correlation of the content of the film and the learning situation, (2) accuracy of information, (3) good instructional technique as a "built-in" feature, and (4) satisfactory technical quality of production.

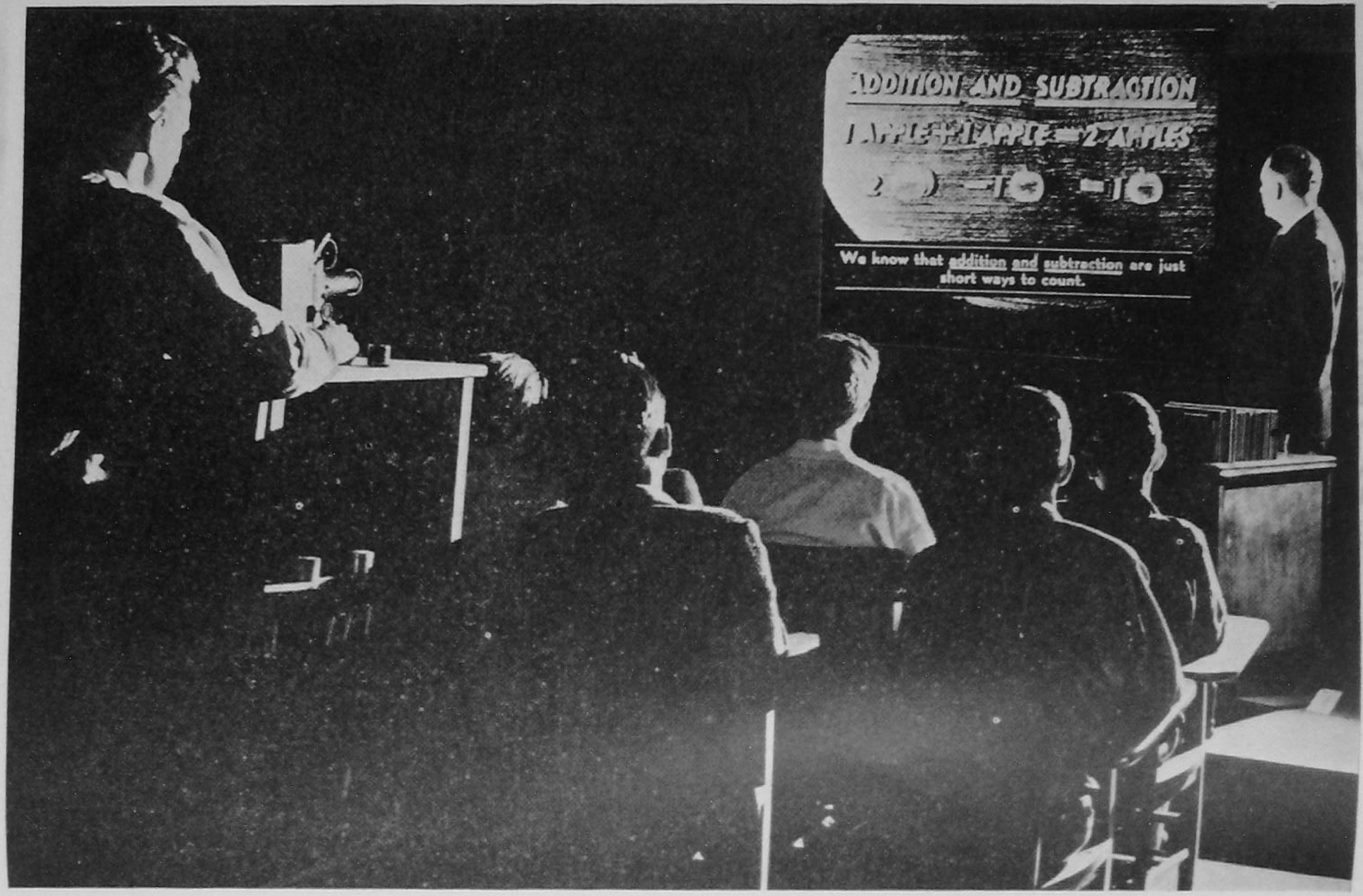

Fig. 25. The ideal teaching film is tailor made for a specific instructional purpose.

1. *Correlation to the learning situation.*

An amazing amount of effort and money have been expended upon production of "educational films" that do not fit into the instructional program. They are not correlated with common learning situations and are neither fish nor fowl on the instructional menu. Here or there a portion may be pedagogically edible, but the sustenance does not justify the effort to extract it.

Teaching films are designed for instruction.

The ideal teaching film is one that is "tailor-made" for a specific instructional purpose (Fig. 25). The beginning point in production is the lesson plan, and the course of study is the scenario writer's bible. The test of any instructional film is this: Will its correct use lead to the most effective accomplishment of the learning objective?

The instructional films produced by the United States Office of Education for training war workers are examples of visual aids correlated to the learning situation. While they were designed for a specific instructional purpose – to speed up job training of war workers – their characteristics are such that they can be used effectively in other types of training programs with similar learning situations.

2. *Accuracy.*

Any inaccuracy in the instructional film tends to reflect upon the veracity of the entire production. This is especially true in technical films where an incorrect

procedure is more noticeable, both to the learner and the instructor, than an inaccuracy in a promotional or recreational film (Fig. 26).

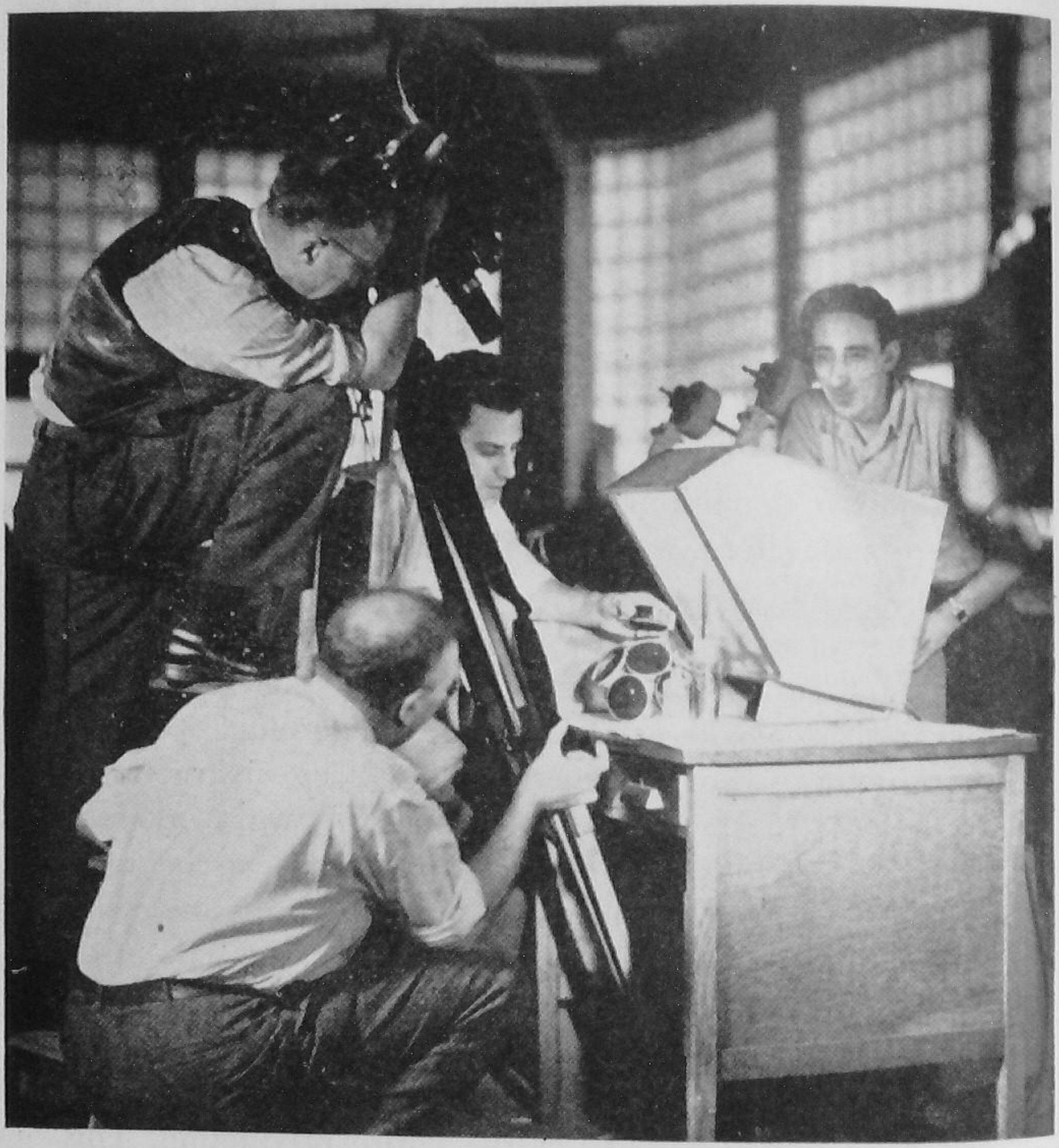

Fig. 26. Technical films must be checked at every step in production to assure accuracy.

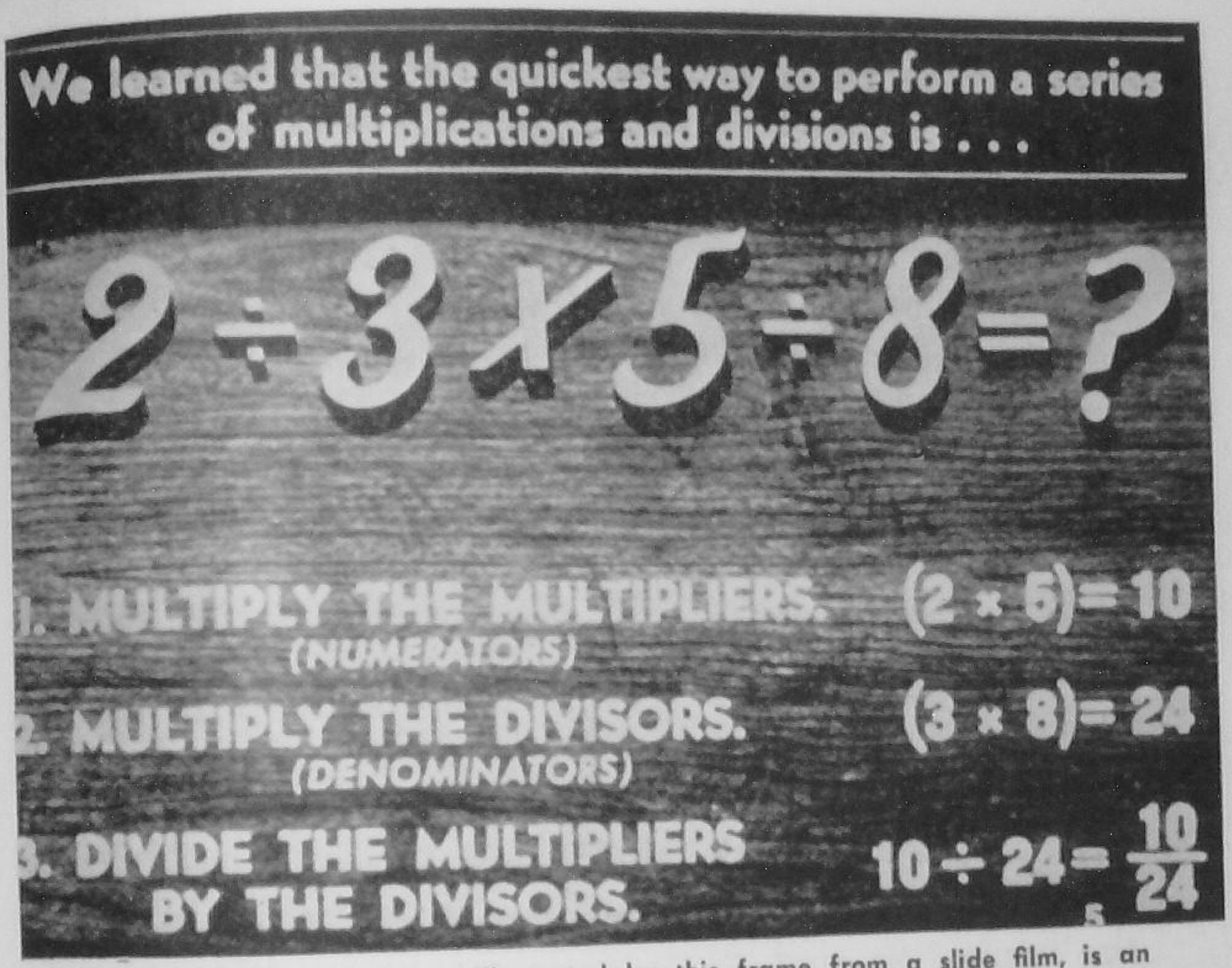

Fig. 27. Summarization, illustrated by this frame from a slide film, is an example of instructional technique built into a teaching film.

Localisms not measure of accuracy.

Deviation from a local practice may, or may not, be an inaccuracy in an instructional film. While the instructor may not agree with a detail of an instructional film, such as the recommended way for holding a measuring tool, for example, he should not be too hasty to condemn it as inaccurate, for the practice shown may be more widely accepted.

3. *Instructional technique.*

As the laws of learning are the basis for all good

instruction, the ideal teaching film encourages observation of this "legislation" by making it the course of least resistance. Scientific instructional technique is a "built-in" feature of the well-made teaching film (Fig. 27).

The skilled instructor has devices to promote readiness to learn and intensity of impressions, and these will be paralleled in the better instructional films. There will be evidence of an understanding of the relation of repetition and recency to recall impressions.

A useable pattern.

The pattern of technical films should involve the application of the technique of instruction: (1) an introduction to encourage readiness to learn, (2) step-by-step explanations of the skill being learned in which various devices are used to increase the intensity of the impression, and (3) a summarization of the key points in the skill, which the film was designed to clarify for the learner.

While experience has shown this to be a satisfactory pattern for many technical subjects, it must not be assumed that it would be desirable for all classifications of instructional films. Selection, organization, and presentation of material are determined by the function of the teaching aid, and the pattern of an instructional film for a specific manual skill may vary from that of a film designed to create an attitude toward a social problem.

Trend in length is to 15-minute film.

Length is another important factor to be taken into consideration in evaluating an instructional film. We have had too many films for classroom use that have been too long. Seldom is it possible to justify the use of an hour-long, or even a 40-minute film from an instructional point of view. The trend is toward the shorter unit with a showing time of 15 minutes or less.

Films that are too long tend to defeat their purpose as instructional aids, as that purpose is to supplement the efforts of the instructor rather than supplant them. A recent survey of the opinion of a group of vocational educators showed that 16 minutes or less is the preferred length for an instructional film.

4. *Technical quality.*

While the average classroom instructor is not expected to be an expert judge of the technical quality of films, he should be alert to certain factors that can be readily observed. He can, for example, determine whether the sound level is maintained at the uniform pitch and intensity throughout the film. A film that requires frequent adjustment of the pitch and volume controls on the projector is not a desirable classroom film.

"Pacing" important to learning.

Correct pacing of the film is an important technical quality that results from judicious cutting and editing

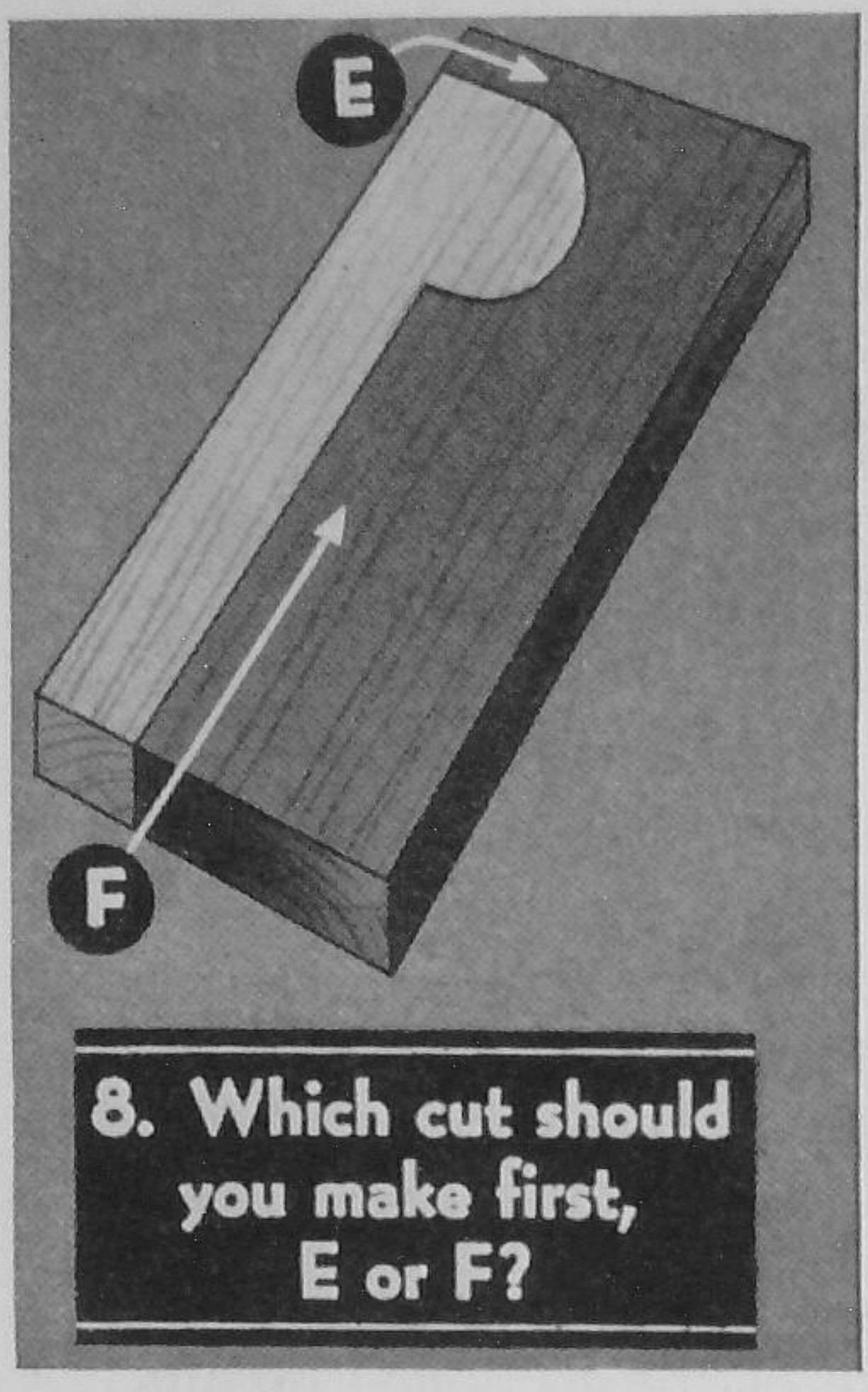

Fig. 28. Good technical quality in a teaching film assures clear understanding by the learner.

in production (Fig. 28). The instructor will sense incorrect pacing when he feels that the film is lagging in places or is proceeding too fast in others.

The organization of content in an instructional film must be suited to the function for which the film has been designed. What may be good organization for a technical film might be poor structure for a documentary film, as the instructional functions of the two classifications differ. Some of the factors or organization in a film are continuity, sequence, and pacing.

Good continuity important.

Good continuity provides for an unbroken flow of thought toward a learning objective. Careful selection of content to be included in the film and ruthless elimination of whatever deviates from the principal purpose is necessary for good continuity.

Sequence is the order of scenes in accordance with the content and continuity. The completed film is a series of sequences of scenes and each sequence is a unit in itself. A sequence of scenes in a motion picture might be compared to a paragraph in a story; it is a unit that consists of a definite topic.

Logical sequence preferred.

A rudimentary sequence of scenes is (1) a long shot, (2) a medium shot, and (3) close-ups. This is a natural approach to an object. When invited to inspect a prize cow in a herd, your first impression is of the field in which the cows are pastured, your next of the herd itself, and finally of the prize animal you are seeking. You make a close-up inspection of the good points of the blue-ribbon winner and compare these with the same features of the less distinguished members of the herd.

Thus, in evaluating an instructional film, the teacher should search for favorable answers to the following four basic questions: (1) Is the film content correlated with the learning situation? (2) Is the material accurate? (3) Is instructional technique a "built-in" feature? and (4) Is the technical quality of the film satis-

factory? If the film scores high on all four of these points, it can be set down as a well-made teaching film.

SELECTING THE RIGHT TYPE OF TEACHING FILM

While the debate continues on the respective merits of still pictures versus motion, sound versus silent, and color versus black and white, the realization is emerging that no one type of instructional film can be considered the ultimate in teaching aids. Each of the several types of teaching film has its advantages and its limitations and an attempt to choose one as best for all purposes is somewhat akin to deciding whether knife, fork, or spoon is the one tool to use at mealtime.

In one learning situation, the sound motion picture in color may be an excellent instructional aid, but it can be as inappropriate as a soup spoon at a fish fry in another. Also, types of instructional films frequently complement one another.

Unfortunately, the selection of types of instructional films has been limited by the projection equipment and materials available to the instructor, and no amount of academic debate has been able to overcome this practical problem. Many instructors have not discovered the instructional merits of the sound slide film because they have not had access to a sound slide-film projector. Others are convinced of the excellence of the sound motion picture as an instructional aid because they have used it exclusively. Few have experienced the pleasant situation in which the instructor may make a choice of uniformly excellent material for several

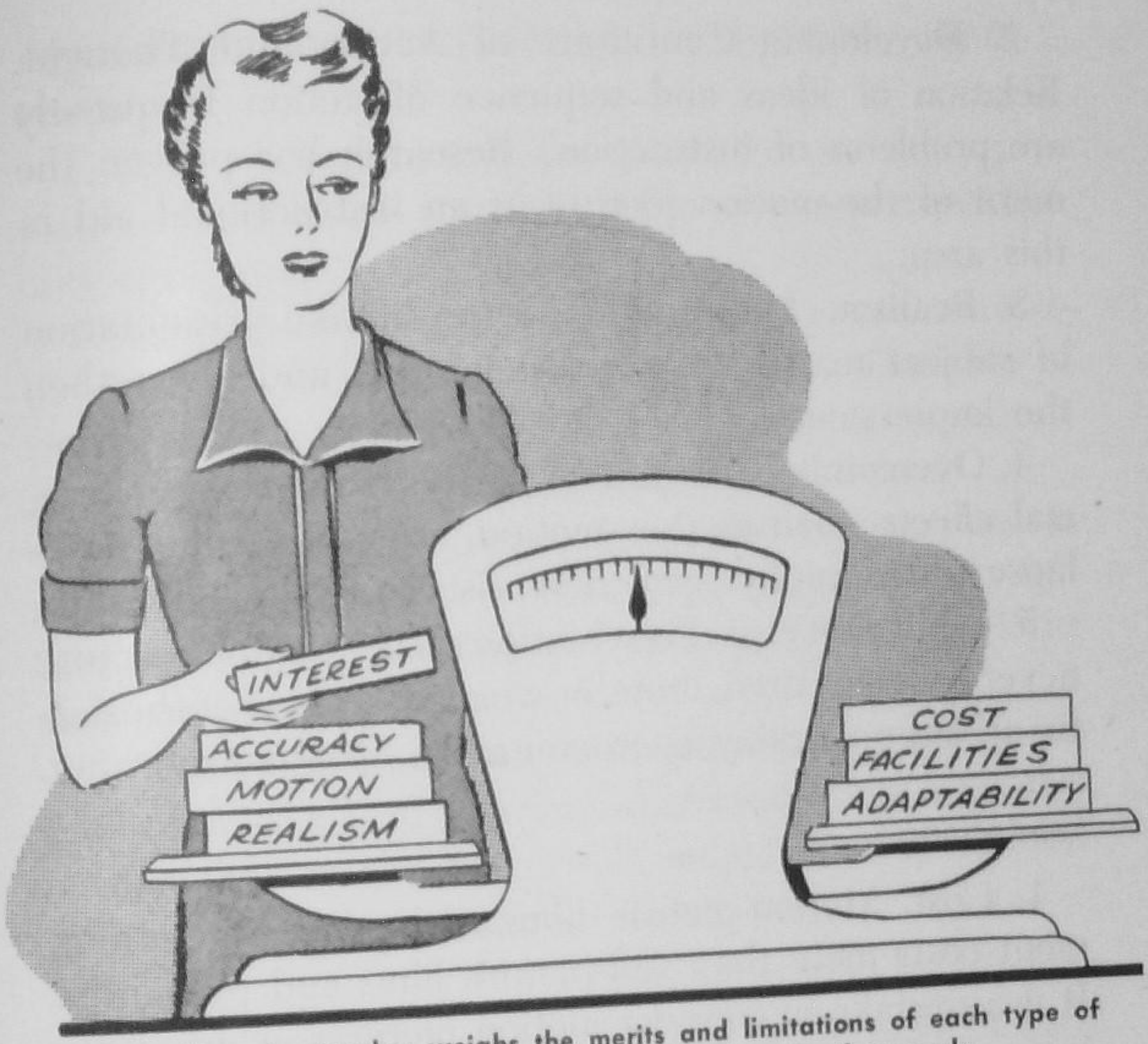

Fig. 29. The wise teacher weighs the merits and limitations of each type of teaching film before deciding which is best for her needs.

types of projection equipment. As this happy day has arrived for some and is approaching for others, a discussion of the inherent merits and limitations of types of instructional films is appropriate.

MOTION PICTURES AS INSTRUCTIONAL AIDS

Merits.

1. Ability to Portray Motion. This is of the utmost importance where motion is one of the essential elements of the learning situation.

2. Developing Continuity of Action and Thought. Relation of ideas and sequence of action frequently are problems of instruction. Research has proven the merit of the motion picture as an instructional aid in this area.

3. Realism. Motion adds to the lifelike presentation of subject matter to increase interest and strengthen the impressions.

4. Overcoming Limitations of the Human Eye. Special effects, such as slow-motion, animation, and time-lapse photography open new vistas in education.

5. Uniformity of Presentation. The motion picture never becomes tired, cross, or worried. It is as enthusiastic an aid on Friday afternoon as on Monday morning.

Limitations.

1. Cost. Motion-picture films and projection equipment costs more than still-picture films and projectors. It is a mistake to consider motion pictures as expensive instructional aids as the costs may be more than justified by the saving of time in improvement of learning.

2. Mechanical Problems. Motion-picture projectors are more complicated mechanisms than still-picture projectors. The equipment is heavier and more bulky.

3. Adaptability. The motion picture is not adapted to variations in presentation as compared to still-picture films.

4. Projection Facilities. As a rule, it is necessary to darken a room more completely for satisfactory showing of motion pictures than for projection of stills.

PROJECTED STILL PICTURES AS INSTRUCTIONAL AIDS

Merits.

1. Cost. Slide films and slides and the necessary projection equipment cost less than motion-picture film and equipment.

2. Adaptability. Projected still pictures are more readily adapted to variations in presentation. The rate of presentation can be controlled by the instructor, except in the case of the sound slide film.

3. Mechanical Problems. Simplicity of operation is one of the features of projection equipment for still pictures. Most slide film and slide projectors are light and compact.

4. Projection Facilities. Still pictures frequently are projected on a wall in a semi-darkened room, a combination that might not result in satisfactory motion pictures.

Limitations.

1. Lack of Motion. The inability of the still picture to portray motion limits its use as an instructional aid.

2. Variety of Presentation. Where uniformity of presentation is important, the motion picture is superior to the slide and discussion slide film. This does not apply to the sound slide film, however.

THE PLACE OF SOUND IN INSTRUCTIONAL FILMS

Merits.

1. Realism. Direct recording of sound and synchronized sound effects add realism to the instructional film.

2. Uniform Presentation. The incorporation of sound

in instructional films makes uniform presentation of material possible.

3. Overcoming Limitations of Human Ear. Sounds ordinarily inaudible can be amplified and made a part of the instructional aid.

4. Accuracy of Instruction. Where sound is a key factor in the learning situation, instructional films incorporating sound are to be preferred. An instructional film for teaching the songs of wild birds is suggested as an example.

Limitations.

1. Cost. Sound-projection equipment costs more and increases the bulk of the equipment.

2. Mechanical Operation. Sound projectors are more difficult to operate than silent.

3. Lack of Adaptability. The inherent uniformity of presentation can be a serious limiting factor of sound films.

4. Projection Difficulties. Poor acoustics or competing noises may interfere with satisfactory use of sound equipment.

THE ROLE OF COLOR IN INSTRUCTIONAL FILMS

Merits.

1. Realism. Natural color adds a realistic quality to instructional films.

2. Accuracy of Instruction. Where color is a key factor in the learning situation, the use of color films is an advantage.

Limitations.

1. Cost. The cost of color films is greater than black and white.

2. Projection Difficulties. Satisfactory projection of color films demands a well-darkened room and a highly reflective screen.

3. Competing Interest. Exaggerated or overuse of color may tend to distract attention from the instructional purpose of the film.

As the instructor understands the merits and limitations of the various types of teaching films, he is better equipped to decide which type to select when a choice must be made. Cost, inherent instructional qualities, projection equipment available, and other factors are weighed one against the other before arriving at the decision as to which is the best type of film for the specific instructional purpose at hand.

CLASSIFICATION OF TEACHING FILMS

Teaching films are instructional aids to the extent that they help impart information and develop skills, attitudes, and appreciations. As one or more of these instructional elements are present in every well-made teaching film, it is difficult to classify these audio-visual teaching aids on this basis. Instead of a classification on the basis of instructional elements, the following classification by functions is suggested (Fig. 30):

1. Technical films
2. Science films
3. Documentary films
4. Historical films

5. Incentive films
6. Promotional films
7. Cultural films
8. Guidance films
9. Recreational films
10. Informational

Fig. 30. One method of classifying teaching films is on the basis of the function they serve.

1. Technical films.

The technical film functions as an instructional aid in teaching the technique of performance. Subjects as "Rough Turning Between Centers," "Fundamentals of Filing," and "A Way to Plow," fall into this category.

2. Science films.

Science films are aids to developing understanding of scientific theories, rules, and formulae and their applications. Films on the atomic theory, principles of flight, and fundamentals of mathematics, would be included in this classification.

3. Documentary films.

Documentary films are records of contemporary action and, as such, are likely to become valuable historical material. These include: "The River," "The Plow That Broke the Plains," "Desert Victory."

4. Historical films.

Historical films are narratives of past events and they may be composed of actual or dramatized scenes.

5. Incentive films.

The purpose of the incentive film is to stimulate an attitude or appreciation to the extent that a desired action will result. In this classification are such subjects as: "Everybody's War," "Conquer by the Clock," "Keeping Fit," and similar films produced by governmental agencies to promote the war effort.

6. Promotional films.

The promotional film functions as an advertising medium to promote a service or a product. Many of these films have a technical and informational value, but the purpose of the producer was to promote rather than to inform. A number of pre-war films produced by industry come under this classification.

7. Cultural films.

Films that promote an appreciation of music, literature, and the arts are obvious subjects for this classification.

8. Guidance films.

The presentation of organized information about a trade, occupation, or profession for the purpose of guidance is the function of the guidance film. Subjects such as "The Electrician," "The Dairy Farmer," and "Nursing," are typical examples of guidance films.

9. Recreational films.

Entertainment is the primary function of recreational films and it is through this door that Mickey Mouse enters the curriculum.

10. Informational films.

The purely informational film presents knowledge for the sake of itself. It is the excursion among instructional aids, the ramble, the jaunt among interesting things.

SUMMARY

1. The characteristics of a good instructional film are: (1) correlation to the learning situation, (2) accuracy of material, (3) instructional technique as a "built-in" feature, and (4) satisfactory technical quality of production.

2. No one type of teaching film, motion, slide film, or slide is the final word among audio-visual aids for instructional purposes. Each type has its limitations and its advantages.

3. In teaching with films, sound and color have both merits and limitations from an instructional point of view.

4. Cost, inherent instructional qualities, projection equipment available, and other factors are weighed one against the other before arriving at a decision as to which is the best type of film for the specific instructional purpose at hand.

5. Teaching films can be classified according to the instructional function they are designed to serve, such as: technical, science, historical, incentive, promotional, cultural, guidance, recreational, and informational.

4

TECHNIQUES OF TEACHING WITH FILMS

Teaching films are their own worst enemies. Next to textbooks, they have been misused and abused more than any other kind of instructional aid. The labor-saving teacher has welcomed films with open arms as a marvelous and wonderful device for entertaining students without requiring any lesson preparation on his part, and the status of teaching films as instructional aids has suffered thereby.

Films not a substitute for teaching.

It is a mistake to think of instruction with films as a flaccid, sugar-coated method of teaching. The facts are that good instructional films in the hands of teachers who have been willing to exert the necessary extra effort to learn how to use them effectively result in vitalized teaching. If this were not so, it is unlikely the training division of our Armed Forces would be making such extensive use of films to teach millions of civilians the terribly important lessons a fighting man must learn. Films, indeed, are not for lazy teachers.

Some teachers never will attempt to learn how to use instructional films effectively for the same reason they never will undertake the mastery of any new tool for learning. They are too deeply imbedded in the intellectual grave of their own instructional rut. Fortunately, these people are among the overwhelming minority of the teaching profession.

One approach to a discussion of the techniques of teaching with films is in terms of the age-old code of the journalist who constantly is in search of the answers to the questions: "Who?" "What?" "When?" "Where?" "Why?" and "How?" Who should use films for teaching? When should films be used for instruction? Where can films and equipment be obtained? What films should be selected? How should one teach with films? Why use films for teaching?

Some of the answers to these questions have been supplied in previous chapters. In Chapter 1, there is a discussion of *why* films should be used for instruction and *who* might use them. Chapter 3 suggests *what* film should be selected for the instructional purpose at hand. The question of *where* to obtain films and equipment will be considered in Chapter 6, "Films and the Administrator." This chapter will advise on *when* and *how* to effectively use teaching films.

The search for an answer to the question of *when* to use a film for instruction is somewhat akin to the adventures of the six blind men who discovered the elephant. Each interpreted the animal according to the particular portion of his anatomy they first chanced

to seize upon, and those who would teach with films must take care that they, too, do not mistake a portion for the whole.

The instructor who uses a teaching film for the sole purpose of introducing a subject to his class may insist that this is the only time when a film should be used. This point of view is open to argument especially from the instructor who prefers films as a device for review. The opinion of the teacher who uses films exclusively at a mid-point in the learning process is likely to add further to the confusion.

Films introduced more than once.

Those who are teaching most effectively with films are using them at all stages of instruction: as introduction or orientation; when a skill is being mastered or at some other mid-point in learning; and for summarization or review. Furthermore, it is possible for one film to be used effectively at each or all stages of instruction.

The film "Rough Turning Between Centers" produced as an aid for machine-shop instruction,, has been used to introduce learners to the operation of a lathe, the machine tool upon which the work in the film is performed. This same film was shown again during the period of instruction when the trainees actually were engaged in performing the operation, and it was repeated near the conclusion of the course for review purposes. Thus, one film was used at least three different times, in different stages of instruction.

This multiple use of a good instructional film might lead to the assumption that the time element is of little importance in teaching with films. One might conclude that there is no problem of deciding *when* to teach with films and when to utilize some other instructional method. Such a conclusion would be most unfortunate in that it would indicate a disregard for one of the elements of instruction: timeliness of presentation of material.

Use film when it enhances learning.

Broadly speaking, the time to use a film is when it will expedite learning above and beyond that which could be accomplished by any other type of available instructional aid. Experience, good judgment on the part of the instructor, and objective tests will help determine this point. Obviously, the time to use a film for teaching is when it can be correlated with the learning situation. But all elements of the problem of *when* to use a film for teaching are not solved by this one broad statement. The specific problem of timeliness within the period of instruction remains, and the solution lies in the technique of the instructor, in *how* he teaches with films.

As a general rule, instructional films should not be shown at the conclusion of a class session. Sufficient time must be left following the showing to permit thorough discussion of the key points of the film. Teaching films are designed to motivate learning and should be presented during the initial steps of the instructional

procedure. Sometimes, there is a tendency to pack too many films into one period of instruction and a discussion of this problem brings us to the point of considering *how* to teach with films.

HOW SHOULD ONE TEACH WITH FILMS?

Although persons in charge of film-lending libraries may not know the details of a teacher's course of study, they have a clue to his instructional practices in his requests for loans of films. The machine-shop instructor who orders a complete list of six or seven motion-picture films on lathe operation to be used for one day in his classes is subject to suspicion. It is unlikely, if not impossible, that these films will be used effectively if they are supplied as requested.

Plan film schedule well in advance.

On the other hand, the instructor who submits a schedule for loans in which only one film of a series is to be loaned each week for use over a period of several days' time, conveys the impression that he recognizes the value of films as teaching aids and is utilizing them accordingly.

If any regulation on the use of teaching films were to be promulgated, it could well be that no teacher should use more than one film during a class session. And, it might be added, that film should not last longer than twenty minutes. Such arbitrary legislation might work some harm, but it would also do much good.

When selecting films, it is advisable to plan the

schedule as far ahead as conveniently possible. This may mean six weeks, six months, or a year, depending upon the nature of the instruction. This much is certain, the farther ahead your film schedule is planned, the more likely you are to have a film on hand when needed.

Lack of complete information and unbiased evaluation of instructional films is the outstanding handicap for most classroom teachers in selecting audio-visual teaching aids. A scanty synopsis cannot answer all of the questions an instructor should ask about a new film. Neither is it possible to preview all new material before scheduling it for use in the classroom.

Annotated catalogue helpful.

At least one film-lending library, the University of Michigan, has prepared a unique catalogue of its films in which each subject is described in detail, with suggestions for its use in the classroom and an evaluation by instructors who have used the film.

A cumulative card index of all instructional films shown is a valuable record for the school. The cards should provide space for a synopsis of the film, information as to how it was used, and the instructor's evaluation as an instructional aid. Data on the source of the film, running time, classification, and other pertinent information should be included.

The availability of good instructional films, adequate projection equipment, and suitable classroom facilities does not of itself assure effective teaching with films.

They are important only as component parts of an instructional tool which is as efficient as the skill of the operator.

The problem in training teachers to use this new tool of education is not confined to the public schools. It exists in the various branches of the Armed Forces for which training films have been produced on an unprecedented scale. The 1943 Edition of "Visual Review" reveals the existence of this problem and provides some valuable hints for educators in the public schools, such as the statement by Dr. Reginald Bell, Senior Educational Consultant, Training Film Section, Photographic Division, Bureau of Aeronautics, United States Navy.

Instructor must know why he shows each film.

"Navy instructors are learning that training films, like other instructional aids such as charts, diagrams, recordings, and books should be used thoughtfully in a teaching setting," writes Dr. Bell. "Film utilization officers are being detailed by the Bureau of Naval Personnel to each Naval District and each major training establishment to help in the development of a sound program of film usage. Under their leadership, each instructor will come to understand that he must preview each film so that he can see where it fits into his course and plan for its best use. He will learn that he must be crystal clear in his own mind as to why he is showing it. He will learn that he must prepare his students for the film and introduce it properly. He will plan how to discuss its important points after the screening, and

be prepared to show it again, if necessary. He will discover the importance of tests on the classwork, including the film information, to help him discover whether his men have learned what he intended."

In this same issue of "Visual Review," Lt. Comdr. Patrick Murphy, U.S.C.G.R., chief visual training officer, United States Coast Guard, writes:

Motion picture and slide film effective.

"The motion training film shows 'what' is to be done and its correct manipulation. Then the slide film is shown which helps the instructor teach the student exactly 'how' to do the job, step by step. The students actually do the job along with the film. As in using other training films, the films may be repeated until the student becomes proficient."

A detailed explanation of the method of teaching with slide films as developed for the United States Armed Forces is included in the 1943 "Visual Review," and five stages of instruction are listed: (1) preparation by the instructor, (2) presentation, (3) application, (4) examination, and (5) discussion and critique.

A recent issue of the "Tra-Div Letter," official publication of the Training Division, Bureau of Naval Personnel, offers the following twelve suggestions for more effective teaching with films:

Twelve points for full utilization of film values.

"If I decide to use a film, here are some of the things I would want to know and do: (1) I would want to

preview the film and know exactly its contents. (2) I would want to know that it was technically correct and good, and that its subject matter is pertinent to what I am trying to teach. (3) I would want to lead my class up to the place where I could say — 'We are going to see a film tomorrow.' I would want them to know why we were going to see the film. (4) Before I would show the film, I would have a discussion leading up to the contents of the film and would want the class to know what they were expected to learn from it. (5) I would want the class to have an understanding of the new terms which were to be used in the film. (6) If the subject is difficult and technical, I might want to show the film once for the overview and follow it by a discussion to clarify any specific concepts which may not have been understood, then I would show it again. (7) After the showing, whether once or twice, I would not say, 'Well, there it is, take it.' I would begin to make application of the content. If it has no application, it has no excuse for showing. (8) I would want to check up on the class, the film, and myself, by giving a comprehensive objective test. (9) I would try to stimulate further investigation on the more vital aspects of the film. (10) I would remember the film and, if practical, I would show it again sometime for review. (11) I doubt if I would ever show more than one film in a period and I would want it to be less than twenty minutes' duration. (12) I would not want to show the film immediately after the pupils had had a meal or exhaustive exercise, nor in a stuffy room."

A training aids' manual, "More Learning in Less Time," produced by the Navy Department's Bureau of Naval Personnel, lists six steps to be followed by instructors in using films and other training aids. These are: (1) examine the aid to be used, (2) arrange to use the aid, (3) prepare the class, (4) present the aid to the class, (5) follow up the use of the aid, and (6) return the aid to stowage.

Although there may be some variation in the labeling of the different steps, there is an unmistakable common technique of procedure with teaching films in these suggestions from the various branches of the Armed Forces.

Preview gives data for discussion.

First: The instructor must be thoroughly familiar with the content of the film. A preview is the best way to accomplish this, although some information can be obtained from the synopsis or teacher's manual that may accompany the film. During the preview, the instructor will want to make notes on the key points of the film and will want to watch for any deviations from local procedure which he may desire to call to the attention of the class. Also, he will want to check on the accuracy of statements and action in the film.

Application to class work necessary.

Second: The instructor must decide how best to use the film for the instructional purpose he has in mind and make the necessary preparations accordingly. If an in-

structor's manual accompanies the film, much valuable information may be obtained from this source. But, with or without the benefit of a manual, he must decide how to prepare the class to see the film, how to introduce it, how to screen it, how to follow up the showing, and how to develop applications and stimulate action.

Third: The instructor must make the necessary arrangements for showing the film. All details in preparing the classroom for the projection of the film should be completed before the class arrives. The various steps in preparing for the showing have been discussed in Chapter 2, "Equipment — Its Use and Abuse."

Fourth: The instructor must prepare the class to see the film. One of the problems in teaching with films is that of overcoming the popular conception that films are for entertainment only and the time to correct that misconception is before the film is shown. The instructor has a purpose in showing a film and he will facilitate the accomplishment of that purpose by introducing the film as a source of desired information.

Preliminary quiz may increase film values.

One device that has been used with success is the exploratory discussion developed about the key points of the film. In this discussion, the instructor discovers how little or how much the class knows about the key points and offers the film as a source of information to verify or explain these points. Frequently, it is desirable to list the key points on the blackboard and to suggest that the class watch for these as the film is being shown.

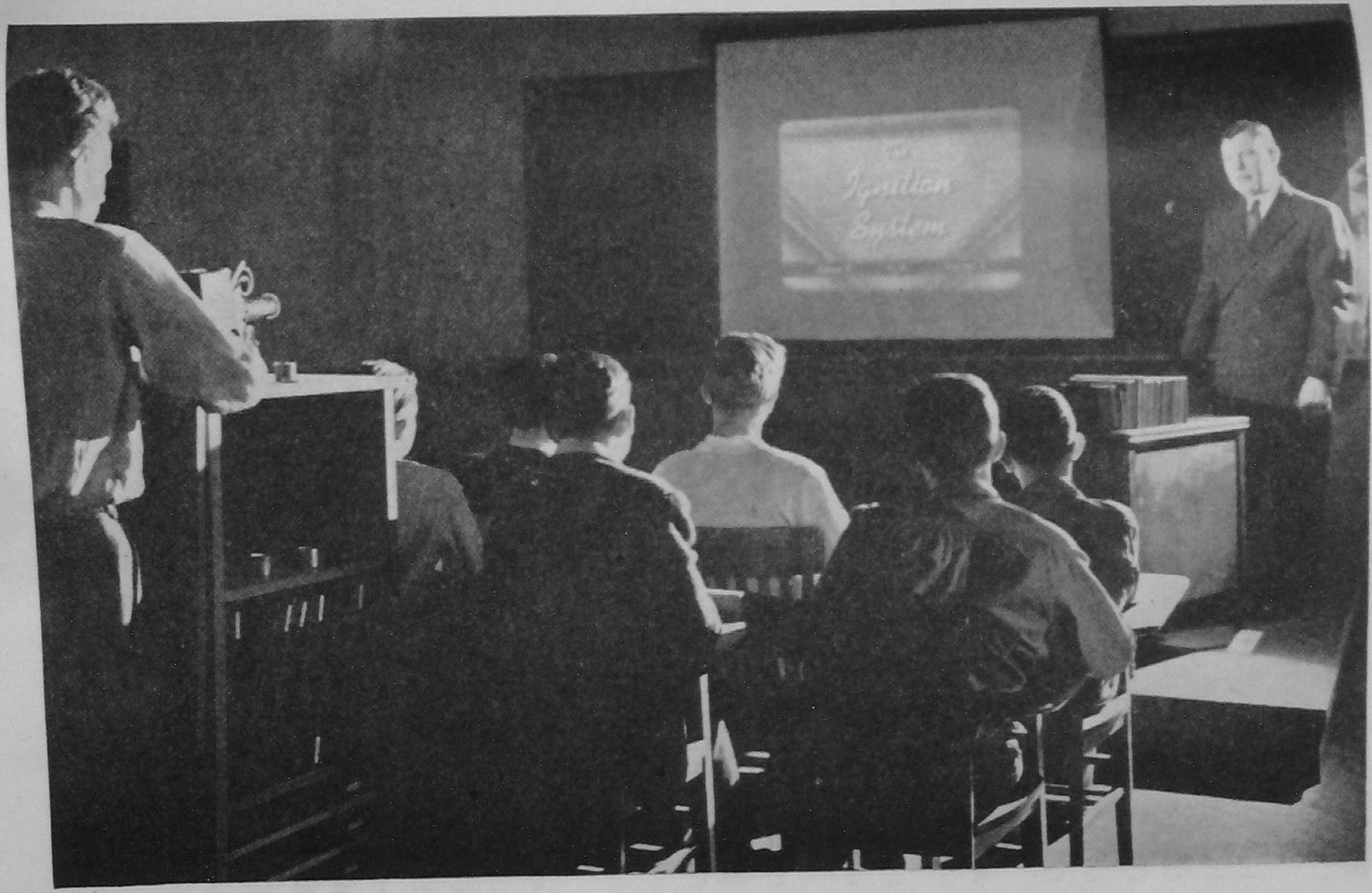

Fig. 31. A well-trained and experienced operator should be at the projector to assure a showmanlike presentation of the film.

A comprehensive objective quiz may be given as preparation for the showing of a film and the correction of the quiz papers will provide a device to motivate the follow-up discussion after the film has been shown. Or, the quiz papers can be corrected before the film is shown and the same quiz can be given after the film to measure the amount of learning that has taken place.

Amateurish presentation reduces effectiveness.

Fifth: The film is shown. Although this is the most easily performed step in teaching with films, it is a step upon which many instructors stumble. A well-trained and experienced operator should be at the projector to insure a showmanlike presentation of the film. If the projection is messy, sound too loud or garbled, film threaded incorrectly, or any one of several projection errors committed, the most carefully laid plans of the instructor will be for naught (Fig. 31).

Not only must the instructor make certain that a skilled operator is at the projector, but he should take advantage of the versatility of the machine to further enhance the learning situation during the showing of the film. If a sound motion-picture projector has stop-motion and reversing devices, the instructor should be alert to the use of these in planning the showing of the film. Usually, a film is screened in its entirety without pause at the first showing, to present a complete over-all picture of the subject. The technique of projection at subsequent showings may vary, however.

Stops for discussion impress points.

It may be desirable to turn off the sound occasionally during a second showing of a sound motion picture to ask members of the class to describe the action on the screen. Or, the film can be shown by sections and the projector stopped at intervals for discussion of the section. The stop-motion device permits projection of a single frame of a motion picture as a silent slide film, but this feature has its limitations. The reverse motion device is a handy gadget on the motion-picture projector when it is desirable to repeat a scene.

Projection of slide films can be varied in much the same way as motion pictures. Sound can be eliminated from sound slide films and the film can be run backward through the projector for several frames. The feature of holding one picture on the screen for several seconds or even minutes is one of the inherent advantages of the slide film as an instructional aid, which were discussed previously.

Sixth: The instructor should follow up the showing of the film. During the follow-up, he has the opportunity to test the instructional value of the film, to clinch key points, and to correct any misconceptions that may have arisen. Pertinent and enthusiastic discussion is the desideratum at this stage of the learning situation and is likely to develop naturally if the prerequisite steps in teaching with films have been taken. There are techniques to assure the development of this desired discussion, however (Fig. 32).

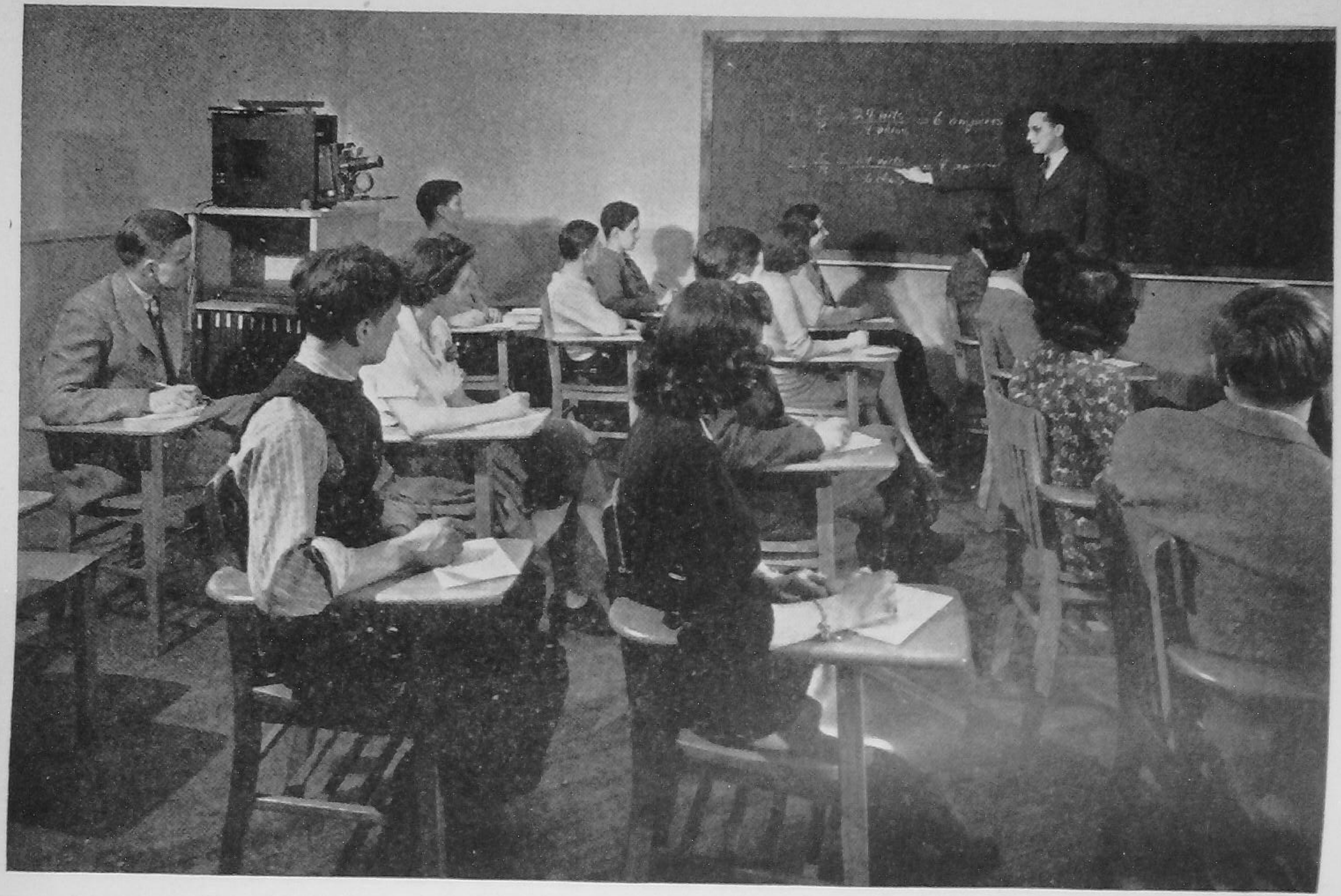

Fig. 32. The follow-up discussion after the showing of the film provides an opportunity to clinch key points and correct misconceptions.

Final quiz reveals extent of learning.

An objective test of the true-or-false type is one device to encourage discussion during the follow-up of a film. Such a test is easy to administer, quickly corrected, and includes desirable competitive elements. It should be constructed about the key points of the film to provide for a review of these points during the post-mortem discussion after the test papers have been scored.

The oral-essay type quiz, stimulated by directed questions, is another device to encourage discussion during the follow-up period. With this method, however, the instructor should beware the pedagogic pitfall in which he becomes an intellectual suction pump attempting to extract information from a passive and sometimes uninterested class, to no purpose.

Vitalized class discussion, whether during the follow-up of a film or otherwise, is more in the nature of a conference than a quiz. The instructor is the conference-discussion leader who keeps the ball of conversation rolling in the direction of the goal, and who calls the penalties for offside and delaying the game.

Another interest-stimulating device for the follow-up period is an adaptation of the popular "Quiz Kids" radio program. A panel of "experts" is selected from the class and questions based upon the content of the film are fired at this panel. The instructor, or a student, may act as moderator to determine the validity of the answer and to screen inappropriate questions.

This device can serve a double purpose if it is explained before the film is shown. Not knowing who

may be called upon to act as an "expert," all members of the group are likely to pay strict attention to the film to absorb as much information as possible. When competition is injected into a learning situation, both interest and learning usually benefit thereby.

Move from film to application by "doing."

Seventh: The instructor should provide for application of the key points in the film. Learning, like forging, is best accomplished by striking when the iron is hot and the sooner the learner has the opportunity to apply key points of a film, the faster learning will take place. The desire to imitate is a powerful natural urge that can be stimulated by a well-made teaching film. If that desire is thwarted by any unnecessary delay of opportunity, the learner's enthusiasm and interest may lag.

For example, the training film, "Fundamentals of Arc Welding," produced by General Electric Co., not only provides an understanding of the basic principles of electric arc welding, but it arouses also a desire to try one's hand at welding. The welding operator in the film is highly skilled and conveys the impression that welding is not so difficult, after all.

Any unnecessary delay in providing an opportunity for learners to try their hand at welding after they have been instructed by the film is a waste of precious interest stimulated by the urge to imitate.

More than mere satisfaction of the desire to imitate is accomplished by providing immediate opportunity

for application of the key points of an instructional film. Practice, while principles are fresh in mind, tends to groove the impression of these key points more deeply than if practice is delayed until principles are stale and vague.

Eighth: The instructor should make use of the teaching film for review purposes. Even with the most efficient technique of instruction, loss of learning can be expected to occur over a period of time, and periodical review is necessary to maintain skills, attitudes, and appreciations at the desired level. The re-showing of a good teaching film is one of the best devices for review of the fundamentals.

Thus, it is seldom possible to make the most effective use of a teaching film by showing it once, only. A technical film, such as "Fundamentals of Arc Welding," can be shown at least three times to each group with learning dividends accruing at each showing – first, to introduce the subject; second, as the skill is being mastered; and third, to review the fundamentals of the operation.

SUMMARY

1. It is possible to use a well-designed teaching film at various stages of instruction. It may be used to introduce a subject, as a skill is being mastered, and for review.

2. The time to use a film is when it will expedite learning above and beyond that which could be accomplished by any other type of available instructional aid.

3. Ordinarily, it is not advisable to use more than one film during a class period.

4. Films should be scheduled well in advance of the time when they are needed to assure their availability.

5. The instructor should preview every film before using it as a teaching aid.

6. Preparation for projecting the picture should be made before the class arrives.

7. The purpose for presenting the film should be clearly understood by the learners before the film is shown.

8. Key points in the film can be emphasized by repeating or varying the presentation of the picture.

9. Follow-up discussion after the showing is necessary to determine the amount and quality of learning.

10. Opportunities for immediate application of the principles developed by the instructional film are desirable.

5

MAKING YOUR OWN TEACHING FILMS

The urge to make an outstanding teaching film lingers in the hearts of most instructors, along with the desire to write a more perfect text. Once an instructor has discovered the value of teaching with films, the amazing paucity of suitable visual aids for the hundreds of learning situations he must create during the course of a year becomes more apparent and the urge to make films becomes stronger.

Many instructors who have developed a hobby of amateur photography have undertaken the making of instructional films and these experimenters now have a greater appreciation of the difficulties encountered in making the "perfect teaching film." Some have persevered in their purpose and have made real contributions to the development of the teaching film. They have proved that the instructor can make good teaching films.

First school-made movies costly and ineffectual.

A wave of school-made movies, popular before wartime restrictions practically outlawed unessential moviemaking, had its effect upon classroom production of films and this effect was not always the most desirable

one. School movies were produced at considerable cost, in which the only apparent purpose was to parade as many children as possible before the camera. These local productions were scarcely educational, and many school administrators promised themselves never to repeat the mistake.

Know limitations before starting.

There is no need for any instructor to invite the responsibility of a colossal blunder by promoting a school-made film, if he is cognizant of the limitations of amateur production. Most school-made films fail because the producers aimed too high. Their sights were set on the Hollywood level but their powder charge was measured on the scales of Milltown, and the shot was short.

So, the first lesson to be learned in making a teaching film is to forget about competing with the professionals. They make a living from what you pay to play with as a hobby. Don't expect your first attempt to win the Academy Award.

Sound increases cost and difficulty.

The sound motion picture is the most expensive and the most difficult type of teaching film to produce. Our best advice is: Leave this one for the professionals.

The silent motion picture is not so expensive as the sound film and offers greater possibilities to the teacher who wants to make his own visual aids for the classroom.

The sound slide film, like the sound motion picture,

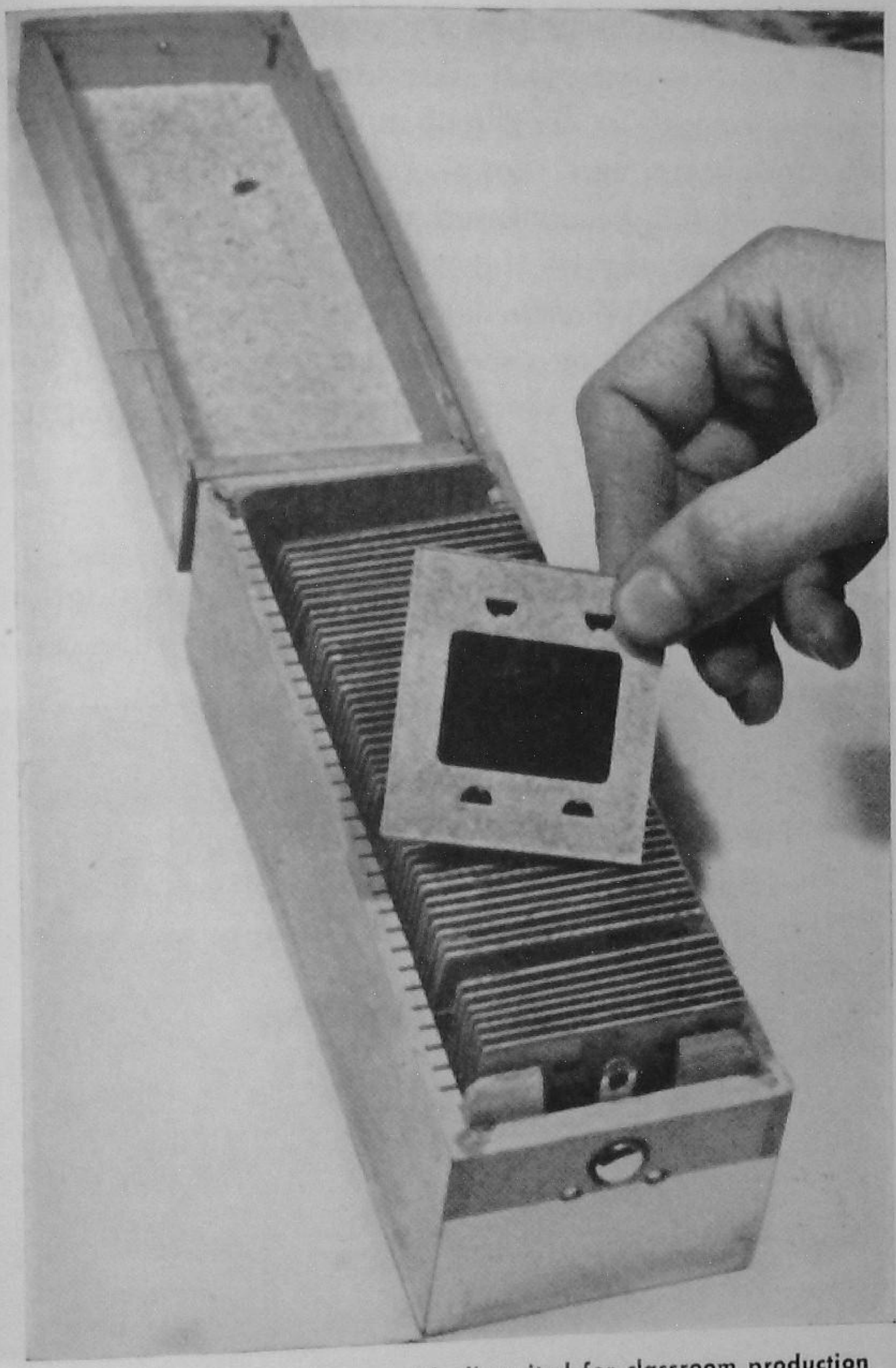

Fig. 33. Miniature slides are ideally suited for classroom production of teaching aids.

is expensive and may best be done by professionals.

The silent or discussion slide film offers many of the same advantages as the silent motion picture for amateur production, but the word "amateur" in this instance must not be confused with the word "novice."

Slides, especially of the miniature variety, are the most foolproof type of visual aid for classroom production, and at the same time the least expensive. Their very simplicity belies their unique value as an instructional aid (Fig. 33).

MAKING A MINIATURE SLIDE SET

Many instructors gravitated naturally into production of teaching films when they acquired a miniature cam-

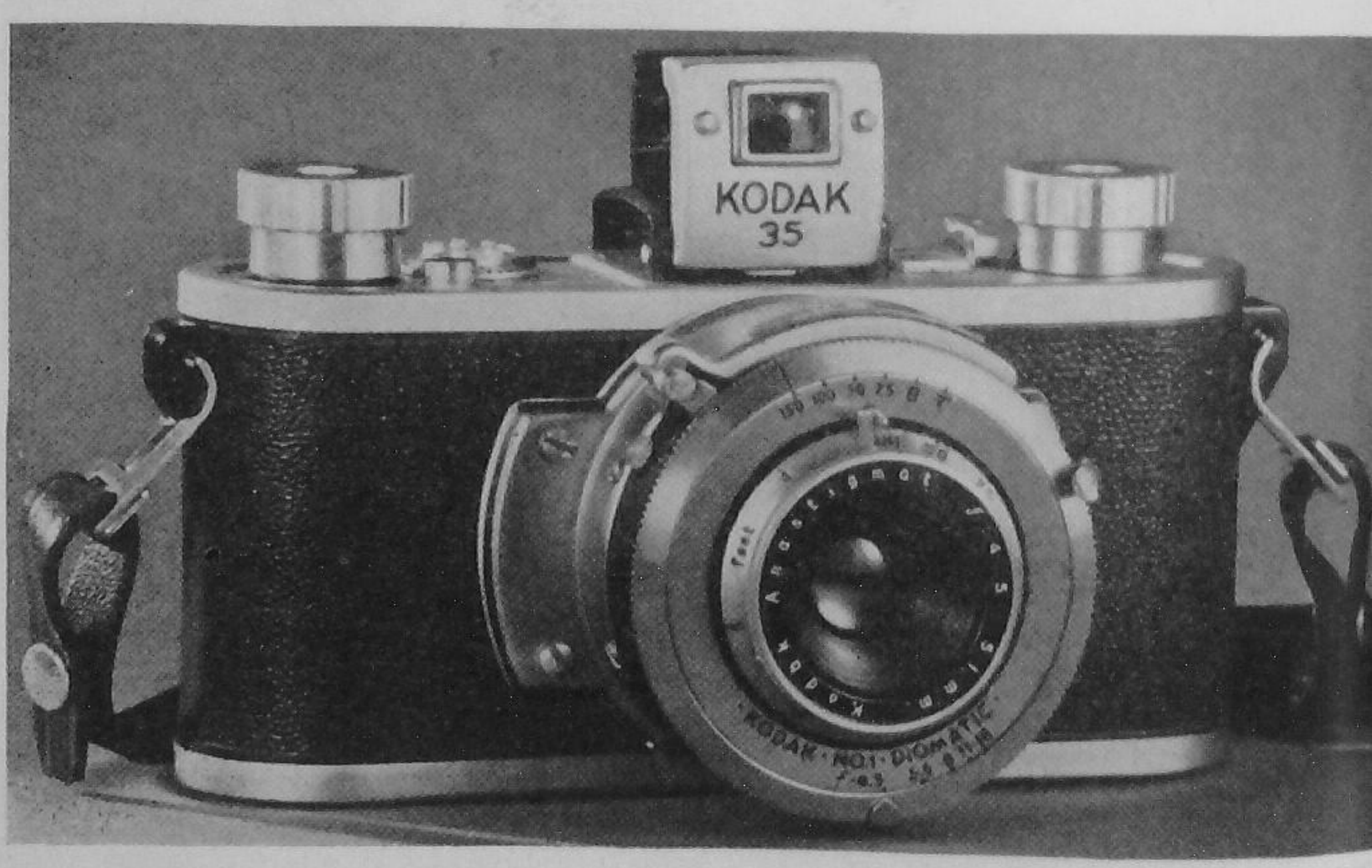

Fig. 34. A moderately priced 35mm camera, such as this, is a satisfactory tool for amateur production of miniature slides.

era, loaded it with Kodachrome film, and began taking pictures (Fig. 34). They went on trips and, being good teachers, they took pictures of interesting things. Gradually, they accumulated a sizable library of miniature slides in natural color and discovered that many of these slides could be used to vitalize their work in the classroom.

The history teacher photographing Gettysburg, the geography teacher photographing Lake Superior's Pictured Rocks, the agriculture teacher collecting colored slides of farm animals, all are making their own teaching films. The botany teacher has gone even further, with her set of miniature slides showing closeup views of all the local wild flowers arranged in the order of the months in which they bloom.

Start with a plan.

Good miniature *slide sets*, like accidents, do not happen – they are caused. There is a technique to making a set of slides for instructional purposes and the secret of that technique is planning. The first step in this planning is to decide the reason for the set or the instructional purpose the slides are to serve. Neglecting this step is like starting a journey without a destination in mind.

Develop a scenario.

Having decided the purpose, the next step is to prepare an outline describing the story or lesson the pictures are to illustrate. Next, pictures are planned to

illustrate the story and their arrangement is decided. This combination of story and planned pictures is the scenario, the road map to a destination.

We learned in interscholastic debating to "Tell them what you're going to say; say it; and then tell them what you've said." This is still good technique for organizing a set of slides. Another way of describing this method of organization is (1) introduction to the subject, (2) developing the subject, and (3) summarization. While a completed slide set may not follow this

Fig. 35. If people are in the picture, show them doing something.

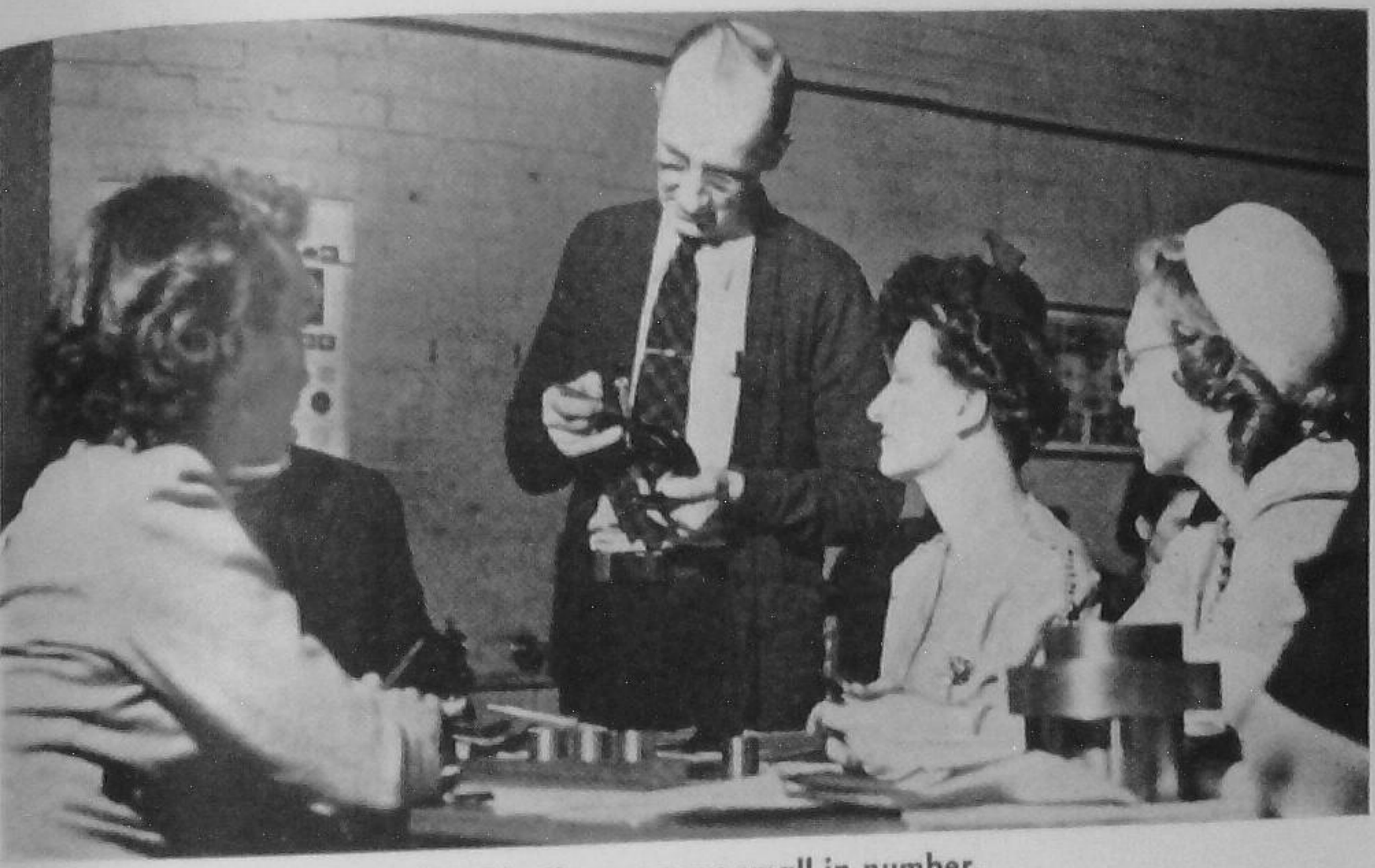

Fig. 36. Keep groups small in number.

traditional organization exactly, it is a good point from which to start planning.

Just as planning is necessary in preparing the scenario, a design (either mental or otherwise) helps in taking the pictures. The purpose is to obtain pictures that tell the story, and sometimes these are not the most obvious situations. The instructor will discover this for himself when he attempts to illustrate an abstract idea, such as "Character Building," by a single photograph.

Six points for pictures.

Here are a few suggestions that will help get action of the story-telling variety into the pictures (Figs. 35 to 40, inc.).

1. If people are in the picture, have them doing something. That "something" should be closely related to the story the picture will tell.

2. Keep groups small in number. Too many persons in the picture tend to distract attention from the point of interest and the effect is somewhat the same as walking into a room full of people. Any group larger than four or five is in danger of becoming a mob scene.

3. Closeups catch attention. As a rule, work as closely to the subject as you can. A closeup picture of a single daisy is likely to be more effective than a field of them.

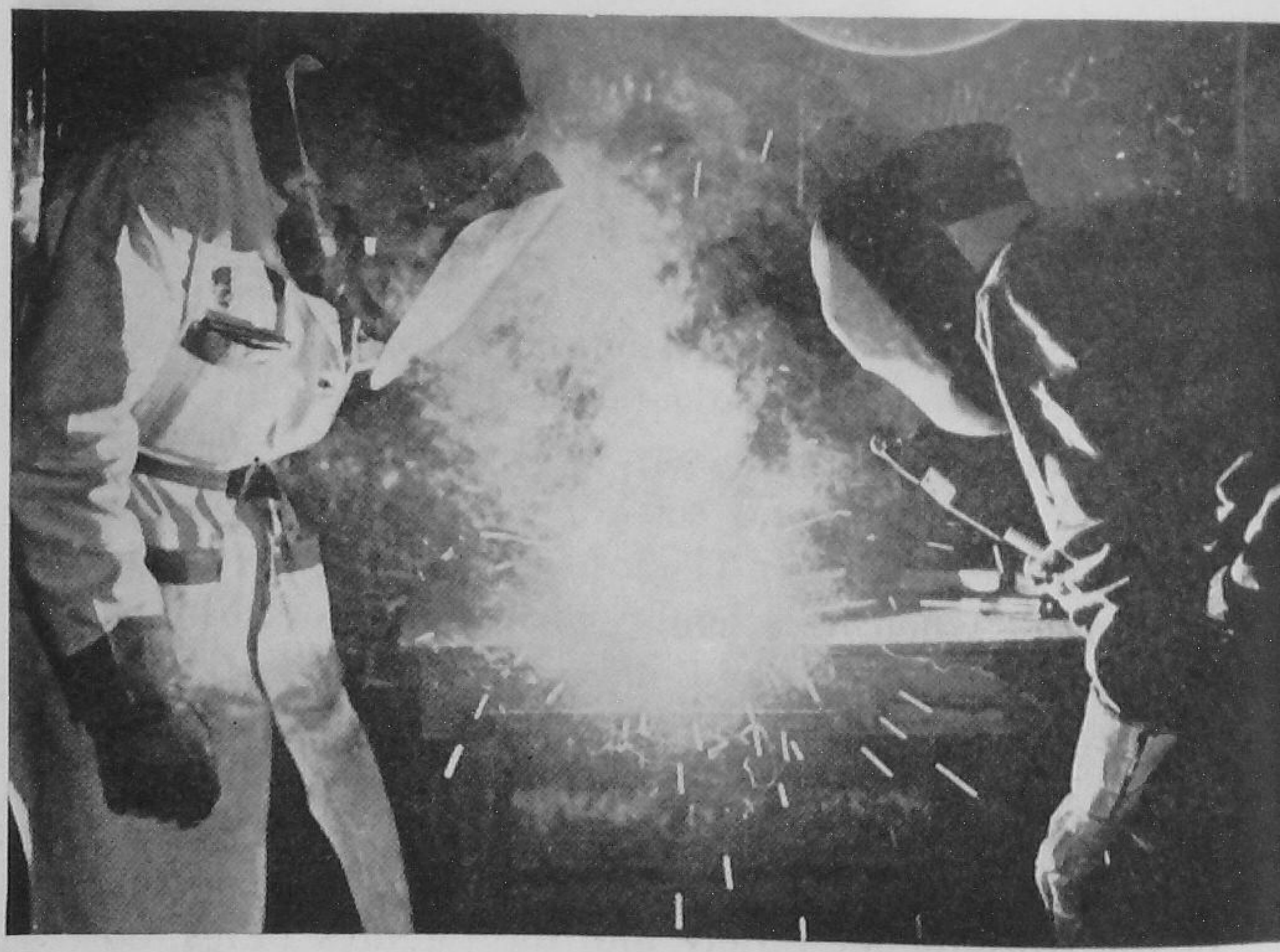

Fig. 37. Closeups catch attention.

Fig. 38. Look for the favorable camera angles.

Distant views and panoramas catch the eye, but they are likely to be disappointing when photographed.

4. Look for the favorable angles. While most pictures are taken from the eye-level position, don't neglect the overhead and low-level shots. It's a good practice to look at the scene you are about to photograph from several points of view and then select the best one.

5. Watch backgrounds. Many otherwise interesting photos have been spoiled by a background that conflicts with the point of interest in the foreground. Figured wallpaper, cluttered benches, wall calendars, picket fences, and glaring lights are notorious for sneaking into pictures to steal the spotlight from the main attraction.

6. Don't let your subjects "watch for the birdie." It isn't good form to stare, either at people or cameras.

Fig. 39. Watch backgrounds. They help tell the story.

Fig. 40. Caution people about watching the camera. Have them look at the chief center of attraction.

Commentary supplements pictures.

If a written commentary is to accompany the *slide set*, preparation of this commentary should be delayed until the pictures have been completed and their final arrangement of scenes decided. The commentary should be brief and fast-moving and the writer should beware the error of introducing each new scene with, "This

is a picture of . . ." Also, do not explain the obvious in the picture. The purpose of the commentary is to supplement the story told by the photographs. It is well to read the commentary aloud after it has been prepared, to be certain that no difficult alliteration or tongue-twisting word sequences will detract from the smoothness of the total production, pictures, and commentary.

The following data accumulated during production of the Kodachrome miniature *slide set*, "Learning to Earn," produced by the Audio-Visual Aids Service of the Michigan State Board of Control for Vocational Education, is presented here to illustrate the techniques suggested for making your own *slide sets*.

Statement of purpose.

"A set of miniature slides in natural color with a commentary to accompany is proposed as a visual aid to describe a project in developing occupations related to homemaking as a part of a course in Homemaking conducted by a vocational homemaking teacher at Everett High School, Michigan.

"The proposed slide set will be used primarily as an aid in teacher training and will be made available to teacher-training institutions and to other teachers of vocational homemaking.

Story idea.

"The community of Everett, adjoining Michigan's Capital City of Lansing, is said to be one of the largest rural-school districts in enrollment in the United States.

The parents of the children work in Lansing factories and this community has the wartime problems of housing, recreation, etc., common to most suburban areas near war production centers.

"Records of the school districts show that a sizable percentage of Everett High School girls do not go on to college. Many of these girls work in Lansing stores, offices, or industries after graduation.

"Recognizing the need for a guidance program, the instructor of vocational homemaking developed a project in occupations related to homemaking through which Everett High School girls have an opportunity to explore various occupations in business and in the home. Upon obtaining the co-operation of employers in Lansing stores, restaurants, beauty parlors, etc., the girls were permitted to obtain work experience in the occupations in which they were interested.

"The results were gratifying. Some girls verified their choice of an occupation, while others decided to try other types of work after their experience on the job. Employers were satisfied with the project to the extent that offers of positions were made to several girls when they had completed their high-school work.

Planning the pictures.

"A series of ten or twelve pictures are needed to introduce the community of Everett and the principal characters of the project. These will include shots of the shopping center, the school, typical homes, and closeup portraits of the girls.

"A series of fifteen or more pictures are needed to show the opportunities within the school for experiences in occupations related to homemaking. These will include scenes of advanced clothing construction, office of the school nurse, cafeteria work, assisting the kindergarten teacher, etc.

"As the school does not offer enough opportunities for work experience, a photograph is needed showing the instructor contacting Lansing employers, and this is followed by a series of pictures of the girls actually at work in stores, restaurants, etc.

"A scene of employer, students, and instructor discussing value of the project would make a suitable conclusion."

The scenario.

Photograph	Commentary
1. Title: "Learning to Earn" is superimposed over a color photo of the dome of the State Capitol at Lansing.	1. Read title.
2. Title: "A Guidance Project in Occupations Closely Related to Homemaking." Same background scene as in 1.	2. Read title.
3. Title: "Produced by the Audio-Visual Aids Serv-	3. Read title.

ice of the Michigan State Board of Control for Vocational Education." Repeat background scene as in Nos. 1 and 2.	
4. Main street of Everett with school in background.	4. The Community of Everett adjoining Michigan's Capital City of Lansing, is said to be one of the largest rural-school districts in the United States. It has a school enrollment of 1,400 from kindergarten through senior high school. Most of the parents work in nearby Lansing factories.
5. Semi-closeup of shopping center.	5. A drug store, two or three groceries, and a few gas stations make up the business district of Everett. Most of the people are of American birth, but there are a number of other nationalities represented in those who have migrated from Poland,

	Russia, Greece, Germany, the British Isles, and Syria.
6. Semi-closeup of a better class home in Cedarbrook.	6. Cedarbrook is the residential showplace of Everett.
7. Semi-closeup of house trailer. Etc.	7. But more than 100 Everett school students come from trailer homes like this. Etc.

MAKING A DISCUSSION SLIDE FILM

Slide film not simple succession of shots.

Theoretically, it is easier to make a *discussion slide film* than any other type of teaching film, but the practical procedure of production is more complicated than making a set of miniature slides. In theory, at least, one should be able to load a camera with black-and-white film or with Kodachrome, and proceed to take a sequence of scenes from life to produce a *discussion slide film*. Actually, this is not the way *slide films* are produced.

In the first place, it would be difficult to include captions with the photographs. The captions would be of billboard size in the original scene. Then, there would be the difficulty of keeping the scenes arranged in the desired sequence. It would be possible to plan the photography to accomplish this, but experience has proven it to be impractical. Also, it is difficult to main-

tain uniform exposure under the variable conditions encountered in taking original photographs. One underexposed film or a frame out of focus would detract from the entire *slide film*. Finally, it is not possible to take more than one shot of a scene, and this limitation would be a definite handicap to the average photographer who does not hope to bat 1,000 per cent with his negatives.

Re-photograph after assembling pictures.

The practical approach to production of the *discussion slide film* is to prepare pictures, captions, and charts on a standard-size format, usually smaller than 8 by 10 inches, and then re-photograph this copy in sequence with a specially designed copying camera making a negative of single-frame size on 35mm film.

Improvements in original may be desirable.

With this procedure, it is necessary to make enlargements to the 8 by 10-inch or other standard format size, but these enlargements can be controlled to produce uniform print tones, thus compensating for variations in the exposures of the negatives. It is possible to do art work on the enlargements, to highlight key points, and to subdue unimportant details. Captions can be added to the enlargement, or can be superimposed over the print. The arrangement of pictures can be changed up to the last moment before the copying is done and the producer has the opportunity to study several photographs for each frame of the *slide film*.

White letters on black for captions preferable.

Fundamentally, the procedure in making a *slide film* is quite similar to production of the slide set: The purpose of the film must be decided, a story developed, pictures planned, a scenario prepared, and the pictures taken. From this point on, however, the technique is different. If the negatives are smaller than the standard format size, enlargements of the pictures must be made. Captions are written and the problem of includ-

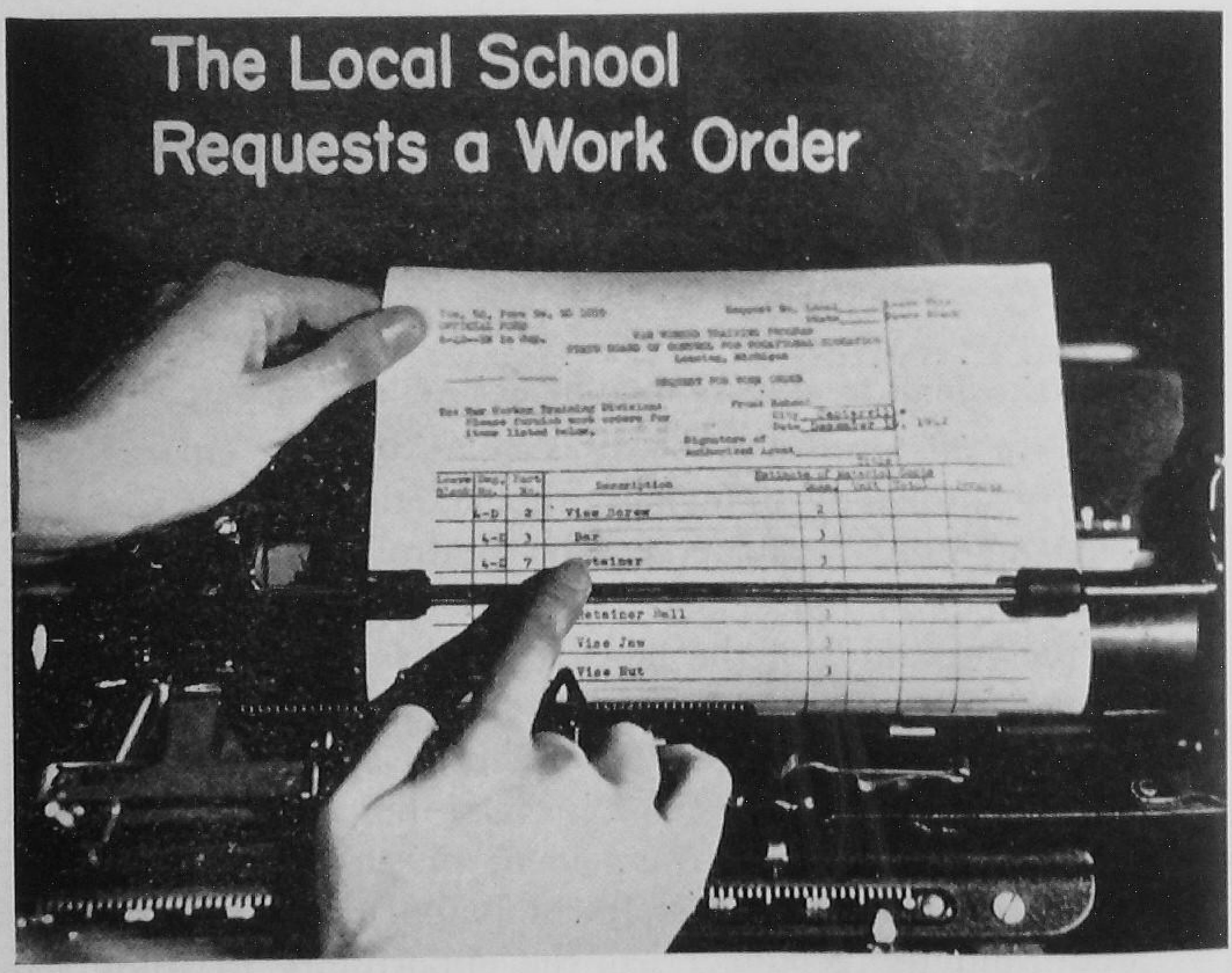

Fig. 41. Sample of original copy for frame of 35mm slide film. The photo was an 8 by 10-in. enlargement to which the printed caption was attached.

ing these captions with the pictures must be solved. A white letter on a dark background is preferred for *slide-film* captions, but white ink is difficult to work with either in printing or in hand-lettered captions.

The professional overcomes this difficulty by using a hot-press method to produce a sharp white letter on the print or transparent sheet if the caption is to be superimposed on the photograph. This method, however, may prove too expensive for the teacher who is producing his own films. One way to circumvent the problem is to letter the captions with black ink on white paper, make a negative photostat of the captions and cement the captions to the enlarged photographs. An airbrushed strip around the cut edge of the caption is desirable (Fig. 41).

Mount pictures or charts.

Before the pictures or charts are re-photographed with the special animation camera, they should be mounted on cardboard of uniform size. Guide holes should be punched at the edge of the cardboard if the copy is to be re-photographed, or animated, by a professional laboratory.

To illustrate the difference between a scenario for a *slide set* and one for a *slide film*, a portion of the scenario for the *slide film*, "Instruction Through Production,"[1] is reproduced.

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[1] Produced by the Michigan State Board of Control for Vocational Education.

Scenario: Instruction Through Production.

Photograph	Captions
1. Machine shop with trainees at work on machines.	1. Title: "Instruction Through Production" (superimposed over photo).
2. Black background.	2. "Efficient Instruction is Essential for Success in Vocational Training." George H. Fern, Director, Michigan State Board of Control for Vocational Education.
3. Panel of completed tools.	3. "Fabrication of Tools and Equipment Aids Instruction."
4. Line drawing of five targets.	4. "The Program has Five Objectives."
5. Instructor and two trainees studying work sheets at inspection bench.	5. (1) "To Vitalize Instruction Through Useful Productive Work."
6. Stockpile of material.	6. (2) "To Conserve Materials Essential to the War Effort."
7. Two women trainees at work on surface grinder.	7. (3) "To Organize Instruction for Future Payroll Jobs in War Industries."

8. Trainee admiring finished tool.	8. (4) "To Motivate Interest Through Production of Useful Equipment and Tools."
9. Array of finished tools.	9. (5) "To Utilize the Productive Capacity of the Thousands in Training for War Production."
10. Draftsman at work. Etc.	10. "Everything Begins With a Design." Etc.

SUMMARY

1. Production of films for teaching by the instructor is feasible if certain limitations are recognized.

2. The sound motion picture and sound slide film are the most expensive and most difficult types of teaching films to produce.

3. Discussion slide films, motion pictures, and miniature slide sets are most within the realm of amateur production efforts.

4. Complete planning is essential to the success of an instructor-made teaching film.

5. A standard method of organization for a teaching film is: (1) introduction to the subject, (2) developing the subject, and (3) summarization.

6. Action, of the story-telling variety, is desirable in all pictures and scenes in the teaching film.

7. Accompanying commentary should be brief and to-the-point.

8. Before starting actual photography of the scenes, there should be an acceptable statement of the purpose for the film, outline of the story idea, and scenario developed.

9. The miniature slide set offers the greatest possibilities as a medium for experimentation in production of teaching films for the average instructor.

6

FILMS AND THE ADMINISTRATOR

One of the phenomena of American education is the nonchalant way its brain children frequently are left to shift for themselves. The infant idea, Teaching with Films, is an example. Although accepted as a legitimate offspring of education, it still finds itself without the guiding influence of either parent or guardian in many schools. Is it any wonder that this juvenile has manifested some tendencies toward becoming an educational delinquent?

Teaching with films requires administration.

Too many schools have adopted the idea of vitalizing the curriculum with teaching films, purchased a sound motion-picture projector, and then left their new baby to make its own way in the world. The mortality rate in such instances is high as more than equipment is necessary for a successful program of audio-visual aids. Films must be selected and made available, projectionists must be trained, teachers must learn the techniques of instruction with films, arrangements for projection rooms must be made, and someone must assume the responsibility for the administration of an

organized in-school program. That person is the director, or supervisor, of audio-visual aids, and he may devote all or part of his time to the work, depending on the size of the school system.

Maintenance and record-keeping important.

In a school situation, the director of audio-visual aids is responsible for the maintenance of equipment and the training of projectionists. He is in charge of the school's film library, and arranges for the use of films from other libraries. He co-operates with a committee in the selection of films to be purchased or rented. He keeps an inventory of both equipment and films, an annotated record of costs.

Photography is his hobby and he helps other instructors make their own teaching films. He arranges audio-visual aid clinics and training conferences for in-service training of teachers, and promotes more effective use of films for teaching wherever possible. His enthusiasm for his specialty is tempered by his years of practical experience in the classroom and his professional training as an educator. Every teacher may not possess the necessary qualifications for director of audio-visual aids, but every audio-visual aids director must be, above everything else, a teacher.

Major repairs require expert.

Responsibility for the care and maintenance of projection equipment does not imply that the director of audio-visual aids must be an expert repairman. He

should be able to make minor repairs such as replacing broken spring belts, burned-out projection bulbs, and exciter and radio tubes, but major repairs are the responsibility of the expert, either local or at the factory. A curious-minded teacher armed with a screw driver is likely to do more damage than good when he attempts major repairs on a projector.

The responsibility of the director of audio-visual aids for the mechanical phase of teaching with films does not end with care and maintenance of equipment. Projection rooms must be prepared, facilities provided to darken classrooms, and projection equipment must be on hand when needed. The purpose is to make the equipment as useful as possible, a purpose not without its problems.

Equipment stationary in ideal situation.

Ideally, there should be a sound motion-picture projector on each floor of a school building and a discussion slide projector for every other classroom. Few schools have realized this ideal situation. More consider themselves fortunate if they have one sound motion-picture projector for each building and one slide-film projector for each floor of the building.

Slide-film projectors are small and easily transported, hence are most satisfactory to lay groups not engaged in organized teaching; not so with sound motion-picture equipment. It is heavy, as anyone who has lugged it from street level to the third floor of a school building can attest. Furthermore, the maintenance problem on

itinerant motion-picture equipment is much greater than on equipment located permanently in a projection room. This makes it highly advisable to have sound motion-picture equipment located in a specially arranged projection room or, better still, in a projection room on each floor of the building. This should be done at least until lighter and more inexpensive equipment is available and all classrooms are equipped for movie projection.

Students can be trained as projectionists.

The responsibility for training projector operators belongs to the director of audio-visual aids, and he may undertake it himself or delegate it to a member of his staff, depending upon the size of the school system. While it is desirable for all teachers or others using teaching films to understand the principles of projector operation, it is not necessary that they learn to be expert projectionists. A corps of trained student projectionists, composed of older high-school girls or boys, can relieve the teacher of the details of projection and permit him to devote his time and energies to the more important work of instruction (Fig. 42).

Inspect film after each showing.

A school film library should be under the supervision of the director of audio-visual aids to assure regular inspection and maintenance of films and recordings. It is advisable to inspect each film after every showing, otherwise it is difficult to trace the cause of torn sprocket

Fig. 42. Older high-school boys and girls can be trained as projector operators to relieve the instructor of this detail in teaching with films.

holes, scratched prints, or other film damage. Also, certain types of film damage can be reduced to a minimum if the damage is discovered and repaired promptly.

Storage should be scientific.

Film storage is a problem that grows as a film library increases in size. Excessive heat and moisture are ene-

mies of films and should be guarded against in selecting the storage place. Enclosed metal cabinets make good film-storage units when they are fitted with racks or bins to conserve space. It is not advisable to stack reels of film on shelves except as an emergency measure. Each film should have a separate bin or stall in which it is stood upright during storage (Fig. 43).

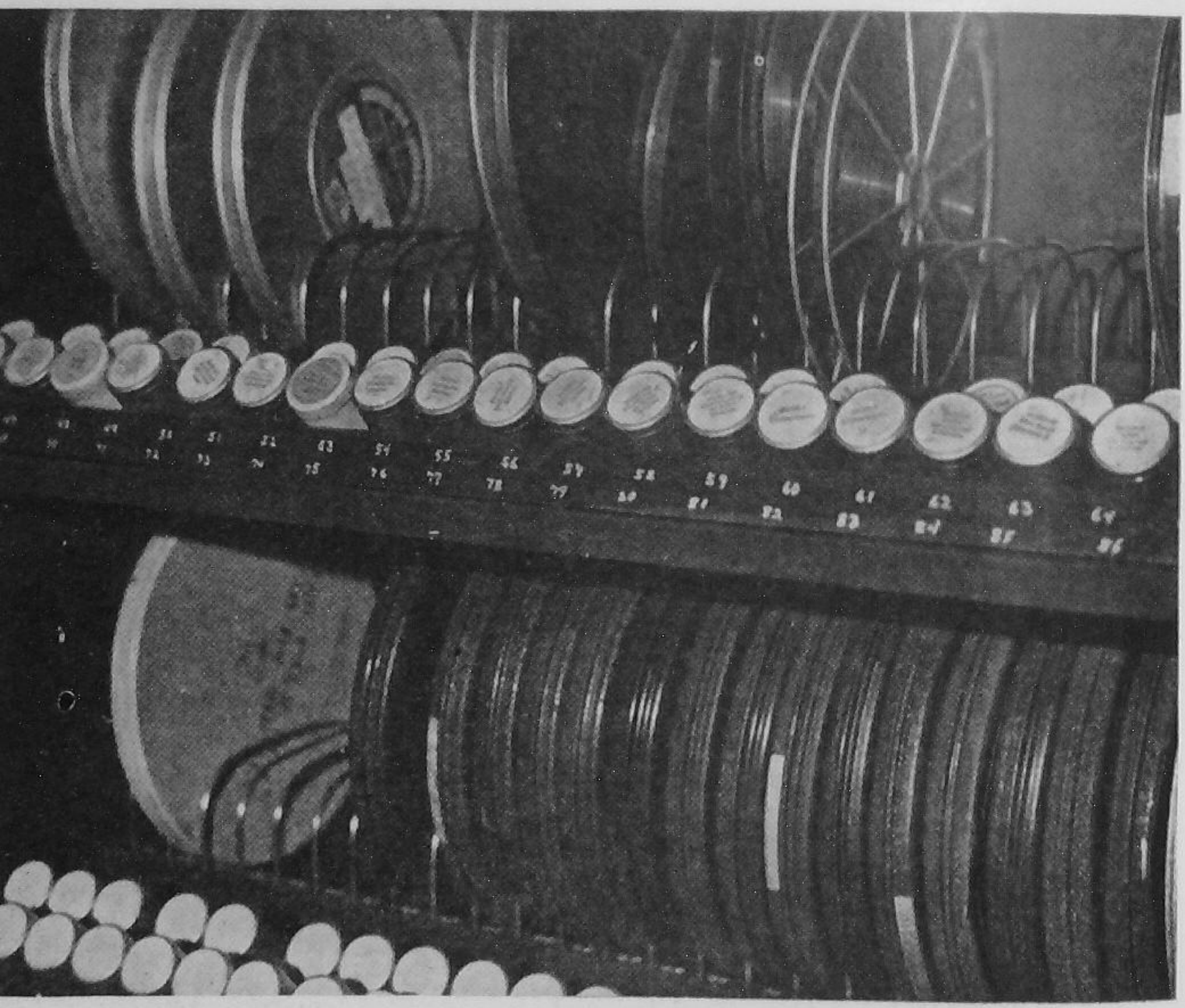

Fig. 43. One recommended method for storing films is to provide individual stalls in which the motion-picture reel can stand upright.

Responsibility can be shared.

Promoting more effective utilization of films for teaching is another responsibility of the director of audio-visual aids, a responsibility delegated to him by the school administration and shared with an audio-visual aids committee composed of his fellow instructors. In larger school systems, the audio-visual committee functions as an advisory group, but it may be a combination working-advisory group in smaller systems in which it is necessary to divide the responsibility for carrying out details of a program.

For example, in a smaller school system or among lay groups engaged in an educational program, funds may not be available to permit the releasing of an instructor who can devote the necessary time to all details of a program of audio-visual aids. The need for centralizing responsibility for the program is as great, however, as in a larger system where a full-time director is employed. One solution to the lay group or small school's problem is to share the work of equipment maintenance, film library, scheduling, record-keeping, etc., among several, with one person supervising the activities of the others.

The science or shop teacher in a school is a logical person to place in charge of equipment. The school librarian might look after the film library and schedule films. The commercial instructor can assume the responsibility of correspondence in borrowing and returning films. The supervisor of this audio-visual aids program should be the teacher who has had the most

experience in teaching with films, is the most enthusiastic booster of their value to the instructional program, and one who can get co-operation.

Expend film funds judiciously.

The selection of films, either to purchase, rent, or borrow, is one of the major responsibilities of the audio-visual aids committee, both in large and smaller school systems and for educational groups or agencies. This is done only after consultation with the various persons who will use the films. No school budget will permit the purchase in a single year of all the films teachers will request, but careful planning and selection will result in the accumulation of sizable libraries over a period of years. The problem of the audio-visual aids committee is to make the budget stretch as far as possible in terms of instructional value.

Thus, the emphasis may be on the purchase of discussion slide films as the first step in establishing a film library. These instructional aids are inexpensive, durable, and do not require expensive projection equipment. They are the ideal medium for the limited budget, and that includes the majority of both educational and training agencies, including schools, that desire to make a sincere attack upon the problem of vitalizing and improving instruction with visual aids.

Always prevue film before purchase.

Under no circumstances should a slide film or any other type of audio-visual aid be purchased until it

has been previewed, or better still, actually used by an instructor in a teaching situation. Buying films from the catalogue description is akin to purchasing a pig in a poke.

The audio-visual aids committee can render valuable service in advising the administration of an institution or group on the purchase of projection equipment. While every devotee of films for training and educational use likes to have all types of projection equipment readily available, few schools at least are able to provide this service. Here, as in the purchase of films, the problem is to get the most instructional value from the funds available. The fact that two or three slide-film projectors and a hundred or more slide films can be purchased at the cost of but a single motion-picture projector should be weighed carefully both by the audio-visual aids committee and the administration.

Projector rates six to one.

Selection of the proper ratio of motion-picture and slide-film projectors is as important as deciding the brand of projector to purchase. This ratio is not determined as in the case of the butcher who admitted his hamburger meat was half-beef, half-rabbit, mixed in the proportion of one cow to one rabbit. For best instructional purposes in the schools, the proper ratio of slide-film to motion-picture projector well might be six-to-one rather than one-to-one.

Purchase of audio-visual aids equipment should be decided upon, and the *type* well in mind, before the

salesman is called into the picture. It is his role to convince the purchaser of the advantages of his particular brand of equipment, rather than to "sell the school" on any one type of equipment. The purchasing committee or director of audio-visual aids should decide on type first and brand second.

Performance and price are the two principal factors to be taken into consideration in purchasing projection equipment. The technical means by which the manufacturer accomplishes these ends may be of the utmost importance to the engineer, but have little meaning for the layman. He is likely to be less interested in a technical explanation of the comparative merits of the mechanism in Projector X that actuates the film claw, than in the fact that Projector X is easily threaded and has simple controls.

Two models available.

Most projection-equipment manufacturers produce a competitive model which they label as "Standard," "Utility," or some similar trade term. Usually the chassis and vital parts of this projector are the same as on the higher priced De-luxe models. The less expensive machine will be a "streamlined" version of the costlier models, without the accessories that make good selling points, but may not be used a great deal by the usual classroom instructor.

Thus, in the search for the best value, it may be wise to begin with the less-expensive competitive model of equipment, and determine whether this grade will de-

liver the necessary performance for the purpose in mind. Purchasing an auditorium-type equipment for classroom use is like buying a sixteen-cylinder engine for a Jeep.

Majority of manufacturers are reliable.

In the final analysis, the average purchaser of projection equipment must rely upon the manufacturer's reputation and the salesman's integrity. To this, he can add the experience of his fellow members of the teaching profession with different makes of equipment, and can rest assured that he is not taking an undue risk in selecting any one of several popular makes of American-manufactured equipment.

Funds should be earmarked for visual aids.

Too frequently, finances for audio-visual aids have been provided by haphazard methods. Projection equipment has been purchased from funds raised by Parent-Teacher Associations, box socials, suppers, public entertainments, and donations. While it is true that these devices have made it possible for many to utilize audio-visual aids for instruction sooner, the fact remains that audio-visual aids are instructional costs the same as texts or teachers' salaries.

Thus, the annual school budget should include funds for projection equipment and films, for the same reason that money is provided each year for books, chalk, and other instructional materials. Long-time planning is necessary to spread the cost of financing the program over a number of years, and the funds should be allo-

cated on the basis of the number of students enrolled. Setting aside the amount of 25 cents per student each year for financing audio-visual aids is not an extravagant budgetary practice when measured in terms of the resulting instructional benefits.

For many years, business and industry have recognized the value of films for teaching and have utilized them for training salesmen, mechanics, and other personnel, as well as for describing the product to the potential customer. Adequate funds to finance the programs were made available from the regular operating budget and were justified expenses when measured in terms of results obtained.

Teacher-training first essential in use of training films.

The availability of projection equipment and films does not, of itself, guarantee the success of audio-visual aids for instruction. Effective utilization of films for teaching cannot be expected until teachers learn how to use these instructional aids. An in-service training program is not only highly desirable but essential to successful teaching with films in most schools.

Experience indicates that at least ten hours in-service training is a minimum amount of time to develop the key points of teaching with films. These key points are: (1) the contribution of films to instruction, (2) types of audio-visual aids, (3) operation of equipment, (4) techniques of teaching with films, (5) evaluating the teaching film, and (6) sources of material.

While the responsibility for developing such an in-service training program rightly falls upon the shoulders of the local director of audio-visual aids, it should not be assumed that the training program is a one-man performance. The conference method of training with opportunity for all to participate and for many to share the responsibilities of the meetings is recommended in preference to a lecture-type series of meetings (Fig. 44).

The following outline of a series of six two-hour conferences for more effective utilization of teaching films may serve as a pattern for other in-service training programs.

First Session.

1. The role of audio-visual aids for instruction purposes. This discussion can be led either by the local director of audio-visual aids, the superintendent of schools, principal, outstanding teacher, or other person versed and experienced in the use of visual aids as an educational tool.

2. The status of audio-visual aids for instruction. Members of the group are encouraged to describe their experiences in teaching with films.

3. Selection of topics for consideration at future meetings. The conference leader may suggest topics and ask the group to indicate their relative importance. It is reasonable to anticipate that the selection will be similar to suggestions made here for the following sessions.

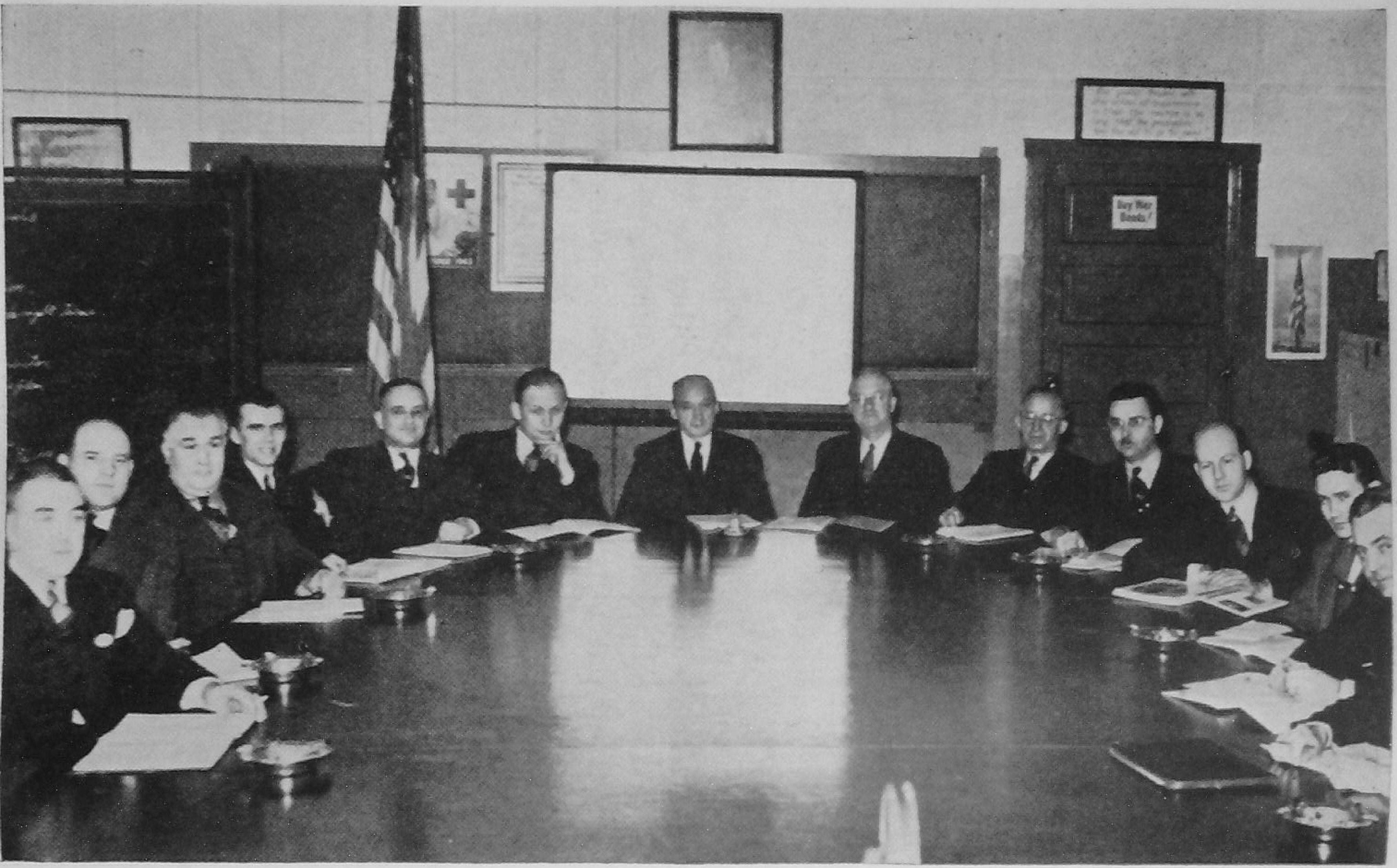

Fig. 44. In-service training programs are valuable for keeping supervisors and instructors up-graded in effective utilizaton of teaching with films.

Second Session.

1. Types of audio-visual aids. Samples of the various types of audio-visual aids are presented and the advantages and limitations of each type are discussed. To be complete, this should include sound and silent motion pictures, sound and silent slide films, miniature and standard slides, and recordings.

Third Session.

1. Operation of equipment. Demonstrations of equipment operation are presented, and suggestions on preventive maintenance are offered. Methods of varying presentation of films are demonstrated. Opportunity should subsequently be provided for further instruction and practice for those who will operate projection equipment.

Fourth Session.

1. Techniques of teaching with films. Members of the group demonstrate good teaching techniques with various types of audio-visual aids. The key points in effective instruction with films are emphasized.

Fifth Session.

1. Evaluating the instructional film. Following a discussion of the factors to be considered in evaluating an instructional film, the group rates several films. Emphasis is placed upon the importance of maintaining evaluation records of all films used in the classroom.
2. Sources of material. Sources of audio-visual aids

and methods of obtaining them are discussed. Establishment or expansion of a school library of films is considered.

SUMMARY

1. More than availability of equipment and films is required for a successful program of teaching with films.

2. In a school situation, a director of audio-visual aids is responsible for maintenance of equipment, administration of the film library, training of projectionists, and promotion of the use of films through in-service training of teachers.

3. Major repairs of projection equipment should be made by skilled service men only.

4. One sound motion-picture projector for each floor of a school building, and a slide-film projector for every other classroom is the ideal distribution of equipment.

5. The sound motion-picture projector should be located permanently in a room especially equipped for projection.

6. In storing films, guard against excessive heat and moisture.

7. In larger institutions, the audio-visual aids committee functions as an advisory group. In small organizations, its members may share the work of operating an audio-visual aids program.

8. Finances for audio-visual aids should be provided as a part of the annual budget of the school, organization, or agency.

9. It is well to consider the purchase of slide films as the first step in establishing a library of teaching films.

10. Performance and price are the two factors to be taken into consideration in purchasing projection equipment.

11. The key points of an in-service training program on teaching with films are: (1) the contribution of films to instruction, (2) types of audio-visual aids, (3) operation of equipment, (4) techniques of teaching with films, (5) evaluating the teaching film, and (6) sources of material.

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