Film-Tech

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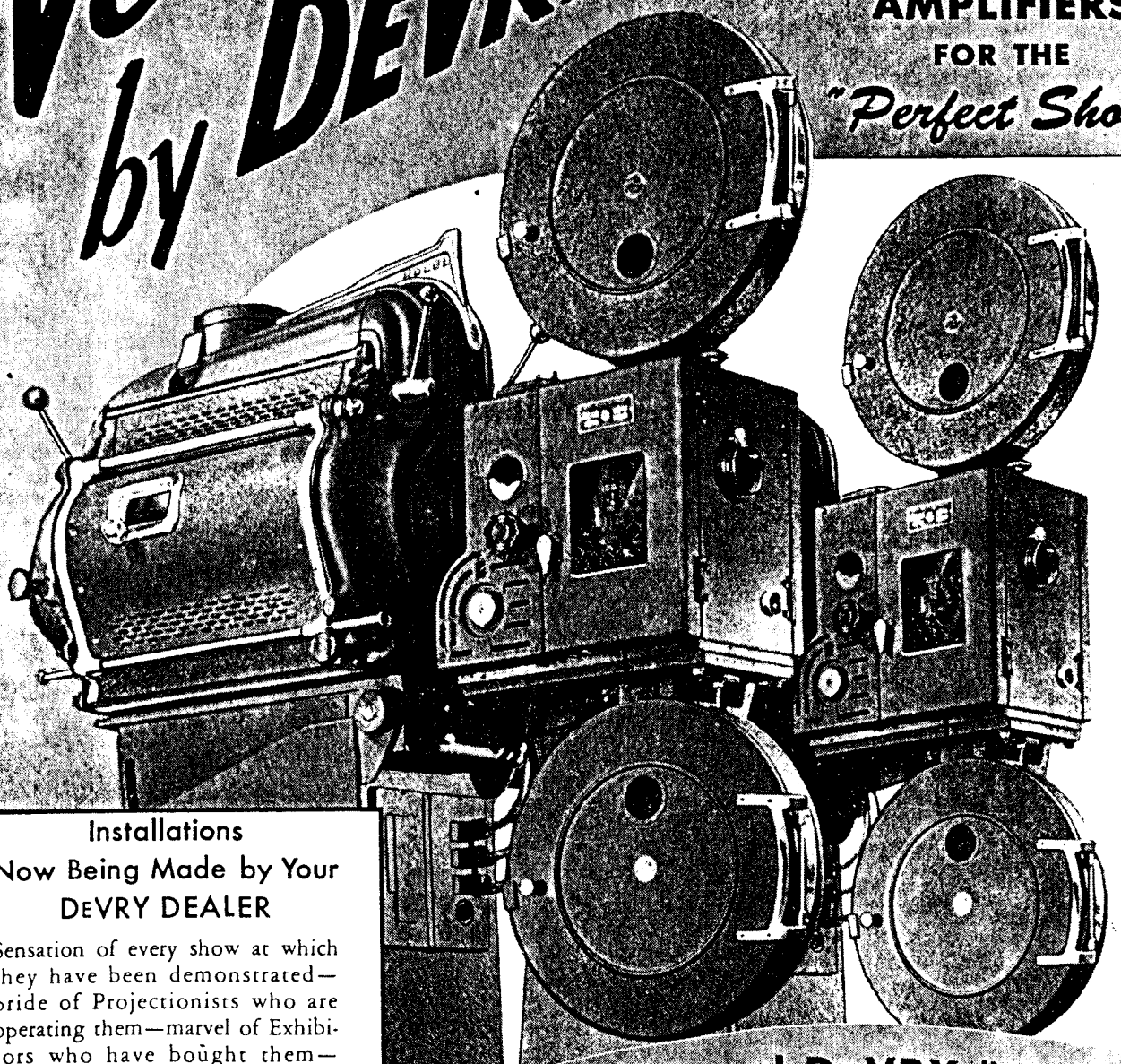
New by DeVRY

Improved PROJECTORS AND AMPLIFIERS FOR THE "Perfect Show"



Sensational DeVRY "12000" THEATER PROJECTORS with Built-In Sound Head & Patented Silent Chain Drive

Installations Now Being Made by Your DeVRY DEALER

Sensation of every show at which they have been demonstrated—pride of Projectionists who are operating them—marvel of Exhibitors who have bought them—DeVRY's new "12000 Series" Theater Projectors and Amplifiers gives you more of what you want to help achieve the "Perfect Show," and for such a moderate investment.

You want to know more about the new DeVRY "12000 Series"—to see it in action. Write for FREE literature and name of authorized DeVRY Theater Supply Dealer—or actual theater installation—nearest you. DeVry Corporation, 1111 Armitage Ave., Chicago 14, Illinois.

In Canada DeVRY Equipment is distributed by Arrow Films, Ltd., 1115 Bay St., Toronto 5, Ontario

Only 5-TIME WINNER of Army-Navy "E" for the production of motion picture sound equipment

DeVRY CORPORATION, 1111 ARMITAGE AVE., CHICAGO 14, U. S. A.

1947

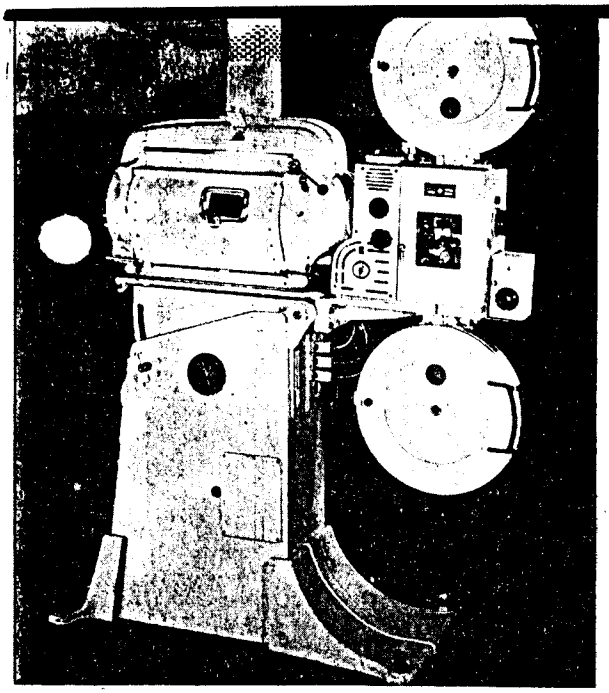


FIG. 1. The new DeVry '12000' 35-mm projector complete, as viewed from the operating side.

Visual components of this new equipment are detailed herein. The sound system will be described in our next issue.

THE DEVRY '12000' SERIES 35-MM SOUND-FILM PROJECTION EQUIPMENT

E. W. D'ARCY
Chief Engineer, DeVry Corporation

THE DeVry "12000" series of 35-mm motion picture projection equipment includes a new design of projector head, new designs of projector base, amplifiers in various powers up to 250 watts, and speakers designed to accommodate theatres of maximum size and ranging down to the drive-in theatre speaker for use within a car.

The projector mechanism head incorporates the sound head components usually supplied in a separate unit. This basic construction allows for great economy and maximum simplification of the mechanical drive for all of the projector functions.

The projector head itself is aligned and secured to a mounting plate in such a manner as to permit rapid replacement in correct projection alignment in case of need, and the switchover from defective head to replacement head can be accomplished very rapidly.

The basic components utilized in the mechanism construction are protected against corrosion or rust by suitable platings or the use of corrosion-resistant material, and assembly of parts to the main mechanism plate is with through-bolting where possible or mechanical locking devices of various approved types.

Basic Mechanism Data

The "12000" projector head is built around a main center mounting plate of normalized aluminum of adequate cross-section to guarantee permanent correct alignment of the optics, sprockets, intermittent mechanism, sound head, *etc.*

All of the power driving mechanism is mounted on the non-operating side of the mechanism main frame and is accessible for service or inspection by a latched, hinged door. Conversely, all of the film handling equipment is mounted on the operating side of the mechanism plate and it, too, is accessible by a latched, hinged door in which a fire-resistant glass port is installed for inspection of the proper operating loops during projection.

The Intermittent Movement

The intermittent movement is of the 90° Geneva cross type, the cam and star operating in an oil chamber. The entire intermittent movement is readily replaceable and is doweled to the framing mechanism so that proper timing may be maintained when removed for inspection, repair or replacement. Lubrication of shaft bearings is by oil canals ground on the shaft, oil feeding from the reservoir. Final end performance of the intermittent is such as to result in a projected picture jump of less than 0.25 per cent at a 100-foot projection distance.

Absolute 100 per cent synchronous framing is accomplished in an ingenious manner, utilizing the chain-drive feature so as to maintain perfect synchronization between the star and cam crossover point and the shutter position. This is accomplished by rotation of the intermittent housing and sprocket around the intermittent sprocket axis through sufficient angle to allow framing over two picture frames.

Synchronization with the shutter is accomplished by synchronizing the rotary movement of the intermittent housing with two vertical moving chain idlers so as to maintain the same effective distance with respect to chain length between the crossover point of the star and the cam and the correct shutter position for 100 per cent synchronous timing. The system is inherently precisely in time at all positions and no vernier timing adjustment is required in order to achieve this 100 per cent synchronization. Fig. 3 illustrates this method.

Film Rails and Shoes

Film rails on which the film rides at the aperture are made of hardened ground stock that is then chrome-plated to reduce frictional resistance, thus allowing the maintenance of adequate tension on the film during projection and insuring a steady projection without undue strain on the film perforations. Edge-guiding flanged rollers are mounted at the top of the film rails and are hardened and of adequate diameter to insure a solid film guide to the correct lateral position. Side sway is also held to less than 0.25 per cent at a 100-foot projection distance.

Film is held securely to the film rails by means of film shoes from a position well above the aperture to the intermittent sprocket. This is accomplished by three pressure shoes, the aperture film

shoe being adjustable in pressure to allow compensation for various conditions of film, and it can be adjusted during projection. The intermittent sprocket pressure shoe holds the film on the intermittent sprocket and guarantees a four-tooth engagement with the sprocket at all times.

Clearances between the individual shoes, as shown in Fig. 4, are of the order of 1/16 inch and this extremely close film contact with the rails guarantees freedom from film slap, thus aiding in the reduction of film jump or weave.

The assembly plate mounting all of the four tension shoes is removable by a single knurled thumb nut for cleaning purposes and is positioned by guide pins to insure correct replacement alignment in the operating condition. All springs used for the gate assembly are tested thoroughly as to tension.

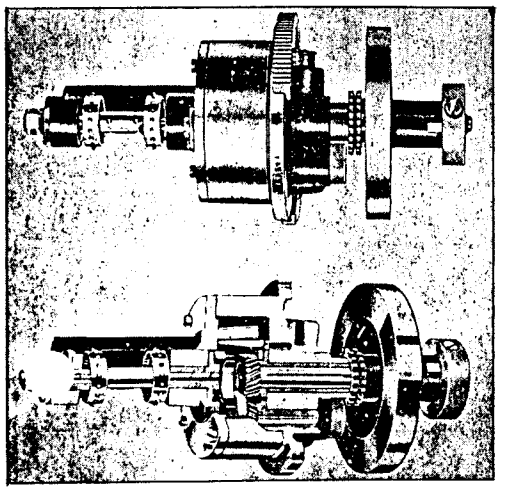
Power and Drive Data

All power is transmitted in the "12000" series of projectors by means of silent chain drives which accomplish a positive mechanical drive system, additionally allowing rapid replacement of worn assemblies without the necessity of skilled mechanical craftsmanship.

The chain drive system, as such, has been field-tested throughout a 15-year period and has certainly proven its dependability and long life in actual operation, more than 10,000 projector mechanisms having been made with this drive system, to the users' complete satisfaction.

The main driving motor normally supplied is a 1/8 h.p. split-phase, self-starting, single-phase induction unit, statically and dynamically balanced, and so adjusted as to starting characteristics that no undue strain is placed on the film or mechanism during acceleration to operating speed. It will function satisfactorily between voltage variations of 110 to 120 volts, and within this range operates with less than ½ per cent variation in the mean speed of the film.

FIG. 2. DeVry '12000' intermittent movement.



Other special purpose motors are available for the operation of the projector under all field conditions from 25 to 100 cycles. This line of A.C. motors is implemented by governor-controlled types of universal characteristics which guarantee correct performance of the projector over wide voltage variations such as are encountered in poorly regulated power areas, both domestic and foreign. In all cases motors are adjusted as to acceleration characteristics to equal that of the standard motor normally supplied.

Barrel-Type Shutter System

The shutter utilized in the "12000" series of projectors is of the barrel type, running at 1440 r.p.m., and is of rugged construction, with its driving shaft extended through a bearing housing to the rear of the mechanism. The film shutter assembly is supported on roller bearings mounted in the bearing housing assembly, silicone high temperature grease being used as a lubricant. The shutter is mounted between the light source and the aperture and is of slightly more than 50 per cent transmission efficiency.

Of course, the inherent advantage of the barrel shutter with reference to double light cutoff is well known with respect to flicker reduction.

The fire shutter assembly is integral with the shutter and functions by means of centrifugally-operated weights with rawhide inserts which transmit power between the film shutter main shaft assembly and the fire shutter shaft. This arrangement works infallibly under all conditions of temperature or oil seepage.

The fire shutter is set to open or close at a film velocity of 50 feet and its roller bearings are silicone grease-sealed type capable of withstanding high temperature operation.

All sprockets are hardened and ground and are in accord with the standard dimensions of the Society of Motion Picture Engineers.

DeVry Projection Lenses

Projection lens focusing is accomplished by a micrometer screw located outside the projector case with the lens focus lock located inside the projector case, assuring permanent, accurate lens focusing. The focusing mount lens holder barrel extends through the projector case so as to allow the clamping of a preset focus ring onto the objective lens, allowing rapid replacement in focus registry when lens removal for cleaning is required.

The projection lens focusing device is screw-driven and slides on a rod of adequate section in a straight line motion, guaranteeing no shift of picture position on the screen during all focusing operations.

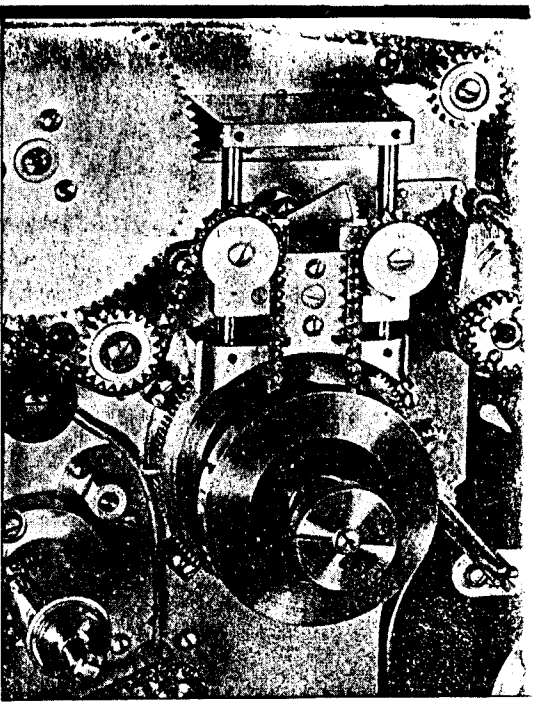


FIG. 3. '12000' drive mechanism.

DeVry projection lenses are supplied in Series II, in all focal lengths from 3½ to 9¼ inches and are coated so as to achieve maximum efficiency in light transmission. The formulae on which these lenses have been designed have been time-tested through many years of experience in the manufacture of high-speed, high-resolution projection lenses. The lenses are free from halo effects, and suitable interior lens barrel blackening, with the addition of coating, guarantees an efficient, high-contrast, sharp picture.

The magazines are made of sheet metal spinnings mounted on cast aluminum support frames in which is mounted the fire trap roller assembly. This assembly is comprised of two floating hardened and ground rollers, gravity-held against a single accurately-positioned main trap roller. Clearances between rollers and film is held to less than 0.005 inch, guaranteeing effective fire trap action.

Feed reel holdback tension is adjustable by means of a knurled tension nut compressing the holdback spring against a washer-type brake clutch assembly.

Takeup power is transmitted through a chain drive from the projector mechanism to the constant-torque clutch assembly, mounted on the takeup spindle shaft. Takeup film tension is of a designed value and is not field-variable. Torque uniformity is such as to accommodate any reel size up to 2,000 feet capacity.

Film magazines and fire traps have been approved by the Underwriters' Laboratories and the various state regulatory agencies.

Projector lubrication is by both oiling

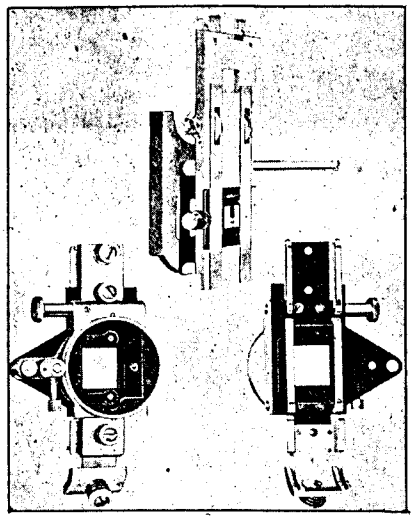


FIG. 4. Rail and shoe assembly.

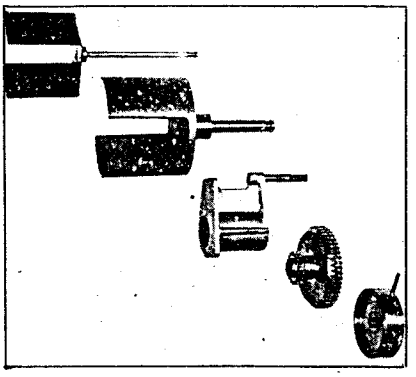


FIG. 5. Fire shutter assembly.

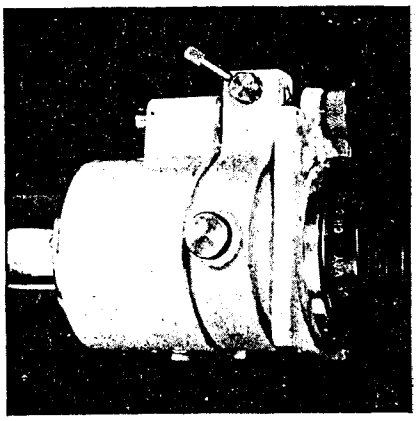


FIG. 6. Lens focusing mount.

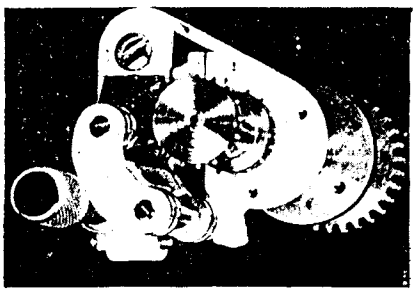


FIG. 7. Sprocket pad roller.

and greasing. A single-point visible oiling system serving the oiling requirements and Alemite fittings are used for the greasing points. The system is of a gravity-feed visible reservoir-type and feeds all bearing assemblies requiring the lighter type of lubrication.

Silicone grease is used in the shutter assembly and this is supplied every 500 hours by means of an Alemite gun.

Sprocket Pad Roller Assembly

The sprocket pad roller assembly is mounted integrally with the sprocket shaft housing assemblies and its operation is that of a lever arm, its final position determined by a spring-motivated plunger pressing into adjustable registry points located on the sprocket shaft housing assembly. The pad rollers themselves are removable, for cleaning or replacement, from the operating side of the projector by the removal of the pad roller operating knob which releases the front pad roller bearing plate.

The pad rollers are made of hardened and ground steel and are set so as to allow ample clearance with the sprocket teeth. The operating means for the pad roller is of adequate size to insure long life and ease of operation.

All projector switching is accomplished in a terminal box located at the top of the mechanism case; these facilities consist of a motor switch, framing light switch and changeover button. This location places all changeover operations within the span of a hand, thus eliminating the spread-out switching method so commonly used, with its attendant operating difficulties.

This method of switching was incorporated at the request of many projectionists who felt that something could be done about eliminating the two-handed-one-foot requirements of the conventional projector changeover operation.

Air Blast Cools Head

An adjunctive ventilation unit is supplied for high-intensity arc operation, acting to cool both the film rails and film to such a degree as to render unnecessary the use of a heat filter and thus permit maximum light on the screen. The temperature of the rails under 80-ampere high-intensity projection conditions is reduced to less than 120° at the end of a 20-minute period of operation.

Ventilation is accomplished by means of a pressure blast of air and an effective means of exhausting same. An air blast is directed across the aperture, film rails and film in such a manner that the film is not disturbed during projection; the heated air is then carried away to a location where the head exhaust fan is effective. This additionally removes heat radiated from not only the aperture rails and baffles, but from the shutter as well.

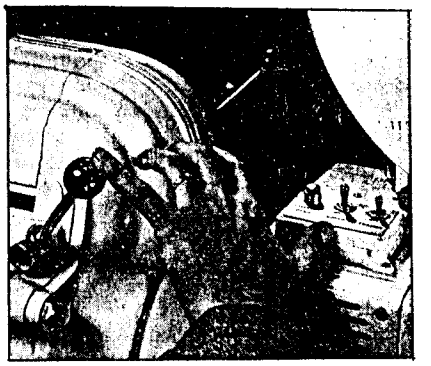


FIG. 8. Centralized finger-tip controls.

Film cooling is quite effective by this means, and a substantial increase in film life is obtained, as compared with conventional methods of film projection.

The head ventilation is supplied as an adjunctive unit, complete in itself and readily attachable to all "12000" projector heads.

[NOTE: The second and concluding article of this series, describing the sound system of the DeVry "12000" equipment, will appear in the next issue.—ED.]

Superior German Mirrors Are Revealed by U. S. Bureau

Semi-transparent mirrors that absorb only from one to two per cent of the incident light and transmit light without coloring it perceptibly were manufactured in Germany during the war, according to a report now on sale by the U. S. Dept. of Commerce. The report describes visits to the W. C. Heraeus Co. and the Siemens Schuckert Works to obtain data on German vacuum evaporation methods for producing first-surface mirrors, semi-transparent mirrors, and non-reflecting films.

Heraeus manufactured first-surface mirrors that were resistant to water and abrasion and did not corrode in air. The "Steinheil-2"-type mirrors, consisting of a film of titanium dioxide on a glass base, had a coefficient of light absorption of about one per cent. The maximum reflectivity attainable in these mirrors reached 42 per cent. Light passing through them acquired a barely perceptible pink tint.

Used Vacuum Evaporation Process

The Heraeus company used vacuum evaporation methods that produced first-surface rhodium-coated mirrors capable of reflecting 10 to 13 per cent more light than similar mirrors made in the U. S. by electrolytic deposition. The Heraeus mirrors had a maximum reflectivity of 85 per cent; the American mirrors, 72 to 75 per cent. The report attributed the superiority of the German mirrors to the fact that vaporized or gaseous rhodium is purer than electrolytic rhodium.

The report contains two special appendixes: one describing the work instructions for producing thin mirror coatings according to the Steinheil processes; and the other, the vacuum evaporation method developed by Siemens Schuckert Works and used by Heraeus.

Address orders for report (PB-4158, "German Vacuum Evaporation Methods") to O. T. S., U. S. Dept. of Commerce, Washington 25, D. C. Cost is: for photostat, $3; microfilm, 50 cents; paper, 43 pages including illustrations, $1.50, with checks payable to Treasurer of the U. S.

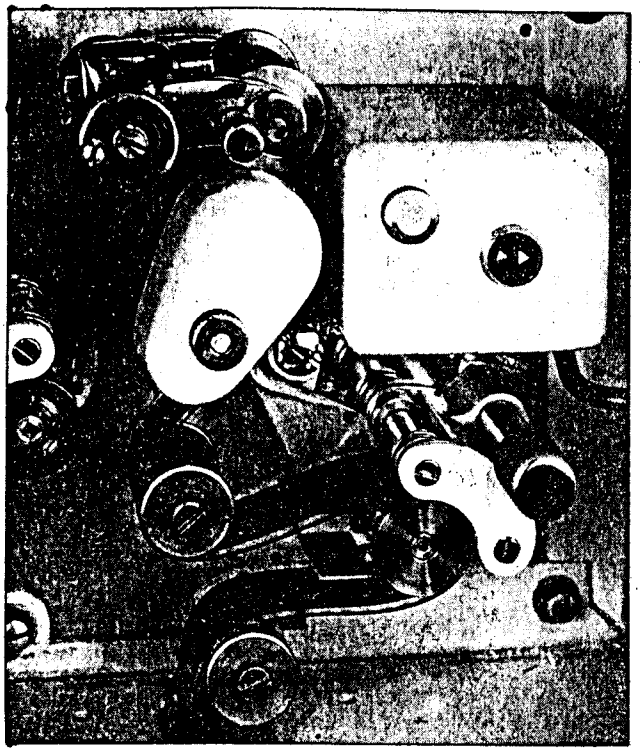


FIG. 9. Showing the threading path in the soundhead of the new DeVry '12,000' projector.

Soundhead, projector base and changeover unit are described in this second article of a series concerning the new

Exciter Lamp:
BSS/BSB
6 volt, 1 amp

DeVRY '12,000' SERIES 35-MM SOUND-FILM PROJECTOR

By E. W. D'ARCY
Chief Engineer, DeVry Corp.

THE soundhead portion of the DeVry "12.000" series projector is built around an internally stabilized flywheel filter system utilizing a coupling fluid relatively uniform in its performance over wide variations of temperature. This rotary stabilizer functions in conjunction with the film loops as established for its correct operation so effectively as to reduce speed variations or flutter to less than 0.25% of the mean operating speed.

The mass weight and the weight ratio between the shell and its internal inertia wheel is such as to allow full stability of filtering to be reached in less than five seconds. In explanation of its filter performance, the film is isolated from intermittent sprocket fluctuations by a combined isolation and feed sprocket feeding the film to the sound drum, with its associated scanning components. The holdback sprocket for the takeup reel serves a dual purpose as the sound sprocket.

The film path between this combined sound and takeup sprocket passes around an idler roller in such a manner as to form two film spring elements of great effectiveness in increasing filter efficiency. The entire bearing assembly for the sound drum and flywheel combines into a readily replaceable unit featuring again rapid equipment serviceability. Fig. 9 illustrates the compactness and field serviceability of the entire assembly.

Film lateral adjustment is obtained by movement of the pressure pad roller holding the film in secure contact with the sound drum laterally and providing a means to secure this adjustment permanently by a locking screw. The pad roller additionally is supported on conical bearings which guarantee long life, a low frictional impedance, and low mechanical noise factor.

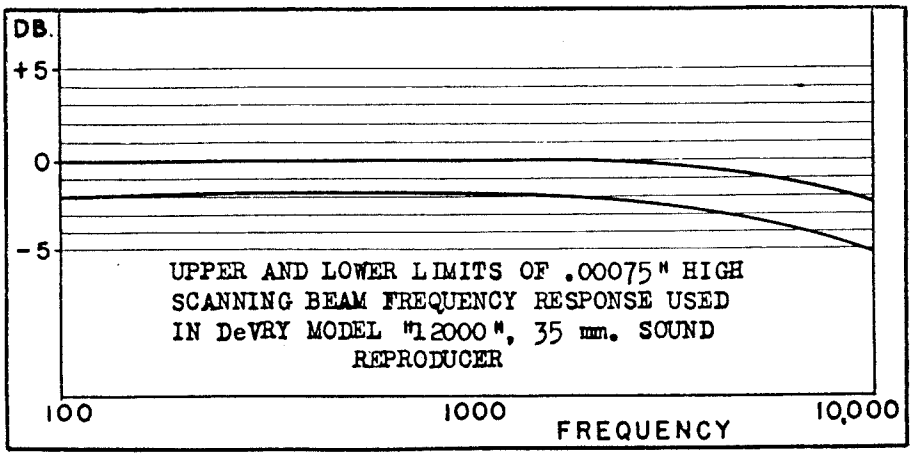
An additional adjustment is supplied in the pad roller bracket assembly for adjusting the tension upholding the film on the sound drum in such a manner that a component of force exists forcing the film to guide against the sound track side of the pad roller flange. This eliminates the necessity for splitting the pa l roller and applying direct pressure to the film for guiding.

The sound optical system is of a type utilizing a cylindrical reduction lens system with the photoelectric cell located inside of the sound drum. This allows full use of all of the illumination transmitted through the film and eliminates the necessity for condensers or mirrors between the film and photocell. Fig. 9 shows the location of the components.

A 6-volt, 1-ampere lamp of prefocus type is utilized for the light source and is held in fixed relationship to the cylindrical reduction lens system. It eliminates exciter alignment problems and guarantees rapid, correctly registered replacement of lamps in case of burnouts.

The cylindrical reduction lens system is adjustable from the front of the projector mechanism both as to focus and

FIGURE 10



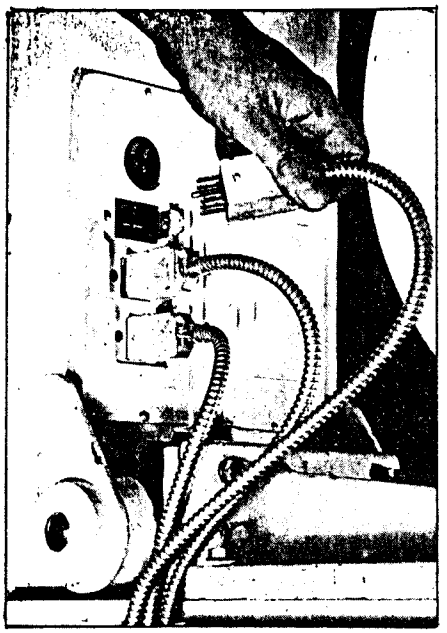


FIG. 11. Showing centralized plug-in wiring system in projector base.

azimuth. As may be seen, all mechanical parts, slit system, photocell and exciter lamps are readily accessible from the front of the projector for replacement or inspection.

The photocell used is of the type CE25 and is protected from electrical disturbances by adequate shielding. The photocell wires are led to the outside of the projector case by a low-capacitance neoprene type cable, where it terminates in either a preamplifier or, in some cases, to an extension cable for the wall-type of amplifier.

In performance, the optics allow the recommended Academy of M. P. Arts & Sciences curve to be produced with a noise level, projector operating, of less than 60 db below normal operating power level. A frequency response curve illustrating the over-all performance of the soundhead is shown in Fig. 10. This curve is of slit performance alone and illustrates the frequency response obtainable with the cylindrical reduction lens system.

Projector Base Data

The projector base supplied as standard with the "12000" series equipment is available in either the table-training or non-training types. It consists essentially of a welded frame to which front and rear mounting base castings are attached. The center of gravity and weight is so adjusted that a balance point for the completely assembled projector falls behind the table pivot bar and underneath the arc lamp.

Adjustment of the projector as to azimuth is obtained by a hand wheel mounted inside the base frame and is accessible by removal of a side panel. Bases are locked in operating position by two hand wheels on either side of the base main frame, locking into the table apron, which extends downward in the mechanism frame housing. The table consists of a front and rear casting of adequate section and is available in both training and non-training types. The arc, rectifier starting switch and carbon respository are mounted in the rear of the base.

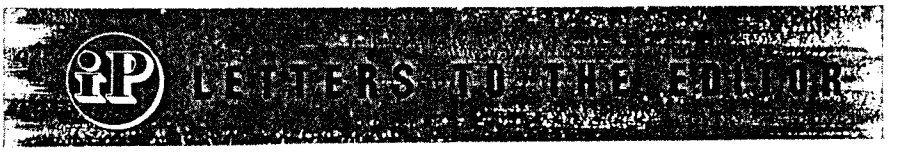
All wiring is brought to a terminal box located in the front of the base, which is accessible by the removal of its cover plate (Fig. 11). A trouble light outlet receptacle is mounted directly below the terminal box. Plugs are mounted in the mechanism base, facilitating rapid disconnection of the projector head itself.

The front table casting is removable from the rear table by bolts, and other front tables are supplied meeting various conditions of projector base usage. The base is four-point leveling, and when levelled is held to the projection floor by expansion bolts, *etc.*, which are spotted through the leveling screws themselves.

The exciter lamp supply is mounted in the base itself and consists of a selenium rectifier unit, rapidly replaceable, with good regulation and low ripple content.

Changeovers supplied with the projector head are of the "Zipper" type; they may be operated manually from either side of the projector for emergency usage in case of solenoid failure. Projector heads are so wired that no master projector is required and straightforward conventional changeover wiring is used, with the exciter lamps being utilized for the sound changeover, and with photocell outputs and preamplifiers being in an operating condition at all times. Facilities are available in the base terminal box for the attachment of floor foot-switches in case that should be preferred over the press-button available in the projector head.

[NOTE: Complete data anent the "12,000" series amplifiers and speakers will appear in an early issue.—ED.]



To the Editor of I.P.:

Regarding Mr. Benson's contribution to the discussion of acetate film stock in your July issue†: I can't see Benson's point of view with respect to the doleful happenings if he had not had his own acetate cement on hand. All he need have done was to insert a piece of blank nitrate film at the break, as acetate will bind to nitrate with regular cement.

I have been a projectionist for 40 years, and it would take more than a film break to stop my show. If I am running an acetate print and a few patches come apart, I cut about four frames of nitrate film and splice the acetate to it—*using ordinary cement.* I haven't had a patch pull loose on me yet. If no blank film be available, snip a piece from the tail end of a short or any other subject you have on hand—anything to keep the show going.

FRED LUNDY

Brentwood Theatre, Jacksonville, Fla.

Indicating that our British brethern are also having difficulty with acetate prints is the appended representative communication from a projectionist to *Ideal Kinema*, film trade paper:

"Before the recent run of a Magnacolor print we received a card from the renters stating that the only solution which would stick this kind of print was glacial acetic acid. Upon examining the print I found that although the projectionist on the prior run had scraped *both* surfaces, each splice came apart at the slightest pressure. The suggested splicing solution was useless, as was ordinary cement.

"However, after trying unsuccessfully for 20 minutes to splice this film, I tried inserting a frame of white spacing between each splice. This did the trick, and we ran the print without trouble. The white spacing, of course, does occasion a flash on the screen, but this is preferable to a blank screen resulting from a splice coming apart.

"We ran numerous acetate prints during the war. They always created a terrific noise and it was difficult to maintain a steady image on the screen. The Magnacolor print behaved in exactly the same way, and it struck me that perhaps it was printed on a safety base."

An opposing view is taken by another *I. K.* subscriber, even when using regular cement:

"After scraping I always roughen the film with a strip of fine glass-paper. The splicing of acetate film is not a major operation; the point to remember is that the film should be scraped *dry*, that is, without moistening the film."

The *I. K.* also offers a formula for acetate film cement submitted by a "leading sub-standard film worker":

Acetone	20 cc.
Chloroform	4 cc.
Glacial Acetic Acid	2 cc.

Dissolve into this 2 in. clean 16 mm. base. Do not keep in metal cans; use a stoppered bottle. Keep brushes separate from those used for normal cement.

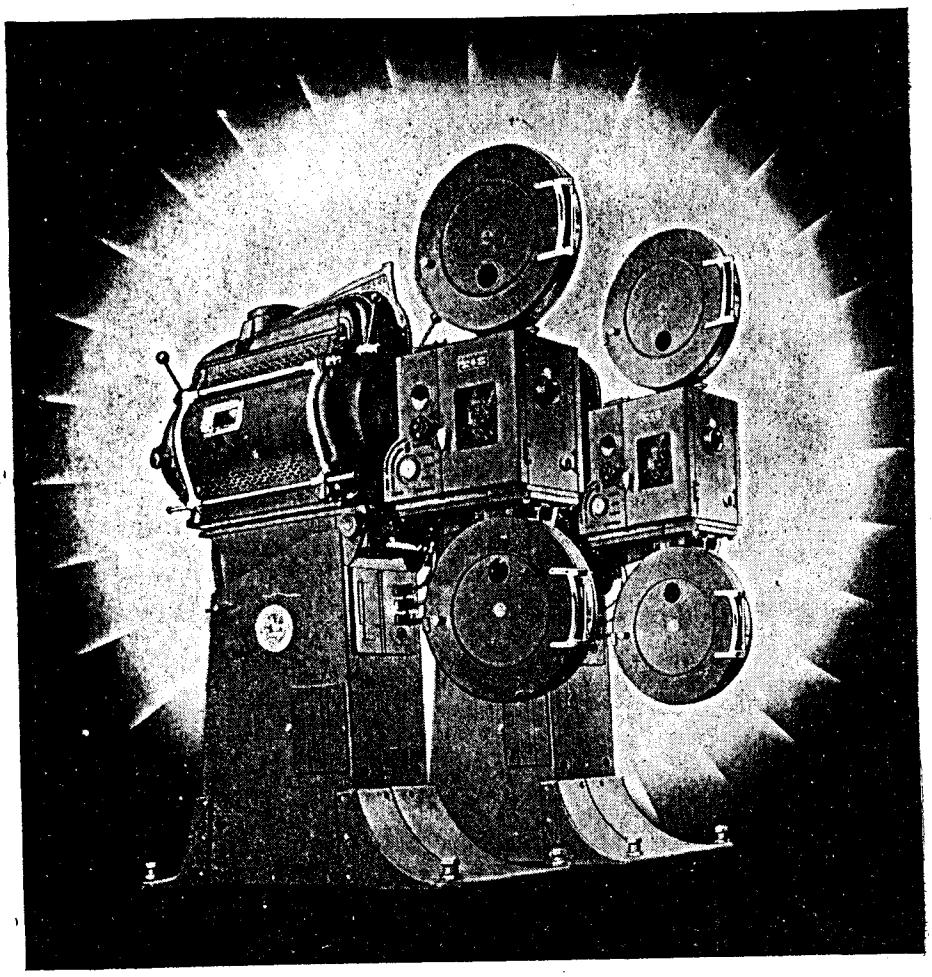
To the Editor of I.P.:

Two Roy Rogers features (Republic's Trucolor) and several other 35-mm features and shorts have proven the new

(*Continued on page 37*)

† "Letters to the Editor," I. P. for July, 1947, p. 19.

NOW--for that PERFECT SHOW-



The New DEVRY "12000 SERIES"

Projectors and Amplifiers

You never knew you could get so much of what you want for so little as you get in the *new* DeVRY "12000." They're the sensations of every show at which they have been previewed. "The biggest equipment news," Exhibitors say, "since the talkies!" Projectionists call them a major contribution to "the perfect show."

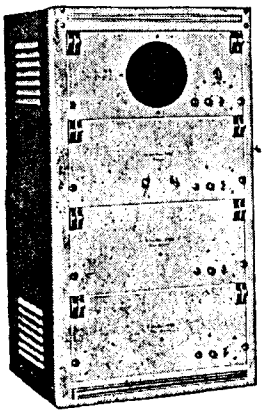
Now Being Installed

With Sound Head and Picture Mechanism in *one complete unit*— . . . With patented Silent Chain Drive . . . With warperfected Rotary Sound Stabilizer and a host of other major refinements in design, manufacture and finish—DeVRY's new, sensational "12000 SERIES" theater projectors and amplifiers are now being installed in the world's finer theaters.

See these beautiful, rugged, streamlined projectors at the Authorized DeVRY Theater Supply Dealer nearest you. Check them for *stamina, dependability, simplicity, serviceability*—for *low cost maintenance*—and for *performance.*

DEVRY'S NEW "12000 SERIES" AMPLIFIERS Meet Projectionists' Most Rigid Specifications

There Is a DEVRY for Every Size and Type of Theater . . . From 20 to 120 Watts . . . and UP



. . . Projectionists! Exhibitors! Until you've heard sound projection via DeVRY's "12000 SERIES" Amplifier, you have not heard today's closest approach to your fondest goal—"the perfect show." And PROJECTIONISTS: With DeVRY Equipment, everything you need to check, service or replace, is "easy to get at," through our Unit Service Plan.

Here's Another Major Equipment Development . . .

DEVRY'S IN-CAR SPEAKER

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