T. ARMAT.

PROJECTING MACHINE.

APPLICATION FILED JULY 22, 1916.

1,259,067.

Patented Mar. 12, 1918.

2 SHEETS—SHEET 1.

Fig. 1.

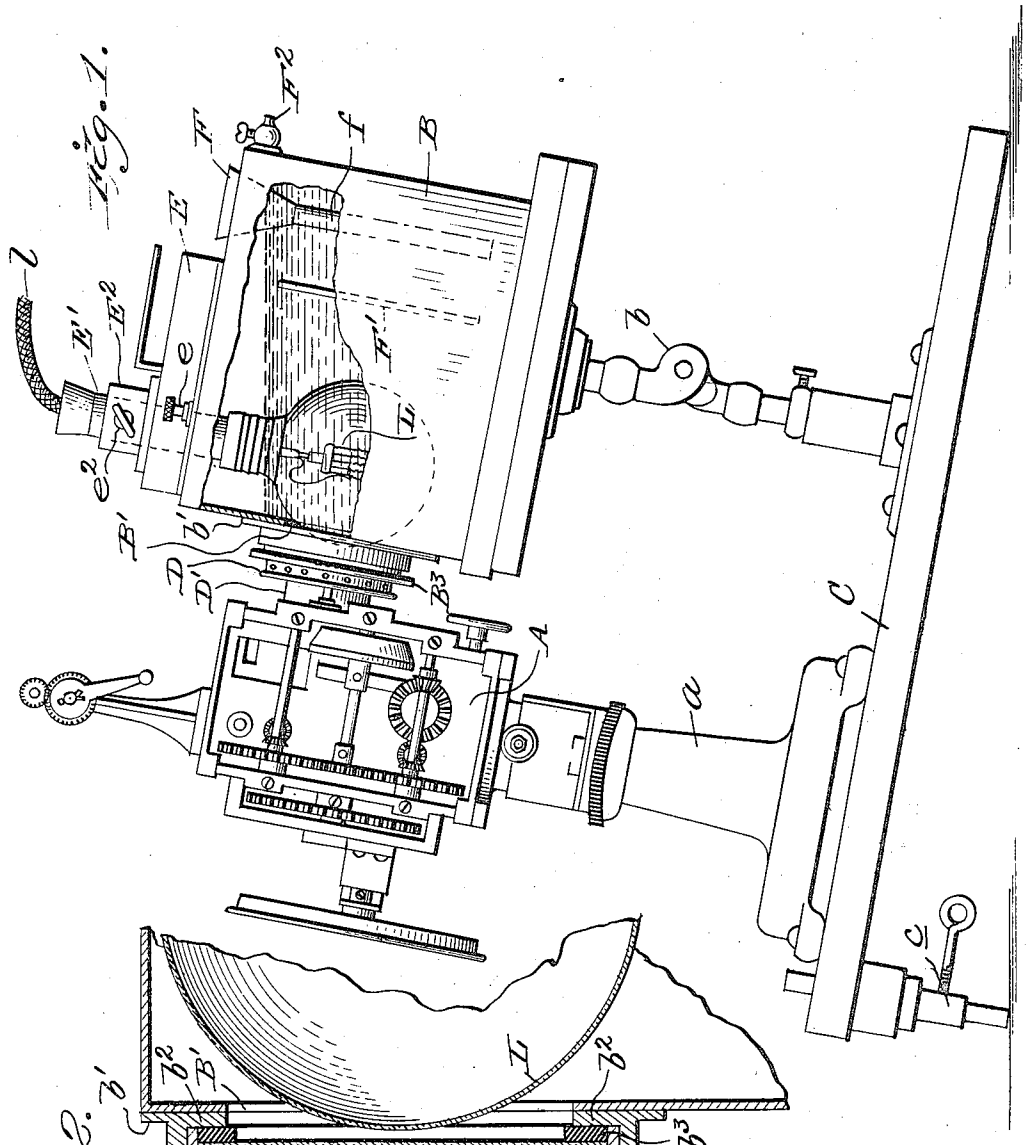
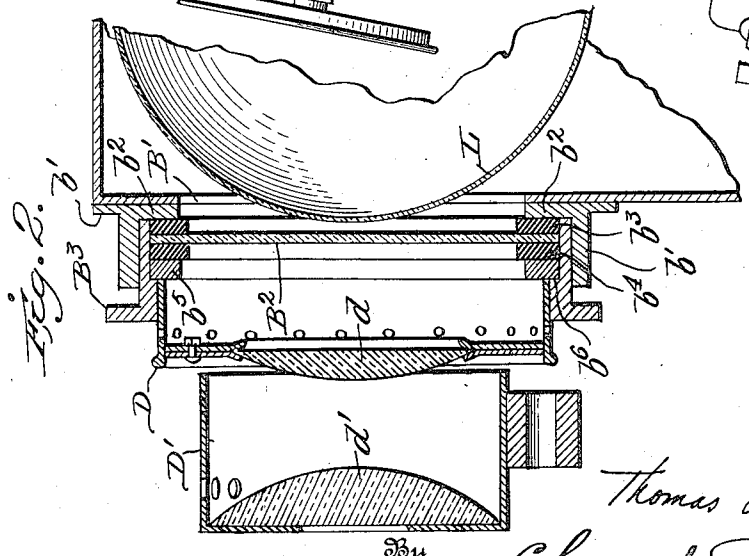


Fig. 2.



Inventor

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By

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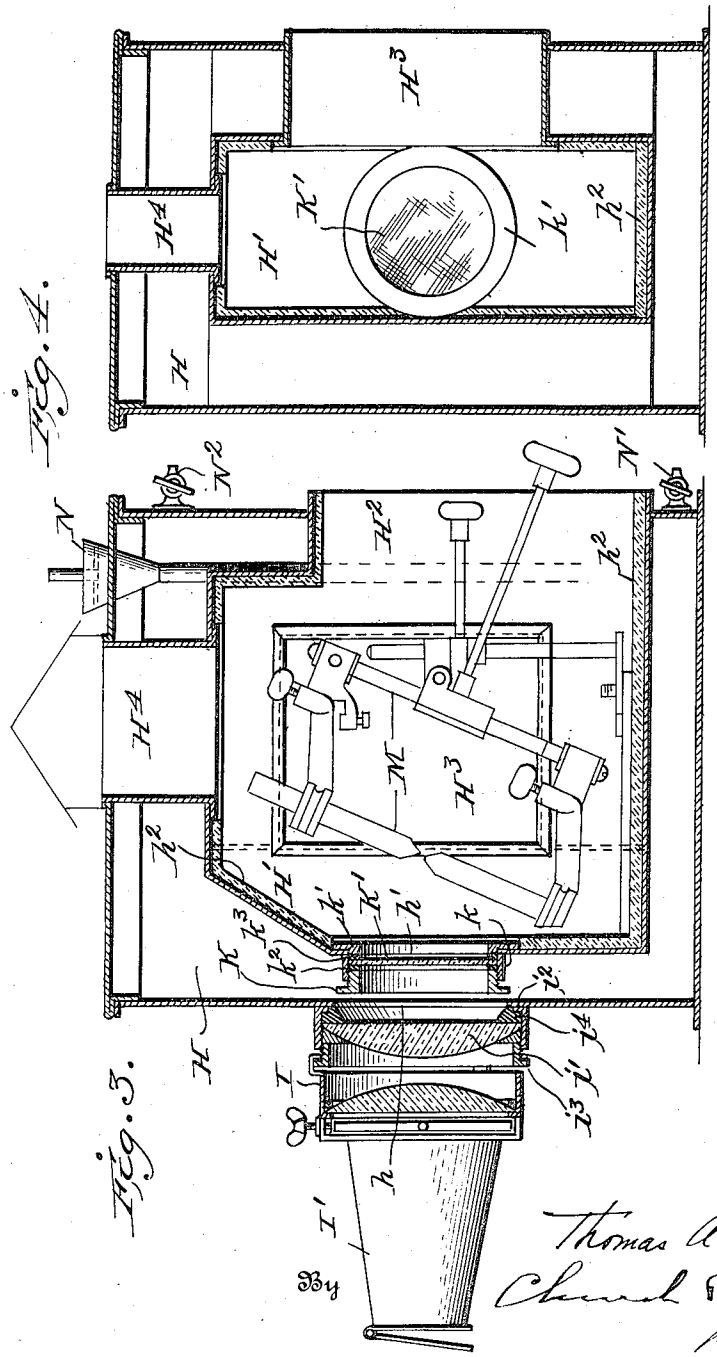


Fig. 4.

Fig. 3.

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UNITED STATES PATENT OFFICE.

THOMAS ARMAT, OF WASHINGTON, DISTRICT OF COLUMBIA.

PROJECTING-MACHINE.

1,259,067. Specification of Letters Patent. Patented Mar. 12, 1918.

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To all whom it may concern:

Be it known that I, THOMAS ARMAT, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Projecting-Machines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to heat absorbing means, especially adapted to motion picture and other projecting apparatus where a beam of light is projected through an inflammable screen.

The primary object of the invention is to absorb the heat rays from the light without appreciably affecting the light rays.

By the present invention, the necessity for fire shutters and other fire protection in motion picture apparatus is removed. It obviates the necessity for long title runners. Its advantages in microscopic work will readily suggest themselves. By the employment of this improvement in motion picture projection, the film may be held at rest in the focus of the light as long as may be desired, so that any picture may be examined on the screen at leisure, without the least danger of setting fire to the film. The present practice with title or announcement runners is to run them through the machine at the rate of about a foot a second, so that an announcement that would have to be given half a minute to be read would be about thirty feet long, whereas, by employing my improvement, it need not be longer than a foot or two, and it could then be held on the screen not merely half a minute, but as much longer as could possible be desired.

A full understanding of the invention will be attained from the ensuing detailed description when taken in connection with the accompanying drawings which illustrate a structural embodiment of the invention in a preferred form. The novel features will be pointed out in the claims at the end of the specification.

In the drawings:—

Figure 1 is a side elevation partly in section of a projecting apparatus embodying the present improvements.

Fig. 2 is a detailed fragmentary longitudinal section of the forward end of the lamp receptacle.

Fig. 3 is a longitudinal section of a lamp receptacle of a modified type.

Fig. 4 is a transverse section of the device illustrated in Fig. 3.

Like characters of reference in the several figures indicate the same parts.

Briefly stated, the principle underlying my invention and which is embodied in the devices illustrated in all the figures, is to absorb the heat rays, at the source, so to speak; in projection work before the heat reaches the condensers. I have found that it is possible to do this by interposing a comparatively thin wall of water or other heat absorbing media, between the light and the condensers, provided the wall of water is connected with a larger body so that the heat it absorbs may in turn be absorbed and carried away by the larger body of water, or other medium, with which it is connected.

For the above purpose I interpose in the line of projection behind the condensing lens and between the lens and the source of light a body of heat absorbing liquid, such as water, which is preferably in direct communication with a body of similar liquid surrounding or substantially surrounding the source of light. By actual experiment I have found that a twenty-five ampere arc lamp inclosed in a water jacketed lamp house, as illustrated at Fig. 3, the rays from which were condensed on an ordinary moving picture film for half an hour, had no appreciable heating effect on the film and it raised the temperature of less than a third of a cubic foot surrounding the lamp house only to 100 degrees at the bottom and 110 degrees at the top. Had the light from this lamp been used in the way it has heretofore been universally employed it would have set fire to the film in a few seconds.

While it will be obvious that many different arrangements may be devised for carrying out the above mentioned improvement, I preferably employ the forms of apparatus illustrated in the accompanying drawings. Referring now more particularly to Figs. 1 and 2, the projecting apparatus A and a lamp receptacle B are respectively provided with suitable adjustable pedestals *a* and *b*, whereby they may both stand on a base or support C. The latter may be raised and lowered to vary the angle of projection of the pictures by means of an adjustable foot or rest *o*. The projecting apparatus em-

bodies, as will be understood, the usual projecting lenses, framing device, and means for feeding the film strip across the line of projection. Any preferred type of projecting apparatus may be employed in connection with the present improvements, since the projecting apparatus forms no part of my improvements. The lamp receptacle B is located at the rear of the projecting apparatus and embodies a substantially rectangular casing having a light opening B′ in its front wall located in the line of projection. In front of the opening B′, an open cylindrical cap b' is secured to the outer wall of the casing. This cap is provided with an inwardly extending annular flange b^2 against which is supported a rubber or other water tight ring b^3. Between said ring b^3 and an outer ring b^4 of similar material is located a glass window B^2 which covers the light opening B′. A metal ring b^5 rests against the outer rubber ring b^4 and the three rings and the glass window are clamped in position by a second cylindrical cap B^3 which extends within the cap b' and is provided with an annular shoulder b^6 resting against outer ring b^5. The mount D containing the rear condensing lens d is supported within the cap B^3. The front condensing lens d' is located within a mount D′ supported on the rear of the projecting apparatus A.

Mounted on the top of the lamp casing B is a lamp mount E adapted to be adjusted thereon by a screw e. This mount is provided with a vertically extending bore for the reception of a water tight tube E′, the latter projecting above the top of the mount E and surrounded by a cap E^2 mounted on the top of the mount. A screw e^2 in the cap E^2 permits upward and lowering movement of the tube E′ relatively to the mount. Supported at the lower end of the tube is an incandescent lamp L, the circuit wires of which extend upwardly through the tube, as indicated by the cable l. Preferably, the lamp L is located directly behind the light opening B′ and quite close up to the glass window B^2, as shown more particularly in Fig. 2. The position of the lamp L may be adjusted as desired by manipulating the screws e, e^2 and moving the mount E and the tube E′ up and down in the block. It is essential that the base of the lamp be protected from the water by a water tight tube extending above the water level.

Extending into the casing or tank is a funnel F having an elongated spout f, which may be provided with a short hose connection for use when running water is employed. The casing may be filled with water through said funnel, and water is poured in until it completely submerges the bulb of the lamp L. The water extends around in front of the lamp and up against the glass plate B^2, leakage being prevented by the rubber rings on each side of the glass. Preferably, the water is circulated in the tank, and this is effected by placing in the tank a baffle plate F′. A cock F^2 permits the water to be drawn off, as desired.

With the above construction, the beam of light must pass through the water and next the glass plate before it reaches the condenser lens. This, as before stated, has the effect of absorbing or extracting practically all of the heat rays from the light without affecting appreciably its illuminating power. The absorption of heat is enhanced by reason of the fact that the lamp is entirely surrounded by water. When the light reaches the film its heating power is so reduced that the film may remain stationary in it indefinitely, without catching fire.

In the form shown in Figs. 3 and 4, the light receptacle placed behind the projecting apparatus is constructed for use with arc lamps. This receptacle embodies an outer chamber H and an inner chamber H′. The outer chamber is provided in its front wall with a light opening h in the line of projection and the inner chamber with an alined light opening h' also in its front wall. Mounted in the outside of the front wall of the outer chamber is a condensing lens I. The inner member i' of the lens I is held firm by a cap i^3 against a rubber ring i^4, which in turn seats on a flange i^2 carried by a cylinder i^5 projecting from the front wall of the outer chamber. This construction renders the outer chamber water tight. In front of the condenser lens is mounted a light cone I′. Projecting from the front wall of the inner chamber and surrounding the light opening h' is a cylindrical member k into which is screwed a cylindrical cap K. A flanged ring K′ is seated in the opening h' and the cap K holds against said ring k' a glass window K′ located between rubber rings k^2, k^3.

The arc lamp apparatus M is mounted on the inner chamber H′, the walls of said chamber being preferably provided with an insulating lining h^2 to prevent short-circuiting of the current.

To permit ready access to the lamp M the inner chamber is provided with rearward and sidewise extensions H^2, H^3 intersecting the walls of the outer chamber. Said inner chamber is also provided with a chimney H^4 extending through the top of the outer chamber, as shown.

Water may be poured into the outer chamber through a funnel N projecting into said chamber through the top. In practice, sufficient water will be introduced until the sides of the inner chamber are substantially surrounded by water and the water completely fills the space between the condenser lens and the glass window in the inner chamber. The light rays from the arc lamp pass

first through the glass window and then through the water, before they reach the lens. A cock N′ permits the water to be drawn off as desired. It will be obvious that a circulation may be maintained by keeping the top cock N^2 open and maintaining a continuous flow through the funnel.

I am aware that cells containing water, alum water, etc., have heretofore been employed as heat absorbers in projection work.

What is claimed is:

1. A projecting apparatus embodying a condensing lens, a source of light and a water chamber substantially surrounding said source of light and extending between the same and the condensing lens.

2. A projecting apparatus embodying a condensing lens, a receptacle for a liquid heat-absorbing medium located in rear of said lens, and a chamber for a source of light located within said receptacle, whereby the heat-absorbing medium is interposed between the chamber and the condensing lens, and said chamber is substantially surrounded by said medium.

3. A projecting apparatus embodying a condensing lens, a receptacle for a liquid heat absorbing medium located in rear of said lens, a chamber for a source of light located within and substantially surrounded by the receptacle whereby a body of heat-absorbing medium will be interposed between the source of light, condensing lens and walls of the receptacle, a source of light, and means accessible from the exterior of the receptacle for adjusting the position of the source of light with respect to the condensing lens.

4. In a projecting apparatus, the combination of an incandescent electric lamp, condensing and projecting lenses, and means for surrounding the lamp with a liquid heat absorbing medium adapted to absorb the heat rays from the lamp before they reach the condensing lens.

5. In a projecting apparatus, the combination of projecting and condensing lenses, a water tank behind the condensing lens having a light opening in its front wall and in the line of projection, said light opening being provided with a water tight glass window, a body of water in the tank and a lamp immersed in the body of water behind the light opening.

6. In a projecting apparatus, the combination of projecting and condensing lenses, a water tank behind the condensing lens having a light opening in its front wall and in the line of projection, said light opening being provided with a water tight glass window, means for circulating water in the tank, and a lamp immersed in the water behind the light opening.

7. In a projecting apparatus, the combination with a source of light, projecting and condensing lenses, of means for maintaining a volume of heat absorbing liquid between the source of light and the condensing lens, said volume of liquid extending backwardly around the source of light whereby heat rays passing toward the condensing lens are absorbed and carried by conduction and convection into the surrounding volume of liquid for dissipation into the surrounding atmosphere.

8. In a projecting apparatus, the combination with a source of light, condensing and projecting lenses, of a receptacle for heat absorbing liquid substantially surrounding and spaced from the source of light, whereby heat rays passing from the source of light toward the condensing lens are absorbed by the liquid medium and transferred by conduction and convection for dissipation in the surrounding atmosphere through the walls of the receptacle.

9. In a projecting apparatus, the combination with a condensing lens, a heat absorbing liquid receptacle located in rear of said lens, a source of light located within the receptacle and spaced from the condensing lens, whereby the heat absorbing liquid may circulate around the source of light and between the same and the condensing lens, and a baffle plate for augmenting the circulation of the heat absorbing medium, whereby heat absorbed between the source of light and condensing lens will be carried away and dissipated.

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