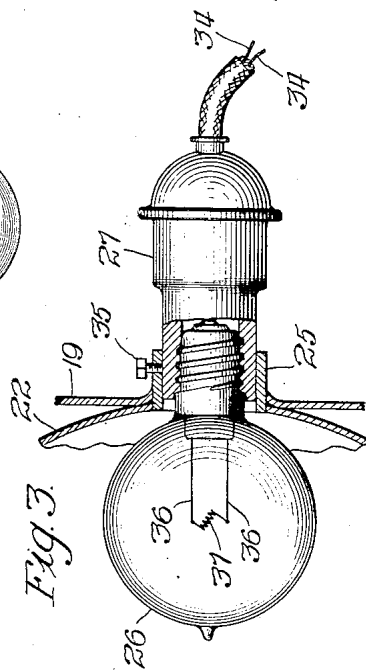
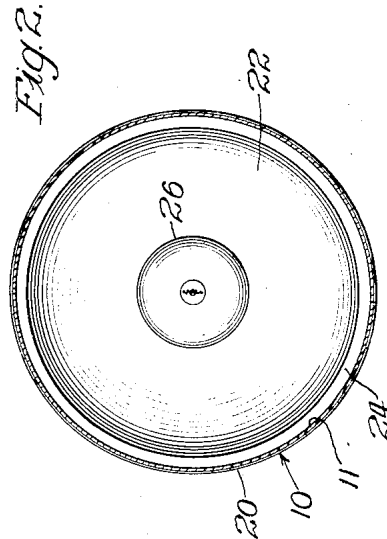
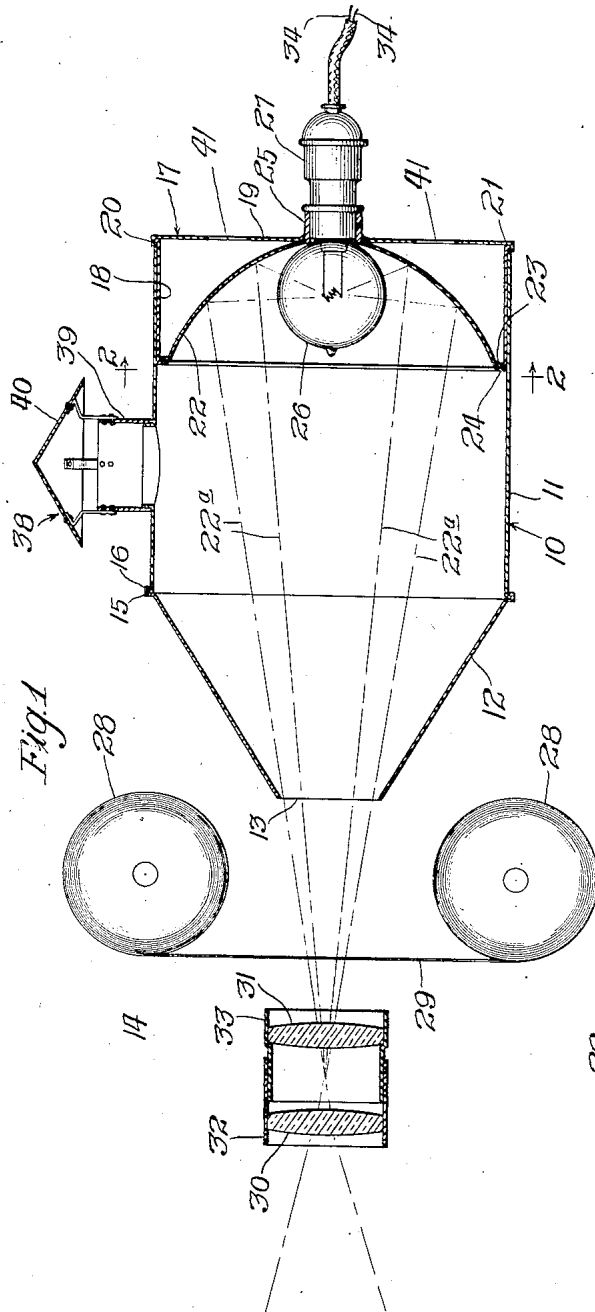


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LIGHT PROJECTING APPARATUS.
APPLICATION FILED SEPT. 7, 1915.

1,204,272.

Patented Nov. 7, 1916.



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UNITED STATES PATENT OFFICE.

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LIGHT-PROJECTING APPARATUS.

1,204,272.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, FRANK A. HARDYMAN, a citizen of the United States, and a resident of Quincy, in the county of Adams and State of Illinois, have invented certain new and useful Improvements in Light-Projecting Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a light projecting apparatus for cinematographs and picture projecting machines.

Most cinematographs or moving picture projecting machines now in general use employ as the source of light electric arc-lights. The arc lights used are either alternating current or direct current ones, depending of course upon whether an alternating or a direct current is supplied to the lighting system in the locality in which the picture projecting machine is used. With an alternating arc as the source of light, the light stream is not a steady and unvarying one, but varies in intensity due to the fluctuation of the alternating current supplied thereto. On the other hand, while a direct current arc gives a more steady light stream, yet the same varies somewhat in its intensity due to the fact that the impurities in the carbons interfere with the combustion. In either case, arc lights are costly to install and expensive in their maintenance, and further, require extreme care in operating because of the intense heat developed and also due to the fact that the light flame which is caused by combustion is for all intents and purposes exposed and unprotected.

Among the objects of my invention is to provide a light projecting apparatus for picture projecting machines of kind referred to, whereby an incandescent electric lamp of the bulb type may be successfully used as the source of light.

A further object of my invention is to provide a light projecting apparatus for the purpose stated that will be portable and also be devoid of lenses.

A still further object of my invention is to provide a light projecting apparatus wherein the reflector used has such a curvature that the reflected light rays will be con-

verged toward the principal axis of the reflector and concentrated on one of the projecting lenses of the picture projecting machine with which my apparatus is used.

The invention consists further in the matters hereinafter described and more particularly pointed out in the appended claim.

In the accompanying drawings: Figure 1 is a longitudinal sectional view of a light projecting apparatus constructed in accordance with my invention, and showing the projecting lenses and picture projecting machine of the type with which my improved apparatus is used; Fig. 2 is a transverse sectional view taken on line 2—2 of Fig. 1; and Fig. 3 is a longitudinal sectional view with parts in elevation of a detail of construction to be hereinafter described.

Referring to the drawings, illustrating in detail a light projecting apparatus embodying the features of my invention, 10 indicates what may for convenience be termed a "lamp house". Said lamp house, comprises a tubular body portion 11, which as shown in the drawings is cylindrical in cross-section, and open at both of its ends. To one end of said body portion 11, namely its front end, is secured a tubular member 12, which as shown is frusto-conical in shape. The outer end of said member 12 is provided with a centrally disposed opening 13, through which the rays of light from the source contained in the lamp house are emitted and pass through the moving film or picture slide placed in front of the opening 13 in the said lamp house. The inner end of said hood 12 is secured to the front end of said body portion 11. As illustrated in Fig. 1, said parts are secured together by an annular flange 15 clenched over an annular flange 16 on said body portion 11. The other end of the body portion 11 is closed by a reflector device 17, the same comprising an annular member 18 adapted to be inserted in the open end of said body portion. A back plate 19 is secured to said annular member 18 by a flange 20 on said back plate being clenched over a flange 21 on said part 18. As shown in Fig. 1, said flanges 20, 21 project beyond the body portion 11 and serve to contact with the end of the body portion and prevent the reflector device 17 from being forced too far into the lamp house. Set within the annular

member 18 is a concave reflector 22. As shown the base of said concave reflector 22 bears against the inner surface of said back plate 19 at the center thereof. The outer edge of said reflector 22 is provided with an annular flange 23 which bears outward against an annular marginal flange 24 on the inner edge of said member 18. Both the concave reflector 22 and the back plate 19 are provided in their contacting parts with centrally disposed registering holes or openings. Inserted in such holes is a sleeve 25. Said sleeve 25 extends outward for a short distance to the rear of the back plate 19 and the inner end of the sleeve is flush or substantially so with the reflecting surface of the reflector 22. Said sleeve 25 is secured in the opening in the back plate 19 in any desired manner. All of the parts of the lamp house are preferably made of sheet metal.

The source of light used with my apparatus is in the form of an incandescent electric lamp of the bulb type. As illustrated, said lamp 26 is located in the lamp house 10 and between its opening 13 and the concave reflector 22. In order to hold lamp 26 in position, the neck of the lamp socket 27 furnished with said bulb 26 is inserted in the open end of the sleeve 25 from the rear of the back plate 19 and the externally screw threaded base of said lamp 26 is screwed into said socket from the concave side of the reflector 22.

In assembling such parts, the lamp 26 and its socket 27 are attached to the reflector device 17 while the latter is removed from the lamp house 10. After the incandescent bulb and its socket has been applied to the reflector device 17, the latter is then inserted in the open rear end of the lamp house and occupies the position shown in Fig. 1. When it is desired to renew a burnt out or otherwise disabled lamp, the reflector device 17 is withdrawn from the end of the lamp house and the disabled bulb removed and replaced by a new one.

In Fig. 1 of the drawings, I have shown the two vertically spaced reels 28, 28 of the moving picture machine 14. About one reel is wound from the other the picture film 29. Said Fig. 1 also shows the two lenses 30, 31 with which said machine is usually provided. Said lenses are located in front of the film 29 and as usually constructed, the outermost lens 30 is secured in an upright position in a sleeve 32 which has end-wise or telescopic connection with the sleeve 33 in which the other lens 31 is secured. Said lenses are moved toward or from each other by any mechanism usually provided for that purpose, so as to regulate the focus of the image projected thereby on the screen. As my invention has no bearing on the moving picture projecting apparatus, I have therefore, shown and described only enough

of such machine as to give a lucid understanding of the applicability of my light projecting apparatus thereto.

The concave reflector 22 is given such a curvature that the reflected light rays from the incandescent lamp 26 are projected outward toward and through the opening 13 in the conical hood 12 of the lamp house 10. In other words, the curvature of the reflecting surface of the concave reflector 22 is such that the reflected light rays therefrom converge toward the principal axis of the reflector 22 and tend to meet in a common point situated beyond the front end of the lamp house. In short, the curvature of the reflecting surface of the concave reflector 22 is such that the reflected light rays are concentrated on the rear lens 31, and by the aid of such lens, said light rays are brought to a focus at a point between the lenses 30, 31 and on the principal axis thereof and between the forward lens 30 and its principal focus. By the aid of the forward lens 30 the image is projected on the screen right side up and enlarged. In Fig. 1, I have indicated by dotted lines 22^a, 22^a the path of several of the reflected light rays, and it will be noted that such rays converge toward the principal axis of the concave reflector 22 and are concentrated on the rear lens 31.

Attached to the lamp socket 27 are inclosed conductor wires 34, 34 which may be connected with a suitable source of electric supply by means of a wall socket in the lighting system.

In Fig. 3 of the drawings, I have shown, the lamp socket 27 adjustably mounted in the sleeve 25, so that when the incandescent bulb 26 is secured to the socket 27, the said lamp 26 may be adjusted toward or away from the reflector 22 for the purpose of setting the source of light in the proper position with respect to the curvature of the reflecting surface of the reflector 22 and thereby insure the reflected light rays being properly concentrated on the rear lens 31. The adjusting means shown comprises a set-screw 35 inserted through the sleeve 25 to the rear of the back plate 19. The inner end of the set-screw 35 is adapted to be impinged against the tubular neck of the lamp socket 27. The main advantage in providing the means whereby the bulb 26 may be adjusted with respect to the reflector 22 resides in the fact that, in case, the lead wires 36, 36 which support the metal filament 37 in one lamp used are longer or shorter than in the lamp which replaces the former, such variation in the length of lead wires may be compensated for by adjusting the lamp so as to bring the light source at the focus of the concave reflector 22.

In order to dissipate the excess heat, the lamp house 10 is provided with a chimney

38 which may be made in any suitable manner and form. As shown in Fig. 1, however, said chimney comprises a short stack 39 opening into the interior of the lamp house through the body portion 11 thereof and forward of the reflector 22. Said stack supports above the open upper end thereof a cowl 40. The back plate 19 is provided with a plurality of apertures 41, 41 whereby 10 air may circulate around the back of the reflector 22 and thus serve to cool the same.

One of the main advantages arising in the use of my apparatus resides in the fact that the source of light is in the form of an 15 incandescent electric lamp, which insures a constant and steady light stream so essential to moving picture and the like projecting machines. Furthermore, with an incandescent electric lamp as the source of light, there 20 is no exposed light flame, such as present in electric arc lamps heretofore used. Consequently with an incandescent electric lamp there is no danger of fire in case the lamp bulb is fractured or broken as the light 25 source becomes immediately extinguished when the lamp bulb is broken. Moreover, my apparatus is inexpensive to manufacture and maintain in use, when compared to the cost of an electric arc light equip- 30 ment. Then again, my apparatus is portable and all parts thereof may be assembled in the factory and the complete device readily installed for use. Other and further advantages arising in use of my novel 35 apparatus will be readily apparent to those

skilled in the art to which my invention appertains.

Although, I have shown and described in detail herein one form in which a light projecting apparatus embodying my invention 40 may be made and constructed, yet it is to be understood that I may variously modify and change the details of construction and arrangement of parts shown without departing from the spirit and scope of my invention, and I do not want to be limited to the 45 exact details of construction and arrangement shown, except as pointed out in the appended claim.

I claim as my invention:

A light projecting apparatus adapted for use with a cinematograph or other picture projecting device, comprising a lamp house having a tubular body portion, a conical hood secured to one end of said body portion and 55 having at its outer end an uncovered, light-emitting opening, a concave reflector completely closing the other end of said body portion, and an incandescent electric lamp located in said lamp house and attached to 60 said reflector.

In testimony that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 2nd day of September, A. D. 1915.

FRANK A. HARDYMAN.

Witnesses:

JOHN T. INGRAM,
JACOB A. HARMAN.