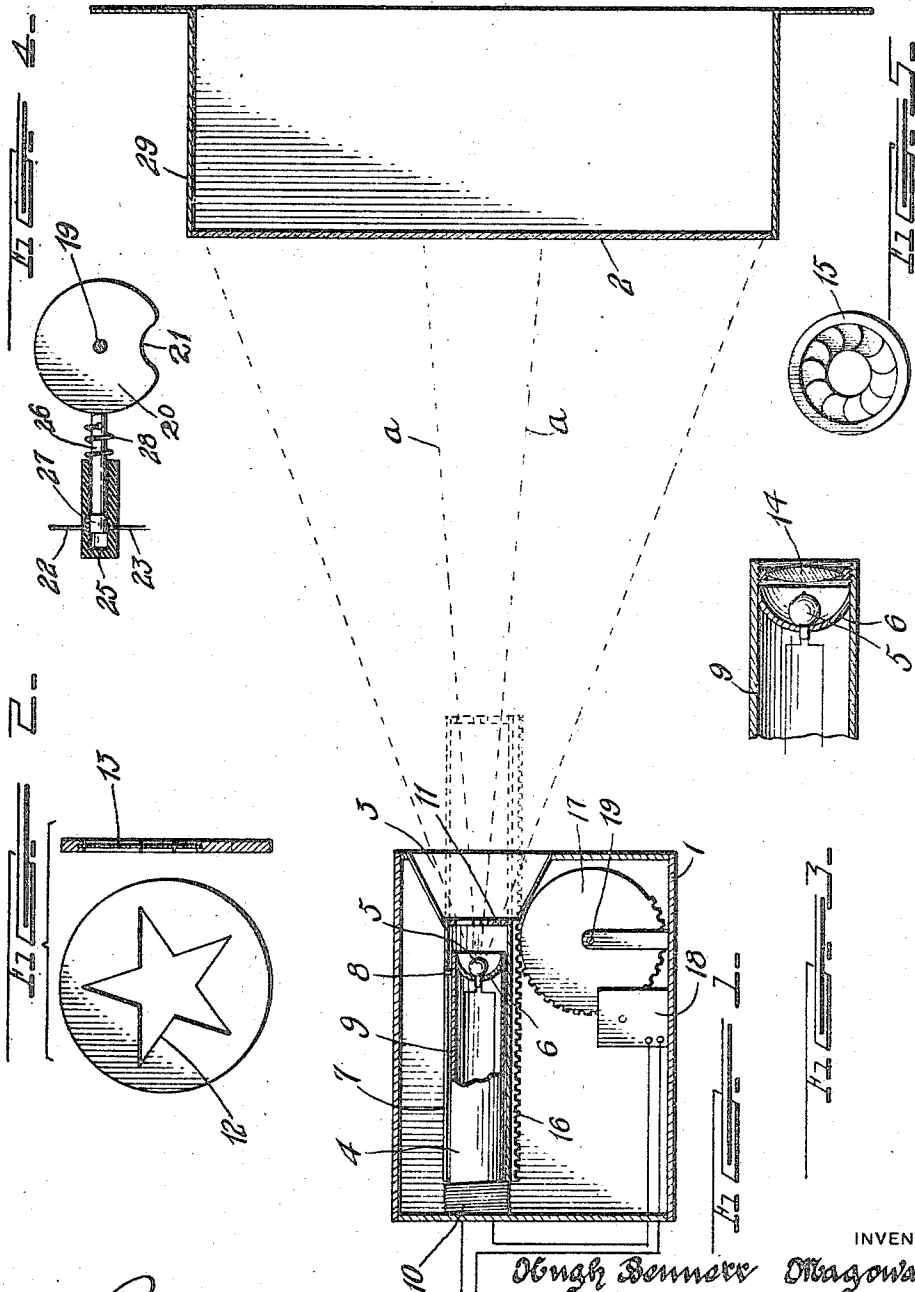


H. B. MAGOWAN.
PROJECTING APPARATUS.
APPLICATION FILED FEB. 9, 1916.

1,228,685.

Patented June 5, 1917.



WITNESSES

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To all whom it may concern:

Be it known that I, HUGH B. MAGOWAN, a subject of the King of England, residing at Whitby, in the Province of Ontario, Dominion of Canada, have invented certain new and useful Improvements in Projecting Apparatus, of which the following is a specification.

An object of my invention is to provide a projecting apparatus which is so arranged that light is passed through a mask which is mounted to be capable of movement in its relative proximity with respect to the source of light, together with a clockwork or other operating means by which the mask is moved, the parts being so arranged that as the mask is moved and the relative proximity of the same with respect to the source of light is varied, the image cast through the mask upon a screen or other surface will be caused to increase and decrease in size inversely with the movement of the mask away from and toward the source of light.

A further object is to provide means to be connected in the circuit when an electric lamp is used as the source of light, and which means is so constructed and arranged that during movement of the mask in one direction, the light will be extinguished.

A still further object lies in the provision of operating means which will propel the mask in one direction of movement only and when the limit of that movement has been reached, will release the mask to permit the same to be instantaneously returned under spring action.

With the above and other objects in view, my invention consists in certain novel features of construction and combinations of parts which will hereinafter be set forth in connection with the accompanying drawings and then more specifically pointed out in the claims.

In the drawings:

Figure 1 is a view in longitudinal vertical section of a device constructed after my invention with the lines of projection schematically indicated.

Fig. 2 illustrates an elevational and sectional view of a form of mask which may be used.

Fig. 3 shows a modified form of the light projection apparatus.

Fig. 4 is a fragmentary detail view of one form of switch which might be used to control the light circuit.

Fig. 5 is a detail view showing a diaphragm to vary the size of the light projecting opening.

In the present disclosure I have illustrated the main casing 1 and the screen 2 as being independent members, although it will be understood that under some circumstances of use it may be found desirable to construct the main casing in such a manner that the screen may be placed over the forward end thereof.

As is here shown, the case 1 comprises a rectangular receptacle which has the opening 3 provided at one end near the top thereof. A lamp carrying tube 4 is stationarily mounted with the opposite end of the casing 1 in line with the opening 3, and an electric lamp bulb 5 is mounted at the outer end of this lamp supporting tube 4, the reflector 6 being provided around this bulb to concentrate and project the rays of light therefrom in such a direction that they will shine out through the opening 3.

A sleeve or tube 7 is disposed around the light supporting tube 4 to be capable of endwise sliding movement thereon and it is preferable that a pin 8 be passed through the slot 9 formed longitudinally at one side of this tube 7 and secured in the light supporting tube 4 to hold the tube 7 against turning movement. A coil spring 10 is mounted around the inner end of the light supporting tube 4 to bear against the rear wall of the casing 1 and against the rear end of the extension tube 7 so that this tube will normally be held in the extended relation as indicated by the dotted lines of Fig. 1.

The forward end of the tube 7 is adapted to receive and hold a mask 11, the construction of which is better shown in Fig. 2. As is illustrated in Fig. 2, the body of the mask comprises an opaque disk which has the cut out opening 12 formed in outline of the image to be projected, and if desired, a transparent film 13 may be disposed in the cut out portion 12 of the mask 11, this making it possible to project the image in colors or to show lining or printing as the rays are projected through the mask and are caught by the screen 2. Under some circumstances, it may be found desirable to make the entire mask a transparency and paint, print, or otherwise place subject matter thereon which is to be projected, and under such circumstances it will of course be understood

that any portions which are not to have the light penetrated therethrough will be painted or otherwise coated with an opaque covering. To concentrate the rays cast by the lamp bulb 5 and cause the same to be cast with greater intensity through the mask, it may be found desirable to provide a lens 14 in the forward end of the light supporting tube 4 after the manner illustrated in Fig. 3, and under some circumstances it may also be found advisable to provide a diaphragm or shutter 15 of the type illustrated in Fig. 5, or of any other approved form such as is used in a photographic camera, it however being understood that the lens and diaphragm are not essential to the successful operation of the device, but are only mechanical refinements which might be resorted to.

As is stated, the spring 10 will act to normally hold the tube 7 extended to the position indicated by the dotted lines in Fig. 1, and in this relation of the parts, the image will be projected through to be thrown upon the screen 2 in the size indicated by the dotted lines at *a-a*. As the tube 7 is moved inwardly over the light supporting tube 4 against the tension of the spring 10, the mask 11 will be brought into closer proximity to the light bulb 5 and in consequence the rays of light will be cast therethrough at a wider angle and the image as caught by the screen 2 will be correspondingly enlarged. It is desirable that some form of means be provided to cause this movement of the tube 7 to thus cause variance of the size of the image cast upon the screen 2, and to this end, I provide a rack bar 16 on the lower side of the tube 7, and an interrupted gear wheel 17 being mounted in the casing to receive its turning movement from the motor 18. The gear 17 meshes with the teeth of the rack 16 and as this gear is turned in the direction indicated by the arrow, the extension tube 7 will be carried into the casing 1 against the tension of the spring 10 and in consequence, the image cast upon the screen will be gradually increased as the angle at which the rays are projected through the mask is widened. It is preferable that the gear wheel 17 be arranged as an interrupted gear, that is that the teeth be omitted on one side so that as the extension tube 7 has been carried inwardly to the proper extent, this interrupted portion of the gear wheel 17 will be brought into line with the teeth of the rack 16 and thus the extension tube 7 is free to return to its extending position under the tension of the spring 10 to be again returned gradually inwardly by the engagement of the teeth of the gear wheel 17 as the rotation is continued.

Under some circumstances, it may be found desirable to arrange means whereby

the light will be cut out of its circuit while the extension tube 7 is moving to the extended position and to cause the light to be glowed only while the tube 7 is being carried on its inward travel, and in Fig. 4 I have shown a means by which this result can be accomplished. As here shown, the shaft 19 by which the gear wheel 17 is carried has a cam wheel 20 mounted to turn thereon and provided with the notch 21 at a point registering with the point at which the teeth of the gear 17 will be carried out of mesh with the teeth of the rack bar 16 as the gear wheel is turned. The lamp circuit wires 22 and 23 are led to the spaced apart contact carried by the insulated bearing tube 25 and a slide rod 26 is mounted in this bearing tube 25 to be capable of endwise sliding movement and is provided with a bridge-piece 27, the spring 28 being provided to normally hold the slide rod 26 extended from the bearing tube 25 and in engagement with the rim of the cam wheel 20. As the shaft 19 is turned and the cam wheel 20 is given consequent movement, the slide rod 26 will be normally pressed into the bearing tube 25 against the tension of the spring 28 and the bridge-piece 27 will be in a position to establish an electrical connection between the contact connected with the lamp circuit wires 22 and 23 and then, as the slide rod 26 passes into the notch 21, this bridgepiece 27 will be removed from the position of engagement with the contact and in consequence the lamp circuit will be broken.

As is stated, the screen 2 may be formed as a part of the main casing 1, and under these circumstances, the screen would be a transparency, as for instance ground glass, which would cast the image and permit the same to be viewed from the exterior. Where the screen 2 is to be used for day-light projections, it may be found desirable to provide the shades 29 around the side edges thereof and this same expedient might be resorted to where the screen is either of a semi-transparent nature or is of the reflecting type.

In the present disclosure, I have shown the circuit connection to the lamp bulb 5 and to the motor 18 as deriving energy from the same source, although it will of course be understood that these circuit connections might be carried in any particular use of the device. While the source of light has been illustrated as an electric bulb, this might be varied and a gas, oil, or other suitable lamp provided to project its rays through the mask carried by the extension tube 7, and also for the motor 18, there might be substituted a clockwork mechanism which would cause the gear wheel 17 to be given the proper turning movement.

While I have herein shown and described

only one specific form of the invention, it will be understood that the means by which the extension tube 7 is given its outward movement and the means by which the same is moved inwardly might be varied, that the mask might be given any number of varied forms, that printed matter and other designs might be shown on the mask to adapt the device for use in advertising or by placing grotesque figures thereon, the device could be adapted as a toy for the amusement of children, and that other modifications and variations in the construction and arrangement of the parts can be resorted to without departing from the spirit and scope of my invention, and hence, I do not wish to be limited to the exact disclosure but only to such points as may be set forth in the claims.

I claim:—

1. A source of light, a mask mounted to have the rays of light projected therethrough and arranged to be capable of movement in a straight line toward and away from said source of light to vary the width of the angle at which said rays are projected therethrough, and means to accomplish the desired movement of the mask.

2. A source of light, a mask mounted to have the rays of light projected therethrough and arranged to be movable in its relative disposition with respect to the source of light, means to accomplish movement of the mask, and means deriving operative movement from the mask moving means to extinguish the light at predetermined intervals.

3. In combination with a screen, a lamp arranged to cast rays of light upon the screen, a mask mounted between the lamp and the screen to be capable of relative movement in its proximity to the lamp on a line from the lamp to the screen, and means to transmit movement to the mask to vary the proximity of the same to the lamp and to thus vary the angle at which the rays are cast through the mask from the lamp to be received on the screen.

4. A projecting apparatus comprising a casing, a screen, a lamp mounted at a fixed point, a mask arranged to be capable of movement with respect to the lamp and to have the rays cast therethrough to be received on the screen, means to normally hold said mask in one of its extreme positions, and means to move the mask to the remain-

ing position and to permit return of the same under the action of said first means.

5. A projecting apparatus comprising a casing, a screen, a lamp mounted at a fixed point, a mask arranged to be capable of movement with respect to the lamp and to have the rays cast therethrough to be received on the screen, means to normally hold said mask in one of its extreme positions, means to move the mask to the remaining position and to permit return of the same under the action of said first means, and means to extinguish the light during the movement of the mask in one direction.

6. A projecting device comprising a casing, a screen, a light tube mounted at a fixed point in this casing, a lamp carried by said tube to project the rays upon the screen, an extension tube received around the light supporting tube, a rack carried by said extension tube, a spring to normally hold said tube in one of its extreme positions, and an interrupted gear to be given turning movement to cause the extension tube to be moved to the remaining extreme position through the mesh of the teeth thereof with the teeth of the rack, and means to cause the interrupted gear wheel to be turned.

7. A projecting device comprising a casing, a screen, a light tube mounted at a fixed point in said casing, a lamp carried by said tube to project the rays upon the screen, an extension tube received around the light supporting tube, a rack carried by said extension tube, a spring to normally hold said tube in one of its extreme positions, an interrupted gear to be given turning movement to cause the extension tube to be moved to the remaining extreme position through the mesh of the teeth thereof with the teeth of the rack, means to cause the interrupted gear wheel to be turned, said parts being so arranged that as the teeth of the gear wheel pass from mesh with the teeth of the rack, the extension tube is permitted to return to the first extreme position under the tension of the spring, and means to extinguish the lamp as the tube is moving under the tension of the spring.

In testimony whereof I affix my signature in presence of two witnesses.

HUGH BENNETT MAGOWAN.

Witnesses:

FRANCIS MOCKERBY,
J. FANNING.