June 10, 1930. F. E. ALTMAN 1,763,208

LIGHT SYSTEM FOR PHOTOGRAPHIC PRINTING MACHINES

Filed Dec. 17, 1926 2 Sheets-Sheet 1

FIG - 1

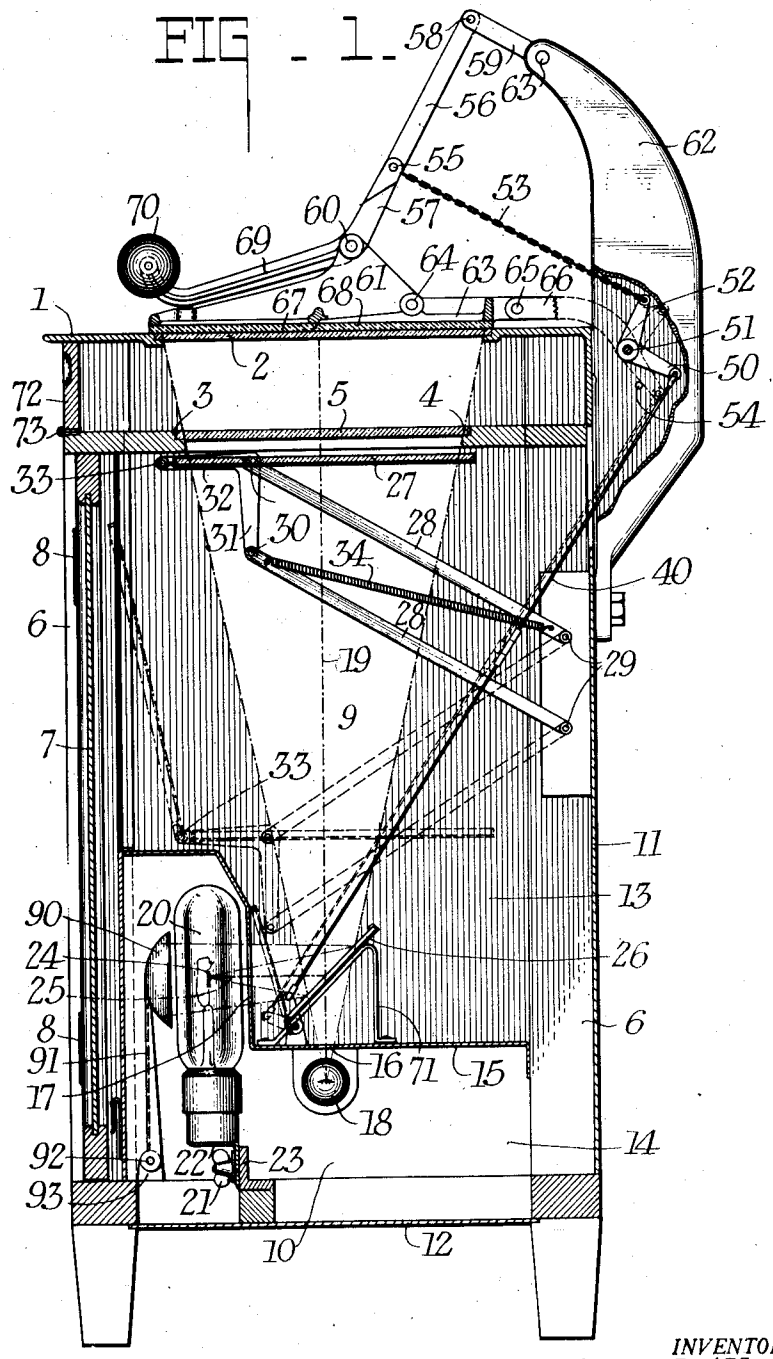

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FIG. 2.

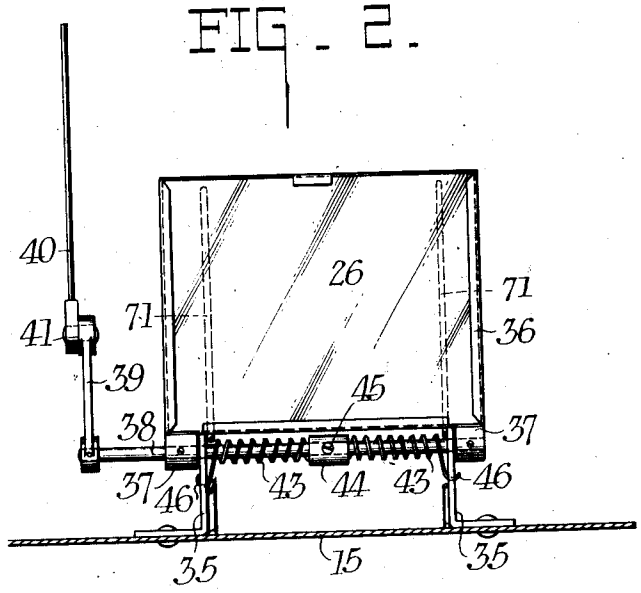
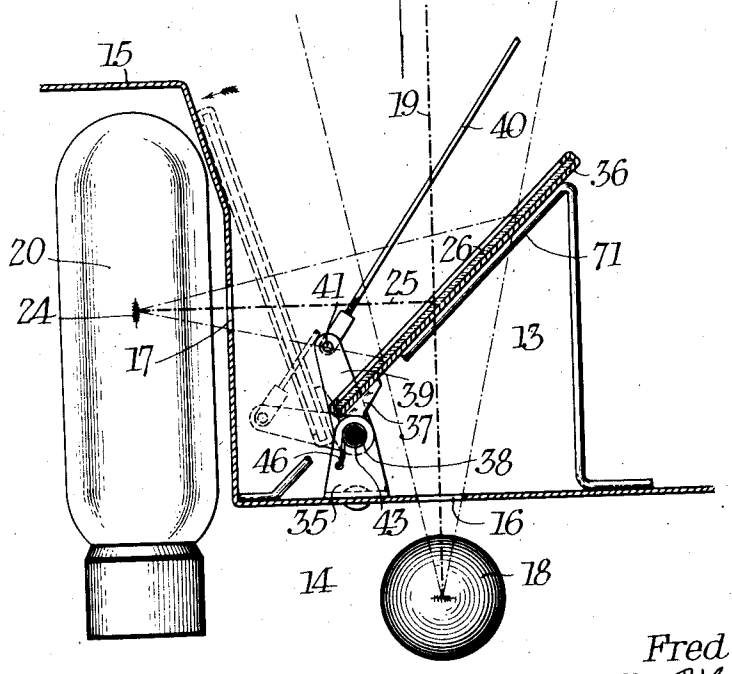


FIG. 3.



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UNITED STATES PATENT OFFICE

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LIGHT SYSTEM FOR PHOTOGRAPHIC-PRINTING MACHINES

Application filed December 17, 1926. Serial No. 155,526.

This invention relates to photography and more particularly to photographic printing machines. One object is to provide a suitable illuminating system for a photographic printing machine. Another object is to provide a machine of the class described with a restricted light source from which the light rays pass to the platen with a minimum amount of diffusion. Another object is to provide a printer with a printing and a pilot lamp optically spaced like distances from the platen. Another object is to provide such a lamp system in which the beams of light rays passing to the platen are of like dimensions, differing only in actinic quality. Another object is to provide a printer in which the light beams from the pilot and printing lamps are parallel to each other as they approach the platen, and other objects will appear from the following specification, the novel features being pointed out in the claims at the end thereof.

Coming now to the drawings wherein like reference characters denote like parts throughout:

Fig. 1 is a part section and part side elevation of a printer constructed in accordance with and illustrating one form of my invention;

Fig. 2 is an enlarged detail showing the mirror used in the printer of Fig. 1; and

Fig. 3 is an enlarged detail section showing parts of the mirror operating mechanism and the relation of the printing pilot lamps.

I have shown my invention as applied to a printing machine which may consist of a top 1, in which there is mounted a printing panel 2 preferably of heavy glass, and below which there is a frame 3 in which a slideway 4 is provided. This slideway is adapted to receive a screen 5 which preferably consists of a sheet of clear glass.

The table top 1 is supported by legs 6 and there is a front door 7 which may be swung by hinges 8 to gain access to the chamber 9 which is formed by the front door 7, side wall 10, rear wall 11, and bottom 12.

The chamber 9 is divided into two sections 13 and 14 by means of a bent partition plate 15 in which there are two windows 16 and 17. Window 16 lies just above the pilot lamp 18 so that the central ray 19 from this lamp may pass up through the window to the center of the platen 2. This pilot lamp may be of orange or red color or it may be a very low power colorless lamp.

The printing lamp 20 is of high power, (500 to 1000 watt being preferable) and is adjustable by means of a set screw 21 and the relatively slidable members 22 and 23 until the lamp filament 24 lies directly behind the center of the window 17. The central ray 25 from this lamp may pass out through the window 17 and may be reflected by the mirror 26 upwardly towards the center of the printing panel 2. After being reflected by mirror 26 the light ray 25 will coincide with the central ray 19 from the lamp 18.

A reflector 90 is preferably employed to increase the effective light rays. This reflector may be mounted on an arm 91 hinged at 92 to bracket 93. If desired, as shown in Fig. 3, the reflector may be omitted, in which case the window 17 is made somewhat smaller.

The lamps 20 and 18 are optically spaced a like distance from the printing panel 2, and the size and shape of the light beams are the same, the only difference being that the light rays from lamp 18 have not sufficient actinic rays to impress a latent image upon photographic paper; whereas the light rays from lamp 20 are of high actinic value.

Inside of compartment 13 a second screen 27 is movably mounted upon the parallel links 28, each of which is pivoted at 29 to the printing machine frame and at 30 to one arm of the bell crank lever, the other arm of which 32 supports a shaft 33 upon which the screen 27 is mounted and spring 34 is placed between the parallel links to counterbalance this screen so that it may be moved up or down between the two positions shown in Fig. 1, or the screen 27 may be turned about shaft 33 out of alignment with the light beam, as shown in dot and dashed lines.

As best shown in Figs. 2 and 3, the light rays from the printing lamp 20 are reflected by a mirror 26 which is movably mounted upon brackets 35 in the following manner.

A sheet metal frame 36 supports the mirror, and is attached to lugs 37. These lugs form bearings for a shaft 38 to which the lugs are pinned, the shaft being mounted to turn freely in the brackets 35. A lever 39 is also affixed to shaft 38, and a rod 40 is pivotally attached at 41 to member 39. Each time 40 is moved motion will be transmitted to shaft 38 and mirror 26.

The miror is normally turned toward the position shown in dashed lines, Fig. 3, by means of a pair of coiled springs 43, these springs being anchored at one end to a sleeve 44 and being anchored at the other end 46 to the brackets 35. By turning the sleeve 44 and adjusting the set screw 45 the desired tension is provided.

As shown in Fig. 1, the rod 40 is attached to one end 50 of the bell crank lever carried by shaft 51, and having attached at 52 a chain 53, a stop 54 limiting the downward movement of the bell crank lever. Chain 53 is attached to the joint or pivot 55 of a toggle composed of links 56 and 57. The former link being pivoted at 58 to arm 59 and the latter link 57 being hinged at 60 to a platen section frame 61. Link 59 is suitably carried by the bracket 62 upon a shaft 63.

The platen frame consists of two sections 61 and 63 hinged together at 64, section 63 being pivotally supported at 65 by a link 66 which may also be supported upon shaft 51. Each section of the platen is preferably faced with a transparent material, such as pyroxylin as indicated at 67 and 68. I prefer to color this pyroxylin orange or red so that the printing operation may be viewed through the platen without blinding the eyes of the operator because of the brilliancy of the lamp.

The toggle link 57 is extended to form a curved arm 69 to which is affixed an operating handle 70. Each time this handle is moved to lower the platen upon the printing panel the closing movement of the toggle pulls up chain 53 which through the bell crank lever and rod 40 swings mirror 26 against the action of springs 43 and turn it to the position shown in Figs. 1 and 3, in which the mirror rests upon the bracket 71. This bracket locates the mirror so that the restricted beam of light from the printing lamp 20 will be passed to the printing panel 2.

When the handle 70 is raised to remove the platen from the printing panel, chain 53 is released and springs 43 may thus turn mirror 46 until it lies in the position shown in broken lines, Fig. 3. In this position the pilot lamp 18 illuminates the printing panel by means of a beam of the same size and shape as the light beam from lamp 20.

It is important to have the lamps arranged to provide light beams of the same dimensions, the central rays of which are parallel through a part of the distance between the printing panel and lamps; because if they were spaced differently a vignette placed by means of the light from the pilot lamp would not register properly when the printing lamp is used. By arranging the lamps as above described vignetting material may be placed through the door 72 hinged at 73 to the printing machine frame upon the clear glass screen 5. When so placed because of the point light source a sharp image of the vignette will result.

If, however, it is desired to soften the edges of the vignette, a ground glass screen 27 may be employed, and the degree of diffusion of vignetting material carried upon screen 27 can be controlled by moving the screen upon links 28. The closer the screen is to the lamp, the more diffusion may be obtained.

Since the platen holds the printing paper and negative in contact, the diffusion resulting from screen 27 will not destroy a sharp reproduction from a sharp negative. However, screen 27 may, as above described, be swung beyond the light beam so that only direct light rays are used for printing. If such is the case, it is not necessary to obtain perfect physical contact between the paper and negative because the parallel light rays are used.

Certain features shown in the drawings and described in the specification are the subject matter of separate applications in the name of Roy S. Hopkins for photographic printing machine and photographic printer vignetting apparatus, Serial Numbers 153,882 and 153,881 filed December 10, 1926.

While I have described my invention as being particularly suited for the printing machine shown and described, it is obvious that it may also be applied to printing machines of widely different types, and, I, therefore, do not wish to be limited to the machine shown and described, but claim as within the scope of my invention all such printing apparatus as may come within the scope of the appended claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is,—

1. In a photographic printing machine, the combination with a printing panel, of a platen movably mounted thereover, a transparent face on said platen, a printing lamp spaced from the panel, a pilot lamp spaced from said panel, means for reflecting the light from one lamp into the path of light from the other lamp, whereby the light beams from both lamps may pass through the same path before reaching the printing panel, and means confining the light rays from both lamps to a beam of predetermined size.

2. In a photographic printing machine, the combination, with a printing panel, of a platen movably mounted thereover, a trans-

parent face on said platen, a printing lamp spaced from the panel, a pilot lamp spaced from said panel at an angle from the first mentioned lamp, means mounted near the lamps for reflecting the light from one lamp into the path of light from the other lamp, whereby the light beams from both lamps may pass through the same path before reaching the printing panel, connections between the reflecting means and the platen whereby these parts may be moved in timed relation, both lamps being positioned to illuminate the platen with light beams differing only in photographic intensity, and means confining the light rays from both lamps to a beam of predetermined size.

3. In a photographic printing machine, a printing window, two sources of light, and a movable shutter for controlling the exposure having two alternative positions, in one of which it shuts off light from one source from said window and in the other of which it shuts off light from the other source from said window.

4. In a photographic printing machine, a printing window, a source of actinic light, a source of non-actinic light, an opaque movable reflector constituting a shutter for controlling exposure and having two alternative positions in one of which it reflects light from one source to the window and shuts off light from the other source from the window, and in the other of which it permits light from said other source to reach said window and shuts off light from the one source therefrom.

5. In a printing machine, the combination with a printing panel, of a platen movable thereover, a printing lamp spaced from the panel, means spaced from the panel for passing a light beam of limited area upon the printing panel, a pilot lamp, and means spaced from the panel for limiting the light beam from the pilot lamp to the printing panel to the same area as that from the printing lamp, whereby the light beams from the two lamps differ only in actinic intensity.

6. In a printing machine, the combination with a printing panel, of a platen movable thereover, a printing lamp spaced from the panel, a pilot lamp spaced from the panel a distance substantially equal to the spacing of the printing lamp, means for controlling a beam of light rays from each lamp to pass through a limited angle toward the printing panel, a movable reflector by which the light beam from both lamps is controlled, and means for operating the reflector.

7. In a printing machine, the combination with a printing panel, of a platen adapted to move to and from the panel, a printing lamp and a pilot lamp, each spaced from the panel at substantially the same distance therefrom, means for restricting the light beam of each lamp to a predetermined degree, and means for permitting a light beam to pass from only one lamp at a time to the panel, said light beams being of like dimension and direction.

8. In a printing machine, the combination with a printing panel, of a platen adapted to move thereover, a printing lamp spaced from the printing panel, a pilot lamp optically spaced at substantially the same distance from the printing panel, and a reflector hingedly mounted beneath the panel and positioned to lie in the path of light rays from at least one lamp and constituting an exposure shutter whereby the light rays from the two lamps may transverse like paths toward the printing panel through a part of their course, and may traverse different paths through another part of their course toward the printing panel.

9. In a printing machine, the combination with a printing panel, of a platen adapted to move thereover, a printing lamp spaced from the printing panel, a pilot lamp optically spaced at substantially the same distance from the printing panel, a shutter for controlling exposure including a reflector to bend the rays from one lamp toward the printing panel, and means for moving the reflector to shut off the rays of one lamp at a time.

10. In a printing machine, the combination with a printing panel, of a platen adapted to move thereover, a printing lamp spaced from the printing panel, a pilot lamp optically spaced at substantially the same distance from the printing panel as the printing lamp, a reflector hingedly mounted in the machine near the lamps for directing the rays from one lamp toward the printing panel, said reflector constituting a shutter for controlling exposure, said reflector being positioned to pass light rays from one lamp only to the printing panel.

11. In a printing machine, the combination with a printing panel, of a platen adapted to move thereover, a printing lamp spaced from the printing panel, a pilot lamp optically spaced at substantially the same distance from the printing panel as the printing lamp, a reflector, a movable mount therefor, connections between said mount and the platen whereby the reflector may be moved in timed relation to the platen to pass light rays from either lamp to the printing panel.

12. In a printing machine, the combination with a printing panel, of a platen adapted to move thereover, a printing lamp spaced from the printing panel, a pilot lamp optically spaced at substantially the same distance from the printing panel, means to bend the light rays from one lamp into the path traversed by light rays from the other lamp, and means including the light bending means

for controlling the emission of light rays from a lamp to the platen.

13. In a printing machine, the combination with a printing panel, of a platen adapted to move thereover, a printing lamp spaced from the printing panel, a pilot lamp optically spaced at substantially the same distance from the printing panel as the printing lamp, a reflector for directing the rays from one lamp towards the printing panel, said reflector being positioned to pass light rays from one lamp only to the printing panel, connections between the last named means and platen whereby movement of the platen controls the light rays falling on the printing panel.

14. In a printing machine, the combination with a printing panel, of a platen adapted to move thereover, a printing lamp spaced from the printing panel, a pilot lamp optically spaced at substantially the same distance from the printing panel, a shutter movable to two positions for controlling exposures, in one of which the rays of a lamp may be obscured from the printing panel and in the other of which the rays of a lamp may be passed to the printing panel, and a reflector associated with the shutter adapted to bend light rays from one lamp toward the printing panel when the shutter is in one position.

15. In a printing machine, the combination with a printing panel, of a platen adapted to move thereover, a printing lamp spaced from the printing panel, a pilot lamp optically spaced at substantially the same distance from the printing panel, a shutter for controlling exposure movable to two positions to control the light rays from the two lamps.

16. In a printing machine, the combination with a printing panel, of a platen adapted to move thereover, a printing lamp spaced from the printing panel, a pilot lamp optically spaced at substantially the same distance from the printing panel, a shutter movable to two positions for controlling exposure, in one of which the rays of a lamp may be obscured from the printing panel and in the other of which the rays of a lamp may be passed to the printing panel, and a reflector associated with the shutter adapted to bend light rays from one lamp toward the printing panel when the shutter is in one position, a reflecting surface on said shutter adapted to bend the light beam from one lamp.

17. In a printing machine, the combination with a printing panel, of a platen adapted to move thereover, a printing lamp spaced from the printing panel, a pilot lamp optically spaced at substantially the same distance from the printing panel, a shutter for controlling exposure movable to two positions to control the light rays from the two lamps, a reflecting surface movable with said shutter adapted to bend the light beam of one lamp towards the printing panel when the lamp is in one position, and to bend the light rays away from the platen when moved to another position.

18. In a photographic printing machine, the combination with a printing panel, of a platen movable thereover, a printing and pilot lamp optically spaced at substantially equal distances from the printing panel on the same side thereof, and a shutter for controlling exposure including means for controlling the light beams passing between the lamps and the printing panel.

19. In a photographic printing machine, the combination with a printing panel, of a platen movable thereover, a printing and pilot lamp optically spaced at substantially equal distances from the printing panel on the same side thereof, and a shutter for controlling exposure including means including a movably mounted reflector for controlling the passage of light rays from the lamps to the printing panel.

20. In a photographic printing machine, the combination with a printing panel, of a platen movable thereover, a printing and pilot lamp optically spaced at substantially equal distances from the printing panel on the same side thereof, and a shutter for controlling exposure including means movably mounted between the lamps and printing panel for permitting light rays from one lamp at a time to pass to the printing panel.

Signed at Rochester, New York, this 13th day of December, 1926.

FRED E. ALTMAN.