

June 1, 1943.

W. P. BATES

2,320,334

PHOTOGRAPHIC PRINTING MACHINE

Filed June 25, 1941

2 Sheets-Sheet 1

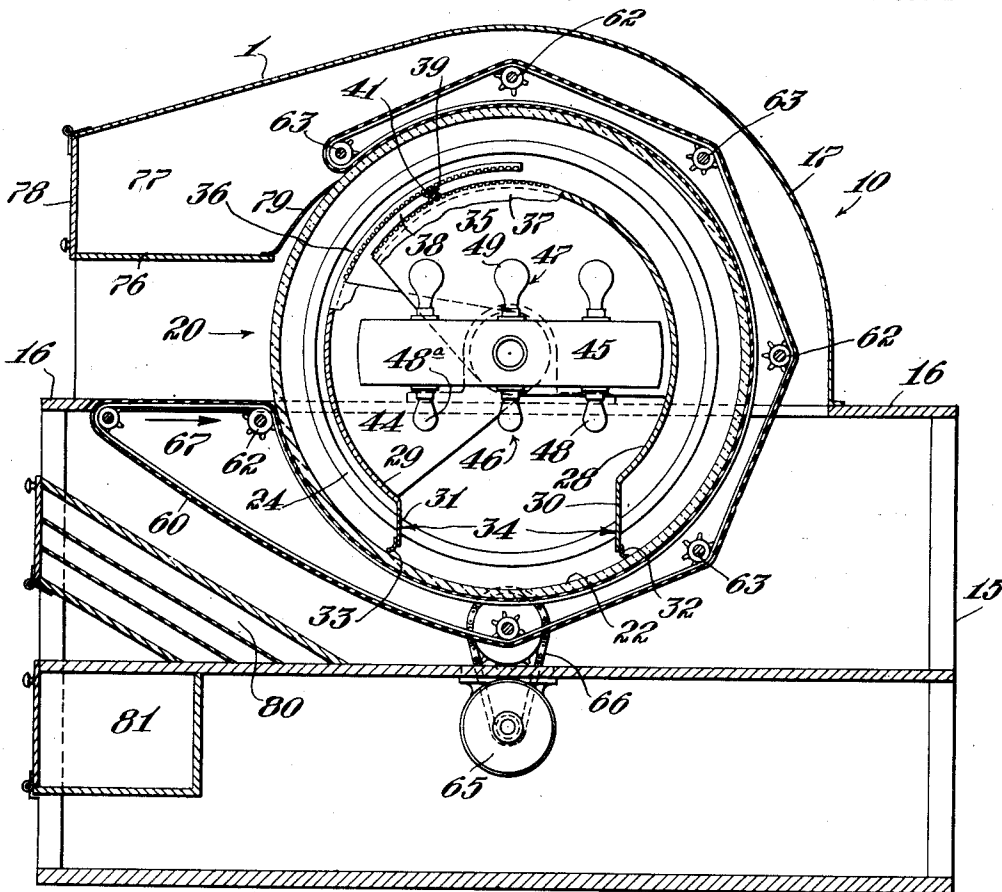


Fig. 1

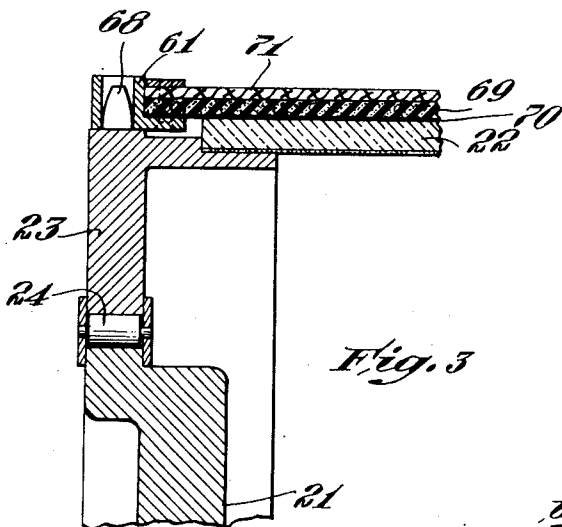


Fig. 3

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2 Sheets-Sheet 2

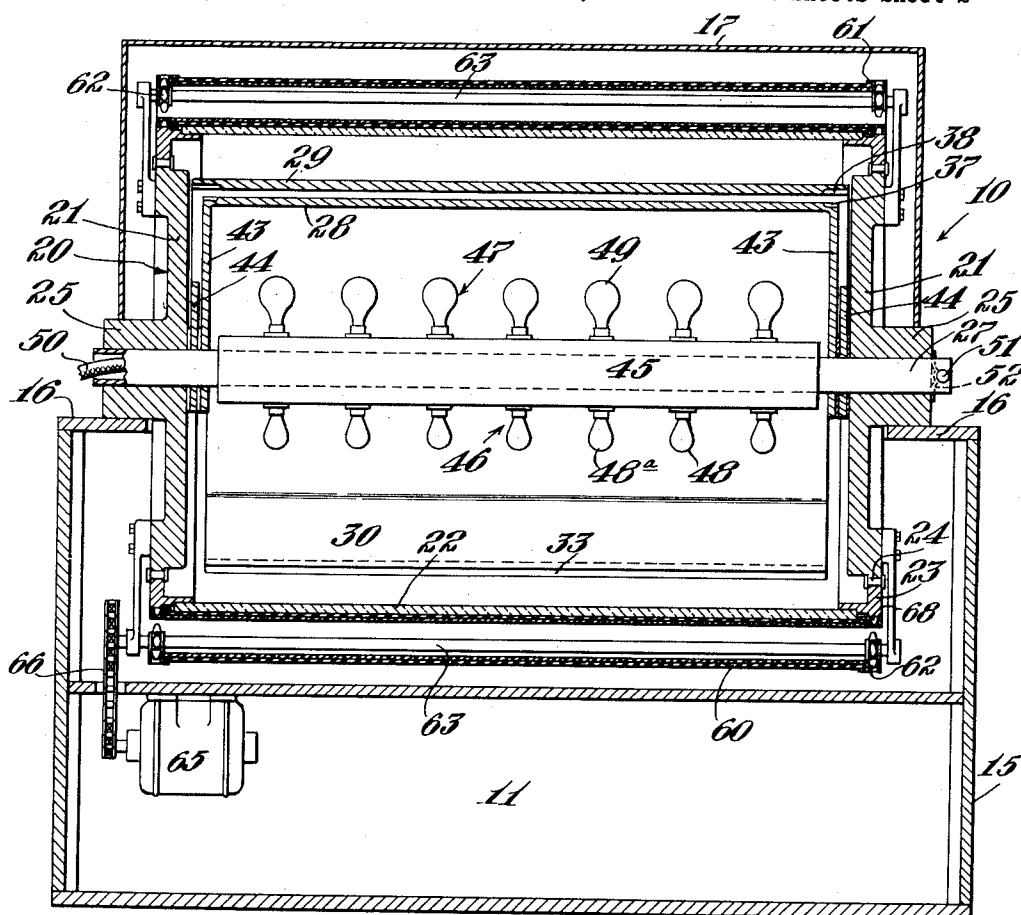


Fig. 2

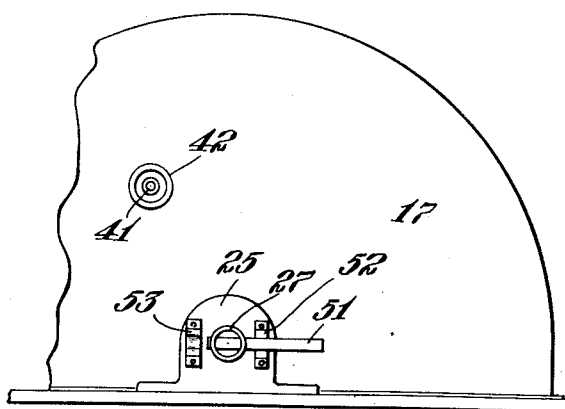


Fig. 4

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UNITED STATES PATENT OFFICE

2,320,334

PHOTOGRAPHIC PRINTING MACHINE

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Application June 25, 1941, Serial No. 399,621

4 Claims. (Cl. 95—77.5)

This invention relates to an improvement in photographic printing machines and particularly those of the type in which the work, consisting of the image bearing material assembled with the sensitized sheet to which the image is to be transferred, is exposed to rays of light by which the image is transferred to the sheet.

The primary object of this invention resides in the provision of means by which the light employed in printing is varied both in kind according to the type of printing to be performed and in amount according to the character and structure of the image to be transferred.

A further object of this invention resides in the provision of a printing machine with batteries of light varying in the length and power of the light rays emitted from the batteries and means for selectively determining the battery to be employed.

Another object of this invention resides in the provision of a machine wherein the work is advanced to the printing area by the coaction of a cylindrical transparent roller and a belt between which the work is firmly clamped, the light rays acting on the work through the roller, and wherein the printing area is defined by an aperture variable in extent so that the period during which the printing is performed may be varied.

These and other objects of the invention will be fully set forth in the following description of one embodiment of the invention and in the accompanying drawings which illustrate such embodiment and in which

Fig. 1 is a side elevation, partially in section, of a machine embodying this invention;

Fig. 2 is a cross-sectional view thereof;

Fig. 3 is an enlarged sectional view illustrating a portion of the machine; and

Fig. 4 is an elevational view of a portion of one end of the machine.

The photographic printing machine 10 shown in the drawings comprises a housing within which is supported a cylinder 20 having its outer cylindrical wall formed by a rotatable, transparent, cylindrical roller 22, a plurality of batteries mounted at the longitudinal center of the cylinder, an endless belt 60 by which the work is clamped against the transparent roller 22 of the cylinder, and means for advancing said belt and rotating said cylindrical roller to present the work at the printing position and remove it therefrom.

The housing comprises a base or standard 15 including a table 16, said table being at the desired height for convenience in operating the machine and serving as a support for a cylinder 20, and a hood 17, said base and hood substantially enclosing the cylinder.

The cylinder 20 comprises a pair of stationary end walls 21 mounted on the table 16, a cylindrical roller 22 of glass or suitable transparent material, and a pair of annular bands 23 which

engage the side edges of the roller 22 and form continuations of the end walls 21. The roller 22 and bands 23 form a unit which is supported upon the periphery of the wall 21 and is rotatable about such walls, preferably upon interposed roller bearings 24. The end walls 21 are provided with bosses 25 which rest upon and are secured to the table 16 of the base or standard 15. A shaft 27 extends through the longitudinal center of the cylinder 20 and is supported at its ends in said bosses 25.

Rotatably carried by the shaft 27 within the cylinder 20 are a pair of arcuate shutters 28 and 29, each of which terminates at one end in a plate, 30 and 31, respectively, provided with a wiper, 32 and 33, respectively, of rubber or similar flexible material which bears against the inner surface of the glass roller 22. The plates 30 and 31 define the aperture 34 through which light passes to perform the desired printing. The other ends 35 and 36, respectively, of the shutters overlap and are provided on the adjacent surfaces at each edge with gear teeth 37 and 38, respectively. The teeth 37 and 38 mesh with gears 39 and 40 fixed upon a roll 41 supported in the stationary end walls 21 and provided at one end with a handle 42. Each shutter 28 and 29 is mounted at each side edge on plates 43 and 44, respectively, each plate having a circular opening through which the shaft 27 passes.

Mounted upon the shaft 27 within the shutters 28 and 29 is a block 45 of any desired material, upon the opposite faces of which are supported batteries 46 and 47 of lights. The battery 46 may, as here shown, comprise a plurality of standard base frosted, white and clear amber bulbs 48 and 48a arranged alternately or in any other desired combination. This battery is particularly adapted to be used in photographic printing through positive or negative sheets. The battery 47 is adapted for blueprinting and is here shown as including a plurality of quartz or ultraviolet bulbs 49. It will be understood, however, that the batteries may consist of other forms of lighting means such as, for example, fluorescent lights or, in battery 47, arc lights. Electric current is fed to the batteries through a cable 50. Suitable means (not shown) are provided by which the batteries 46 and 47 are independently lighted and by which either the amber bulbs 48 or the white bulbs 48a or both sets of battery 46 are lighted. As shown in the drawings, the face of the block 45 carrying the battery 46 is nearer the aperture 34 and is held in such position by the engagement of a rod 51 at one end of the shaft with a bracket 52. This condition will be reversed by turning the shaft 27 through 180° and thus bringing the rod 51 into engagement with a bracket 53.

The endless belt 60 by which the work is brought into printing position is provided along each edge with an endless length of flexible chain

61 having equally spaced perforations and is supported upon a plurality of gears 62 carried by suitably mounted shafts 63. The teeth of the gears 62 mesh with the chains 61 and one shaft 63, the lowest, as shown in Figs. 1 and 2, is positively driven by a motor 65 through a sprocket and chain unit 66. The belt travels in the direction indicated by the arrow 67, first substantially around the cylinder 20 and then over the gears 62. The bands 23 of the cylinder 20 are provided with radially projecting teeth 68 which mesh with the chains 61 so that the glass roller 22 of the cylinder is rotated by the belt and in unison therewith. The belt 60 is preferably laminated, having a main layer 69 of rubber, a facing layer 70 of black cloth adjacent the cylinder and a backing layer 71 of cloth or other fabric, and the flexible chain 61 is firmly secured to the edges of the layers by nuts and bolts or other suitable means.

The side walls of the hood 17 at the front of the machine are connected by a plate 76 thus forming a chamber 77 to which access is had through a door 78. Mounted in the chamber 77 at the inner edge of the plate 76 is a doctor blade or stripper knife 79, the inner edge of which rests against the outer wall 22 of the cylinder. In the base or standard below the table 16 is provided a compartment 80 for rolls of paper and a second compartment 81 for scraps of paper or other articles.

The operation of the machine as shown in the drawings with the bulbs 48 of battery 46 lighted will now be described. The work consisting of a negative of the image to be printed and a sensitized sheet of paper or the like is laid on the facing layer 70 of the belt as it passes through the table 16 to the cylinder 20. The sensitized sheet rests on the facing and the belt presses the work against the glass roller 22 of the cylinder, the rubber layer acting to spread the work out smoothly against the cylinder and obviate any wrinkles in the work. As the work passes below the aperture 34 the rays from the bulbs 48 of the battery 46 print the image upon the sensitized sheet in the usual way. The work is carried around the cylinder to the doctor blade 79 by which it is stripped off and falls into the chamber 77. A mirror image can be obtained by the reflex negative method from an original printed or written on both sides or from an opaque original by placing the material face down upon the emulsion side of the sensitized paper and using the amber bulbs as before. If the work consisted of an image-bearing positive instead of a negative, the white bulbs 48a of the battery 46 are lighted instead of the amber bulbs 48. When blueprinting is to be carried out the shaft 27 is turned 180° to bring the battery 47 directly above the aperture and the bulbs 49 of that battery are lighted. The size of the aperture is adjusted by turning the roll 41 with the handle 42 to space the plates 30 and 31 the desired distance apart.

While the operation of the machine in handling sheets of paper is described, it will be understood that the machine can be used equally well in handling webs and other material and hence the references to handling sheets of paper in the specification and claims is expressly not lim-

itative and includes webs as well as other materials.

The particular embodiment herein described and set forth in the drawings was selected for the purpose of illustrating the invention and it will be understood that the invention is not limited thereto and that other embodiments thereof may be made without departing from the spirit and scope of the invention as set forth in the following claims.

I claim:

1. A photographic printing machine comprising a housing, a work table, a cylinder enclosed within said housing and having stationary end walls supported on said work table, and an outer wall formed by a roller of transparent material and freely rotatable about said end walls, shutters defining a printing aperture at said roller, a shaft within the cylinder mounted in said stationary end walls, a pair of batteries carried by said shaft within said cylinder, means for manipulating said shaft so as to bring one of said batteries into register with said printing aperture, a belt which coacts with the roller to clamp the work therebetween and which rotates said roller to advance the work to the printing aperture and remove it therefrom, and means for driving said belt.

2. A photographic printing machine comprising a housing, a work table, a cylinder enclosed within said housing and having stationary end walls supported on said work table, and an outer wall formed by a roller of transparent material and freely rotatable about said end walls, shutters defining a printing aperture at said roller, a shaft within the cylinder mounted in said stationary end walls, a pair of batteries carried by said shaft within said cylinder, means for manipulating said shaft so as to bring one of said batteries into register with said printing aperture, a belt which coacts with the roller to clamp the work therebetween and which rotates said roller to advance the work to the printing aperture and remove it therefrom, means for driving said belt, and means for rotating said shaft to bring the other battery in register with said aperture.

3. A photographic printing machine comprising a cylinder, the outer wall of the cylinder being a roller which is rotatable and transparent, shutters mounted within said cylinder, which shutters coact to form a printing aperture at the outer wall thereof, a shaft mounted within said cylinder and supported at the ends by the end walls of the cylinder, two batteries mounted on the shaft at opposite sides thereof, said shaft being rotatable to bring either of said batteries in register with the aperture, means for holding the work upon the outer surface of the roller, and means for rotating said roller whereby the work is carried past the printing aperture formed by the shutters.

4. A photographic printing machine comprising a cylinder having a printing aperture at the outer cylindrical wall thereof, a shaft mounted within the cylinder and supported at the ends by the end walls of the cylinder, and two batteries mounted on the shaft at opposite sides thereof, said shaft being rotatable to bring the battery selected into register with the aperture.

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