

Jan. 3, 1956

W. FIX

2,729,155

PHOTOGRAPHIC PRINTER

Filed Jan. 8, 1952

2 Sheets-Sheet 1

Fig. 1.

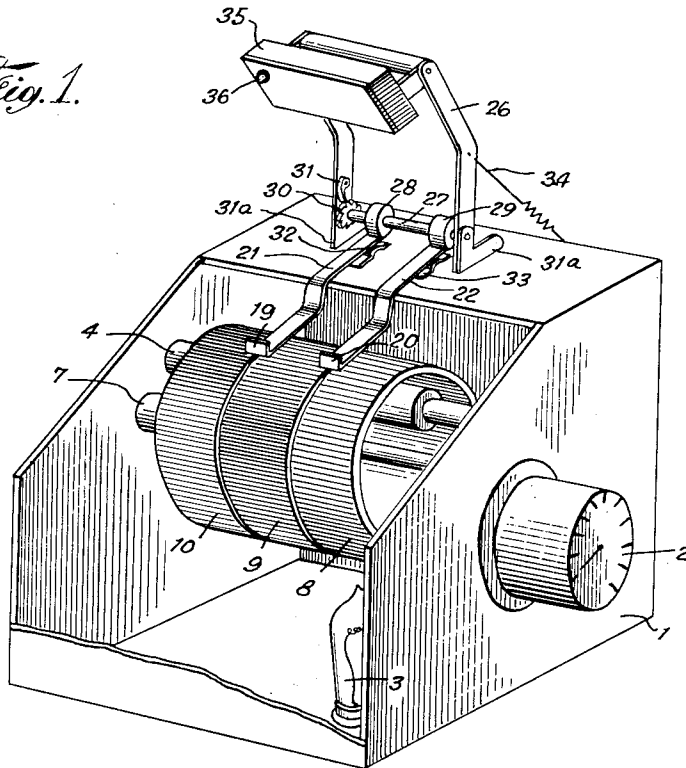
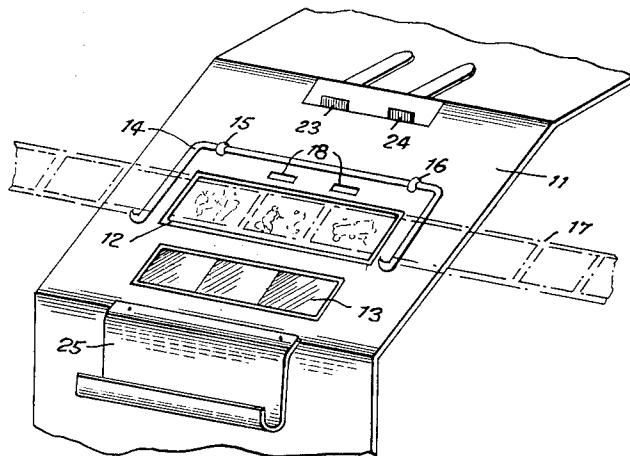


Fig. 2.



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Fig. 3.

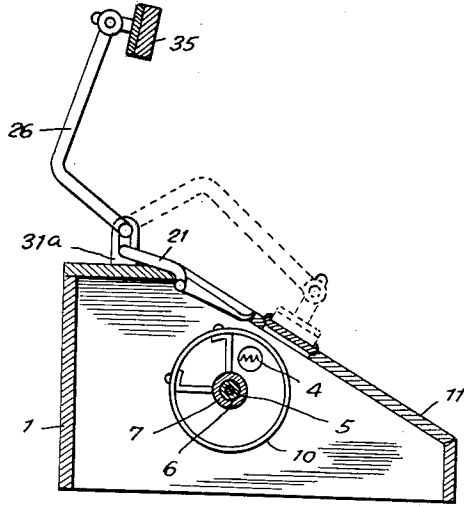
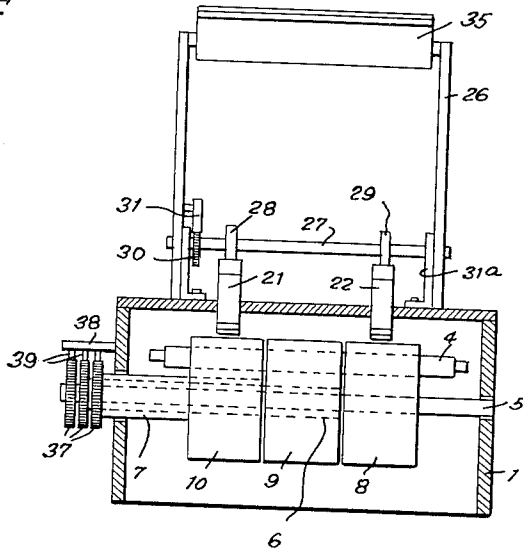


Fig. 4.



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2,729,155

PHOTOGRAPHIC PRINTER

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Application January 8, 1952, Serial No. 265,430

Claims priority, application Germany January 13, 1951

8 Claims. (Cl. 95—75)

The present invention relates to a photographic printer and more particularly to such a printer adapted to produce images in series from films. Such prints, especially in the case of miniature camera prints, have hitherto as a rule had to be taken from more or less long film strips by individual exposure of each image. Strip-like prints have been produced which are then cut up into individual prints, the handling and accommodation of which are usually very difficult for the amateur, and the identification of individual exposures being rendered rather tedious or requiring the use of special albums and the like.

Printing apparatus of various types for the production of prints of various sizes are well known. Such an apparatus consists essentially of a box-like housing with electrical equipment, such as plugs, printing lamp and colored bulb, and also a desk-like lid with a printing window for use as a support and as a means for illumination and exposure by transmitted light, and the so-called print backing plate and printing lever which is movable under spring loading by means of a handle attached thereto, to fix the position of negative and printing paper on the support during the printing operation.

Such apparatus is, however, unsuitable for the simultaneous printing of images in series because in collecting together several negatives for simultaneous printing, the different densities of the individual negatives would lead either to over-exposure or to under-exposure if the conditions were adjusted to suit only one of the images of the group.

An object of the present invention is to provide a printer capable of producing properly exposed prints at one exposure, from negatives of different densities.

Another object of the present invention is to provide such a printer which is capable of rapidly producing several prints in coordinating groups on a single sheet of printing paper, such as collective prints in the form of spaced parallel rows of several individual prints. As an example, said printer may produce a double row of three individual prints upon a single sheet which is then easy to handle and a plurality of which may be fastened in a cover, thus providing a handy format for the collection and display of related exposures. In this connection it should be noted that it is necessary to provide means to insure the correct registry of the printing paper in printing the separate rows.

Still another object of my invention is the provision of such a printer which incorporates means to mark printing paper and the like to enable the recognition of a printed portion thereof.

These and other objects are accomplished by a printer which includes a box-like housing, a window in said housing dimensioned to permit the printing of a plurality of negatives at one time, a spring-loaded backing block pivotally mounted so as to have alternate defined positions of engagement with the surface of said window and out-of-engagement position, a printing lamp spaced from said window and adjustable light intensity varying means mounted so as to be movable between said lamp and said

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window so as to be capable of controlling the amount of light from said lamp falling upon different portions of said window so that light which passes through negatives of different densities may be controlled so as to produce a substantially equivalent intensity gradation of light through each said image. The light intensity varying means may be gray wedge rolls and each of them may be mounted on a shaft, said shafts being co-axial and each being capable of adjustment from the exterior of the apparatus without disturbing the adjustment of the other. This latter effect may be obtained by means of a milled wheel attached to each shaft and a separate leaf spring bearing on each milled edge.

Guide means to assist in positioning paper to be printed upon may be in the form of both fixed abutments and members projecting through slots in said housing proximate said window and which are mechanically linked to said backing block so as to be withdrawn within said housing during the exposure operation.

The means of marking exposed portions of paper or other printing material may consist of a marking pin mounted upon said backing block adapted to pierce or otherwise mark paper at the time the backing block is brought into position during the actual exposure process.

Other objects and a fuller understanding of the present invention may be had by referring to the following expanded description and claims, taken in conjunction with the accompanying drawings which illustrate a preferred embodiment thereof, it being understood that the foregoing statement of the objects of the subject invention and the brief summary thereof are intended to generally explain the same without limiting it in any manner.

Fig. 1 is a perspective view of the printing apparatus after the removal of the desk lid, which includes the printing window, and with a part of the vertical front wall shown broken away.

Fig. 2 is a perspective view of the above mentioned desk lid with broken parts of the bounding walls.

Fig. 3 is a diagrammatic representation of a mean section perpendicular to the axis of the gray wedge rolls.

Fig. 4 shows diagrammatically a vertical section parallel to the axis of the gray wedge rolls.

In the drawing 1 is the housing with a time switch 2 of conventional type and a likewise conventional colored lamp 3, for example a red lamp. Over the source of illumination 4, in this case a tubular printing lamp, there is provided, on separate co-axial shafts 5, 6 and 7 (cf. Figs. 3 and 4) a roller body consisting of three adjacent rings or hollow cylinders 8, 9 and 10 of transparent material, for example glass, one on each shaft, in such a manner that tubular lamp 4, positioned eccentrically, is situated as near as possible to a desk lid 11, or more particularly to a printing window 12 of the desk lid. The three rolls 8, 9 and 10 have increasing peripheral shading, which is similar in each case, so that, beginning with a degree of brightness corresponding to complete transparency of the material, sections of increasing light intensity reduction, parallel to the axis, pass to a section where the intensity is reduced to zero, that is to say amounting to complete opacity. The widths of sections of approximately the same degree of intensity correspond approximately to the width of printing window 12, but of course the shading is not abruptly interrupted. In the drawing various adjacent shadings are indicated. Hence, as rings 8, 9 and 10 are rotated they permit greater or lesser amounts of light to pass through them to window 12.

A comparison window 13 is placed on desk lid 11 below printing window 12. Said comparison window has preferably a fixed gray value to which time switch 2 is adjusted. Alternately, it may have a gray value which is variable by means not illustrated, which means

3 may take the form of gray wedge rolls such as 8, 9 and 10. In such case, the rotation of such time switch 2 may be linked to the means of moving such rolls so that it is automatically set upon the positioning of such rolls.

Frame 14 is pivotally mounted in rings 15 and 16 on desk lid 11 and serves the purpose of maintaining film 17 in a flat position against printing window 12. Of course, there may be substituted for this frame other conventional means for holding a negative or strip of film in a flat position. Alternately, clamping means for fixing the frame or detachable accommodation for the frame may also serve, instead of this holding device, for holding a cassette over the printing window, film containers with spooling devices being positioned on each side of the window, so that, instead of the exposed film, if desired also unexposed film can be intermittently passed in front of the window and exposed, through the cassette, after opening a slide located underneath, by unrolling from one of the spools, for example for the production of diapositives.

Above printing window 12 are located two slots 18 which allow the passage of the turned up ends 19 and 20 of the levers 21 and 22, to permit them to project through slots 18 so that they may serve as abutments to facilitate the positioning of paper on the surface of desk lid 11, in the same way as the abutments 23 and 24 shown higher up on said lid. A print collecting device is shown at 25. A printing lever 26 of conventional type, has on its shaft 27 two cams 28 and 29 and a ratchet wheel 30 which is engaged by a pawl 31 on one arm of the L frames 31a. The cams each become positioned with one of their two oppositely disposed lobes upon the levers 21 and 22. The two leaf springs 32 and 33 tend to urge the freed ends of the rear arms of levers in an upward direction. 34 is an over-centre tension spring which, on raising of the printing lever, automatically urges it into the illustrated idle position and, on lowering the printing lever into the operating position, presses the backing block 35 of the said lever down on the picture window. 36 is a marking pin for making an impression in the printing paper to one side of the portion undergoing exposure. 37 are three milled wheels (Fig. 4) for the actuation of the gray wedge rolls and 38 an arm with frictional holding springs 39 which prevent undesired rotation of a neighboring roll.

The method of operation of the apparatus is as follows. After the film 17 has been placed with the section to be printed, consisting, as shown, of three consecutive individual images, over printing window 12 and after it has been fixed with respect to said window by folding down frame 14, printing lamp 4 is switched on and the gray wedge rolls 8, 9 and 10 are rotated by turning milled wheels 37 (Fig. 4), until the gradation of brightness, as seen by transmitted light, is the same in the case of each of the three images and, if desired, agrees with the comparative value rendered visible at the same time at window 13. Printing lamp 4 is then switched off. By previous movement of lever 26, cam shaft 27 has been so rotated that, at the instant considered, the turned up ends 19 and 20 of the levers 21 and 22 project in the form of stops from the desk lid surface above printing window 12. The printing paper is laid with the emulsion side downwards against the projecting ends and it is of such a size that it can accommodate two rows of three, one under the other.

Printing lamp 4 is now switched on again, being actuated by time switch 2, after the backing block 35 has been lowered. At the same time as the latter operation takes place, the impression pin 36 marks the paper with a small indicating mark to one side of the portion being printed upon, at a point where the film cannot be damaged. This mark has the object that, should the paper be inadvertently displaced after the

printing, the section which has been printed upon can be recognized.

After raising frame 14, the film is now displaced towards the right by a distance corresponding to three further exposures and the operation conducted in the same manner as indicated above, after the paper has been positioned against the upper projections 23 and 24 and the lobes of the cams 28 and 29 have been rotated into the horizontal position, by lifting printing lever 26 after the first printing operation, so that the springs 32 and 33 raise the rear sections of levers 21 and 22 and thus cause projections 19 and 20 to sink through slots 18 below the surface of desk lid 11. The sheet which has been completely printed upon falls into receiver 25 and the whole procedure can be repeated.

The adjustment of the movable support for the paper for the first printing operation, for effecting which object the described method has only been given by way of example, can be carried out in a variety of ways by means of other transmission means of the type having fixed or variable couplings, in dependence upon the movement of the printing lever 35. For example, said lever may carry pins on its frame which penetrate into the desk housing and by means of a ratchet and pawl raise or lower the support at every other movement or also actuate a plurality of consecutively movable supports arranged at different places on the sloping desk lid surface so that three or four parallel superposed series of prints can be produced. Also the printing window itself can be rendered variable as regards the width of the picture by means of masks, slides or the like or it may be provided with a cassette closure and so on.

Instead of effecting the above described reduction of the light intensity of individual pictures by gray wedge rolls, other means of effecting a gradation can be provided. Finally the switching on of the time switch can be a function of the movement of the backing plate lever or still further customary modifications for such copying apparatus can be provided.

By the described method of gradation of the light intensity for each image, which can easily be operated prior to printing, and the variation, by movement of the backing block, of the required position for printing by changing the stops for the printing paper, a process is provided, especially for use in mass printing, for the rapid production of satisfactory associations of several prints in co-ordinated groups on a single sheet, and especially for use in printing from film strips but also in printing from individual negatives which are held together by a band or a frame so that they can be passed consecutively over the printing window.

Although the subject invention has been described with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous additions and changes in the details of construction, combination and arrangement may be resorted to without transcending the scope of the invention as hereinafter claimed.

What is claimed is:

1. An exposure apparatus comprising a housing, a light transmitting window positioned on a wall of said housing, a light source disposed in said housing and spaced from said window, a plurality of rotatably supported tubular members, axially aligned and encompassing said light source, said tubular members being formed of a light transmitting material, the light transmitting properties of said material varying along the periphery of said tubular members and means to individually angularly rotate said tubular members so as to control the intensity of light from said light source incident upon predetermined areas of said window.

2. A photographic printer comprising a housing, a printing window in a wall of said housing dimensioned to permit a plurality of negatives to be placed against said

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window, a printing lamp mounted in said housing spaced from said window, a plurality of shafts rotatably mounted so as to extend within said housing, means external to said housing for controlling the rotation of said shafts, a gray wedge roll mounted on each of said shafts so as to be rotatable therewith and so that portions of each said roll shall extend between said lamp and a predetermined area of said printing window, whereby the amount of light falling upon predetermined areas of said printing window may be individually controlled by rotation of said gray wedge rolls.

3. An exposure apparatus as described in claim 1, a plurality of detent means extending from the wall of said housing upon which said light transmitting window is positioned and spaced from said window, said detent means being adapted to enable the repetitive positioning of material to be printed upon in at least two predetermined positions, so that a plurality of rows of printed images can be produced at predetermined positions on a single piece of material of corresponding size.

4. An exposure apparatus as described in claim 3, a backing plate pivotally mounted upon said housing so as to be swingable against said printing window, at least one of said detent means being mechanically linked to said backing plate so as to be removed from an operative position upon at least alternate swings of said backing plate toward said window.

5. An exposure apparatus as described in claim 2, a backing plate pivotally mounted upon said housing and swingable against said printing window, a marking member projecting from said backing plate and adapted to mark the material to be printed.

6. A photographic printer comprising a housing, a printing window in said housing dimensioned to permit a plurality of negatives to be placed against said window, a printing lamp mounted in said housing spaced from said window, a plurality of independently adjustable light intensity varying means interposed between said lamp and said window, each of said light intensity varying means comprising gray wedge rolls rotatably supported in end-to-end coaxial relationship and encircling said printing lamp and means for individually angularly adjusting each of said rolls, whereby the intensity of light cast upon a particular portion of said window by said lamp may be

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adjusted independently of the light so cast upon other portions thereof.

7. A photographic printer comprising a housing, a printing window in said housing dimensioned to permit a plurality of negatives to be placed against said window, a plurality of detent means extending from the wall of said housing upon which said light transmitting window is positioned and spaced from said window, said detent means being adapted to enable the repetitive positioning of material to be printed upon in at least two predetermined positions, a printing lamp mounted in said housing spaced from said window, a plurality of light transmitting sheets, each such sheet having corresponding areas of varying degrees of light transmission, said sheets being movably mounted between said lamp and said window, means operable from without said housing to independently move each of said sheets, whereby upon displacement of one of said sheets the light intensity upon a predetermined portion of said window which receives light through said sheet may be varied in accordance with the light transmitting qualities of that part of said sheet disposed between said portion of said window and said lamp, thus enabling the simultaneous printing of negatives requiring different light values, and so that a plurality of rows of printed images can be produced at predetermined positions on a single piece of material of corresponding size.

8. An exposure apparatus as described in claim 7, a backing plate pivotally mounted upon said housing so as to be swingable against said printing window, at least one of said detent means being mechanically linked to said backing plate so as to be removed from an operative position upon at least alternative swings of said backing plate toward said window.

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