March 22, 1966 H. T. HODGES 3,241,485

REGISTRATION MECHANISM FOR COPYING APPARATUS

Filed Aug. 1, 1963

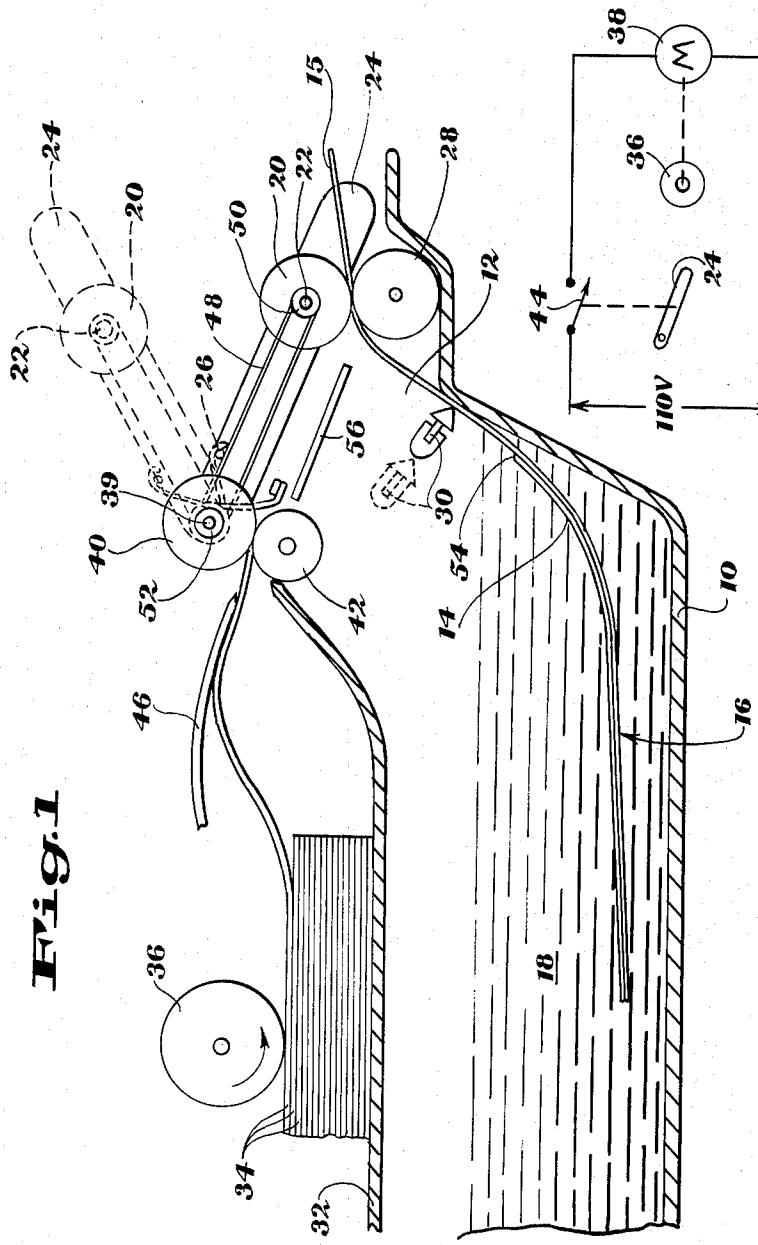



Fig. 1




Fig. 2

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United States Patent Office 3,241,485 Patented Mar. 22, 1966



3,241,485

# REGISTRATION MECHANISM FOR COPYING APPARATUS

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Filed Aug. 1, 1963, Ser. No. 299,368
5 Claims. (Cl. 101—132.5)

This invention relates generally to photographic reproduction, and more specifically to a registration mechanism for a photographic processing and image-transfer copying apparatus.

Photographic processing and image-transfer copying devices for processing an exposed sensitized photographic sheet in a suitable liquid, and then placing the processed sheet in intimate contact with a copy sheet which is nonsensitized to cause transfer of an image from the photographic sheet to the copy sheet are well known in the art. A device of this type is specifically disclosed in U.S. Patent No. 2,666,384. The principle upon which this type of apparatus operates is disclosed in U.S. Patent No. 2,596,756, in which a film or paper support, coated with a substantially unhardened silver halide gelatin emulsion containing a pigment or dye and a tanning developing agent, is exposed to a suitable two-tone subject, such as a line or halftone subject, after which the sensitized film or paper is processed by immersion in an alkaline solution. This processing results in the developing of the exposed image, and the simultaneous hardening or tanning of the gelatin in the exposed and developed areas. Thereafter, the excess fluid may be squeegeed from the processed sheet which is then pressed, while still moist, into contact with a nonsensitized sheet of paper having an absorbent surface. After separation of the sheets, it will be found that a stratum of the unexposed and, therefore, unhardened areas of emulsion layer will have been transferred to the sheet of paper. This process thus produces a direct positive image. Moreover, although the image is immediately discernible upon separation of the two sheets because of the pigment or dye in the transferred emulsion, this image will darken further upon exposure to light since the transferred emulsion also contains sensitized silver halide.

This process is especially useful since it permits making several reproductions from the exposure of a single sensitized sheet. This is possible because in the transfer of unhardened gelatin to the absorbent sheet, only a stratum thereof is carried over. The processed sheet may be again wetted in the alkaline solution, squeegeed and pressed against a second absorbent sheet whereby a second stratum of the unhardened gelatin will be transferred. It is possible to repeat this a number of times before the unhardened gelatin is exhausted to the extent that acceptable copies are no longer obtainable.

Since the composition of the emulsion, as well as a number of modifications thereof, and the chemistry of this process are fully disclosed in the above-noted patent and actually forms no part of the present invention, we have omitted such data in the specification. We refer to this process, however, in that the apparatus disclosed below, which comprises the present invention, is particularly adapted for use in this process and in such variations thereof as may occur to those skilled in this art.

Photographic processing and image-transfer devices of the type described provide only the basic essentials for transferring an image from a matrix master to a nonsensitized copy sheet; namely, a tray containing activator solution into which the exposed matrix is inserted and developed, a separate container for holding and positioning the copy paper, and a simple, manually operable



mechanism for squeegeeing the excess solution from the matrix and immediately thereafter pressing the matrix into intimate contact with the image-receiving copy sheet. It is necessary in this type of device for the operator to insert the exposed matrix into the activator tray, time the development, manually pull out the matrix after development along with a piece of copy paper whose leading end has been placed in register with the leading end of the matrix, manually strip the two apart, and reinsert the matrix into the activator and repeat the cycle for as many copies as is required or for as long as the matrix lasts. It is also necessary for the operator to trim a tab which is about an inch and a half long off of each copy sheet to produce the final copy. The tab is necessary since a portion of the matrix and the copy sheet are kept out of the activator solution to facilitate handling of the matrix and copy paper by the operator.

One disadvantage of the above-described copying apparatus is that it is wasteful of copy paper; requiring that each sheet of copy paper be approximately an inch and a half longer than is necessary to provide the pull tab mentioned above. This copying system has a further disadvantage in that it is often necessary to trim off the tab portion of the copy paper to produce an acceptable final copy which is time-consuming and inconvenient. These disadvantages are believed to be obviated by applicant's registration mechanism that automatically positions the leading end of an image-receiving sheet in register with the boundary between the sensitized and unsensitized portions of the matrix before the sheets are transported through the pressure rollers.

It is therefore one of the objects of the present invention to provide a registration mechanism for automatically positioning the leading ends of two separate sheets in proper registration with one another.

Another object of the invention is to provide an improved processing and image-transfer apparatus in which the copy sheets used therein have the same dimensions as the sensitized area of the matrix, thereby making it unnecessary to trim off a tab from the finished copy sheet.

Still another object of this invention is to provide a photographic apparatus of simple design and construction, thoroughly reliable and efficient in operation, and economical to manufacture.

Objects and advantages other than those set forth above will be apparent from the following description when read in connection with the accompanying drawing, in which:

FIG. 1 is a segmental, diagrammatic view of a photographic processing and image-transfer apparatus embodying the invention; and

FIG. 2 is an electrical wiring diagram for the apparatus.

As shown in the drawing, the illustrated apparatus comprises a processing solution container **10** having an opening **12** through which an exposed sensitized portion **14** of a matrix **16** of the type described heretofore may be inserted into the solution **18** and withdrawn by grasping the unsensitized tab portion **15** at one end thereof. A pressure roller **20** is secured through its shaft **22** to an arm **24** pivotally mounted on the apparatus for movement between a normal operative position, shown in full lines in FIG. 1, into which it is biased by a spring **26**, and an inoperative position, shown dotted. In its operative position, the pressure roller **20** is in pressure engagement with an idler roller **28** mounted on the container near the opening **12**, and exerts pressure upon the matrix **16** which has been introduced therebetween. A squeegee **30** is also secured to arm **24** by any suitable linkage, not shown, and cooperates with the surface of matrix **16** insuring that surplus liquid is removed therefrom by squeegee action when roller **20** is in its operative position and

matrix 16 withdrawn from container 10 by pulling on the tab portion 15. When roller 20 is manually moved to its inoperative position, the squeegee 30 is raised from matrix 16 to its dotted position of FIG. 1. A cover for the processing solution container 10 is formed by the walls of a container 32 for a stack of image-receiving sheets 34. Paper supply means comprising a paper supply roller 36 driven by an electric motor 38 (see FIG. 2) feeds the top sheet 34 from the stack into the nip between a pair of feed rollers 40, 42 mounted on the apparatus adjacent the opening 12. The electric motor 38 is operated by a microswitch 44 which is actuated by arm 24 when it is manually raised to its inoperative position uncovering the opening 12 in the solution container 10 for the insertion therein of an exposed matrix 16. The axis of the upper feed roller 40 and the pivot for arm 24 are coincidental. A deflector plate 46 mounted on the apparatus acts as a backing plate for the image-receiving sheet as its leading edge is forced into the nip between the paper-feed rollers 40, 42. The paper-feed rollers are spaced from pressure roller 20, and upper feed roller 40, which is mounted on a shaft 39, is coupled to pressure roller 20 by means of a belt 48 trained over pulleys 50, 52 mounted on shafts 22, 39 respectively, although any other suitable driving coupling may be used such as a chain or gears. When a matrix sheet 16 is manually withdrawn from solution container 10 by pulling on tab portion 15, pressure roller 20 is rotated and in turn rotates roller 40 through belt 48 and pulleys 50, 52. The distance between the pressure and paper-feed rollers 20, 40 respectively, and the diameter of the respective pulleys 50, 52 and rollers 20, 40 are so selected that the leading edge of the image-receiving sheet 34 reaches the nip between the pressure roller 20 and matrix 16 at the same time as the boundary 54 between the sensitized portion 14 and unsensitized or tab portion 15 of matrix 16. A guide plate 56 aids in directing the sheet 34 fed by rollers 40 and 42 into the nip between matrix tab 15 and roller 20.

In operation, the exposed sheet of matrix 16 is manually inserted into the solution container 10 to a predetermined point by the operator with one hand while the arm 24 is held in a raised position by the other hand. As long as arm 24 is raised, the motor 38 is energized causing the paper supply roller 36 to rotate feeding the top image-receiving sheet 34 from the stack. When the leading edge of sheet 34 enters the nip between rollers 40, 42, its upper surface is forced against deflector plate 46, and the roller 36 slips over the surface of sheet 34. After inserting a matrix 16 into the solution container 10, the arm 24 is lowered deenergizing motor 38 and causing pressure roller 20 to press the unsensitized or tab portion 15 of matrix 16 against idler roller 28 with a predetermined portion of the matrix tab 15 protruding past the rollers 20, 28. When the appropriate period of processing has expired, the matrix 16 is withdrawn manually from container 10 by grasping and pulling the protruding end of tab 15. The surplus processing solution 18 is removed by the action of squeegee 30, and the pressure roller 20 is rotated as the matrix 16 is pulled past it. This rotation of roller 20 is transmitted by belt 48 to feed roller 40 which feeds the image-receiving sheet 34 previously introduced into the nip between rollers 40, 42 over the guide plate 56 and into the nip between pressure roller 20 and matrix tab 15. The leading edge of the image-receiving sheet 34 reaches the nip coincidentally with the boundary 54 between the sensitized and unsensitized portions 14, 15 of matrix 16. As the operator continues to manually withdraw matrix 16, the image-receiving sheet 34 is pressed into intimate contact with the sensitized portion 14 of matrix 16 by roller 20. After complete withdrawal of matrix 16 and image-receiving sheet 34, the latter is stripped from matrix 16 and bears a positive, right-reading transfer image. It will be apparent that this transfer operation can be repeated by manually raising arm 24 once again causing another image-receiving sheet 34 to be supplied from the stack to rollers 40, 42, reintroducing the matrix 16 into the solution 18 of solution container 10, lowering arm 24, and then manually withdrawing matrix 16.

The invention has been described in detail with particular reference to a preferred embodiment thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention described hereinabove and defined in the appended claims.

I claim:

1. In an apparatus for feeding a first sheet into proper registry with a second sheet and urging the two sheets into intimate surface contact as the two sheets are withdrawn from the apparatus by pulling said second sheet, the combination comprising:

a first support;

a first roller in engagement with said first support to form a first nip therebetween;

a second support;

a second roller movable between an inoperative position, in which it is disengaged from said second support to allow the introduction of said second sheet between said second roller and second support in a predetermined position, and an operative position, in which it presses said second sheet against said second support and cooperates with one surface of said second sheet to form a second nip therebetween;

a drive coupling between said first and second rollers for producing rotation of said first roller upon rotation of said second roller by manual withdrawal of said second sheet from between said second roller and said second support;

means responsive to movement of said second roller to its inoperative position for feeding a first sheet into said first nip; and

means for guiding said first sheet from said first support and first roller into said second nip, said first sheet being fed into said second nip in proper registry with said second sheet and urged into intimate surface contact therewith upon manual withdrawal of said second sheet from said apparatus while said second roller is in its operative position.

2. The invention according to claim 1 wherein said first and second supports are rollers.

3. The invention according to claim 2 wherein said coupling means comprises a pulley connected to each of said first and second rollers, and a belt trained over said pulleys.

4. The invention according to claim 1 wherein said feeding means comprises a feed roller, an electric motor for driving said feed roller, and a switch for said motor responsive to movement of said second roller between its operative and inoperative positions.

5. In an image-transfer device including a tank for a supply of processing solution having an entrance through which a sheet of exposed matrix having a sensitized portion and an unsensitized portion is inserted for processing and a compartment located remotely from the entrance of said tank for holding a stack of sheets of copy paper, means for feeding a sheet of copy paper from said stack in registry with the sensitized portion of a sheet of matrix in said processing solution and urging the two sheets into intimate surface contact as they are withdrawn from the device by pulling on said sheet of matrix and comprising in combination:

a first pair of rollers adjacent the entrance to said tank and movable relative to one another between an inoperative position, wherein they are separated to permit insertion of a sheet of exposed matrix into said tank to an extent that the sensitized portion thereof is immersed in said processing solution and a part of the unsensitized portion extends be-

tween said rollers, and an operative position, wherein said rollers squeeze the matrix between them;

a second pair of rollers substantially in rolling contact and adjacent said compartment for feeding a sheet of copy paper into the nip formed between one of the rollers of said first pair and the surface of the matrix;

means for feeding a sheet of copy paper from said stack into the nip between said second pair of rollers so that it will be engaged and driven by said rollers as one of them is rotated; and

a drive coupling between one of said first pair of rollers and one of said second pair of rollers for rotating the latter to feed a sheet of copy paper as the former is rotated by pulling said sheet of matrix from said tank, said drive coupling being correlated with the spacing of said pairs of rollers and the diameters thereof so that the leading edge of the copy paper will register with the leading edge of the sensitized portion of said matrix as they move between said second pair of rollers.



No references cited.

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