March 17, 1931. J. S. GREENE ET AL 1,796,366

PHOTOGRAPHIC PRINT TREATING APPARATUS

Filed April 4, 1929 2 Sheets-Sheet 1

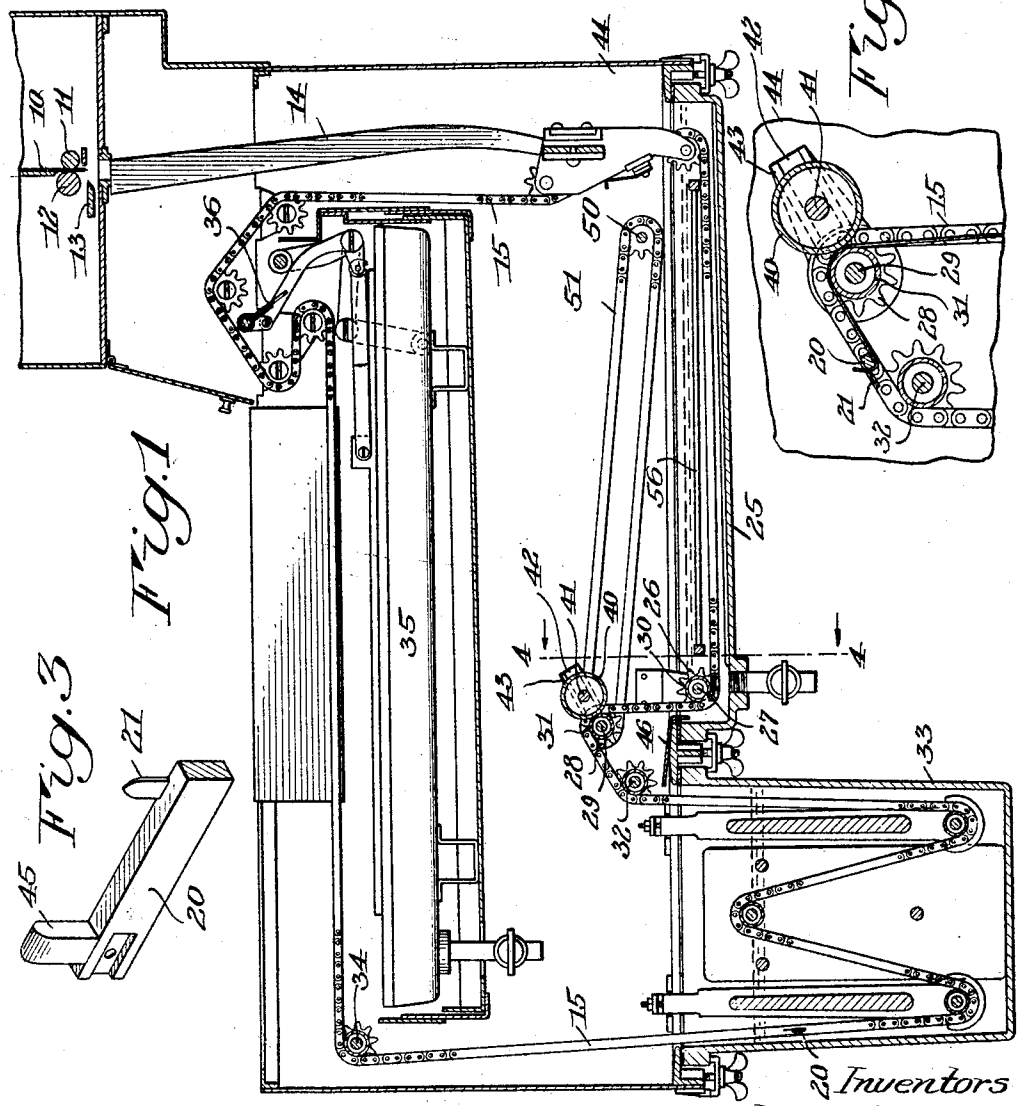


Fig. 1

Fig. 2

Fig. 3

Inventors
John S. Greene
Paul Landrock
BY
Dumpston & Griffith
their ATTORNEYS

March 17, 1931. J. S. GREENE ET AL 1,796,366

PHOTOGRAPHIC PRINT TREATING APPARATUS

Filed April 4, 1929 2 Sheets-Sheet 2

Fig. 4

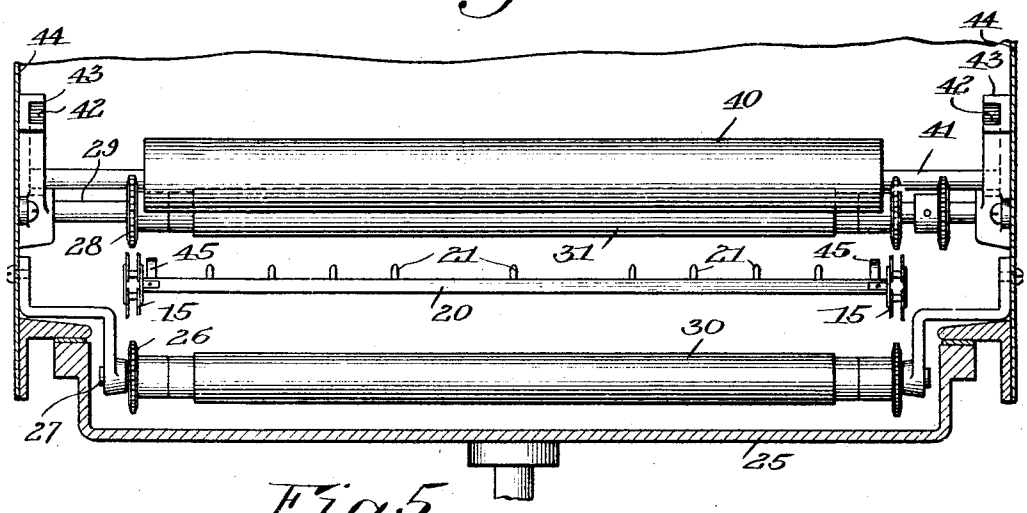
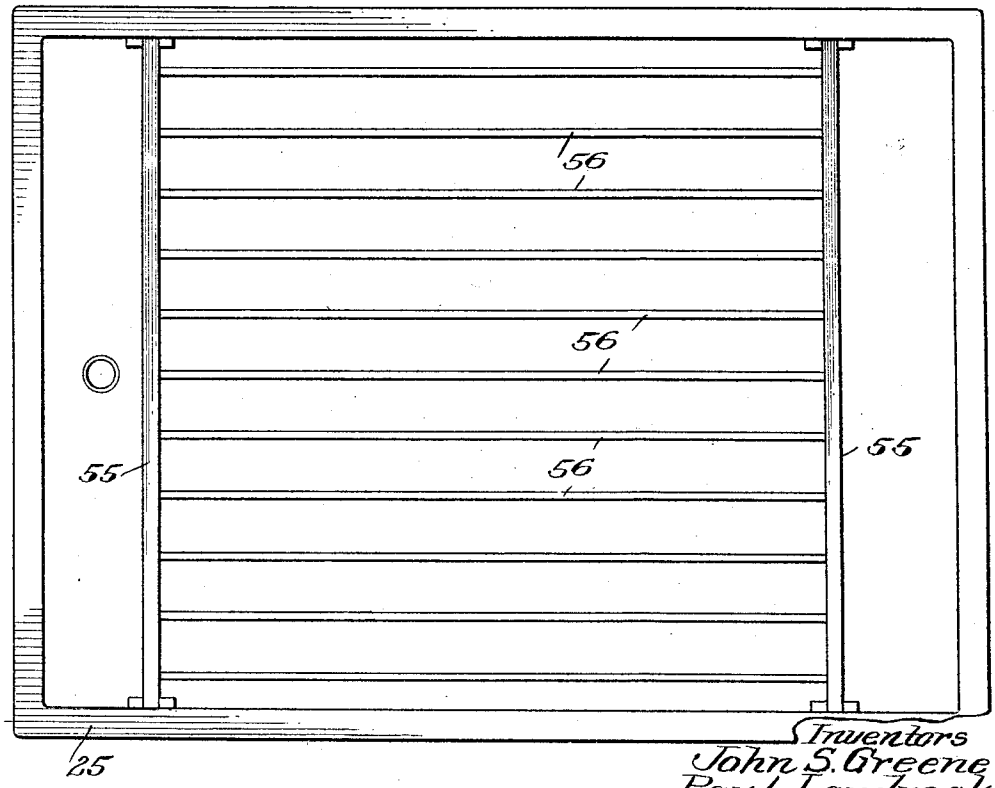


Fig. 5



Inventors
John S. Greene
Paul Landrock
BY
Crumpton & Griffith
Their ATTORNEYS

Patented Mar. 17, 1931 1,796,366

UNITED STATES PATENT OFFICE

JOHN S. GREENE AND PAUL LANDROCK, OF ROCHESTER, NEW YORK, ASSIGNORS TO PHOTOSTAT CORPORATION, OF PROVIDENCE, RHODE ISLAND, A CORPORATION OF RHODE ISLAND

PHOTOGRAPHIC-PRINT-TREATING APPARATUS

Application filed April 4, 1929. Serial No. 352,354.

This invention relates to photographic print treating apparatus, such, for example, as apparatus designed to develop and/or fix photographic prints. An object of the present invention is to provide simple and satisfactory means for squeezing excess liquid out of a photographic print after the removal of the print from a treating bath such as a developing or a fixing bath.

Another object of the invention is the provision of effective and satisfactory excess liquid removing means of a type which is suitable for use in connection with print conveying mechanism of a form frequently used in photographic apparatus known as "commercial cameras".

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a vertical section through one form of photographic print treating apparatus, illustrating a preferred embodiment of the invention applied thereto;

Fig. 2 is a fragmentary sectional view showing on a somewhat larger scale parts of the apparatus illustrated in Fig. 1;

Fig. 3 is a perspective view of a part of a pin bar forming a portion of the print conveying mechanism;

Fig. 4 is a transverse vertical section taken substantially on the line 4—4 of Fig. 1, and

Fig. 5 is a plan of a container for holding a print treating bath.

Similar reference numerals throughout the several views indicate the same parts.

The present invention may be used in connection with many different forms of photographic print treating apparatus, but is here illustrated by way of example as applied to apparatus of the so called "commercial camera" type, in which successive portions of a strip of sensitized sheet material are held at 10 in the focal plane of a camera, images of the object to be photographed being thrown on the focal plane in well known manner. After each exposure, feed rolls 11 and 12 are rotated to feed the exposed portion of the sheet material downwardly and to bring a fresh unexposed portion into position to be exposed. The exposed portion is then severed from the unexposed portion by operation of a severing knife 13, which allows the severed sheet to fall into a guideway or chute 14 from which it is picked up by suitable conveying mechanism including a pair of endless members such as the chains 15. There is one of these endless members adjacent each side of the apparatus, and one or more pick up devices are mounted on these endless members so that they move with the endless members when the latter are driven.

In the present instance, the pick-up devices include what might be termed pin bars 20 extending transversely across the apparatus, each pin bar having one end secured to one of the chains 15 and the other end to the other chain. Each of these bars 20 also carries a plurality of sharp points or pins 21 projecting forwardly in the direction of travel of the bars. When the conveying mechanism is operated, the pin bars 20 move along a path intersecting a print held in chute 14, so that the pins 21 pierce the print which thus becomes impaled upon the pins and is carried along when the pin bars move.

When the movement of the endless members 15 is continued, each pin bar 20 with its attached print travels along a predetermined path of travel which takes it substantially horizontally through a developing bath within a relatively shallow bath container or tray 25. The endless members then pass around sprockets 26 on a shaft 27 and extend upwardly out of the bath in a substantially vertical direction to sprockets 28 on a shaft 29. A roller 30 is provided on the shaft 27 between the sprockets 26, which roller serves as guiding means for the print as it trails along behind the pin bar 20 to which it is attached. A similar guide roller 31 is placed on the shaft 29, and other guide rollers may be used in conjunction with the other shafts over which the endless members 15 pass, and need not be specifically referred to hereafter.

After passing partially around the shaft 29, the conveying mechanism and the attached

prints travel over a shaft 32 and downwardly into a container 33 which may hold a washing bath of water or the like. After making as many passages through this washing bath as may be desired, the conveying mechanism passes upwardly, over a shaft 34, and forwardly over the top of a receptacle 35 which may contain, for example, a fixing solution of hypo or the like. The print is removed from the pin bar 20 to which it is attached and dropped into the fixing bath in the container 35, the print removing means forming no part of the present invention, but including an oscillating wiping member 36 which strips the print off of the pins 21 and allows it to fall by gravity into the fixing bath.

According to the present invention, means is provided for removing a considerable portion of the liquid of one bath from a print before the print passes into the next bath. Preferably this liquid removal takes place immediately following the developing bath, and the liquid removed from the print is arranged to drain back into the developing bath. Thus not only is the developing solution conserved, but also contamination of succeeding baths by the developer is prevented or greatly reduced. This liquid removing means, in the present instance, comprises a pair of squeegee rollers arranged to contact with opposite sides of a print to squeeze a large part of the developer therefrom.

The roller 31 on the shaft 29 is utilized as one of the squeegee rollers. The other squeegee roller 40 is shown in Figs. 1, 2 and 4, and is mounted upon a shaft 41 the ends of which project into and are free to slide in guideways or grooves 42 formed in members 43 fixed to the side walls 44 of the apparatus. As will be seen especially from Figs. 1 and 2, the guideways 42 are inclined so that the shaft 41 of the roller 40 is offset both horizontally and vertically from the shaft 29 of the roller 31. Since the guideways 42 are inclined upwardly away from the shaft 29, it is apparent that the force of gravity will tend to bring the roller 40 into contact with the roller 31, so that no springs are needed. The roller 31 may be of hard rubber or the like, but the roller 40 is preferably of metal and is of a larger diameter than that of the roller 31, since it is found in practice that such a construction gives better results.

The roller 40, because of its metallic construction, is comparatively heavy. The inclination of the guideways 42 in which the roller is movable is desirable since part of the weight of the roller is thus supported by the guideway, leaving only a portion or component of the weight acting in a direction to press the roller toward the other roller 31. Thus excessive pressure which would occur if the roller 40 pressed directly downwardly upon the roller 31 is avoided.

It will be observed from Fig. 1 that the print conveying mechanism travels substantially vertically upwardly out of the tray 25 and thence around the shaft 29, and that the point of contact between the rollers 31 and 40 is adjacent the point where the print carried by the conveying mechanism first comes into contact with the roller 31. Also it will be observed that a plane passed through the axes of the rollers 31 and 40 is inclined to the upward path of travel of the conveying mechanism. These characteristics are found in practice to give beneficial results, and to remove the liquid from the print more satisfactorily than when the roller 40 is placed farther around the roller 31 at a greater distance from the point where the advancing print first comes into contact with the roller.

In a print conveying mechanism of the form herein disclosed, the pin bars 20 during their travel must pass between the squeegee rollers 31 and 40. Since the pins 21 on these bars project forwardly in the direction of travel of the conveying mechanism, it follows that they would come into contact with the roller 40 before the body of the pin bar 20 reached the roller, and since these pins are set over at that edge of the pin bar which is toward the roller 40 (as shown in Figs. 2 and 3) there might be some tendency for the pins 21 to become bent or otherwise damaged by contact with the roller. To avoid this, each pin bar is provided with a pair of lugs 45 (Figs. 3 and 4) one near each end of the pin bar, which lugs are of the same thickness as the pin bar and extend forwardly from the forward edge thereof for a distance slightly greater than the length of the pins 21, having rounded front ends. As the pin bar moves upwardly toward the squeegee rollers, the lugs 45 will come into contact with the rollers and displace the movable roller 40 by sliding its shaft 41 up the guideways 42, holding the roller so that it exerts little or no pressure upon the pins 21, so that there is no danger of bending or otherwise damaging the pins. After the pin bar has passed between the rollers, the roller 40 will immediately drop back due to the force of gravity, so that the print trailing along behind the pin bars will be squeezed between the two squeegee rollers in the manner illustrated in Fig. 2. This will wring or squeeze a large part of the developer out of the print, causing it to fall back into the tray 25. Should any of the developer removed by the rollers tend to spatter somewhat instead of dropping directly into the tray, it will be led back into the tray by an inclined guide or chute 46 illustrated in Fig. 1.

The inclined relationship of the guides 42 of the roller 40 has been found to be beneficial not only in giving a very satisfactory

squeegee action to the prints, but also in that the roller 40 may be displaced easily by the pin bars 20 as they pass between the rolls, and after the pin bar has passed, the roll 40 will fall back easily and quickly so that that portion of the print immediately behind the pin bar will be effectively squeezed by the roll. In practice, it has been found that making the guideways 42 at an angle of approximately 30 degrees to the horizontal gives excellent results and is quite satisfactory both from the viewpoint of easy passage of the pin bars and effective action upon the prints.

The conveying mechanism may be driven in any suitable manner, such as by power means acting upon the shaft 50 which, through the chain 51, drives the shaft 29 and the sprockets 28 fixed thereon. The driving means may be either intermittent or continuous, and if intermittent, it is preferably so arranged that a pin bar will be stopped in such position that the print attached thereto remains in the developing bath within the container 25 until the driving means is again operated.

To prevent a print from floating to the surface of the bath when the pin bar has been stopped as described, there may be provided guiding means such as the grid consisting of removable cross pieces 55 which support longitudinally extending rods or wires 56 arranged in a plane above the path of travel of the conveying mechanism and below the surface of the developing bath, is illustrated in Figs. 1 and 5. The wires or rods 56 are preferably circular in cross section, so they will produce less resistance or drag upon a wet print coming into contact therewith than would be caused if flat surfaces of any considerable extent were in contact with the print.

While one embodiment of the invention has been disclosed, it is to be understood that the inventive idea may be carried out in a number of ways. This application is therefore not to be limited to the precise details shown, but is intended to cover all variations and modifications thereof falling within the spirit of the invention or the scope of the appended claims.

We claim as our invention:

1. In a photographic apparatus, the combination with a print treating bath, of print conveying mechanism for withdrawing a print from said bath, and a pair of squeegee rollers for contacting with opposite sides of a print carried by said conveying mechanism to squeeze excess liquid from the print, said print conveying mechanism including a series of points arranged to pass between said rollers, and also including means for separating said rollers to hold them out of substantial contact with said series of points.

2. In a photographic apparatus, the combination with a print treating bath, of a roller, print conveying mechanism for withdrawing a print from said bath, said conveying mechanism including print holding means movable upwardly from said bath and partially around said roller, and a second roller tending to contact with said first roller to squeeze excess liquid from a print moved between said rollers by said print holding means, said print holding means including a portion for contacting with and displacing said second roller, the direction of movement of said second roller when so displaced being at an inclination to the direction of movement of said means when it comes into contact with the roller to displace it.

3. In a photographic apparatus, the combination with a print treating bath, of a pair of rollers tending to contact with each other, print conveying mechanism for removing a print from said bath and passing it between said rollers, said print conveying mechanism including a print engaging member having print impaling pins thereon, and means on said member for separating said rollers as said member moves between them to hold said rollers out of contact with the pins on said member, said rollers coming into contact with a print impaled on said pins after the passage of said member between said rollers, to squeeze excess liquid from said print.

4. An element of a photographic print conveying mechanism, said element comprising a bar, a plurality of pins projecting from said bar in one direction, and a plurality of lugs projecting from said bar in the same direction as said pins, said lugs having an outline which includes the outline of said pins.

5. In a photographic apparatus, the combination with a pair of rollers tending to move toward each other, of print conveying mechanism including a bar movable between said rollers, a plurality of pins projecting from said bar, and a lug also projecting from said bar and having an outline including the outline of said pins, said lug being so placed that upon passage of said bar between said rollers, said lug will separate said rollers to allow free passage of said pins therebetween.

JOHN S. GREENE.
PAUL LANDROCK.