

E. N. MILLAN.
 PHOTOGRAPHIC APPARATUS.
 APPLICATION FILED MAR. 16, 1916.

1,249,291.

Patented Dec. 4, 1917.

2 SHEETS—SHEET 1.

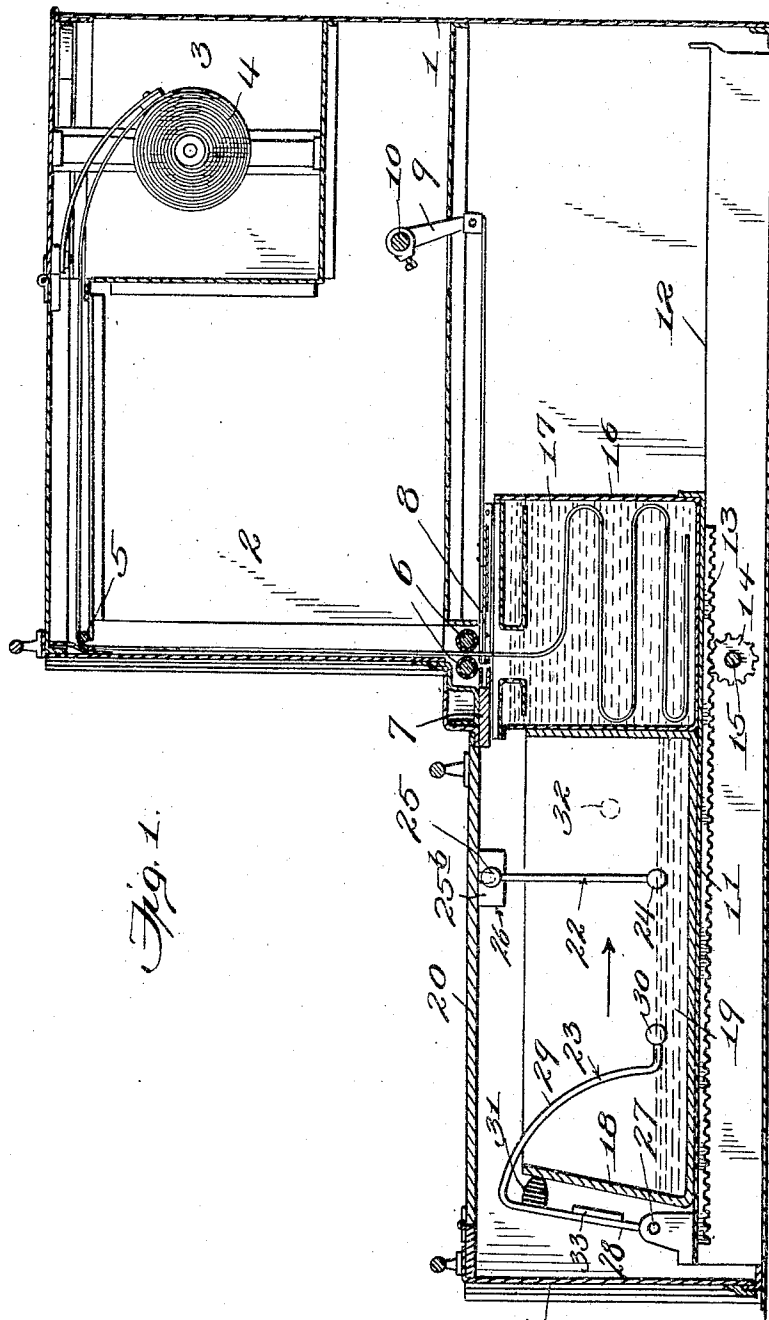


Fig. 1.

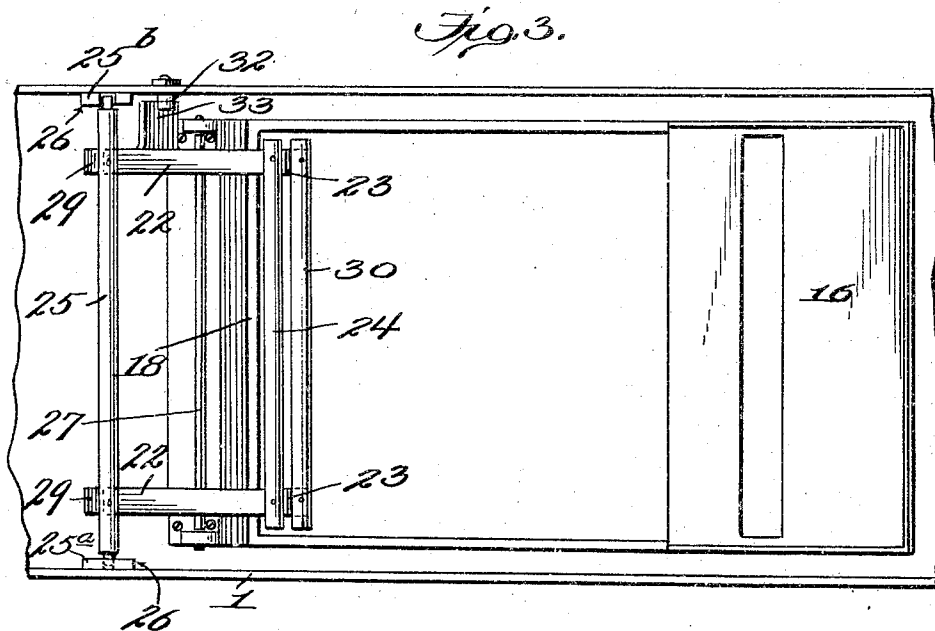
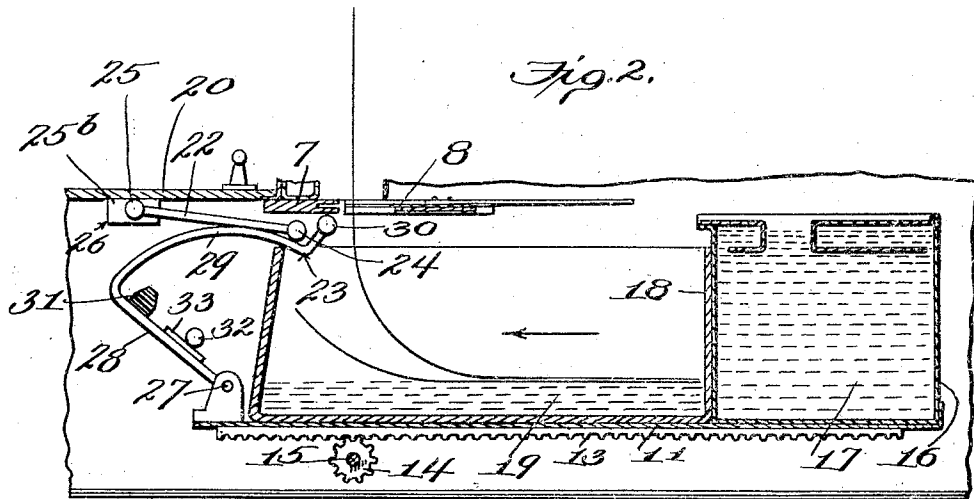
Witnesses:
C. S. Nesler
C. A. Pateman

Inventor
 Edward N. Millan
 by *James L. Norris*
 Attorney

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Witnesses:
 C. D. Kessler
 C. A. Dittman

Inventor
 Edward N. Millan
 by *Paul L. Norris*
 Attorney

UNITED STATES PATENT OFFICE.

EDWARD N. MILLAN, OF KANSAS CITY, MISSOURI.

PHOTOGRAPHIC APPARATUS.

1,249,291.

Specification of Letters Patent.

Patented Dec. 4, 1917.

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To all whom it may concern:

Be it known that I, EDWARD N. MILLAN, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented new and useful Improvements in Photographic Apparatus, of which the following is a specification.

My present invention relates to improvements in apparatus for producing photographic prints or reproductions of documents, drawings, books, papers of various kinds, and objects in general, and more especially to apparatus of this type wherein the exposed sensitized material is developed and fixed without requiring the use of a dark room. The patent to Calvin J. Ellis, No. 929,757 granted August 3, 1909, is an example of an apparatus of this type wherein the developing and fixing means is movable relatively to the exposing means, and this movement serves to transfer the print from the developing bath of the fixing bath, submerging of the print in the fixing bath, however, requiring an independent manual operation. The primary object of the present invention is to provide means operative automatically by the movement of the developing and fixing means relatively to the exposing means for insuring submerging of the exposed and developed prints in the fixing bath, to the end that the fixing action upon each print will be thorough and uniform throughout the area of each print, and the submerging will be accomplished without depending upon the operator to perform this operation manually. An advantageous feature of the present invention is that the print-submerging means at all times over or above the fixing bath receptacle, and hence all dripping of chemicals from the submerging means is received by this receptacle, thereby avoiding slopping of the chemicals in the machine.

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

In the accompanying drawings:—

Figure 1 represents a central longitudinal section taken vertically through photographic apparatus embodying the present invention, the developing bath being shown

in position to receive an exposed section of the sensitized material.

Fig. 2 is a detail sectional view of a portion of the apparatus, showing the developing and fixing baths shifted to transfer the developed print from the developing bath into the fixing bath.

Fig. 3 is a top plan view of that part of the apparatus shown in Fig. 2.

Similar parts are designated by the same reference characters in the several views:

The present invention provides means for automatically insuring complete submerging of the developed prints in the fixing bath in photographic apparatus of the type wherein the developing and fixing baths are shiftable to transfer prints from the developing bath to the fixing bath. In the present instance, the invention is shown applied to a machine of the type illustrated and described in the Ellis patent hereinbefore referred to, and while the invention is so shown and will be so described, it is to be understood that the invention is not restricted to the precise construction shown, as modifications and changes may be made therein within the scope of the claims.

In the present instance, the machine to which the invention is shown applied comprises a casing 1 having an exposing chamber 2, a receptacle 3 to contain a roll 4 of sensitized material such, for example, as photographic paper, the paper in the present instance being guided by a roller 5 so as to pass between a pair of feed rollers 6, and the section of the photographic paper or sensitized material which lies between the feed rollers and the guiding roller 5 occupies the photographic field of the lens whereby an image of the object to be photographed is projected by the lens onto this section of the photographic paper and the same is exposed in the usual way. A knife is provided to sever the exposed sections of the photographic paper to form separate sheets, the knife, as shown, being located beneath the feed rollers 6 and comprising a stationary member 7 and a reciprocatory blade or member 8, the latter being operated by a crank 9 attached to a shaft 10, the latter extending to the exterior of the casing where it is provided with a handle or equivalent means for operating it. Suitable means located exteriorly of the casing is also provided for rotating the feed rollers 6 to feed the exposed

portion or section of the photographic paper into the developing bath and simultaneously bring a fresh portion of the photographic paper into the field of the lens for exposure.

5 The structure just described corresponds to that shown and described in the Ellis patent above mentioned.

Beneath the exposing mechanism is arranged a reciprocatory carriage 11 which is
10 mounted to slide on tracks 12 suitably arranged in the bottom of the casing, and appropriate means is provided for reciprocating the carriage at appropriate times. As shown, a rack 13 is attached to the under
15 side of the carriage, a pinion 14 coöperates with the rack, and a shaft 15 is connected to the pinion, this shaft extending to the exterior of the casing and being provided with means for rotating it. The carriage 11 has
20 mounted thereon a receptacle 16 to contain a bath 17 of developing agent, and the carriage also has mounted thereon a receptacle 18 to contain a fixing bath 19, the developing and fixing baths being movable in unison be-
25 neath the exposing chamber as the carriage is reciprocated. A door 20 is formed in the casing to provide means for removing the fixed prints from the fixing bath when the receptacle containing this bath is brought
30 beneath it, as shown in Fig. 1, and a door 21 is also provided to permit removal of the carriage or the receptacles thereon containing the developing and fixing agents to enable filling, emptying or renewal of the fix-
35 ing and developing agents.

In operating an apparatus of the character just described, the section of the photographic paper extending between the guide roller 5 and the feed rollers 6 is exposed by
40 light admitted thereto through the lens, and after this exposure has been made and while the carriage is in a position where the receptacle 16 thereon containing the developing agent is beneath the feed rollers 6, the latter
45 are operated to feed the exposed portion or section of the sensitized material downwardly into the developing bath. After this exposed section of the sensitized material has remained in the developing bath
50 for a period of time sufficient to effect a proper development thereof, the carriage is reciprocated toward the right in Fig. 1, this section of the sensitized material which has just been developed being still attached
55 to the remainder of the strip of sensitized material which extends between and is held by the feed rollers 6. This movement of the carriage carries the receptacle 16 containing the developing agent from beneath the feed
60 rollers 6 and brings the receptacle 18 containing the fixing agent beneath the feed rollers, and as one end of the developed portion of sensitized material is held by the feed rollers 6, the developed section will be
65 drawn out of the developing bath and trans-

ferred to the fixing bath. When the carriage reaches the limit of its movement in the direction stated, it will occupy substantially the position shown in Fig. 2. The knife is then operated to sever the developed
70 section of sensitized material from the remainder thereof, and this severed, exposed and developed section of material is ready for immersion in the fixing bath. The carriage may then be returned to its initial po-
75 sition, that is to say, to a position where the developing bath is beneath the feed rollers 6 and ready to receive another exposed portion of the sensitized material.

The present invention provides means
80 which is operative automatically by the movement of the receptacles containing the developing and fixing agents for insuring complete and uniform submerging of the developed print in the fixing bath. As
85 shown in the present instance, this submerging means comprises a pair of submerging members 22 and 23 which operate to depress different portions of the print beneath the surface of the fixing solution. The member
90 22 comprises a rod or cross-piece 24 which is preferably of a length approximately equal to the width of the receptacle 18 containing the fixing agent, and this rod or cross-piece is connected by flat links to a supporting
95 shaft 25, the latter having its ends journaled in bearings 26 attached to the sides of the casing 1. The submerging member 23 comprises, in the present instance, a frame which is pivoted at 27 to the reciprocatory carriage
100 whereby this submerging member will travel with the carriage. The frame comprises substantially radial portions 28 and flat arc-like portions 29, a rod or cross-piece 30 connecting the free ends of the arc-like por-
105 tions 29. The arc-like portions 29 of the frame are adapted to operate over the adjacent edge or end wall of the receptacle 18, for which purpose these portions of the frame are preferably substantially concentric with
110 the axis 27. This submerging member is adapted to occupy either of two positions, the rod or cross-piece 30 being lifted into a position above the fixing bath receptacle 18 in one position and occupying a position
115 within and near the bottom of this receptacle in the other position. Gravity and also the submerging member 22 act on this submerging member 23 to move it in a direction that will carry the rod or cross-piece 30 into and
120 toward the bottom of the fixing bath receptacle. To cushion the descent of this member into the fixing bath and to position the cross piece 30 at the proper height above the bottom of the fixing bath receptacle, a rub-
125 ber or other suitable buffer 31 may be attached to one or both of the radial portions 28 of this submerging member in a position to abut against the adjacent end wall of the fixing bath receptacle 18 as this submerging
130

member reaches a proper depth in the fixing bath. Furthermore, it is preferable to space the links of the submerging member 22 and the arc-shaped portions 29 equidistantly whereby the links will rest upon these arc-shaped portions and so act as a brake to prevent too rapid descent of the submerging device 23 as the receptacles are returned from the position shown in Fig. 2 to their original position as shown in Fig. 1. To lift this submerging member to a position above the fixing bath, a projection 32 is placed in the stationary casing at one side of the path of movement of the fixing bath receptacle, and the submerging member 23 is provided with a lateral extension 33 which is adapted to encounter the projection 32 as the carriage is reciprocated in a direction to transfer the print from the developing bath to the fixing bath, continued movement of the carriage in the same direction causing withdrawal of this submerging member from the fixing bath. Preferably, and as shown, the rods or cross-pieces 24 and 30 are of equal length, this length being equal to the distance between the outer sides of the arc-like portions 29 of the frame of the submerging member 23.

The mode of operation of the submerging means may be briefly described as follows:—While the carriage is in a position to subject the exposed portion of the sensitized material to the developing bath, the submerging members will occupy the positions shown in Fig. 1, the submerging member 22 hanging vertically as a pendant from its shaft 25, and the member 23 overhanging the end wall of the receptacle 18 and resting by gravity in its print-submerging position. As the carriage is reciprocated to transfer the exposed portion of the sensitized material from the developing bath into the fixing bath, the submerging member 22, which is suspended from a non-reciprocating part of the casing, is encountered by the cross-bar 30 of the submerging member 23, and in turn the connecting links of the submerging member 22 are encountered by the arc-shaped members 29 of the submerging member 23, which latter reciprocates with the carriage, causing the submerging member 22 to be tilted toward the right. As the movement of the carriage continues in the same direction, the lateral extension 33 on the member 23 encounters the projection 32, and as the movement of the carriage continues, the member 23 is tilted toward the left about its pivot 27. This causes the member 23 to be rocked into a position where the rod or cross-piece 30 thereon is lifted above the liquid in the fixing bath receptacle. While the submerging members are so withdrawn from the liquid in the fixing bath, the developed section of sensitized material which is then severed will be free to drop without

obstruction into the fixing bath. When the carriage is reciprocated in a reverse direction to bring the developing bath into a position to receive the succeeding exposed portion of the sensitized material, mutual action of the submerging members 22 and 23 permits them to descend into the liquid in the fixing bath receptacle owing to the relative movement between the carriage and the projection 32, and the rod or cross-piece 30 on this submerging member will assume a position where it bears upon the print and submerges the same beneath the surface of the fixing bath. Movement of the member 23 into print-submerging position also permits the submerging member 22 to resume its normal pendant or vertical position, and the rod or cross-piece 24 on this member will engage the print at the edge of the cross-piece 30 of the submerging member 23, and as the carriage completes its movement, the rod or cross-piece 24 will traverse the surface of the print to an extent sufficient to insure complete and uniform immersion thereof in the fixing bath.

The further advantage of this submerging arrangement is that it will hold the print well under the solution so that the inertia of the fixing bath, due to the translation of the carriage 11 from one end of developing compartment to the other, will raise the fixing bath in one end and then in the other end of the tray, washing over the developed print very similarly as is accomplished in tilting a tray by hand.

While it is preferable to employ both submerging members to operate conjointly, as hereinbefore described, either of these members alone may be used. It is also preferable to mount the shaft 25 of the submerging member 22 at one end in a bearing 25^a having a round hole and the other end of this shaft in an open-topped bearing 25^b, this arrangement enabling this submerging member to be lifted out of the fixing bath receptacle when desired, although normally it will not be disturbed in its operation when the door 20 is opened for the inspection of the prints.

I claim as my invention:—

1. In photographic apparatus of the character described, the combination of a movable liquid-bath receptacle, a submerging device pivoted to move with said receptacle, and means whereby said device is caused to swing into and directly above the receptacle consequent upon movement of the receptacle.

2. In photographic apparatus of the character described, the combination of a reciprocable liquid-bath receptacle, a submerging device reciprocable with the receptacle, and means whereby said device is caused to move into and directly above the receptacle consequent upon reciprocation of the receptacle.

3. In photographic apparatus of the char-

acter described, the combination of a liquid-bath receptacle, a submerging device mounted to move into and directly above the same and having an actuating portion thereon, and a part coöperative with said actuating portion to swing the submerging device directly above the receptacle consequent upon relative movement between the receptacle and said part.

10 4. In photographic apparatus, the combination of a movable liquid-bath receptacle, a submerging device carried by the receptacle and movable into and directly above the same, and a fixed part operative on the
15 submerging device to move it out of said receptacle consequent upon movement of the latter.

5. In photographic apparatus, the combination of a reciprocable liquid-bath receptacle, a submerging device reciprocable with said receptacle and pivoted at one end thereof to swing into and above the same, and a part operative to swing the submerging device out of said receptacle consequent upon
20 reciprocation of the receptacle.

25 6. In photographic apparatus, the combination of a casing, a liquid-bath receptacle, said casing and receptacle being relatively movable, a submerging device in fixed rela-

tion to the receptacle and movable into and above the same, a part in fixed relation to the casing and operative to move said submerging device above the receptacle consequent upon relative movement between the receptacle and casing, and a second submerging
30 device movable into a position above the receptacle by the first-mentioned submerging device.

7. In photographic apparatus of the character described, the combination of a casing, a liquid-bath receptacle, said casing and receptacle being relatively reciprocable, a submerging device pendant from the casing and operative to move into and above the receptacle consequent upon relative movement between the casing and receptacle, and a second pivoted submerging device movable into positions in or above the receptacle and having arc-shaped portions forming an operating engagement with the first-mentioned
40 submerging device.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

EDWARD N. MILLAN.

Witnesses:

JOSEPH G. HAWTHORNE,
C. O. RANDALL, Jr.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."