

Aug. 30, 1932.

A. W. CAPS

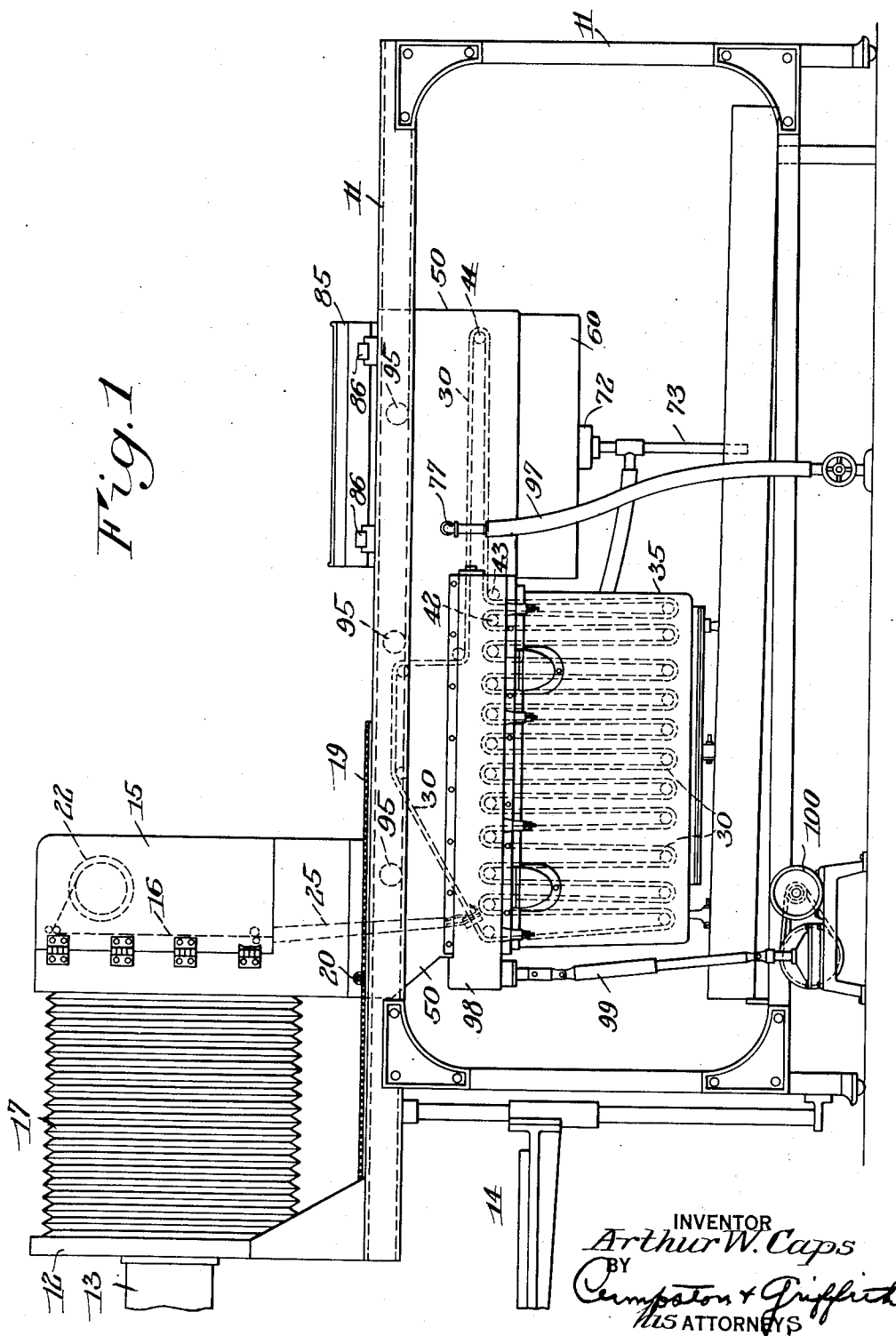
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PHOTOGRAPHIC PRINT DELIVERING MEANS

Filed July 7, 1928

3 Sheets-Sheet 1

Fig. 1



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3 Sheets-Sheet 2



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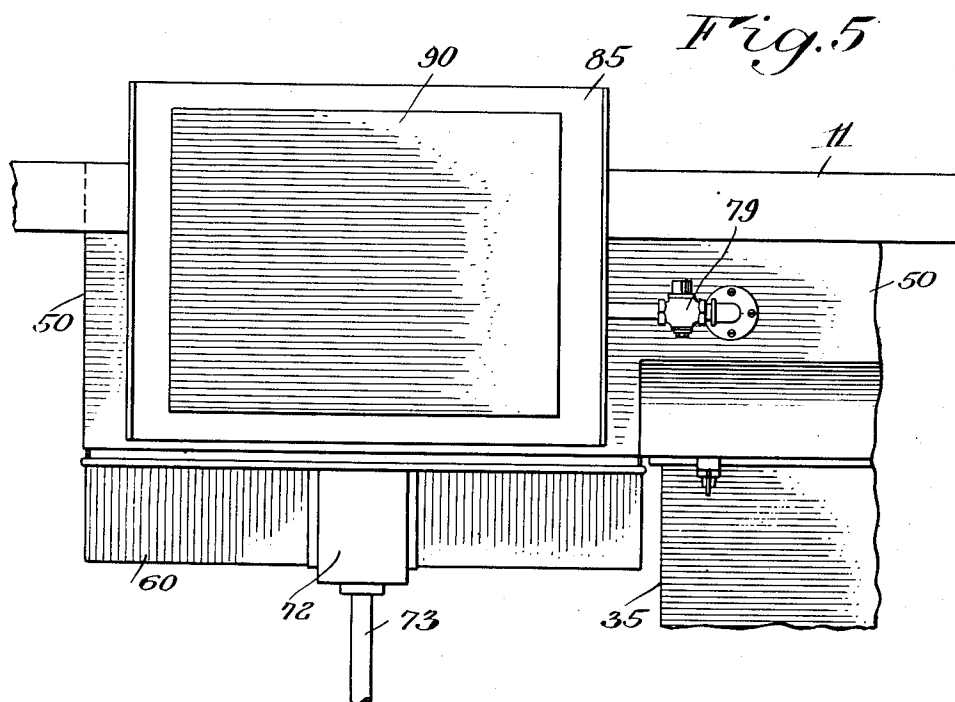
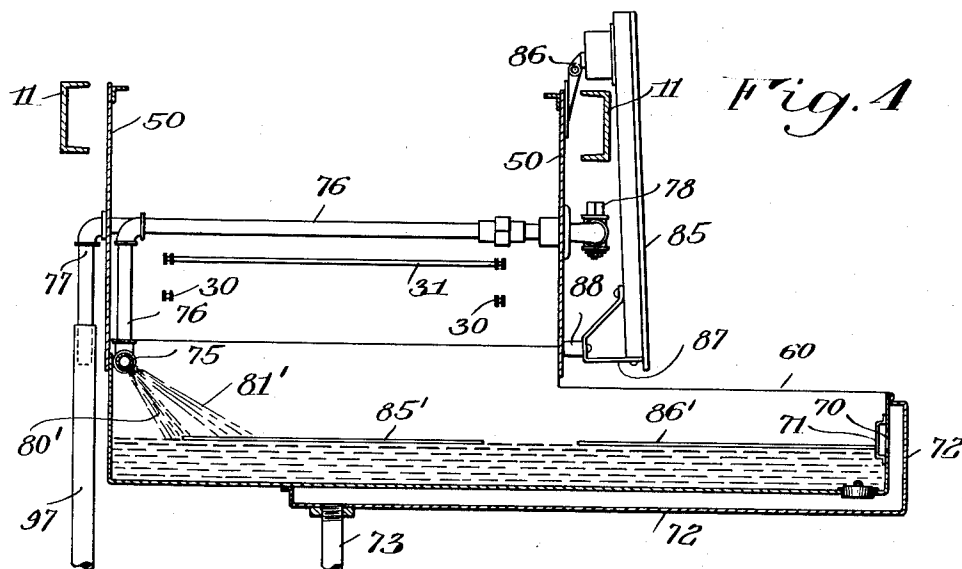
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3 Sheets-Sheet 3



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PHOTOGRAPHIC PRINT DELIVERING MEANS

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This invention relates to means for delivering photographic prints from photographic apparatus. The invention has for its principal object the provision of efficient and satisfactory means for delivering a print to such a position that it may be easily and conveniently picked up by the operator of the apparatus.

Another object of the invention is to provide, in photographic apparatus of the type having movable print conveying mechanism, means for delivering a print to a point substantially spaced from the path of travel of the conveying mechanism, so that the operator may pick up the print at the delivery point without danger of his coming into contact with the moving conveying mechanism.

Still another object is to provide print delivering means which will not jam or become clogged, and which will continue to function properly whether or not the operator removes the prints promptly from the delivery point.

An additional object is the provision of print delivering means including a liquid bath in which the print may remain as long as desired by the operator, so that the delivering means may serve also as a washing bath for the prints.

A further object of the invention is to provide print delivering means which may serve as a light trap if desired, so that prints may be delivered from a dark chamber to a point outside of the dark chamber without admission of light into the chamber.

A further object is to provide print delivering means in combination with a squeegee board conveniently located adjacent the delivery point of the delivering means, so that the operator of the apparatus may easily and quickly pick up a print from the delivery point and place it upon the squeegee board.

A still further object of the invention is to provide print delivering means which is easy and inexpensive to manufacture, easy to install, simple and effective in operation, not

liable to get out of order, and which has no wearing or moving parts.

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 side elevation of one possible embodiment of photographic apparatus in which the present invention may be used, showing the invention applied thereto;

Fig. 2 is a view partly in plan and partly in horizontal section of the rear portion of the photographic apparatus, illustrating the invention;

Fig. 3 is a longitudinal vertical section taken approximately centrally through the parts shown in Fig. 2;

Fig. 4 is a transverse vertical section substantially on the lines 4—4 of Figs. 2 and 3, and

Fig. 5 is a side elevation of the parts shown in Fig. 4.

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

Referring now to Fig. 1 of the drawings, there is shown a frame 11 having a camera front 12 mounted thereon, this camera front carrying a casing 13 in which a suitable lens system may be mounted, and preferably being provided with a prism (not shown) to change the direction of the light rays so that the camera may be used to photograph objects laid upon the horizontal copyholder 14.

A camera body 15, containing a focal plane 16, is connected to the camera front 12 by extensible bellows 17, and is movably mounted upon the frame 11 so that the focal plane may be brought closer to or farther away from the lens system, for purposes of focusing. The means for moving the camera body to focus it may comprise, for example, the rack 19 mounted on the frame 11, and a

pinion 20 meshing with the rack, this pinion being mounted upon a shaft journalled in the camera body.

Suitable means may be provided for placing sensitized sheets in the focal plane 16. This means may include, for example, the roll 22 of sensitized sheet material, successive portions of the roll being unwound and placed in the focal plane, where they may be exposed to make photographic prints. After the portion of the strip of sheet material in the focal plane has been thus exposed, the strip may be fed forward by any suitable means to bring a fresh unexposed portion thereof into the focal plane, the exposed portion being fed into a sheet holding means such as the chute 25, and being cut from the strip by suitable severing means. The exposed sheet, now separated from the strip, falls by gravity to the bottom of the chute 25, and may be picked up therefrom by suitable sheet conveying means, which is preferably arranged to convey the sheet through developing, fixing, and washing baths, so that the print is treated in the desired manner.

The print conveying means may be of any desired form, and in the present instance it comprises a pair of continuous members such as the chains 30 (Figs. 1 to 4), the chains being transversely spaced so that one of them is near one side of the apparatus while the other is near the other side. Cross bars 31 (Fig. 2) are arranged at intervals along the continuous members 30, one end of each cross bar being attached to one of the continuous members, and the other end to the other one, so that the bars extend transversely across the apparatus and travel along with the continuous members 30 when they are moved. Each of these cross bars 31 carries a plurality of pins 32 extending forwardly or in the direction of travel of the bars. The sheet holding chute 25 is arranged to hold the sheet or print at an angle to the path of travel of the conveying means and with its lower edge just below this path. As one of the pin-bars 31 travels past the sheet held in the chute, the pins 32 pierce the sheet and thus attach the sheet to the conveying means. Continued movement of the conveying means withdraws the sheet thus attached to the pin-bar from the chute 25 and carries it along through the path of travel of the conveying means, the forward edge of the sheet being secured to the pin-bar 31 by the pins 32, and the body of the sheet trailing along behind the pin-bar.

The path of travel of the conveying means is indicated in general in Fig. 1, from which it will be seen that it passes downwardly into a container 35 which may be supported from the side walls 50 of the apparatus. This container 35 is divided into a plurality of separate receptacles for holding the necessary baths for treating a photographic print, for

example, developing, fixing, and washing baths. The conveying means, in the present instance, is arranged to travel in a sinuous path through one of the baths after another so that the print is thus developed, fixed, and washed.

The partitions which subdivide the container 35 into the various liquid receptacles are not indicated in Fig. 1, but the rearmost one of them is shown at 36 in Fig. 3. Between this partition and the rear end of the container 35 is a space indicated in Fig. 3 by the numeral 37, which space preferably contains a washing bath for washing the print after it has passed through the fixing bath, which may be contained in the space 38 next in front of the receptacle 37. The washing bath is supplied with water through a conduit 40 which extends transversely across the apparatus above this washing receptacle 37, as shown in Figs. 2 and 3. The conduit 40 has a plurality of openings along its lower side so that water issues therefrom in a liquid spray which falls upon and thoroughly washes both the print and the conveying means as they pass over the shaft 42 in the course of their travel. The liquid from the spray, after impinging upon the conveying means and the print, falls into the receptacle 37 and thus supplies fresh liquid to the washing bath.

Any suitable means may be provided for withdrawing liquid from the washing bath so that the supply of liquid thereto from the spray conduit 40 does not cause the bath to overflow.

After passing around the shaft 42 and being subjected to the spray issuing from the conduit 40, each pin-bar 31 and its attached print travels downwardly, around a shaft near the bottom of the washing receptacle 37, and thence upwardly to the shaft 43. From this shaft the endless members 30 of the conveying means extend rearwardly to a shaft 44 mounted upon arms 45 pivoted at 46 to the side walls 50 of the apparatus. A nut 51 on a threaded link 52 attached to an arm 45 may be used to draw the shaft 44 rearwardly, to adjust the tension of the endless conveying members 30.

Behind the washing receptacle 37, and beneath the path of travel of the conveying means, is a delivery tank 60 which extends across the apparatus and has a portion projecting from one side thereof, as is shown clearly in Figs. 2 and 4. Each print carried by the conveying means is removed therefrom while over this delivery tank 60 by suitable print removing means indicated generally by the numeral 65 in Fig. 3. The specific details of this print removing means need not be illustrated here, as it is sufficient for the purpose of the present application to state that this means includes an arm 66 which is automatically moved downwardly and rear-

wardly just after each pin-bar 31 passes it. This motion of the arm 66 disengages or kicks the print from the pins 32 on which it is impaled and allows the print to drop downwardly into the tank 60.

After the print has thus been removed from each pin-bar, continued motion of the endless members 30 carries each pin bar around the shaft 44 and toward the front of the apparatus. During the forward or return travel of the pin-bar it passes through a light trap comprising the plates 55 and 56, and finally completes its cycle of travel by again passing the print holding means or chute 25, from which it picks up another print and carries it along the same path of travel above described. It will be understood, of course, that several pin-bars 31 are provided at appropriate intervals along the endless members 30, so that some of the pin-bars are traveling forwardly to pick up other prints, while other pin-bars, with prints impaled upon them, are moving along their sinuous paths of travel through the treating baths.

The delivery tank 60, into which the prints are dropped when they are removed from the pin-bars 31 by the removing means 65, is provided with an overflow outlet 70 at that end of the tank which extends out beyond the casing wall 50. This overflow outlet 70 is protected by a grating 71, as shown in Figs. 2 and 4, and discharges into a conduit 72 which passes down the side and along the bottom of the tank 60 and which is connected to a drain pipe 73. A bath of water or other suitable liquid is preferably maintained within the tank 60 up to the level of the overflow opening 70.

When the prints are removed from the pin-bars by the removing means 65, they drop to a point approximately directly below the conveying means. According to the present invention means is provided for transferring the prints from this point to a point removed therefrom, where they may be picked up more easily and conveniently by the operator of the apparatus, and where there is no danger of his coming into contact with the moving conveying means when picking up the prints. It is for this purpose that the tank 60 is extended laterally so that it projects beyond the side of the casing 50.

The means for transferring the prints from a point beneath the conveying means to the portion of the tank which extends beyond the path of travel of the conveying means, preferably comprises means for floating the print from one part of the tank 60 to another part thereof. In the present instance, a liquid conduit 75 extends along that side of the tank 60 which is opposite to the outlet opening 70, this liquid conduit being somewhat above the liquid level within the tank, as shown clearly in Figs. 3 and 4. This conduit 75 is supplied with liquid, preferably

water, through a supply pipe 76 which is connected, as shown in Fig. 2, to the supply conduit 77, the spray pipe 40 above mentioned also being connected to this conduit 77. Valves 78 and 79 may control the flow from the conduit 77 to the conduits 75 and 40 respectively.

The conduit 75 in the tank 60 has a plurality of openings therein for directing streams of liquid downwardly and obliquely toward the side of the tank containing the outlet 70. Preferably, these openings are arranged so that certain of the liquid streams are at one angle to a horizontal plane while other streams are at another angle thereto. Thus, in Fig. 3, that portion of the conduit 75 which extends leftwardly from the supply pipe 76 has its openings 80 arranged to extend more nearly vertically than the openings 81 in the other portion of the conduit which extends to the right of the supply pipe 76. In Fig. 4, the directions of the streams flowing from the openings 80 and 81 are clearly shown, and are denoted by the numerals 80' and 81' respectively.

When a sheet or print is first dropped into the tank 60, it is substantially in the position 85' shown in Fig. 4. The action of the liquid sprays issuing from the conduit 75 causes the print to travel across the tank until it comes into contact with the opposite side thereof, this position being shown at 86', in Fig. 4. The constant addition of water to the bath within the tank 60 at one side thereof and its constant overflow or withdrawal from the other side create a current within the tank moving from the former side to the latter, and this current carries the prints along with it across the tank. The travel of the prints is greatly aided and hastened, however, by the fact that the liquid streams or sprays from the conduit 75 are arranged at an angle, and impinge obliquely upon the print in a direction tending to move it in the desired manner.

Since a part of the spray, near one end of the print, is arranged at a greater angle to the horizontal than another part of the spray near the other end of the print, it follows that the end of the print which is acted upon by the spray which is more nearly horizontal will travel faster than the opposite end, and thus the print will be turned slightly and will float across the delivery tank somewhat cornerwise instead of remaining parallel to one side of the tank. It is found in actual use that this is very advantageous, as it results in more satisfactory travel of the print and especially in quicker and more satisfactory starting of the travel after the print has been dropped from the conveying means into the delivery tank. With this arrangement of the inflowing liquid at two different angles, one end of the print first begins to move and then the other end commences its movement, the whole travel of the print being initiated more

rapidly and with greater certainty than is the case when the spray is arranged all at the same angle.

When the print has traveled across the tank 60 and come to rest against the side thereof in which the outlet opening 70 is located, the operator of the apparatus may remove the print immediately if desired, or he may allow it to remain in the tank as long as he wishes, without danger of clogging the apparatus or interfering in any way with the delivery of the prints. The tank 60 may be used as a supplementary washing bath, if desired, and the prints may be allowed to remain quietly in it or they may be agitated from time to time by the operator if preferred.

When the operator is ready to remove a print from the delivery tank, either immediately when it reaches the delivery point or at any subsequent time, he may pick up the print and place it upon a squeegee board 85 conveniently mounted adjacent the delivery point, as shown in Figs. 4 and 5. This squeegee board 85 is mounted substantially vertically on the side wall 50 of the housing or casing of the apparatus, the upper edge of the squeegee board being hinged at 86 to the wall and the lower edge carrying an abutment member 87 including a rubber block 88 which may lie against the wall 50 to hold the squeegee board in the position illustrated in Fig. 4. This position is directly over the open delivery end of the tank 60, so that the operator may pick up a print from the tank and place it easily and instantly upon the squeegee board, a print thus placed on the board being indicated by the numeral 90 in Fig. 5. The hinged mounting of the board allows it to be moved to obtain access to the valve 78 when it is desired to adjust the flow to the conduit 75. This valve is normally covered by the squeegee board, although the board is omitted from Fig. 2 for the sake of clarity. A squeegee board, as is well understood in the art, is a board upon which the wet print is placed preparatory to running a squeegee over the print to remove surplus liquid therefrom, the board acting as a support for the print during this operation. Frequently several prints are accumulated on the squeegee board, one on top of another, and then are all removed at once.

The prints are preferably delivered by the conveying means face downward, and, of course, they are still face downward when they reach the delivery point of the tank 60. If the operator, standing at the end of the tank in which the outlet 70 is placed, picks up the print by the edge which is toward him and places the print on the squeegee board with this edge uppermost, it is obvious that the print on the board will have its face outward so that it may be observed at once. Thus the squeegee board is so located with

reference to the print delivering means that the natural and normal way of picking up a print and placing it on the board results in the print being face outward. It is therefore unnecessary for the operator to go through waste motions or lose time in turning the print over.

It has been mentioned above that the camera body 15 was movable back and forth along the frame members 11 for purposes of focusing. The walls 50 preferably form downward and rearward extensions of this camera body 15, and are supported by rollers 95 (Fig. 1) which roll upon the lower flanges of the channel members which constitute the top longitudinal portion of the frame 11. The conveying means, treating baths, and delivering tank 60 all move back and forth as a unit with the camera body 15 when the latter is moved for purposes of focusing. It will be noted from Fig. 4 that the squeegee board 85 extends over the frame 11 and is held in spaced relation thereto by the abutment means 87, 88. Thus the mounting of the squeegee board does not interfere in any way with the relative movement of the housing 50 and frame 11, but allows this movement to take place unimpeded.

The pipe 77 which supplies water to the spray conduits 40 and 75 may be connected by flexible means such as the hose 97 (Fig. 1) to a suitable source of water supply. This flexible connection permits the housing 50 to move back and forth on the frame 11 for focusing without interfering with the constant supply of water to the sprays.

The conveying means may be driven in any suitable manner, such as by gearing within the gear housing 98 (Fig. 1) connected by flexible shafting 99 to a driving motor 100. This flexible shafting allows the camera to be focused without interfering in any way with the drive of the conveying means.

Referring now to Fig. 3, it is seen that as the rear edge of a sheet or print carried by the conveying means passes over the shaft 43 and drops downwardly therefrom, it may hit the edge of the tank 60 which is just beyond this shaft. An angular guard 102 is therefore provided over this edge so that it presents a smooth surface with which the rear edge of the print may contact, to avoid any scratching or damage to the print which might occur if it came into contact with the upstanding edge of the tank 60. This guard 102 furthermore acts as a deflector for any liquid which drips from the print or from the conveying means, and prevents such liquid from getting into the joint between the container 35 and the tank 60.

In the present instance, since the light trap consisting of the plates 55 and 56 is employed, the portion of the housing forward of this light trap may be kept dark easily so that there is no danger of fogging the prints be-

fore they are completely developed and fixed. In some instances, however, it may be desirable to modify or omit this light trap and to make the dark chamber of the apparatus extend all the way to the rear edges of the plates 50, so that the space containing the print removing device 65 and the liquid conduit 75 may be included within the dark chamber.

The present invention is well adapted to use under such circumstances, and it should be particularly noted that this print delivering means may be employed for delivering a print from a point inside a dark chamber to a point outside thereof. Since the print, after being subjected to the action of the sprays 80' and 81', floats almost but not quite on the surface of the liquid, it follows that the wall 50 through which the tank 60 passes may be extended down to the surface of the liquid within the tank, without interfering with the delivering movements of the print. The wall 50, coming down to the surface of the liquid, will exclude light from that end of the tank in which the print is deposited, but will not interfere with the motion of the print as it is floated through the liquid bath, under the wall 50, and out into the delivery end of the tank.

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.

I claim as my invention:

1. In a photographic apparatus, the combination with a liquid tank, of means for depositing a sheet near one end of said tank, and means for moving said sheet within said tank toward the opposite end thereof, said moving means comprising means for producing a plurality of horizontally spaced liquid jets extending obliquely toward said opposite end of said tank, one of said jets being directed at a greater angle to a horizontal plane than another of said jets.

2. In a photographic apparatus, the combination with a liquid tank, of means for depositing a sheet near one end of said tank, and means for moving said sheet within said tank toward the opposite end thereof, said moving means comprising liquid conduit means extending across said tank adjacent said first-named end thereof, said conduit means being provided with horizontally spaced openings for producing a plurality of liquid jets extending obliquely downwardly and toward said opposite end of said tank, certain of said jets being directed at a greater angle to a horizontal plane than certain other jets.

3. In a photographic apparatus, the combination with a housing, of sheet conveying means movable within said housing, a liquid tank having a portion beneath said housing and a portion outside thereof, means for transferring a sheet from said conveying means to said liquid tank, and liquid spray means for moving said sheet across said tank from a point beneath said housing to a point outside thereof.

4. In a photographic apparatus, the combination with a housing, of sheet conveying means movable within said housing, a liquid tank having a portion extending beneath said housing and a portion outside thereof, means for maintaining a substantially constant level of liquid within said tank, said housing having a wall extending downwardly into relatively close proximity to said liquid level, means for transferring a sheet from said conveying means to the portion of said tank within said housing, and means for floating said sheet across said liquid tank beneath said wall to a point outside of said housing.

5. In a photographic apparatus, the combination with a liquid tank arranged to have a photographic print deposited therein near one end thereof, of means for moving said print within said tank toward the opposite end thereof, said moving means comprising liquid conduit means extending substantially horizontally across said tank near the end at which the print is deposited and above the liquid level therein, and a series of liquid outlets spaced along said conduit means, certain of said outlets being arranged at a different angle to a horizontal plane than other outlets to produce a series of liquid jets in which certain of said jets are at a different angle to a horizontal plane than certain other jets, said jets acting to move said print.

6. In a photographic apparatus, the combination with a liquid tank arranged to have a photographic print deposited therein near one end thereof, of means for moving said print within said tank toward the opposite end thereof, said moving means comprising means for directing a liquid jet obliquely downwardly toward a print deposited in said tank near one end of such print and means for directing another liquid jet obliquely downwardly at a different angle toward such print near the other end thereof, said jets acting to move said print across said tank and concomitantly to turn said print slightly relative to its original deposited position.

7. In a photographic apparatus, the combination with a housing, of sheet conveying means movable within said housing, a liquid tank having a portion extending beneath said housing and a portion outside thereof, means for maintaining a substantially constant level of liquid within said tank, said housing hav-

ing a wall extending downwardly into relatively close proximity to said liquid level, means for transferring a sheet from said conveying means to the portion of said tank within said housing, and liquid spray means
5 including a plurality of horizontally spaced liquid jets within said housing directed obliquely downwardly from a point above said liquid level, for moving said sheet across
10 said liquid tank beneath said wall to a point outside of said housing.

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