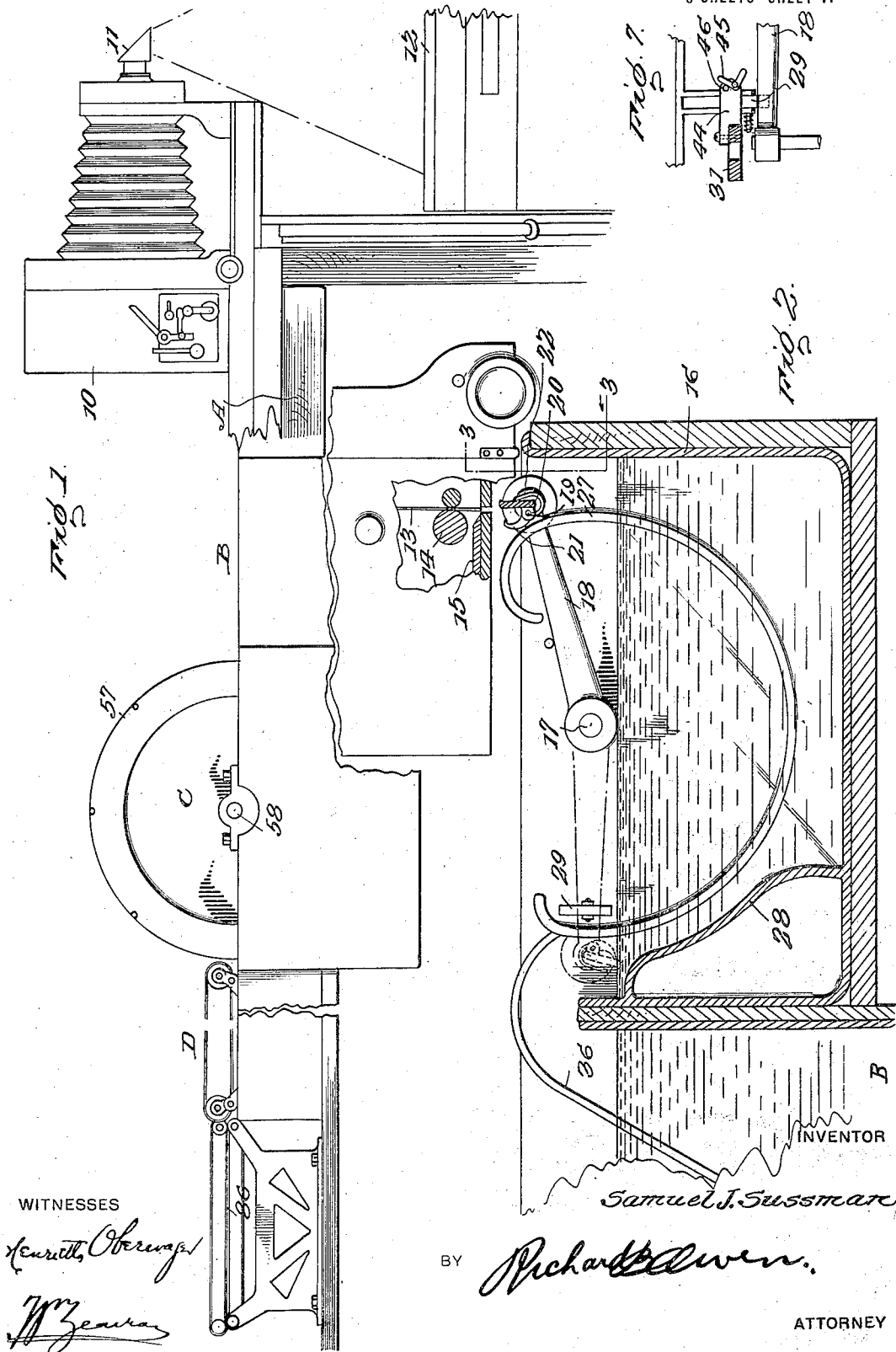


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 PHOTOGRAPHIC DEVELOPING MACHINE.  
 APPLICATION FILED JULY 30, 1918.

1,328,305.

Patented Jan. 20, 1920.

3 SHEETS—SHEET 1.



WITNESSES

*Henry C. Obermayer*  
*Wm. Zeigler*

BY

*Richard A. Owen*

ATTORNEY

*Samuel J. Sussman*

INVENTOR

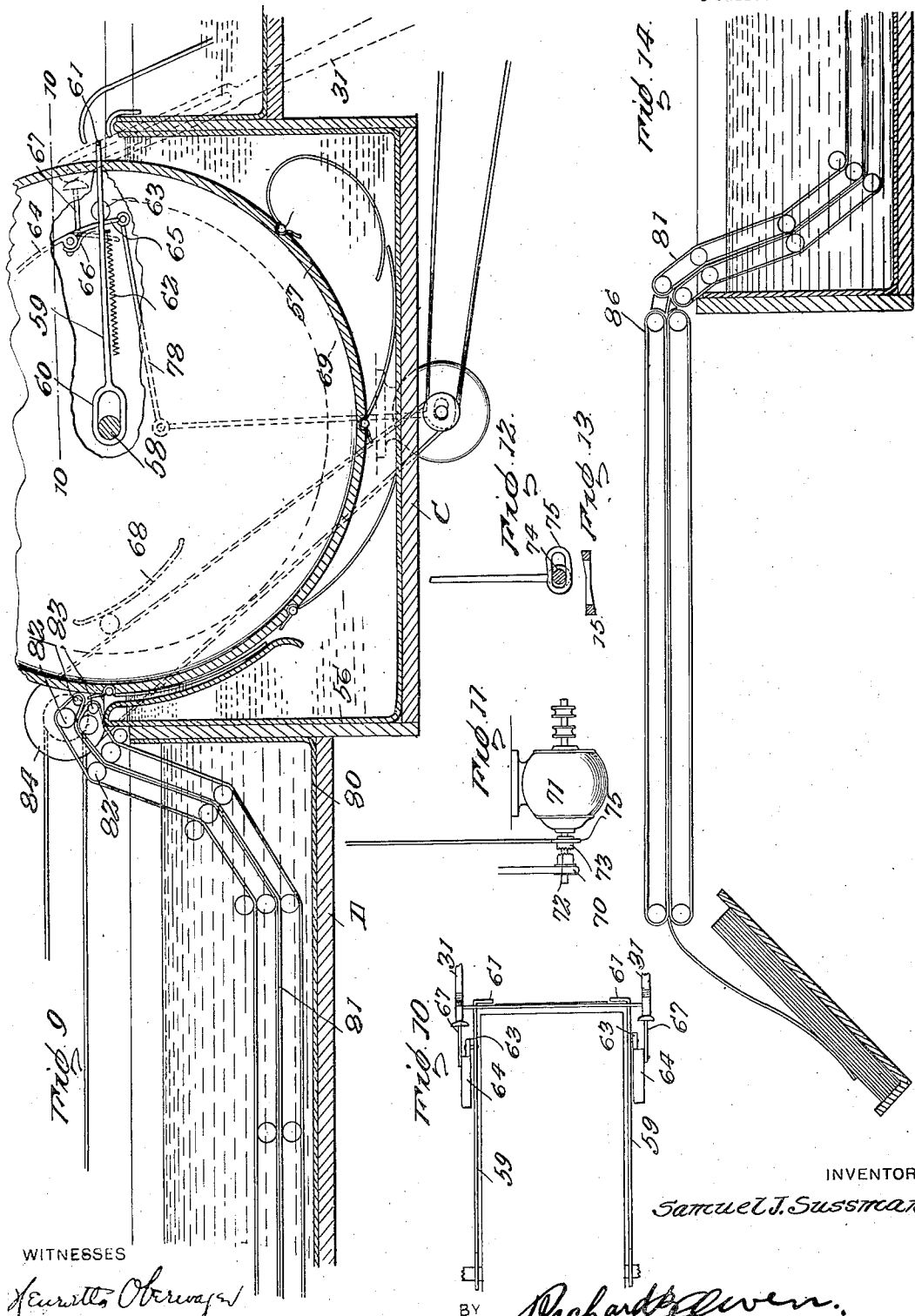


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*Heurto Obermayer*  
*W. Zeamer*

BY

*Richard E. Allen*

INVENTOR

*Samuel J. Sussman*

ATTORNEY

# UNITED STATES PATENT OFFICE.

SAMUEL J. SUSSMAN, OF BROOKLYN, NEW YORK.

## PHOTOGRAPHIC DEVELOPING-MACHINE.

1,328,305.

Specification of Letters Patent

Patented Jan. 20, 1920.

Application filed July 30, 1913. Serial No. 247,442.

*To all whom it may concern:*

Be it known that I, SAMUEL J. SUSSMAN, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Photographic Developing-Machines, of which the following is a specification.

This invention has relation to the art of photography, and the nature and objects will be readily apparent to those skilled in the art to which this invention appertains, in the light of the following description and the accompanying drawings illustrating what I now believe to be the preferred embodiment or mechanical expression of my invention, from among other forms and arrangements within the spirit thereof and the scope of the appended claims.

However, an object of the invention is to provide a photographic developing and fixing apparatus, designed primarily for cooperation and association with a conventional form of photographic copying machine whereby the prints may be automatically developed, fixed, and washed without the attention of the operator.

Another object of the invention is to provide a photographic developing machine of the character above set forth embodying means to clamp and secure a print, and for introducing the print into a tank of developing solution without the necessity of introducing the fingers into the solution.

Another object of the invention is to provide a photographic developing machine embodying means for automatically and at predetermined intervals removing prints from the developing solution and for quickly passing the prints through water before their entrance into the fixing bath.

A still further object of the invention is to provide in a photographic developing machine, means for introducing developed and washed prints into a fixing bath and for retaining the prints therein for a predetermined time or until the prints are fixed, and for subsequently disposing the fixing prints in a position to be withdrawn from the bath.

A still further object of the invention is to provide means in a photographic developing machine for removing the prints from the fixing bath and for conveying them slowly through a tank of water at a predetermined rate of motion to insure proper washing of the prints, and for disposing

the washed prints in proximity to another element of my apparatus.

In addition to the foregoing, this invention comprehends the improvements in the detailed construction and arrangement of parts to be hereinafter set forth and specifically pointed out in the appended claims.

In the accompanying drawings in which similar and corresponding parts are designated by the same characters of reference throughout the several views in which they appear:

Figure 1 is a view in side elevation illustrating a conventional form of photographic copying machine and the association therewith of a developing, and fixing machine constructed in accordance with my invention.

Fig. 2 is a detailed view in section of the apparatus for introducing the print into the developing solution,

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 2,

Fig. 4 is a detailed view illustrating the mechanism for transferring the prints from the developing to the fixing solution for subjecting the prints to a preliminary rinsing,

Fig. 5 is a transverse section taken on the line 5—5 of Fig. 4,

Fig. 6 is a detailed view of the cooperating transferring clamps,

Fig. 7 is a detailed view taken on the line 7—7,

Fig. 8 is a detailed view of a clutch shifting means,

Fig. 9 is a view in section of the means for introducing the prints into the fixing bath and for transferring the prints from said bath to the washing tank,

Fig. 10 is a detailed section taken on the line 10—10 of Fig. 9,

Fig. 11 is a detailed view in side elevation of the motor and clutch for driving the various elements of my apparatus,

Fig. 12 is a detailed section taken on the line 12—12 of Fig. 11,

Fig. 13 is a transverse section of the clutch shifting element,

Fig. 14 is a view in section of the delivery end of the apparatus.

With reference to Fig. 1 of the drawings, 10 indicates a copying camera of conventional type embodying a deflecting prism or lens 11 whereby work placed on the table 12 may be copied upon a sheet of sensitive paper 13 fed from a roll (not shown) with,

in a camera. The lower end of the paper is held between rollers 14 which act to feed the paper after an exposure has been made. This mechanism forms no part of my invention, nor does the knife 15 for severing an exposed section of sensitive paper from the roll.

My invention includes a developing tank A, a rinsing tank B, a fixing tank C, and a washing tank D. These elements are arranged in longitudinal alinement and a description of each element will be taken up separately in the order named.

The developing apparatus comprises a tank 16 of porcelain or other desirable material suitably supported. A shaft 17 is extended transversely of the tank and the former carries a pair of arms 18, the outer ends of which are connected by means of a rod 19 disposed parallel to the shaft. Mounted upon the rod 19 is a pair of clamping members, each including a plate 20 and a pivoted clamping finger 21. The clamps are spaced apart to a distance corresponding to the width of the sensitive paper so as to grasp the margins only. Each finger 21 is formed with an extension 22 which is disposed against that face of the plate 20 opposite the side thereof carrying the finger. The finger 21 is formed adjacent its pivotal point with a pair of notches 23 in which the end of a leaf spring 24 may be engaged, thereby acting to releasably retain the finger either in a position in engagement with the plate or in an open position to receive the paper between said finger and the plate. The shaft 17 is extended beyond the casing and provided with an operating knob 25, a coiled spring 26 being provided to urge the arms 18 toward the position shown in full lines in Fig. 2, or in a position to dispose the clamps directly beneath an opening in the under side of the camera through which opening the exposed paper is projected. A semi-circular paper guide 27 is mounted within the tank in spaced relation to a guide 28 located at the rear end of the tank so as to straighten out the paper in a manner to be presently obvious. A pivoted pawl 29 is mounted within the developing tank adjacent the rear end thereof to engage one of the arms 18 when the latter are moved to a rearward position, said pawl acting to hold the arms against the tension of a spring 26 described above. The pawl 29 is itself spring pressed to insure engagement with the arm.

The rinsing bath B includes mechanism which comprises a shaft 30 disposed parallel to the shaft 17, and said shaft 30 carries a pair of upstanding arms 31, each having an elongated slot 32 formed in its upper end. Mounted in each slot is a block 33, and said blocks are connected by means of a rod 34. Each block furthermore carries a roller 35

which bears against a cam track 36 of an undulating configuration having its extremities directed downward. Mounted upon the intermediate portion of the rod 34 is a clamping member comprising a plate 37 of a length sufficient to enable the plate to pass between the clamps which are mounted on the arms 18 as set forth above. Pivotaly mounted at each end of the plate 37 is a clamping finger 38, said clamping finger having notches 39 formed therein adjacent their points of pivotal mounting whereby leaf springs 40 mounted on the plate may engage in either of the notches to retain the pawls in open or closed positions. Mounted at each end of said plate 37 and upon the side face thereof opposite the side carrying the pawl is a lever 41 having one end connected by means of a link 42 to an extension of an adjacent pawl 38. The other end of each lever is extended and bent at an angle for the purpose to be presently obvious. A coiled spring 43 is mounted on each arm 31 and connected to the block 33 to urge the roller 35 into engagement with its cam track 36. Each arm 31 furthermore carries a bracket 44 upon which an angular pawl 45 is pivotaly mounted, rotation of said pawl being limited by means of a stop pin 46. Mounted upon the shaft 30 is a clutch member 47 fixedly secured thereto for coaction with a clutch member 48 having a pulley 49 formed thereon and intended to be shifted by means of a bell crank 50 which is operated by means of a time controlled mechanism indicated generally at 51, the construction of which however forms no part of this invention. A coiled spring 52 is embraced about the shaft 30 with one end connected thereto and the other secured to a stationary part of the machine, so as to urge the arms 31 toward a direction away from the developing tank. An arm 53 is secured to the shaft 30 and is connected to a dashpot 54, the action of which is controlled by means of a valve regulated by the thumb screw 55. The fixing element of my apparatus indicated at C comprises a tank 56 in which is mounted a drum 57 rotatable about an axle 58. Mounted at each side of the drum is a plurality of radially movable clamping rods 59, each having an inner end slotted as at 60 to receive the axle, and the other end bent as at 61 to engage the periphery of the drum. Coiled springs 62 act to retain the rods 59 in an inward position. Each rod furthermore carries a roller 63. Located on each side of the drum adjacent the rinsing bath is an arcuate cam track 64 having a section 65 pivotaly connected thereto. A leaf spring 66 acts to retain the section 65 of the cam track in alinement with the section 64. Pivotaly connected to each section 65 is a trip button 67 designed to be engaged by the arm 31 when said arm

is in a retracted position. Also located on each side of the drum at a point remote from the cam track 64 is a second cam track 68. Mounted upon the axle 58 is a relatively large pulley 69 connected by means of a belt to a pulley 70 mounted on the shaft of a motor 71. The pulley 70 carries a clutch member 72 for coaction with a clutch member 73 splined to the motor shaft. The clutch member 73 is formed with an annular groove 74 in which an arcuate slotted cam shifting member 75 operates, said member 75 having opposite ends thickened or beveled as at 76, more clearly shown in Fig. 13. The member 75 is operated by means of a lever 77 fulcrumed upon a stationary portion of the machine and having its free end connected by means of a link 78 to one section 65 of the cam track 64. The motor shaft also carries a pulley 79 which is connected by means of a belt to the pulley 49, mentioned above.

The washing element of my apparatus indicated at D comprises a tank 80, and a pair of coating belts or conveyers 81 mounted at each side to extend in a longitudinal direction. Each pair of belts is trained over pulleys 82 so that the intermediate stretches of the belts will be located in the lowest portion of the tank, and the ends of the stretches above the ends of the tank, with the forward ends of the belts trained over pulleys 83 which are located adjacent the periphery of the drum 57 to receive the prints therebetween in a manner to be presently described. Each pair of belts is intended to operate in unison, and rotatable with one roller 82 is a pulley 84 which is connected by means of a belt to a pulley 85 mounted on the shaft of the motor 71.

The balance of my apparatus comprises a plurality of pairs of belts 86 having adjacent stretches contacting to receive the prints therebetween. The forward ends of the belts are located adjacent the discharge end of the conveyor belts 81 so as to transfer prints from the latter to the former belts. The prints may then be discharged from between the belt 86 into any container designed to receive them.

In operation, after a section of the sensitized paper 13 has been exposed the paper is moved down sufficiently to permit the lower end thereof to be inserted in the clamping members forming a part of the developing element A. The clamping fingers 21 are engaged manually against the paper so as to secure the latter between said fingers and the plates 20. The knob 25 is then grasped and rotated in a clockwise direction so as to unroll the sensitized paper and to immerse the exposed portion of the paper in the developing bath contained in the tank 16. This action is against the tension of the spring 26 and will dispose the arms 18 in

a rearward position as shown in dotted lines in Fig. 2, the arms being retained in this position by means of the pawl 29. The knife 15 is then operated to sever the exposed section of the paper which then falls into the bath and is totally immersed. The attention of the operator may now be directed toward the exposure of another section, since the development of the exposed print will now take place automatically. The time controlled mechanism 51 is designed to rock the bell crank 50 when the development of the print is complete. As a result the clutch member 48 is shifted into engagement with its mating member 47 so as to permit the transmission of motion from the constantly operating motor 71 to the shaft 30, thereby swinging the arms 31 forward to the position shown in full lines in Fig. 4. As a result of this movement, the levers 41 will engage the extensions 22 of the clamping members previously engaged against the print so as to disengage the fingers 21. Simultaneously with this movement, the clamping fingers 38 are caused to engage against the print in the manner set forth in detail in Fig. 6. A reactuation of the time controlled mechanism 51 will disengage the clutch 48 so as to permit the arms 31 to return to normal position under the influence of the spring 52. In returning the pawl 45 will engage the pawl 29, disengaging the latter in the manner shown in Fig. 7, and will also carry the print through a water bath contained in a rinsing tank. In returning the rollers 35 will ride upon the cam tracks 36 so as to immerse said rollers, the clamping member 37 and the print, causing the latter to travel in an undulatory path through the water and out again, disposing the clamping member 37 and margin of the print in a position adjacent the periphery of the drum 57.

The drum 31 will come to rest in the dotted line position shown in Fig. 9. Contact of the arms 31 with the buttons 67 will cause the sections 65 of the cam tracks 64 to be depressed, releasing the roller 63, and at the same time shifting the lever 77 so as to throw the clutch member 73 of the motor shaft into engagement with the member 72 so as to transmit motion to the drum 57 thereby rotating the latter through a portion of a revolution. Simultaneously with the releasing of the roller 63 the rods 59 located adjacent the rinsing tank will be moved inward so as to grasp the margins of the print held by the clamping fingers 38. Said clamping fingers 38 will be released by engagement of the levers 41 with a stop pin stationarily mounted so that the print, now attached to the periphery of the drum may be immersed in the fixing bath contained in the tank 56.

As each operation described above is re-

peated the drum 57 is carried through a partial revolution, eventually bringing the print adjacent the lever of the fixing bath in the rear end of the tank. In this position the rollers 63 of the rods 59 will engage the cam tracks 68 thereby releasing the print so that the margin thereof may be engaged between the belts 81 and carried by said belts through the water in the washing tank. The belts 81 are caused to move slowly but continuously so that by the time the prints reach the discharged end of the belts 31 they will be thoroughly washed and discharged between the adjacent stretches of the conveyer belts 86. The conveyer belts 86 carry the prints slowly and discharge them into a collecting box shown in Fig. 14 in which the finished prints are received.

While I have illustrated and described my invention with some degree of particularity, I realize that in practice various alterations thereon may be made. I therefore, reserve the right and privilege of changing the form of the details of construction or otherwise altering the arrangement of the correlated parts without departing from the spirit of the invention or the scope of the appended claims.

Having thus described my invention what I claim as new and desire to protect by United States Letters Patent is:

1. In a photographic developing machine, a tank, a pair of arms pivotally mounted therein, means on the arms to engage a print, means for rotating the arms to immerse the print, and means for returning the arms to normal position.

2. In a photographic machine, a tank, a pair of arms rotatable therein, resilient means retaining the arms in normal position, clamping means on the arms to engage a print, said arms being rotatable to immerse the print, and a releasable spring pawl to engage the arms to retain the latter in a shifted position, said pawl being releasable to permit the arms to return to normal position.

3. In a photographic developing machine, a developing tank, rotatable means therein for engaging a print and for immersing the latter, a rinsing bath, and means operable automatically to transfer the print from the arms to itself and for immersing the print in a rinsing bath.

4. In a photographic developing machine, a developing tank, means movable therein to engage a print and to immerse the same, a second tank containing a rinsing bath, means movable through the rinsing tank, clamping means on the last mentioned means

to receive the print from the first mentioned means, and means for operating the second mentioned means to immerse the print in the rinsing bath.

5. In a photographic developing machine, a developing tank, arms movable therein, clamping members carried by the arms to engage a print, a second tank containing a rinsing bath, members movable through the rinsing tank, clamping means carried by the members, means for transferring the print from the first clamping members to the second, and means for moving the members to immerse the print in the rinsing bath.

6. In a photographic developing machine, a developing tank, arms mounted therein for rotation, clamping members carried by the arms to engage a print, a tank containing a rinsing bath, arms pivotally mounted in the rinsing tank, clamping members carried by the arms, means for moving the first mentioned arms in a position to immerse the print, a spring pressed pawl for retaining the first mentioned arms in said position, means on the second mentioned arms for releasing the pawl, resilient means for returning the first mentioned arms to normal position, means for transferring the print from the first mentioned clamps to the second clamps, means for moving the second mentioned arms away from the developing tank, and means operable during such movement to immerse the print and to withdraw the same from the rinsing bath.

7. In a photographic developing machine, a fixing tank means mounted therein for rotation, means for intermittently attaching prints to first mentioned means, and means for intermittently rotating the first mentioned means to immerse and subsequently withdraw the prints from the fixing tank.

8. In a photographic developing machine, a tank, a drum mounted therein for rotation, a plurality of radially movable rods mounted on the drum, means on the free ends of the rods to secure a print between said ends and the drum, means operable during rotation of the drum to move the rods outward, means for introducing a print between the ends of the rods and the drum, means for releasing the rods to permit the same to clamp the print, means for intermittently rotating the drum to introduce and subsequently withdraw the prints from the tank, and means for releasing the rods from the prints.

In testimony whereof I affix my signature.

SAMUEL J. SUSSMAN.