

Sept. 25, 1934.

M. E. LONG

1,974,890

MACHINE FOR WASHING AND FIXING PHOTOGRAPHIC PRINTS

Filed July 13, 1931

4 Sheets-Sheet 1

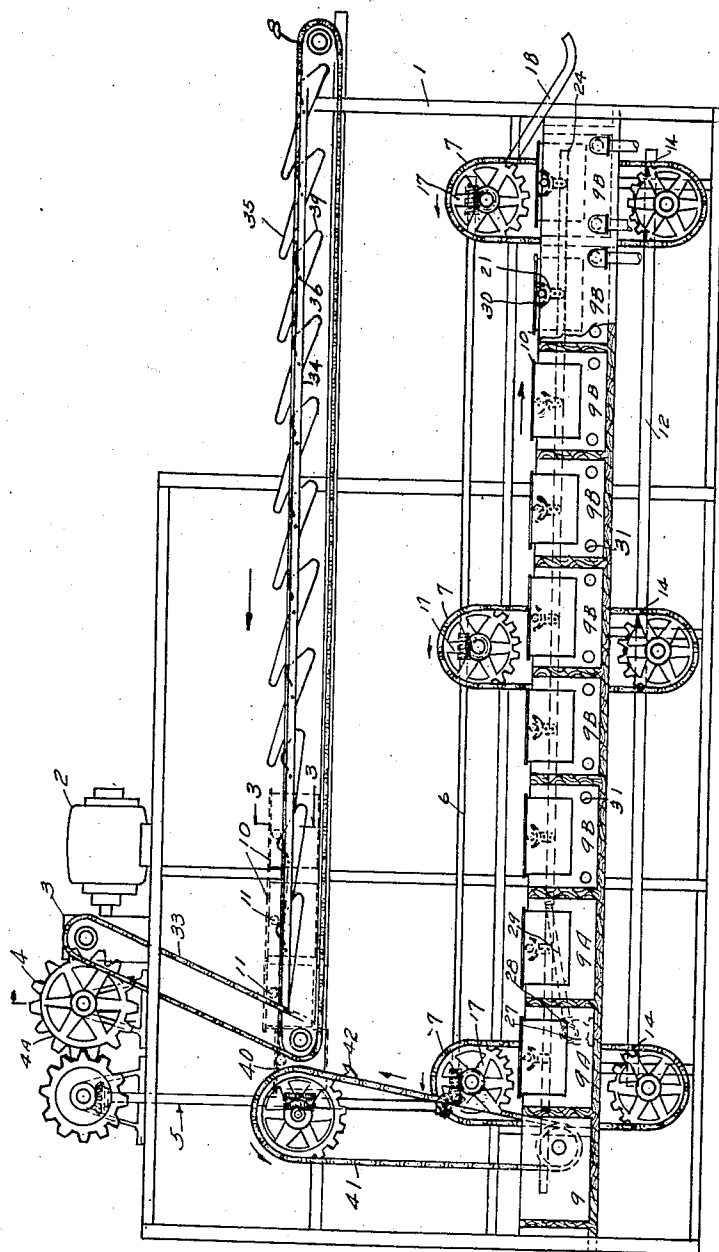


Fig. 1

Millard E. Long

INVENTOR.

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4 Sheets-Sheet 2

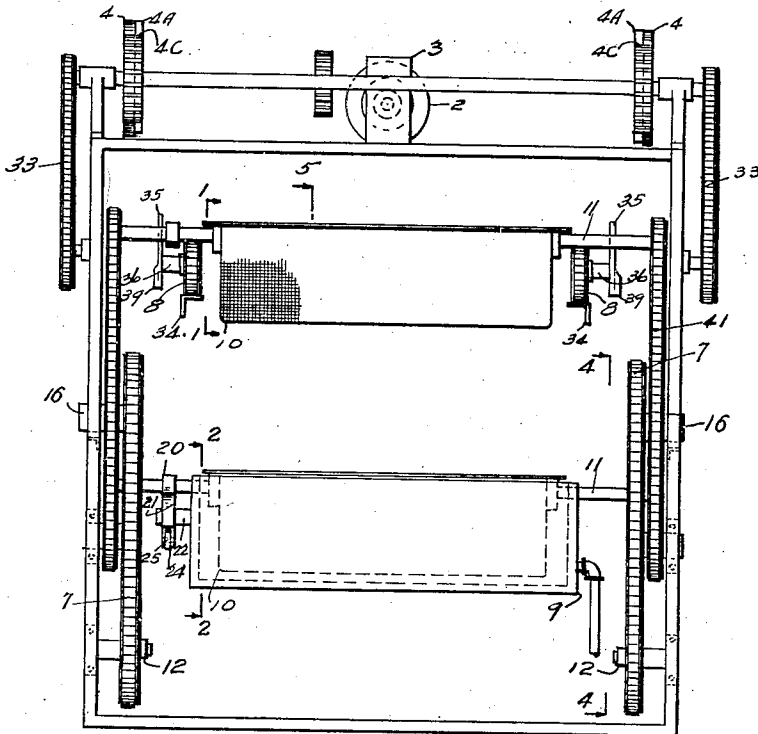


Fig. 2.

Willard E. Long

INVENTOR.

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M. E. LONG

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4 Sheets-Sheet 3

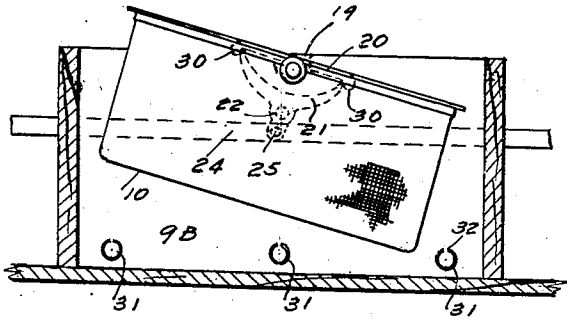


Fig. 3.

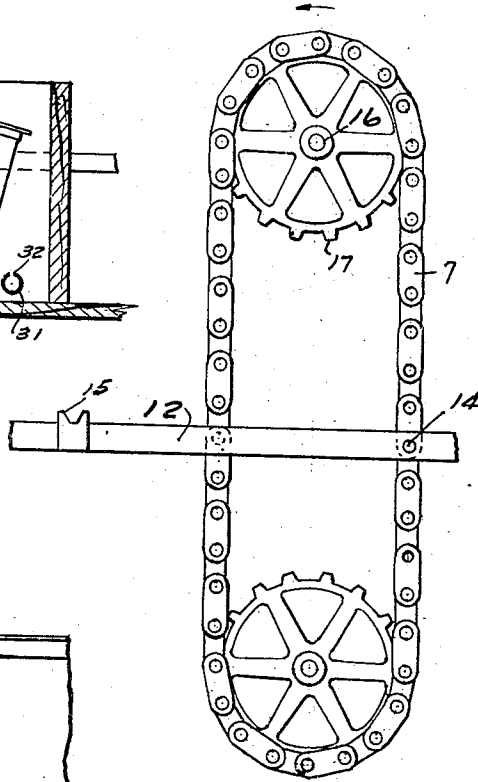


Fig. 4.

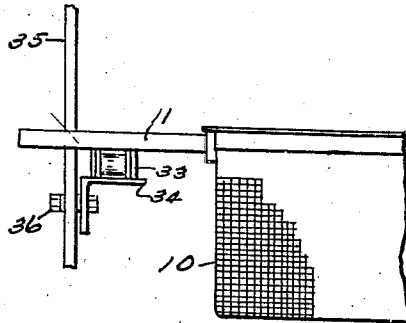


Fig. 5.

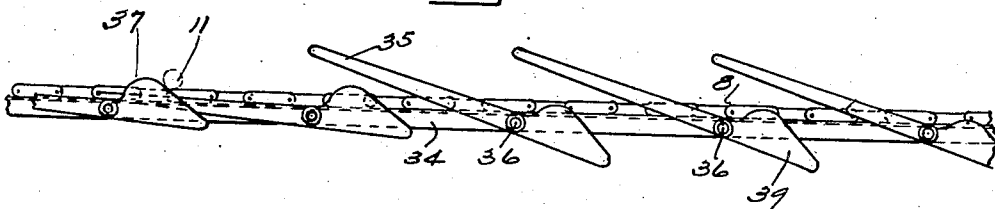


Fig. 6.

Millard E. Long
INVENTOR.

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4 Sheets-Sheet 4

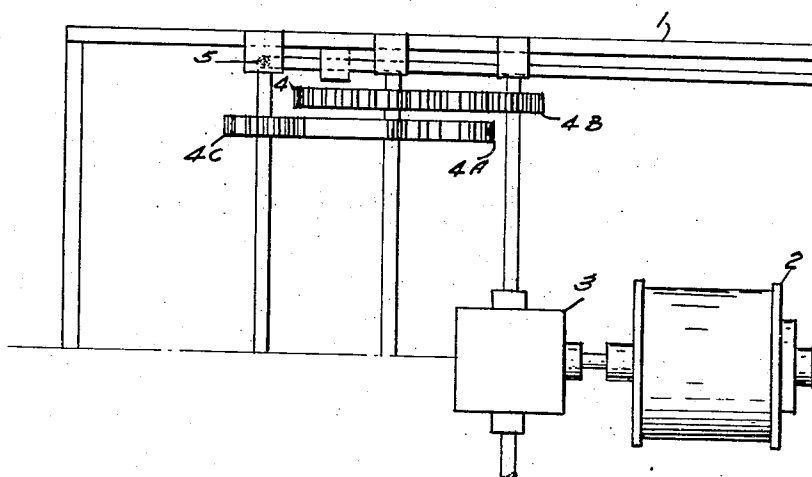


Fig. 7

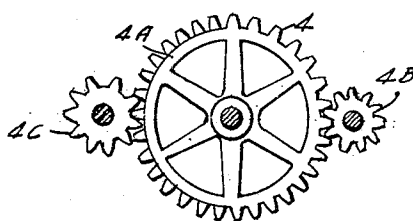


Fig. 8

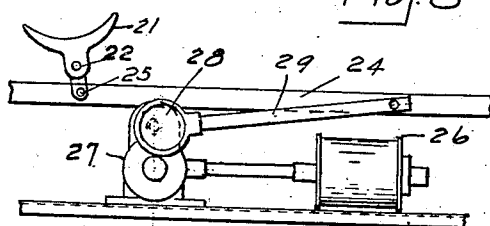


Fig. 9

Fig. 10

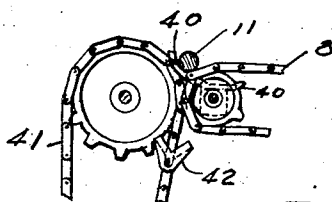


Fig. 11

William E. Long

INVENTOR.

UNITED STATES PATENT OFFICE

1,974,890

MACHINE FOR WASHING AND FIXING
PHOTOGRAPHIC PRINTS

Millard E. Long, San Antonio, Tex., assignor to
Carl D. Newton, San Antonio, Tex.; Carrie
Gentzen Newton administratrix of said Carl
D. Newton, deceased

Application July 13, 1931, Serial No. 550,366

6 Claims. (Cl. 95—89)

The object of this invention is to provide a mechanical means whereby photographic prints, after exposure, shall be immersed in a multiplicity of fixing baths and water baths in a proper time relation and in a continuously operating method.

A further object of this invention is to provide a means whereby a series of containers or baskets shall at the start hold a number of unfixed photographic prints and each basket is advanced through successive fixing solution baths and successive water baths until the proper fixing operations and washing operations shall be completed and said baskets shall be delivered individually to a holding rack and after being emptied returned by mechanical means to the initial point for filling and a subsequent continuation of operations.

A further object is to provide a synchronized and properly timed movement of the individual baskets and a means for agitating both the solution and the baskets for a complete coverage of each individual print.

A thorough test of the prints by this method by the mechanical means hereinafter outlined have proven that said prints have developed a resistance to fading which is not consistently obtainable by the usual methods.

Referring to the drawings:

Fig. 1 is a longitudinal vertical section on line 5—5.

Fig. 2 is an end elevation, without the driving mechanism.

Fig. 3 is an enlarged vertical section on line 2—2 through an individual bath showing the basket in a tilted position and the fluid spray pipes.

Fig. 4 is an enlarged view of the vertically disposed chain operated lifting bar.

Fig. 5 is a cross section on line 3—3 through the return chain showing basket trunnion resting on return chain.

Fig. 6 is an exterior elevation of the return chain, showing counter-weighted levers for preventing the crowding or piling of the baskets on said return chain.

Fig. 7 is a partial half plan view of the driving mechanism located on top.

Fig. 8 is an elevation of the intermittent gear, driving and driven pinions.

Fig. 9 is a cross section on vertical center line of gear through same.

Fig. 10 is a view of motor, speed reducer, eccentric means for driving basket agitating bar.

Fig. 11 is a partial view of conveyor chains showing method of taking baskets from the return chain to place in stop bath. A structural

steel frame 1 which supports a driving mechanism consisting of a motor 2, speed reducing mechanism 3, intermittent gears 4, vertical driving shaft 5, horizontal driving shaft 6, vertically operated chain 7, horizontally operated chain conveyor 8, together with other mechanisms hereinafter described, contains in its lower portion a series of longitudinally placed baths, 9, 9A and 9B, which in this modification, are made and shown of wood construction, although this may be of any acid-resisting material.

In the present modification the "hypo" solution is used and this description is based on the use of said "hypo" solution, but it is distinctly understood that the use of the machine is not limited to the use of this solution, but may be adapted to the utilization of any fixing agent, in which case a slight variation of the number of baths and the arrangement of certain mechanical parts thereof may be slightly varied.

The design of intermittent gear 4 is such that the movement of said intermittent gear 4 is timed so that the relation of the resting period of the basket in the solution has a direct reference to the strength of said solution, which has been predetermined both by analysis and tests, and said time ratio so arranged that the basket 10 shall remain in each successive chemical bath for a fixed period, so that the sum of all periods shall be such as to thoroughly fix the prints during the complete successive operations and with a sufficient number of water baths to thoroughly wash said prints, each time interval in the water bath being the same as an individual time interval in each fixing bath.

Referring to Fig. 1 the bath 9 is the "stop" bath, which stops further action of the developing solution. Bath 9A contains the "hypo" solution and 9B are the water baths.

A container or basket 10, preferably of a woven mesh construction, with trunnion 11 rigidly connected to said basket on either end, but preferably allowing the basket through the center to be open is placed in "stop" bath 9 by a mechanical means hereinafter described. A lifting bar 12, pivotally attached to vertically disposed chain 7 by pin extension 14, shall at the end of the predetermined resting interval be driven by intermittent gears 4, and said lifting bar 12 shall be vertically raised until contact is made with trunnion 11 and the basket removed from the bath in which it reposes by the continued upward action of lifting bar 12, and carried forward to the next successive bath.

The pitch diameter of the sprocket wheel and

consequently the horizontal distance between the centers of the vertical chains is the same as the center distance of the baths. A series of V notched attachments 15 in a properly spaced relationship are placed on lifting bar 12 to catch the trunnion 11 and prevent the basket 10 from slipping from a position at right angles to the center plane of the machine.

At the time that chain 7 driven by intermittent gear 4 and subsequent power transmitting means raises lifting bar 12 which passes thru a free, unincumbered space between said chain 7 and the exterior portion of the longitudinally placed tanks, 9A and 9B, the baskets 10 are raised directly from the bath and carried to a point on the horizontal plane of shaft 16 and then forward along the line of the pitch circle of sprocket 17 until the tangent point is reached and a direct vertically downward movement is made into the next bath. The lifting bar continues its downward travel, with trunnion 11 resting in the open top bearing 19, around the lower sprocket and comes to a predetermined stop is held until the next cycle of operations.

When the basket 10 has reached the last water bath 9B, which is shown on the right of Fig. 1, the lifting bar 12 raises the basket 10 from this bath and on the downward travel of the lifting bar deposits basket 10 on outwardly projecting arms 18, from which the basket is then removed and emptied.

An intermittent gear set is shown in Figs. 7, 8, and 9. A driving pinion 4A drives a gear 4, which contains a full complement of teeth. Immediately alongside this gear 4 is another gear 4A which contains approximately one half of its full complement of teeth, the balance being cut off to the root of the teeth. This allows gear 4A to turn one half a revolution without contacting with and driving its mating pinion 4C which in turn drives vertical shaft 5 through gears and horizontal shaft 6, which drives sprocket 17 and chain 7 and lifting bar 12, which raises the baskets 10 from the baths. The period of rest of the intermittent gear 4A and pinion 4C governs the rest period of baskets 10 in each of the various baths. A cam 45 on gear 4A operates lever 46 on pin 47 which inserts stop 48 in hole 49 in pinion 4C, this prevents any movement of adjacent parts.

The empty basket is then placed on horizontally operated conveyor chain 8 which runs in the opposite direction from the path of the basket 10 through the baths 9, 9A and 9B, and said baskets 10 are then returned to the front end of the machine or the starting point of operations.

The basket 10 after being raised from the bath in which it has been placed and deposited in the next bath enters slot or bearing 19 and an arm 20 with double ends 30 mounted on trunnion 11 contacts with an inverted C shaped lever 21 mounted exteriorly on baths 9, 9A and 9B by means of pin 22. A horizontally disposed agitating bar 24 is fastened to the lower end of lever 21 by pin 25. A separate motor 26 mounted on the frame and shown in Fig. 10 driving a speed reducing mechanism 27 with an eccentric 28 and an eccentric rod 29 drives horizontally disposed bar 24, which in turn gives an arced movement to the upper portion of lever 21. The ends 30 of bar 20 rest exteriorly against the upper points of C shaped lever 21 and hold bar 20 in position. The arc movement of lever 21 together with the resistance of the baskets and prints in the solution give an agitating motion to

basket 10 and cause the damp prints in basket 10 to slide from one position to another, thus giving the faces of each individual print a continuous exposure to the solution, whether it may be the fixing solution or the cleaning water solution, and thus preventing unfixed or spotted prints from being produced by this machine.

The water baths 9B contain, in the lower portion, a series of perforated pipes 31 through which replenishment and change is made to the water content. The action of the incoming water through the perforated holes 32 in the top of said pipes cause an agitation of the water which enhances the rocking action of the baskets and causes the water to thoroughly surround each individual print.

The empty basket is placed on horizontally operated conveyor chain 8, this conveyor chain is driven from speed reducer 3 by chain 33 and operated continuously with the lower edge of the upper run of chain 8, resting on angle 34 which forms a part of the frame 1. A series of hump shaped counter-weighted levers 35 are pivotally attached to angle 34 by pins 36. In a clear position the upper end of counter-weighted lever 35 projects upwardly above chain 8 and the hump 37 is below the upper edge of chain 8. The trunnion 11 of basket 10 riding on chain 8 presses the upper end of lever 35 in a downward position and the friction of trunnion 11 on chain 8 being greater than the friction on the upper part of counter-weighted lever 35 allows the basket to progress in a forward manner. When trunnion 11 has passed the upper end of counter-weighted lever 35 the counter-weighted portion 39 of lever 35 causes said lever 35 to resume its normal position. When basket 10 has arrived at the forward end of chain 8 a stop 40 prevents its continuance. The upper end of lever 35 is then held in a position, approximately horizontal, and by means of the off-set relation between the pin 36 and the hump 37, said hump 37 is raised and projects above the upper side of chain 8. The next succeeding basket carried by chain 8 arrives at a point immediately in the rear of, but not touching, the immediately preceding basket and the trunnion 11 striking the hump 37 projected above the top of chain 8 causes trunnion 11 of basket 10 to ride against hump 37 of counter-weighted lever 35, as the distance between any two successive fulcrum pins 36 is greater than the over all width of the basket. The four and aft edges of the basket are free from contact with the preceding or the succeeding baskets and do not allow any crowding or piling up of the baskets, as the friction or holding power of hump 37 against trunnion 11 is greater than the friction of the upper edge of chain 8 on trunnion 11.

Vertical chain 41, which in this modification is a separate motor drive but which may be clutched to any continuously moving portion of the mechanism, overlaps the forward end of chain 8 and has a pocket 42 mounted on chain 41. This pocket 42 when in operation rises and picks basket 10 by means of trunnion 11 from stop 40 and lowers this basket in the first or "stop" bath 9.

Prints may be placed in the basket manually or any desired means of conveying said prints from the developing solution may be used.

In order that the central portion of the machine may be free for the operation and conveying of the baskets through the various stages it will be seen that the various drives are in

duplicate and separately operated in a synchronized manner.

As a matter of reference the machine in its present modification was developed on a basket width of twelve inches and the machine is capable of thousands of prints every eight hours, however the machine may be built for any desired capacity, either larger or smaller.

It is to be understood that I may make changes in the construction and the combination and arrangement of the several parts, provided that such changes fall within the scope of the appended claims.

I claim:

1. A machine for fixing and washing photographic prints, in combination, a frame, a series of baths arranged in a longitudinal manner, a series of baskets, with said prints deposited therein, a means whereby said baskets are successively passed, in a properly timed relation, throughout the range of baths, a means for agitating the fluid in said baths and a mechanical means for rocking said baskets to cause a complete immersion flotation and exposure of each separate print to the fluid contents of said baths.

2. A machine for fixing and washing photographic prints through an automatic process, in combination, a frame, a series of longitudinally placed fixing and washing baths, a series of baskets, a series of vertically and forwardly operating chains operating a horizontally deposed lifting bar functioning on said basket trunnions to project said baskets forwardly through the successive baths in a synchronized and properly timed relationship and a means whereby said baskets when emptied are returned to the initial point and means whereby said baskets return to said point without crowding or piling one on the other, and remain until ready for further filling or use.

3. A machine for automatically washing and fixing photographic prints in combination with a frame containing a series of baths, a series in pairs of vertically and forwardly operating chains with a vertical lifting bar, which automatically and in a regularly timed manner, raise, pass forward and lower into the next succeeding baths a series of baskets containing photographic prints, finally depositing each filled basket in succession on brackets at the end, a means whereby said baskets when empty and placed on a returning conveyor shall be returned to the front of the

machine without crowding or tipping, said means consisting of a multiple system of chains in pairs with a stop and a duplicate system of counter-weighted levers.

4. A machine for fixing and washing photographic prints, in combination, a series of baths arranged longitudinally containing proper solutions and water, with means for changing the water baths means for separating prints by fluid agitation, a series of baskets and cam means with lever and eccentric driven rod for imparting an irregular arcuate movement to said baskets, said fluid agitating means and said mechanical means causing a movement and parting of said photographic prints, whereby a complete immersion flotation and individual contact of each print and the solution is obtained.

5. A basket carrying machine for fixing and washing photographic prints, in combination, a series of solutioned baths, a series of water baths, a series of baskets, a prime mover, a gear reduction, an intermittent gear set, a series of vertically operated chains operating a lifting bar contacting with trunnions on said baskets and giving said baskets a forward movement, a receiving means for said baskets at the end of washing operations, a returning means for said baskets, a chain conveyor, a stop at the end of said conveyor, a series of counter-weighted levers to prevent crowding of said baskets and a vertically operated chain for picking forwardly located basket from stop at the end of said horizontal conveyor and placing said basket in first bath for filling, all drives are arranged in pairs to allow a basket operating space in the center.

6. In a machine for fixing and washing photographic prints, a series of longitudinal placed baths, holding baskets, for floatably containing a quantity of loose, unattached prints, trunnionally supported on either end in a pivotally mounted socket attached to a longitudinal operating agitating bar and transferred by lifting bars and chain moving means, in pairs, mounted in a frame depositing said basket in a forwardly adjacent bath with said trunnion supporting means resting in next adjacent pivotally mounted socket; a means for giving said bar a fore and aft movement and a fluid agitating means, for mechanically and hydraulically separating and covering said prints in said baths.

MILLARD E. LONG.

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