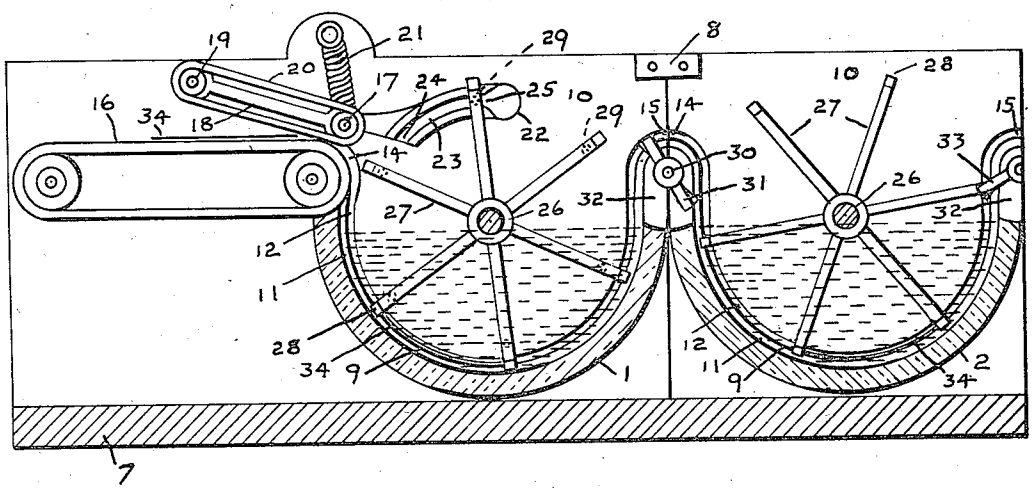
Feb. 18, 1936. L. G. SIMJIAN 2,031,010

AUTOMATIC POSITIVE PAPER DEVELOPING APPARATUS

Filed July 5, 1932 2 Sheets-Sheet 1

FIG. 1.



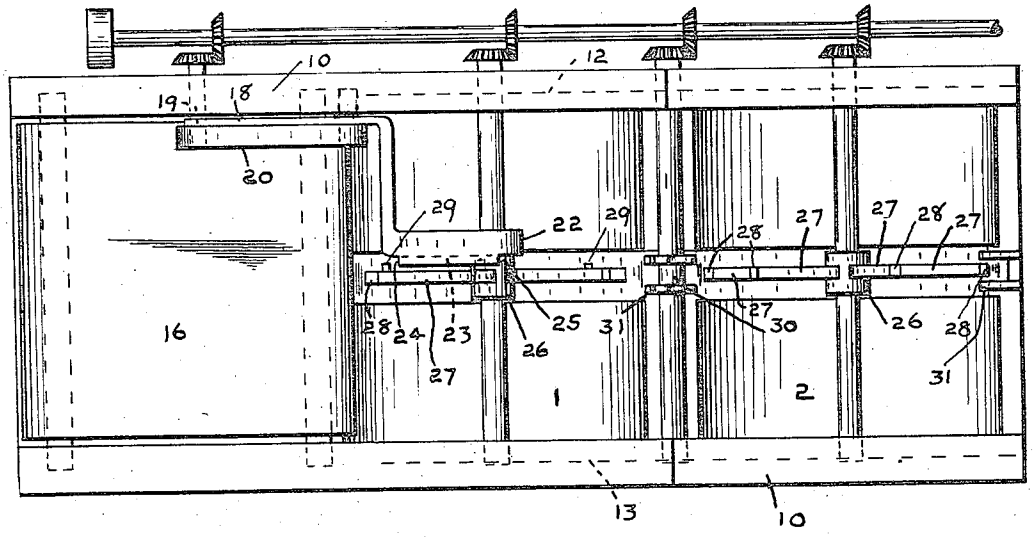


FIG. 2.

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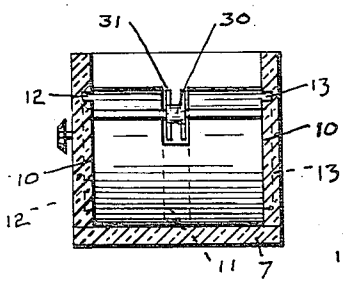


FIG 3

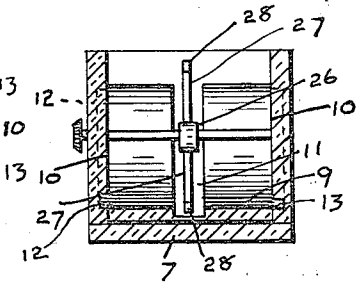


FIG 4

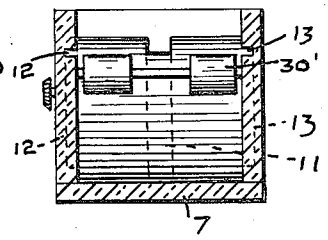


FIG 7

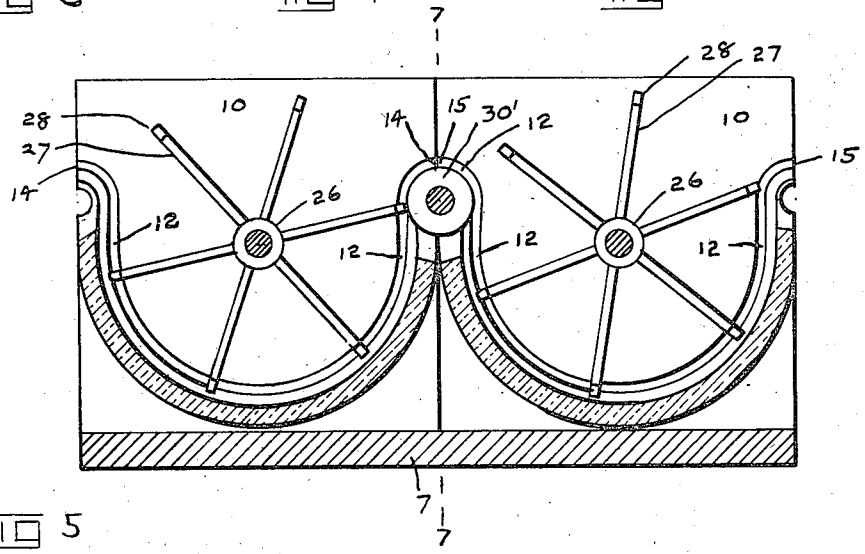


FIG 5

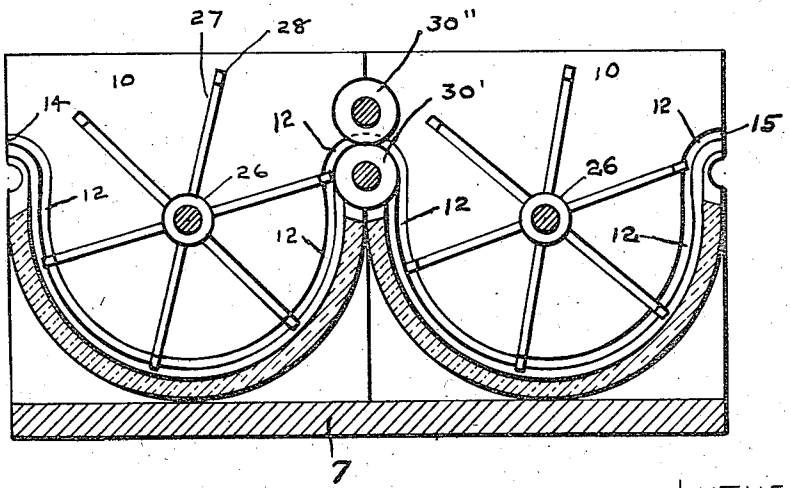


FIG 6

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UNITED STATES PATENT OFFICE

2,031,010

AUTOMATIC POSITIVE PAPER DEVELOPING APPARATUS

Luther G. Simjian, New Haven, Conn.

Application July 5, 1932, Serial No. 620,784

13 Claims. (Cl. 95—94)

This invention relates to improvements in automatic positive paper developing apparatus and more especially to an apparatus for developing flexible photographic prints.

The object of the invention is to provide for the production of an automatic flexible print developing apparatus to be used in connection with, and as a part of, an automatic photographic machine by which a picture may be taken upon the well-known positive paper material and automatically or otherwise transferred to the improved developing apparatus which will automatically develop the print, reversing it, redeveloping it, washing and delivering it to a drying chamber or to hand while the person, having posed for the picture, is waiting for it. There are other automatic photographic and developing machines that have been introduced into the art for the purpose of developing the positive material, but they have never proved to be very practical for the reason that they have provided complicated means within the basin for moving the prints with the resultant possibility of precipitating the solution in certain basins, of the machine, containing a strong acid bath for reversing the negative image to a positive image according to a well-known reversing process. The improved apparatus wholly eliminates the possibility of precipitation of the solution content of any basin because there are no parts moving in the solution that require lubrication; for the only parts moving through the baths are covered with hard rubber insulation. The improved developing apparatus of combined bath units is designed with the intention of being placed lengthwise upon the roof of a photographic booth from which flexible exposed paper may be delivered to the developing apparatus by means of any desired conveying means.

The particular character of the improvement is pointed out by means of an illustrative structure embodying the invention and illustrated by the accompanying drawings of which Figure 1 is a side elevation of certain assembled units of the apparatus illustrated partly in cross-section; Figure 2 is a top view of the assembled units; Figure 3 is an end view of a single unit; Figure 4 is a cross-section of the single unit; Figure 5 illustrates a modified form of assembled units partly in cross-section; Figure 6 illustrates another modified form of assembled units partly in cross-section; and Figure 7 illustrates in cross-section the modified form of unit shown by the Figure 5. Figure 8 is an enlargement of the first two units illustrated by Figure 1; and Figure 9 is an enlargement of the first two units illustrated by Figure 2.

Referring more particulalrly to the drawings, the apparatus, while it may be confined to one bath unit, is illustrated as comprising the units 1, 2, 3, 4, 5 and 6 combined and placed upon a common support 7, adjoining units having some means of intersecurement, such as at 8. Each unit is of the form of a basin having the curved base 9, extending in both directions to the top of the basin, and opposed sides 10, the base 9 throughout its length having a base groove 11 intermediate the sides 10. Companion grooves 12 and 13 are provided by both sides 10 adjacent the curved base 9, said companion grooves 12 and 13 each following the curved course of said base 9 and having open terminals 14 and 15 adjacent opposite portions of the top of each basin. The bath unit 1 is provided exteriorly with the movable platform 16 adapted to be moved by frictional engagement by the roller 17 carried by the lever 18 and having an operable connection with the power wheel 19 by means of the endless band 20, the lever 18 having the same pivotal mounting as said power wheel 19, the roller 17 being adapted for engagement with said platform 16 to impart motion thereto, but the roller 17 is normally separated from the platform 16 by means of the spring 21. The extremity 22 of the lever 18 is provided with the curved groove 23 having the open ends 24 and 25, the latter having an enlarged scope. Each bath unit 1, 2, 3, 4, 5, and 6, is provided interiorly with a rotatable member 26 having radially extending arms 27 adapted to extend into the base groove 11 so that the tip 28 of an arm 27 may ride therein in readiness to engage an edge of a thin flexible print, the tip 28 of each arm 27 being made of some flexible material to insure a yielding contact of the tip 28 with the edge of the print. Each radial arm 27 of the rotatable member 26 provided by the bath unit 1 is provided with the laterally extending pin 29. In combining the series of bath units 1, 2, 3, 4, 5, and 6, the openings 15 of one unit register with the openings 14 of the adjoining unit so that the companion grooves 12 and 13 have an uninterrupted course throughout all of said units from the opening, or inlet, 14 of the bath unit 1 to the opening, or outlet, 15 of the unit 6. The meeting surfaces 27 and 28 of all adjoining bath units provide a bearing 29 for a rotatable arm 30 having the bifurcated extremities 31, the arm 30 being operable within the slot 32 and extending its bifurcated extremities 31 into the path of the arms 27 and beyond the plane of the companion grooves 12 and 13. All of the rotatable arms 30 and the rotatable members 26 have a geared connection with the power wheel 19 as does also the roller 17, the operation as between the members 26 and the arms 30 being so timed that the arms 27 and 30 meet overlappingly as at 33 in the unit 2, and the operation as between the arms 27 and the platform 16 being so timed that the platform is in motion only when a pin 29 is within the groove

23 of the lever extremity 22. In place of the groove 23 and the pins 29, the lever 18 and the rotatable member 26 may be provided with any desired means to automatically force the roller 17 periodically down upon the platform 16.

In use, therefore, prints 34 may be successively placed, automatically or otherwise, upon the platform 16 which is periodically moved by the frictional contact therewith by the roller 17 as the lever 18 is forced down by the means provided therefor, the print 34 thereby being marginally fed into the inlet openings 14 of the companion grooves 12 and 13 of the opposing sides 10 of the bath unit 1. When the arm 27, carrying the pin 29 within the groove 23 of the lever 18, has progressed sufficiently in its forward movement, the pin 29 rides out of the groove 23 thereby releasing the lever which is immediately spring operated to separate the roller 17 from the movable platform 16, this separation is so timed that a print 34 will have fully entered the companion grooves 12 and 13 and a succeeding print automatically spaced therefrom so that a flexible tip 28 of an arm 27 may extend in behind the entered print to engage an edge thereof, the print then occupying a position between two consecutive arms 27 and thus held free from the influence of gravity and confined to the movement of said rotatable member 26, the print 34 thereby being conveyed within the basin content and along said companion grooves 12 and 13, and base 9, to the place of the overlapping arms 27 and 30 from which the arm 30 engages the edge of the print and functions as a relay to convey the print over into the adjoining basin 2 where an arm 27 functions as in the basin 1 to engage and convey the print through the basin 2, and so on throughout the series of bath units 1, 2, 3, 4, 5 and 6, the contents of which may be a developing fluid, a rinsing fluid, a bleaching fluid, another rinsing fluid, a redeveloping fluid and a washing fluid, respectively, the developed print being thereby expunged at the opening, or outlet, 25 at the end of the series of said bath units, a shelf 34, or drying chamber if desired, being provided to receive the same.

The Figures 5 and 7 illustrate a modification which merely substitutes the divided roller 30' for the rotatable bifurcated arm 30, the print riding over the roller 30' into the adjoining bath unit. The Figure 6 illustrates another modification which adds a second roller 30'' to the roller 30', the print riding between said rollers 30' and 30'', the print in the event of either modification being thereby conveyed from one basin to an adjoining basin. The arms 30 in the preferred form, and the rollers 30' and 30'' in the modified forms, may be omitted as unnecessary when the body of the print is less flexible.

The above described improved apparatus, it will be noted, is of simple construction and well adapted to handle the prints automatically for treatment within the consecutive baths, and that while this invention is primarily adapted for treatment of positive paper material it is not to be thus limited.

It is to be further noted that, after exposure is made in the camera, the exposed material may be transferred onto the movable platform of the improved apparatus by hand or mechanical means.

I claim:

1. An automatic developing apparatus comprising a basin for a fluid content, the basin having sides in parallel planes, curved companion grooves in said sides, the grooves having open ends adjacent opposite top portions of the basin, and an arm pivotally mounted upon said sides and adapted to extend below said grooves within said basin, whereby photographic prints, by their marginal portions may be inserted within one set of said open ends, an edge of each print engaged by said arm and thereby urged along said grooves through said content and delivered at the opposite set of open ends of said grooves.

2. An automatic developing apparatus comprising a basin for a fluid content, the basin having opposed side structures, curved companion grooves provided by said side structures, the grooves having spaced open terminals adjacent opposite top portions of the basin, and a rotatable member supported by said side structures, the member having radially disposed arms adapted to extend into said basin below said grooves, whereby photographic prints by their marginal portions may be inserted within one terminal of each of said grooves, an edge of each print being engageable by one of said arms and thereby urged along said grooves, through said content and expunged at the said opposite terminals.

3. An automatic developing apparatus for flexible prints, the apparatus comprising a basin for a fluid content, the basin having a curved base and opposed side structures, a groove in said base intermediate said side structures, curved companion grooves provided by said side structures adjacent said base, the companion grooves having open terminals adjacent opposite top portions of the basin, and a rotatable member supported by said side structures, the member having radially disposed arms adapted to extend into said base groove to engage an edge of a print inserted by its marginal portions within said companion grooves, the print thereby being urged along said companion grooves and said base through said content and expunged from the basin.

4. An automatic developing apparatus for flexible prints, the apparatus comprising a basin for a fluid content, the basin having a curved base and opposed side structures, a groove in said base intermediate said side structures, curved companion grooves having inlet and outlet open terminals adjacent opposite top portions of the basin, a rotatable member suspended over said basin, the member having radially disposed arms adapted to extend into said base groove, a movable platform adjacent the inlet terminals, means to periodically move said platform, said means being controlled by a lever lying in the path of said rotatable member, and means carried by said rotatable member to operate said lever, whereby prints may be placed upon said platform and so automatically fed marginally into said companion grooves that they are spaced apart to permit a radial arm to engage an edge of the print and thereby conveying the same along said grooves through said content and out of said basin at said outlet terminals.

5. An automatic developing apparatus for flexible prints, the apparatus comprising a basin for a fluid content, companion grooves for marginally guiding prints through the basin content, a rotatable member suspended over said basin, the member having radially disposed arms adapted to engage an edge of a print and urge the same through said companion grooves, a movable platform at the entrance to said companion grooves, a power wheel mounted upon a bearing positioned above said platform, and a

lever mounted upon said bearing and providing a bearing for a roller having a flexible band connection with the power wheel, the band being capable of frictional engagement with said platform, but normally separated therefrom by spring means provided therefor, the lever having a groove adapted to receive a pin, with which each radial arm is provided, to operate said lever against said spring and to contact said band with said platform thus adapted to periodically feed prints deposited thereon into said companion grooves in spaced relation to permit a radial arm to engage the edge of a print.

6. An automatic developing apparatus for flexible prints, the apparatus comprising a series of basin units, each adapted for a fluid content, each basin having a curved base and opposed side structures, a groove in said base intermediate said side structures, curved companion grooves in said side structures adjacent said base, the companion grooves of the first and last basins of said series each having open terminals adjacent a top portion of said basins, the other companion groove terminals in the units of said series interregistering to provide continuous companion grooves throughout the series, a rotatable member suspended over each basin, each member having radially disposed arms with flexible tips adapted to extend into the base groove to engage an edge of a flexible print, marginally inserted within said companion grooves, and convey the print along said grooves through said content, and means, provided between and adjacent the top portions of said basins, and adapted to convey said print over into the adjoining basin to be engaged in turn by similar means provided by each of the basins in the series and expunged from said last basin.

7. An automatic developing apparatus for flexible prints, the apparatus comprising a series of basins, each basin adapted for a fluid content and having a curved base and opposed sides, a groove in said base intermediate said sides, curved companion grooves in said sides adjacent said base, the companion grooves of the first and last basins of said series each having open terminals adjacent a top portion of said basin, the other companion groove terminals in said series interregistering to provide continuous companion grooves throughout the series, and cooperating means provided by the apparatus to automatically convey a flexible print along the companion grooves throughout the series and thereby dip consecutively the print in the content of each basin.

8. An automatic developing apparatus comprising a series of basins, each basin adapted for a fluid content and having a curved base and opposed sides, and a groove in said base intermediate said sides, curved companion grooves in said sides adjacent said base, the companion grooves of the first and last basins of said series having open terminals adjacent a top portion of said basin, the other groove terminals of each basin in said series interregistering to provide continuous companion grooves throughout the series, each basin having a rotatable member supported by said sides, the member having radially disposed arms adapted to extend and travel within said base groove, and other arms, each having bifurcated extremities and being mounted pivotally intermediate its length within a slot and a bearing provided by meeting surfaces of basin units, said extremities capable of overlapping each of the radial arms to function as a relay in engaging behind the edge of the print, advanced by the radial arms, and pushing it from one to the other of said basins, the various radial and bifurcated arms cooperating to carry a flexible print along the companion grooves, dipping the print in the content of each basin throughout the series.

9. An automatic photographic developing apparatus for a flexible print, the apparatus comprising a basin for a fluid content, movable means within said basin to move a flexible print, said means having a radially disposed projection, a curved guide within said basin and adapted to receive the flexible print in line with said radially disposed projection and to guide it within the path of said projection while the latter is moving it, and means for automatically feeding the flexible print into the path of said radially disposed projection at a predetermined time, whereby the flexible print may enter into said basin for fluid treatment at such time when the said moving means is not blocking its path.

10. An automatic photographic developing apparatus for flexible prints, the apparatus comprising a series of basins, each basin adapted for a fluid content, a pair of shoulders provided by each basin to guide a flexible print, movable means within each basin and mounted in between said shoulders, said movable means having radially disposed projections adapted to extend below said shoulders to engage the flexible print and move it through the fluid, and an upper guide mounted between adjoining basins above said shoulders to change the directional movement of the flexible print, whereby said flexible print may be guided from one basin to another basin for various fluid treatments.

11. An automatic developing apparatus for flexible prints, the apparatus comprising a series of basins, each basin adapted for a fluid content, a pair of shoulders provided by each basin to guide a flexible print, movable means within each basin, said movable means having radially disposed projections adapted to extend below said shoulders to engage the flexible print and move it through the fluid, an upper guide mounted between adjoining basins above said shoulders to direct the print into an adjacent basin, and an automatic feeding means to feed the print into the first basin at a predetermined time, whereby the print may be evenly immersed in the fluid within the basin in timed relation with the movement of said movable means.

12. An automatic developing apparatus for flexible prints, the apparatus comprising a series of basins, each basin adapted for a fluid content, a pair of shoulders provided by each basin to guide a flexible print, movable means within each basin, said movable means being adapted to propel said print through the basin along said shoulders, an upper guide between adjoining basins to direct the print from one to another of said basins, and propelling means intermediate said basins to move the print through said upper guide.

13. An automatic developing apparatus for flexible prints, the apparatus comprising a series of basins, each basin adapted for a fluid content, a pair of shoulders provided by each basin to guide a flexible print, movable means within each basin, said movable means being adapted to propel said print through the basin along said shoulders, and an upper guide between adjoining basins to direct the print from one to another of said basins, the propelling means of one basin moving in timed relation with the propelling means of the adjoining basin.

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