June 14, 1949. R. W. DART ET AL 2,473,280

AUTOMATIC PHOTOGRAPHING AND DEVELOPING APPARATUS

Filed April 4, 1946 2 Sheets-Sheet 1

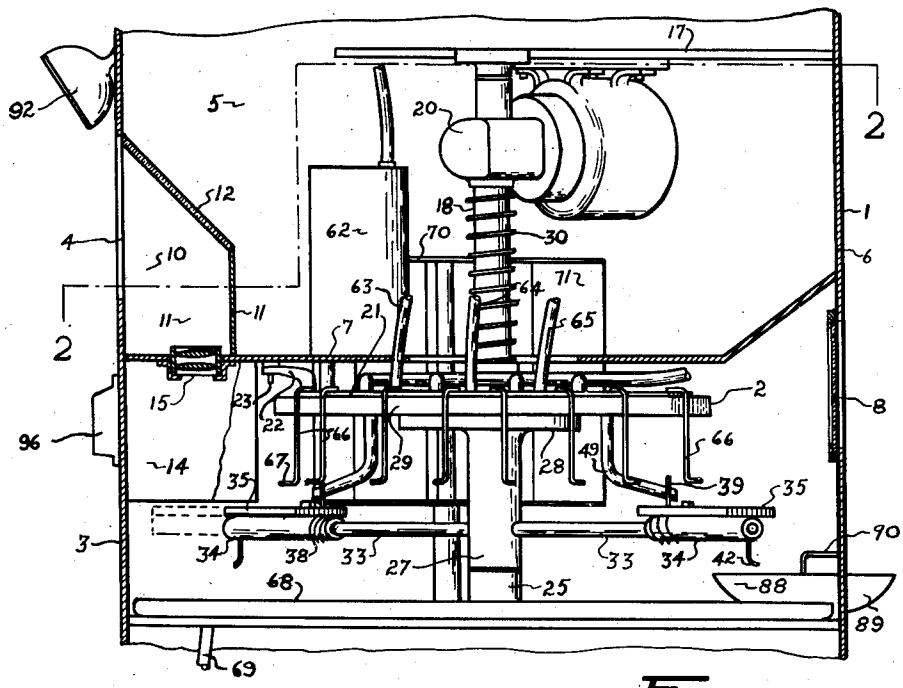


FIG. 1.

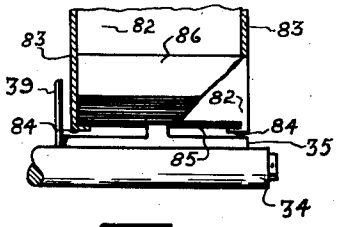


FIG. 4.

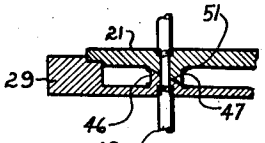


FIG. 6.

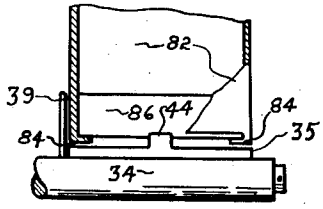


FIG. 5.

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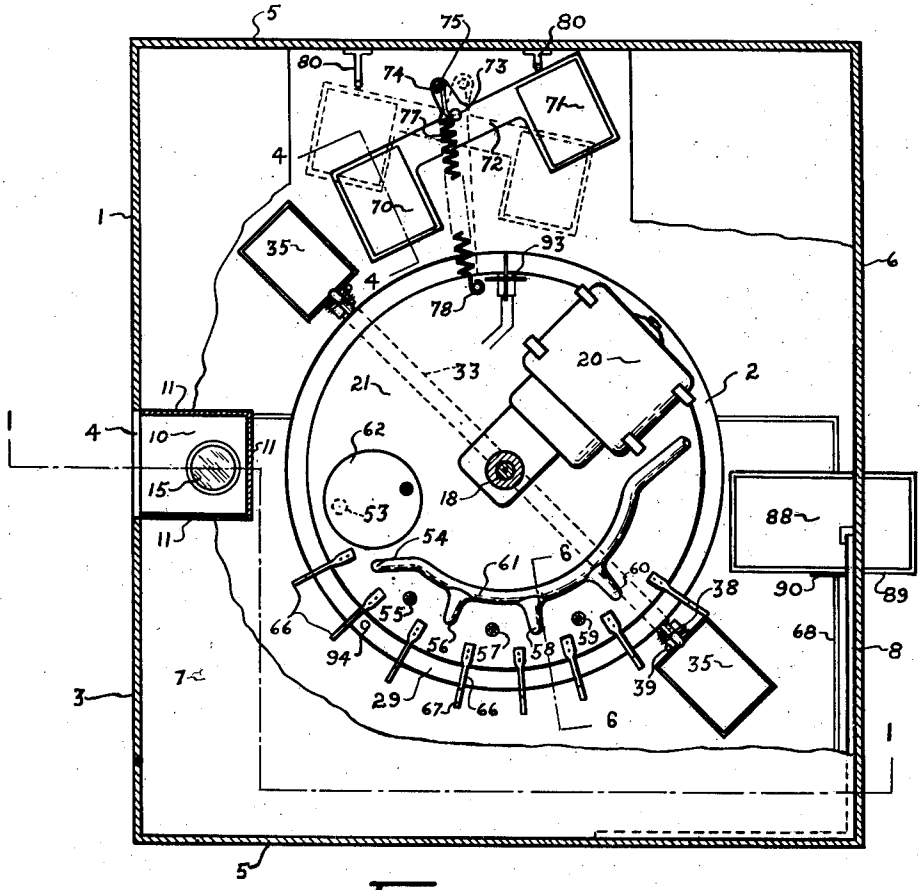


FIG. 2.

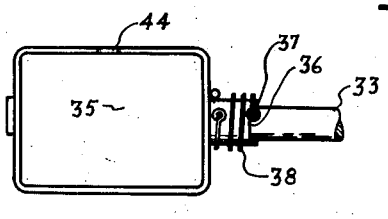


FIG. 3.

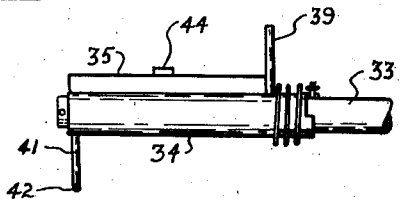


FIG. 7.

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# UNITED STATES PATENT OFFICE

2,473,280

## AUTOMATIC PHOTOGRAPHING AND DEVELOPING APPARATUS

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Application April 4, 1946, Serial No. 659,520

16 Claims. (Cl. 95—14)

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Our invention relates to improvements in photographic machines, such as those employed for automatically exposing a paper photographic plate, developing, processing and washing it, and delivering said plate as a positive to the purchaser in response to starting movement of the machine through the operation of a coin operated lock.

The objects of the machine are to provide means whereby the sensitized plate is moved continuously from starting position; to provide for an instantaneous flash to take place at the appropriate moment when the plate is being moved transversely of its focal plane through the camera; to progressively develop, wash, bleach, wash clear, wash, redevelop, and wash said plate prior to ejection or delivery to the sitter, and to pick up an unexposed plate ready for the next exposure. A further object is to provide a plate supply system whereby more than one plate magazine may be employed and where a full magazine may be automatically brought into service position subsequent to the employing of another.

Referring to the drawings:

Fig. 1 is an elevational view of the machine with the side wall of the cabinet removed, taken on the line 1—1 of Figure 2.

Fig. 2 is a plan view taken on the line 2—2 of Figure 1.

Fig. 3 is a detail view of the plate receiving and developing tray.

Fig. 4 is a detail view taken on the line 4—4 of Figure 1 showing the base of a magazine partly loaded with plates.

Fig. 5 is a similar detail showing the magazine ready to be replaced by another after its supply of plates is exhausted.

Fig. 6 is a detail sectional view through the liquid feed table.

Fig. 7 is an elevational detailed view of the mounting of the trays.

In the drawings like characters of reference indicate corresponding parts in each figure.

The numeral 1 indicates generally a cabinet in which the photographic machine 2 is completely enclosed, it is provided with a front wall 3 having a rectangular exposure opening 4, side walls 5 and a rear wall 6 and a partial horizontal partition 7 extending across it above the path of the undeveloped plates to exclude light admitted through one side and the rear walls 5 and 6 respectively through a viewing window 8. A recess 10 is formed behind the opening 4 with enclosing walls 11 and a mirror or reflector screen 12 extending between said walls at an angle of forty-five degrees to reflect the image of the sitter, who

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would be appropriately seated before the recess 10 prior to and during the time of exposure. A camera body 14 is provided below the partition 7 and extends downwardly there below to approximately the focal plane of the lens 15.

Suitably suspended from an upper support 17 is a bearing in which a vertical shaft 18 is mounted, which shaft is rotatable at appropriate speed through a combined motor and reduction gear 20, which motor combination is secured to the said support 17. The shaft 18 extends through a circular disk 21 which is provided with one or more lugs 22 which slidably engage vertical pins 23, one only shown, which are carried from the horizontal partition 7 to hold said disk non-rotatable, but to leave it free to move down incidental to wear of the underside of said disk. The lower end of the shaft is journalled in a step bearing 25 and is fitted with an elongated hub 27 having an upper flange 28 upon which a circular table 29 is secured. A spring 30 may be provided around the upper part of the shaft 18 between the housing of the motor 20 and the disk to ensure proper watertight engagement between the table 29 and the disk 21. Extending from opposite sides of the elongated hub 27 are two radial arms 33, each of which is fitted at its outer end with a rocking sleeve 34 supporting a tray 35. The sleeve is notched as at 36 and a pin 37 is provided in the arm to engage the sides of the notch to limit its rocking movement. A spring 38 surrounds the inner end of the sleeve and is anchored to both the sleeve and the arm in the usual way to return the tray to horizontal position after being tilted. The tray is provided with an upstanding arm 39 by which it is tilted at appropriate intervals to spill its content of liquid and is provided with a downwardly projecting arm 41 having a forwardly curved portion 42 at its lower extremity for tilting the tray in excess of ninety degrees to discharge the plate carried therein after being processed. The trailing side edge of each tray is provided intermediate its length with an upstanding lug 44 which is adapted to engage a plate to drop it into the tray at an appropriate point of the turning cycle of the radial arm 33 to which the tray is attached.

The rotating circular table 29 is provided on its upper face with an annular rib 46 having an inclined upper surface or seat 47, which seat is bored to provide a pair of solution ports 48, each of which have connected to them a spout 49 to deliver solution onto a tray 35. The non-rotating disk 21 is provided with a complementary annular rim 51 having an inclined face ground to fit the

seat 47. The rim 51 is ported at intervals to progressively register with each of the ports 48 as the table rotates below the disk. The ports of the rim 51 are indicated, Figure 2, by the respective numeral 53, 54, 55, 56, 57, 58, 59 and 60, the ports 54, 56, 58 and 60 being connected by a manifold 61 from a source of water supply. The port 53 is directly connected to the outlet of a developer tank 62, see Figures 1 and 2; the port 55 is connected by a pipe 63 from a source of bleaching solution; the port 57 is connected by a pipe 64 to a source of clearing solution, and the port 59 is connected by a pipe 65 to a source of redeveloping or toning solution. Intermediate adjacent ports 53 to 60 and also beyond the port 60, arms 66 are secured to the disk 21, all of which depend over the rim of the table 29 and terminate in an outwardly extending member 67 which projects into the path of the vertical arm 39 on each tray, so that as each arm 66 is struck by an arm 39 the tray to which the said arm is attached will be tilted to discharge the liquid content last delivered to the tray. Below the trays a pan 68 is provided to take the liquid discharged from said trays and pass it through a pipe 69 to discharge.

Mounted adjacent the periphery of the table 29 and in the line of the travel of the trays, is a magazine 70, with another magazine 71 secured to it by transverse members 72. The transverse members are pivotally mounted upon a vertical shaft 73. A rearwardly extending arm 74 is provided on one of the members 72. A pin 75 is mounted on the extension 74 and is connected by a spring 77 to an anchor rod 78 which is suitably supported from the disk 21. Stops 80 are provided to limit the swing of the magazines 70 and 71 and the spring 77 is adapted to move over the centre of the vertical shaft 73 to hold the magazines in the position shown in fill line in Figure 2 or in the dotted line position.

Each magazine 70 and 71 consists of a rectangular casing having side walls 82 and end walls 83, which latter extend below the side walls 82 and are inturned as at 84 to engage the end marginal edges of the lowermost plate 85 in the magazine. The magazines are obviously open topped to receive the plates, and a block 86 of greater depth than the interspace between the inturned portions 84 of the end walls 83 and the lower extremity of the walls 82 is adapted to be placed on the plates carried by the magazine 70.

In loading the magazines for the days run, they are disposed as shown in Figure 2, so that the lug on each tray will first withdraw plates from the magazine 70 and when the last plate is removed therefrom and the block 86 is seated upon the inturned portions 84, the lug 44 will engage the block and through it rock the magazines to the dotted line position shown in Figure 2, with the lug slipping away from the block as the spring 77 takes its load and completes the swinging movement.

A picture receiver 88 extends through a side wall of the cabinet and is generally disposed in the path of the trays 35. This receiver is provided above its near side wall 89 with a horizontal stop 90, which is adapted to be engaged by the depending arm 41 upon a passing tray to swing said tray to a position vertical to its normal plane and drop the finished plate or photograph into said receiver, from whence it may be picked up by the sitter.

In one or more appropriate positions adjacent the recess 10, a suitable flash lamp 92 is provided to provide the necessary illumination for exposure of each plate, which lamp is energized as the plate is centered below the lens 15 by means of a suitable switch 93 which is mounted upon the circular disk 21 and is tripped alternately by upstanding pins 94 mounted upon the rim of the table 29.

The machine 2 is set in motion in response to the insertion of a coin into a coin lock 96 to close a suitable circuit, which is automatically opened again when the arms again reach the position shown in Figure 2. The coin lock is preferably placed on the front of the cabinet 1 convenient to the sitter, so that when he is seated in front of the recess 10, he can reach the lock and after dropping his coin into the lock can compose himself ready for the portrait to be taken. The room surrounding the cabinet is preferably indirectly lighted, so that no light falls within the recess and that the plate can be carried into its focal plane in the camera without fogging. When the machine is set in motion, a tray 35, having previously been supplied with a plate from the magazine 70 or 71, passes under the lens 15 and when in proper alignment therewith, one of the upstanding pins 94 trips the switch 93 to cause the flashing of the lamp 92, thus causing the exposure to be made.

When the tray is removed from under the camera body 14, the port 48 of the rib 46 and its spout 49 of the arm carrying the now exposed plate, comes into register with the port 53 which is in communication with the developer tank 62, so that an appropriate quantity of developer, which is maintained at a suitable temperature, is flushed over the plate to develop it. As soon as the primary development is completed, an arm 66 is engaged by the upstanding arm 39 of said tray 35 and is tilted to spill the spent developer into the pan 68 and as the arm 39 slips off the arm 66 the tray returns, under the influence of the spring 38 to level position and the port 48 moves into register with the water port 54, so that washing water will rinse the adherent developer from the plate. This sequence of tray movements will be repeated and the port 48 will progressively move into and out of register with the remaining disk ports 55 to 60, causing bleaching solution to be applied to the plate, discharged therefrom, washing water to be applied and discharged, next clearing solution, then water, then redeveloping or toning solution and a final wash water which completes the processing of the plate. As the tray moves beyond the final washing position, its depending arm 41 engages the stop 90, causing the tray to turn over far enough to drop the plate into the delivery receiver 88, thus completing the cycle and disposing the finished plate or portrait to be picked up by the sitter.

Prior to the delivery of the plate to the receiver, the tray on the opposing arm 33 passes under the magazine 70 and in so doing, slides an unexposed plate therefrom, which drops into the tray ready for the machine to be again operated.

It will be obvious that the movement of the trays is relatively slow to provide time for the various chemical functions to take place, and that a person may pose for his portrait and after the exposure pass leisurely around to the back of the machine to watch the final machine movements and the toning of the portrait through the window 8, before it is deposited in the receiver 88.

What we claim as our invention:

1. In a photographic machine of the class described, a table with an arm adapted to be ro-

tated about a vertical axis for the exposure and development of a sensitized photographic plate, a tray tiltably carried by said arm and adapted to receive a sensitized plate, a stationary disk in face-to-face engagement with the table, said disk having a plurality of liquid ports arranged concentrically of the rotary axis of said table, each port communicating with a source of liquid, said table having a conduit in liquid-delivery relation with the tray moving into registry with successive ports of the disk as the table rotates for the delivery of the respective liquids into said tray.

2. In a photographic machine of the class described, a table with an arm adapted to be rotated about a vertical axis for the exposure and development of a sensitized photographic plate, a tray tiltably mounted on said arm and adapted to receive a sensitized plate, a stationary disk having an annular rim on one side, said table having an annular rim in face-to-face engagement with the disk rim, said disk rim having a plurality of liquid ports arranged concentrically of the rotary axis of the table and in communication with sources of solutions and water, respectively, said table rim having a conduit in liquid delivery relation with the tray moving into registry with the successive disk ports as the table rotates.

3. In a photographic machine of the class described, a table with an arm adapted to be rotated about a vertical axis for the exposure and development of a sensitized photographic plate, a tray tiltably mounted on said arm and adapted to receive a sensitized plate, a stationary disk having an annular rim on one side, said table having an annular rim in face-to-face engagement with the disk rim, said disk rim having a plurality of liquid ports arranged concentrically of the rotary axis of the table and in communication with sources of solution and water, respectively, said table rim having a conduit in liquid-delivery relation with the tray moving into registry with the successive disk ports as the table rotates, the engaging faces of said rims being inclined in the form of a truncated cone.

4. In photographic apparatus having an exposure station, an upright magazine for holding a supply of stacked photographic plates of which the bottom-most plate is edgewise removable, and a plate support movable from said magazine edgewise of the plates therein to and beyond said exposure station and tiltable from a substantially horizontal normal disposition for dropping a plate therefrom, said support having an upward projection on its trailing end for engaging and pushing the bottom-most plate from said magazine onto said support on movement of the latter in its normal disposition away from said magazine.

5. In photographic apparatus having an exposure station, an upright magazine for holding a supply of stacked photographic plates of which the bottom-most plate is edgewise removable, and an open-top tray capable of holding liquid and being movable from said magazine edgewise of the plates therein to and beyond said exposure station and tiltable from a substantially horizontal normal disposition to drop a plate therefrom, said tray having a trailing upward projection at its open top for engaging and pushing the bottom-most plate from said magazine into said tray on movement of the latter in its normal disposition away from said magazine.

6. In photographic apparatus having an exposure station, an upright magazine for holding a supply of stacked photographic plates of which the bottom-most plate is edgewise removable, and a plurality of plate supports movable in unison in one direction in an endless path past said magazine edgewise of the plates therein and past said exposure station and being spaced from each other in the direction of said path, each support being tiltable from a substantially horizontal normal disposition for dropping a plate therefrom, and having an upward projection on its trailing end for engaging and pushing the bottom-most plate from said magazine onto said support on movement of the latter in its normal disposition past said magazine.

7. In photographic apparatus having an exposure station, an upright magazine for holding a supply of stacked photographic plates of which the bottom-most plate is edgewise removable, and a plurality of open-top trays capable of holding liquid and movable in unison in one direction in an endless path past said magazine edgewise of the plates therein and past said exposure station and being spaced from each other in the direction of said path, each tray being tiltable from a substantially horizontal normal disposition for dropping a plate therefrom, and having a trailing upward projection at its open top for engaging and pushing the bottom-most plate from said magazine into said tray on movement of the latter in its normal disposition past said magazine.

8. In photographic apparatus having an exposure station, an upright magazine for holding a supply of stacked photographic plates of which the lower-most plate is edgewise removable, spaced liquid dispensers, an open-top tray normally in a substantially horizontal disposition and movable from said magazine edgewise of the plates therein through said exposure station and successively past said dispensers in liquid-receiving relation therewith, said tray having a trailing upward projection at its open top for engaging and pushing the lowermost plate from said magazine into said tray on movement of the latter in its normal disposition away from said magazine, said tray being also tiltable from its normal disposition for draining liquid therefrom, and means for so tilting said tray after passing each dispenser.

9. In photographic apparatus having an exposure station, an upright magazine for holding a supply of stacked photographic plates of which the lower-most plate is edgewise removable, spaced liquid dispensers, an open-top tray normally in a substantially horizontal disposition and movable from said magazine edgewise of the plates therein through said exposure station and successively past said dispensers in liquid-receiving relation therewith, said tray having a trailing upward projection at its open top for engaging and pushing the lowermost plate from said magazine into said tray on movement of the latter in its normal disposition away from said magazine, said tray being also tiltable from its normal disposition into first and second positions for draining liquid therefrom and for dropping a plate therefrom, respectively, means for tilting said tray into said first position when moving between consecutive dispensers, respectively, and means for tilting said tray into said second position after passing the last dispenser.

10. In photographic apparatus having an exposure station, an upright magazine holding a supply of stacked photographic plates of which

the bottom-most plate is edgewise removable, and an open-top tray movable from said magazine edgewise of the plates therein to and beyond said exposure station and tiltable from a substantially horizontal normal disposition, said tray having a trailing lug projecting upwardly from the open top thereof so that the bottom-most plate in said magazine is edgewise in the path of said lug, and is pushed by the latter from said magazine into said tray when the latter is moved in its normal disposition away from said magazine.

11. In photographic apparatus having an exposure station, an upright magazine for holding a supply of stacked photographic plates of which the lower-most plate is edgewise removable, and a plate support movable in one direction in an endless path past said magazine edgewise of the plates therein and past said exposure station, and being tiltable from a substantially horizontal normal disposition for dropping a plate therefrom, said support having an upward projection on its trailing end for engaging and pushing the lower-most plate from said magazine onto said support on movement of the latter in its normal disposition away from said magazine.

12. In photographic apparatus having an exposure station, an upright magazine for holding a supply of stacked photographic plates of which the lower-most plate is edgewise removable, and an open-top tray capable of holding liquid and being movable in one direction in an endless path past said magazine edgewise of the plates therein and past said exposure station, and being tiltable from a substantially horizontal normal disposition for dropping a plate therefrom, said tray having a trailing upward projection at its open top for engaging and pushing the lower-most plate from said magazine into said tray on movement of the latter in its normal disposition away from said magazine.

13. In photographic apparatus having an exposure station, an upright magazine for holding a supply of stacked photographic plates of which the lower-most plate is edgewise removable, spaced liquid dispensers, an open-top tray normally in substantially horizontal disposition and movable in one direction in an endless path past said magazine edgewise of the plates therein through said exposure station and then successively past said dispensers for bringing an exposed plate in said tray into liquid-receiving relation with said dispensers, said tray having a trailing upward projection at its open top for engaging and pushing the lower-most plate from said magazine and into said tray on movement of the latter in its normal disposition past said magazine, said tray being also tiltable from its normal disposition for draining liquid therefrom, and means for so tilting said tray after passing each dispenser.

14. In photographic apparatus having an exposure station, an upright magazine for holding a supply of stacked photographic plates of which the lower-most plate is edgewise removable, spaced liquid dispensers, an open-top tray normally in a substantially horizontal disposition and movable in one direction in an endless path past said magazine edgewise of the plates therein, thence through said exposure station and then successively past said dispensers for bringing an exposed plate in said tray into liquid-receiving relation with said dispensers, said tray having a trailing upward projection at its open top for



engaging and pushing the lower-most plate from said magazine and into said tray on movement of the latter in its normal disposition past said magazine, said tray being also tiltable from its normal disposition into first and second positions for draining liquid therefrom and for dropping a plate therefrom, respectively, means for tilting said tray into said first position when moving between consecutive dispensers, respectively, and means for tilting said tray into said second position after passing the last dispenser.

15. In photographic apparatus having an exposure station, an upright magazine for holding a supply of stacked photographic plates of which the lower-most plate is edgewise removable, spaced liquid dispensers, a plurality of open-top trays normally in a substantially horizontal disposition and movable in unison in one direction in an endless path past said magazine edgewise of the plate therein, thence through said exposure station and then successively past said dispensers for bringing exposed plates in said trays into liquid-receiving relation with said dispensers, said trays being spaced from each other in the direction of said path and each tray having a trailing upward projection at its open top for engaging and pushing the lower-most plate from said magazine and into said tray on movement of the latter in its normal disposition past said magazine, each tray being also tiltable from its normal disposition for draining liquid therefrom, and means for so tilting each tray after passing each dispenser.

16. In photographic apparatus having an exposure station, an upright magazine for holding a supply of stacked photographic plates of which the lower-most plate is edgewise removable, spaced liquid dispensers, a plurality of open-top trays normally in substantially horizontal disposition and movable in unison in one direction in an endless path past said magazine edgewise of the plates therein, thence through said exposure station and then successively past said dispensers for bringing exposed plates in said trays into liquid-receiving relation with said dispensers, said trays being spaced from each other in the direction of said path and each tray having a trailing upward projection at its open top for engaging and pushing the lowermost plate from said magazine and into said tray on movement of the latter in its normal disposition past said magazine, each tray being also tiltable from its normal disposition into first and second positions for draining liquid therefrom and for ejecting a plate therefrom, respectively, means for tilting each tray into said first position when moving between consecutive dispensers, respectively, and means for tilting each tray into said second position after passing the last dispenser.

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