

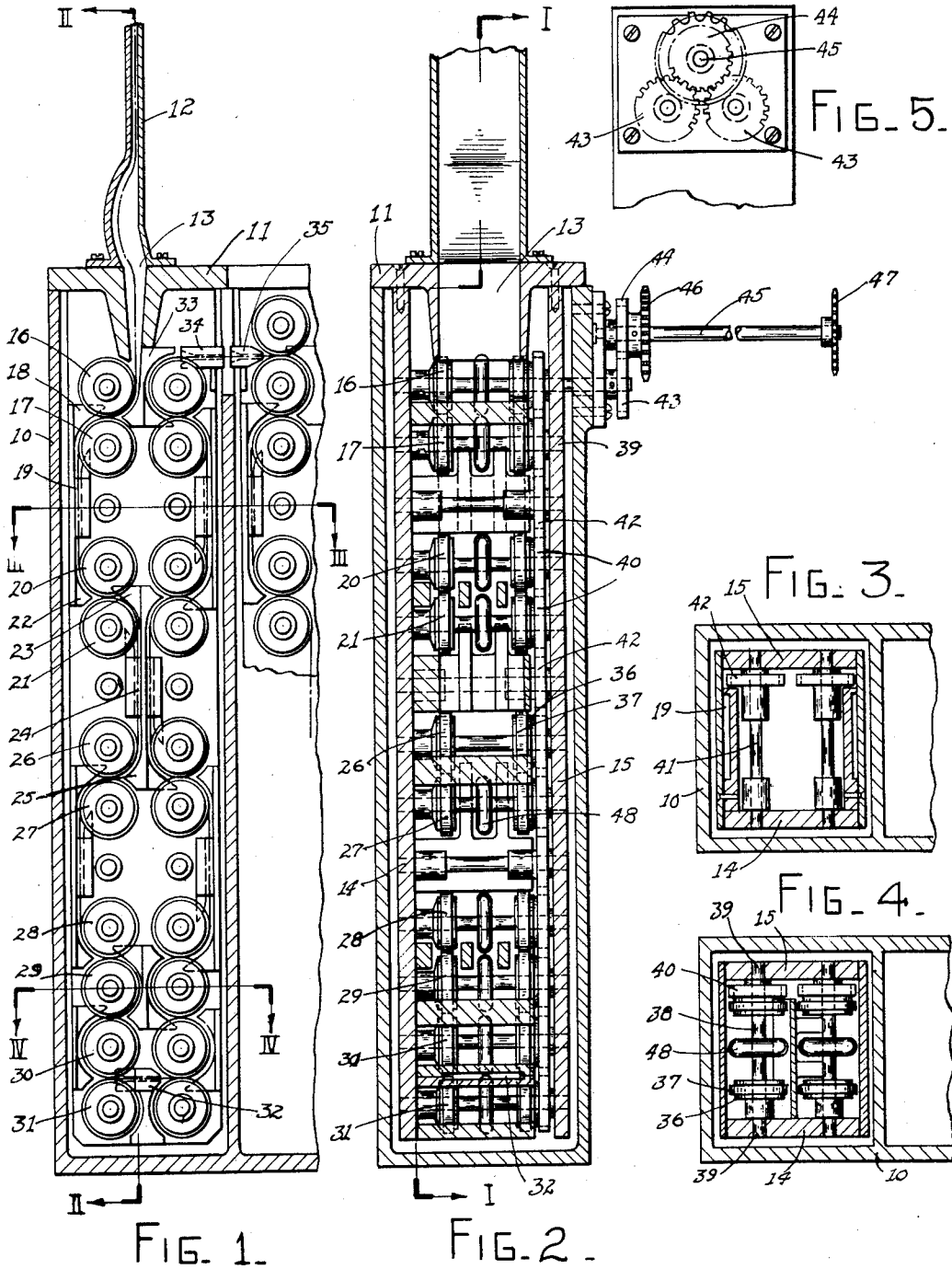
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1,940,202

AUTOMATIC DEVELOPING TANK

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AUTOMATIC DEVELOPING TANK

Casimir Bodan, Brooklyn, and Stanley J. Pask,
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5 Claims. (Cl. 95—94)

This application is a division of application Serial No. 211,031, filed August 6, 1927 and entitled "Automatic photographing apparatus".

The invention relates to automatic photographic apparatus and more particularly to automatic developing and finishing apparatus for a strip of sensitized material after exposure thereof.

The invention is adapted especially for use in connection with the automatic photographing machine disclosed in the above mentioned application but, of course, is capable of use with any form of photographing device and for the general developing and finishing of sensitized paper or film in strip form.

The automatic camera disclosed in said parent application consists briefly of a light-proof cabinet or casing in which is housed apparatus adapted to be set into operation by insertion of a coin to energize a light source for illuminating the object being photographed and to feed automatically a strip of sensitized material from a magazine intermittently into position to have an image of the object being photographed projected thereon by an optical system and the periodic and automatic operation of the shutter mechanism while the sensitized strip is at rest in its intermittent motion. After a predetermined number of successive exposures have been made, a cutter operates automatically to sever the exposed strip from the unexposed portion and to permit the strip to be fed to the developing and finishing tank which forms the subject matter of the present application.

One of the objects of the present invention is the provision of a developing and finishing tank in which the exposed strip will be fed automatically through the successive baths and delivered in a completely finished condition.

A further object is to provide a simple and reliable developing and finishing apparatus by which a continuous or a series of discontinuous strips of sensitized and exposed material will be continuously fed and guided in a positive manner through the various treating solutions in a circuitous path without employing endless conveyors within the baths and in which the feeding mechanism has only limited contact with the sensitized strip.

Other objects and advantages will appear as the description proceeds.

In accordance with the present invention we provide a series of tanks or receptacles for the various treating liquids through which the sensitized strip is fed, after being delivered from

the photographing apparatus. The various tanks are provided with feed rollers which engage the marginal portions only of the strip and carry the same therethrough. The strip is directed in a tortuous path through the respective tanks by stationary guides. A number of guide rollers are provided intermediate the edges of the strip in loose contact therewith, in order to prevent buckling of the strip during its passage through the tanks.

The feed rollers are geared so as to operate in unison at a uniform speed and may be driven by any suitable external source, as by an electric motor. We prefer, however, to operate the feed rollers continuously by directly connecting them to the same motor by which the photographing apparatus is operated.

Reference is had to the accompanying drawing to render an understanding of the invention more complete. In the drawing,

Fig. 1 is a sectional view of one of the developing and finishing tanks taken on the line I—I of Figure 2;

Fig. 2 is a sectional view of the tank taken on the line II—II of Figure 1;

Fig. 3 is a sectional view on the line III—III of Figure 1;

Fig. 4 is a sectional view on the line IV—IV of Figure 1; and,

Fig. 5 is an end view of the external driving means for the feed rollers of the developing and finishing tank.

In the drawing we have shown but a single complete tank but we desire it to be understood that a number of tanks are required for the complete developing and finishing of the sensitized material.

Each of the succeeding tanks may be constructed in substantially the same manner as that illustrated, however, and need not be shown for a complete understanding of the invention. A complete assembly of tanks may comprise the following: one or more developing tanks, washing tank, fixing tank, second washing tank, hardening tank, third washing tank and drying tank. It is to be understood, of course, that any number of developing, washing, fixing or hardening tanks may be employed depending upon the type of sensitized material used and whether a negative or positive picture is desired. The final tank preferably contains a liquid dryer, such as alcohol, ether or a mixture thereof in suitable proportions.

All of the developing and finishing tanks may be contained within a single casing and be

formed by partition walls or, if desired, each tank may be entirely independent. A separate cover is provided for each tank and the complete guiding and feeding mechanism for advancing the sensitized strip through the tank is supported from the cover, so as to be readily removed from the tank for cleaning or repair.

Referring to the drawing, the developing tank comprises a casing 10 of hard rubber or other material resistant to the action of the chemicals employed and a cover 11 to which a guideway 12 is secured. The guideway 12 is adapted to join with the outlet of the photographing apparatus and to conduct the sensitized and exposed strip in a light-proof manner into the developing apparatus. The cover 11 has a slot 13 for the entrance of the strip to be developed.

A pair of plates 14 and 15 of bakelite or hard rubber or other acid resisting material are secured to the cover 11 and extend substantially the full length of the tank. The plates provide bearings for a series of parallel shafts which carry the feed rolls, driving gears therefor, and means for preventing buckling of the strip in transit through the tank.

The strip to be developed upon its passage between the feed rolls 16 and 17 engages a curved guide-plate 18 which directs the strip downwardly through the guide slot 19 at the lower end of which the strip is directed between feed rolls 20 and 21 by a curved guide-plate 22. Guide-plate 23 again directs the strip downwardly through the channel 24 and guide-plate 25 then directs the strip to the feed rolls 26 and 27. In a similar manner, the strip is successively fed and guided between rolls 28, 29, 30 and 31. The strip, after passing through the rolls 30 and 31, is directed by guideway 32 to a second series to pass upwardly to the top of the tank where it is directed by the curved guide plate 33 and guideways 34 and 35 into the succeeding tank which may contain a washing solution. The strip is thus fed from tank to tank and is finally delivered in a completely finished condition from the final tank. The final tank preferably contains a liquid dryer, such as alcohol, ether or a mixture thereof in suitable proportions.

Each of the feed rolls comprises a hard rubber disk 36 having a narrow soft rubber ring 37 set in the periphery thereof. The feed rolls are mounted on shafts 38 of glass or other rigid non-corrodible material and bear in apertures 39 in the side plates 14 and 15. The feed rolls are driven through hard rubber gears 40 mounted upon each of the shafts 38. In each instance in which a set of feed rolls are spaced from the succeeding set of rolls, an idler shaft 41 is interposed having a gear 42 for continuing the drive to the succeeding shafts. The upper set of feed rolls in each tank have their shafts extended outwardly from the tank and are provided on their outwardly projecting end with a gear 43 which meshes with a gear 44 carried by a stub shaft 45. Shaft 45 is provided with two spaced sprocket wheels 46 and 47.

The sprocket wheel 47 of the developing tank is driven by a chain (not shown) from a sprocket wheel mounted on the photographing apparatus and driven by the electric motor employed for operating the photographing apparatus. If desired, a separate motor may be employed, geared in any suitable manner to the shaft 45.

The sprocket wheel 46 may also be provided

with a sprocket chain (not shown) which drives the corresponding shaft of the succeeding tank, which shaft in turn drives the corresponding shaft of the next tank so that the feeding rollers of all of the tanks are operated in unison.

It will be noted from Fig. 2 that the feed rolls engage the marginal portions only of the sensitized strip and do not interfere with the proper developing and finishing of the photograph. In order to prevent buckling of the strip on its passage through the tanks, the shafts 38 have intermediate their ends, hard rubber rolls 48, the adjacent pairs of which are spaced a slight distance apart so as not to tightly engage the strip but yet sufficiently close together to prevent substantial buckling of the strip.

In order to maintain the developing and finishing solutions at a constant temperature, the tanks may be immersed in a cooling or warming solution maintained at a uniform temperature.

While we have described and illustrated but a single embodiment of the invention, it is to be understood that many changes and modifications may be made therein, without departing from the essential attributes of the invention and we do not desire to be limited to the exact details of construction shown and described, except in accordance with the appended claims.

What is claimed is:

1. Developing apparatus comprising a tank adapted to contain a treating solution, a number of sets of feed rollers therein for advancing a strip of material therethrough and curved guide plates disposed intermediate certain of said sets of feed rollers for diverting the path of travel of the strip and directing it in a tortuous path to the succeeding set of feed rollers, said guide plates having surfaces substantially concentric with said feed rollers.

2. Developing and finishing apparatus comprising a series of tanks, means for feeding a strip of material through said tanks in a circuitous path, said means comprising feed rollers for advancing the strip through the tanks, curved guide plates having surfaces concentric with said feed rollers for altering the direction of travel of the strip through certain portions of the tanks and guide channels for restricting the travel to a rectilinear path in other portions of the tanks.

3. Developing apparatus comprising a tank adapted to contain a treating solution, a number of pairs of contacting feed rollers therein intermediate the top and bottom of said tank for advancing a strip of material therethrough and curved guide plates disposed intermediate certain of said pairs of feed rollers and substantially coextensive therewith for diverting the path of travel of the strip and directing it in a tortuous path to the succeeding pair of feed rollers, said feed rollers engaging the marginal portions only of said strip.

4. Developing apparatus comprising a tank adapted to contain a treating solution, a number of sets of feed rollers therein for advancing a strip of material therethrough, curved guide plates disposed intermediate certain of said sets of feed rollers for diverting the path of travel of the strip and directing it in a tortuous path to the succeeding set of feed rollers, said feed rollers engaging the marginal portions only of said strip and means intermediate said feed rollers in loose engagement with the strip to

prevent the same from buckling while being fed through the tank.

5 5. Developing apparatus comprising a tank adapted to contain a treating solution, a cover for said tank, a number of pairs of contacting feed rollers in said tank for advancing a strip of material therethrough, curved guide plates disposed intermediate certain of said pairs of

feed rollers for diverting the path of travel of the strip and directing it in a tortuous path to the succeeding pair of feed rollers, and a pair of spaced plates mounted on said cover and supporting said feed rollers and guide plates.

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