

Dec. 18, 1962

F. C. BARSTOW
PHOTOGRAPHIC DEVICE FOR TREATING PHOTOGRAPHIC
SHEET MATERIALS WITH A LIQUID

3,068,774

Filed Nov. 27, 1959

2 Sheets-Sheet 1

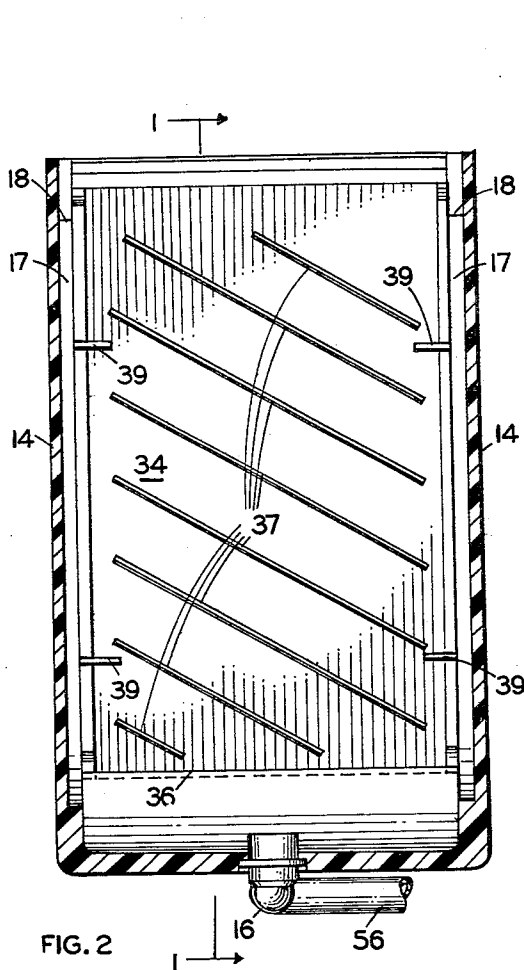


FIG. 2

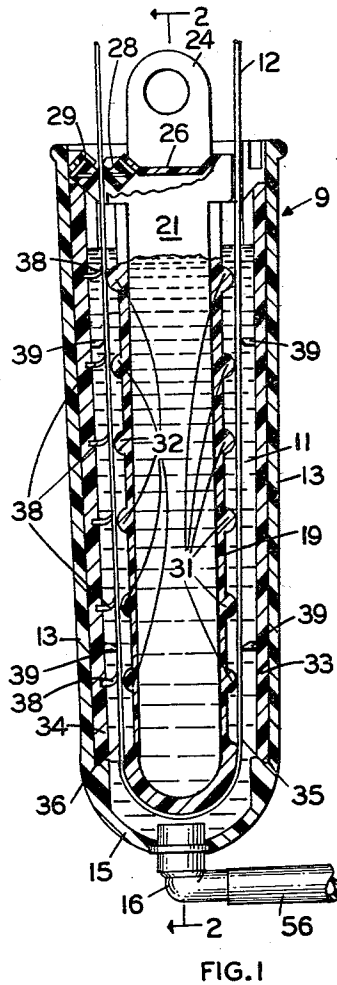


FIG. 1

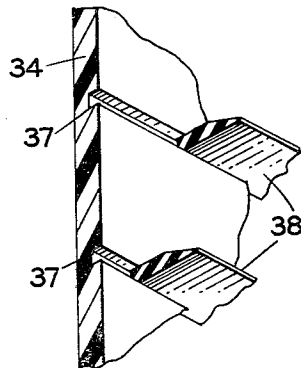


FIG. 5

Frederick C. Barstow
INVENTOR.

BY
Brown and Mitulla
and
Robert O. Peck
ATTORNEYS

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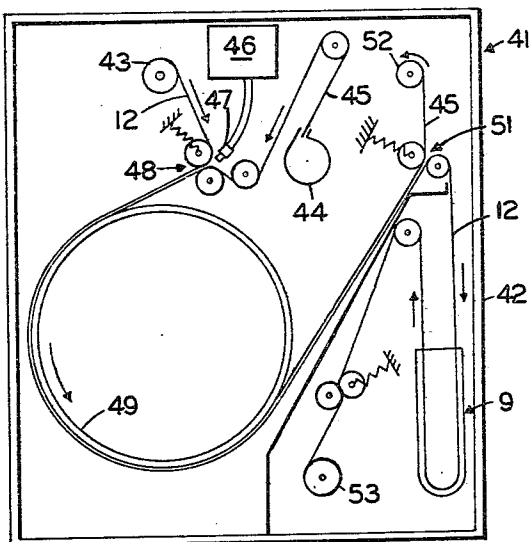


FIG. 6

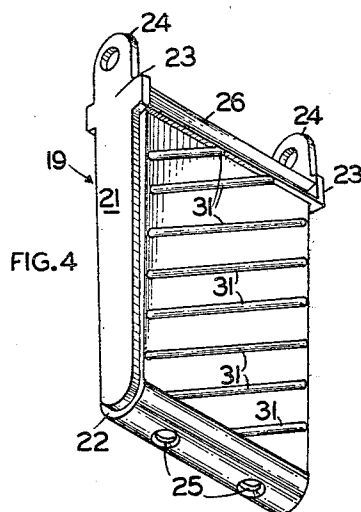


FIG. 4

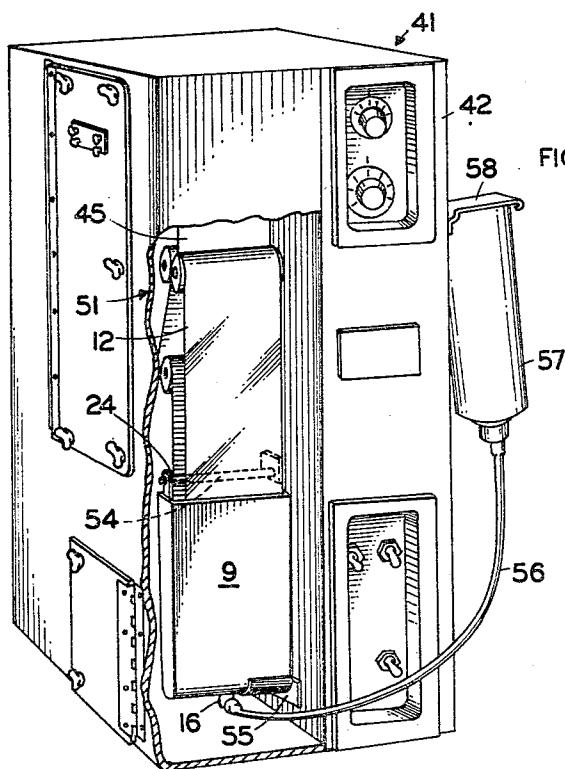


FIG. 7

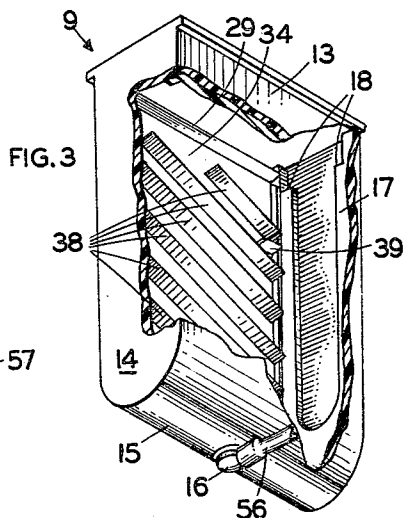


FIG. 3

Fredrick C. Barstow
INVENTOR.

BY
Brown and McCalla
and
Robert J. Beck
ATTORNEYS

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3,068,774

PHOTOGRAPHIC DEVICE FOR TREATING PHOTOGRAPHIC SHEET MATERIALS WITH A LIQUID

Frederick C. Barstow, Sudbury, Mass., assignor to Polaroid Corporation, Cambridge, Mass., a corporation of Delaware

Filed Nov. 27, 1959, Ser. No. 855,872
4 Claims. (Cl. 95—89)

This invention relates to improvements in photographic devices used for treating photographic sheet materials with a liquid.

In U.S. Patent No. 2,873,660 to Land et al., there is shown pocket-size photographic device intended primarily to treat—one at a time—individual photographic prints which have been produced by silver transfer-reversal processes. Such treatment, as is described in the aforesaid Land et al. patent, is intended to wash the print, as well as protect and harden the print's plastic film surface. During treatment, the device may be inverted or shaken to facilitate the action of the treating liquid, thus insuring adequate and uniform treatment of the entire surface to be treated.

There are applications for the aforesaid liquid-treating device wherein it is preferable to retain it fixed in place during treatment, as, for example, when treating an elongated photographic sheet in a continuous processing device. However, in such an application, the fixed position of the liquid-treating device impedes its effectiveness to some extent in that there is no agitation or motion of its fluid contents during treating.

Accordingly, it is an object of this invention to provide an improved photographic device of the type shown in the aforesaid Land et al. patent wherein satisfactory and effective treatment of photographic sheet materials is attained without the need for agitating or otherwise moving the device during treatment.

It is another object of this invention to provide an improved photographic device which is readily suited for treating elongated photographic sheet materials with a liquid processing agent.

It is still another object of this invention to provide such an improved photographic device that can be efficiently and effectively employed as a part of a continuous processor of photographic sheet material.

Briefly, in one aspect thereof, the invention comprises a liquid-holding container having suitable means to allow ingress and egress of a photographic sheet material to and from the container. Guide means are provided within the container to cause the photographic sheet material to traverse a predetermined path through the treating liquid, and scrubbing members are mounted within the container for contacting a surface portion of the sheet material as it passes through the treating liquid.

The invention accordingly comprises the apparatus possessing the construction, combination of elements and arrangement of parts which are exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

The objects of the invention, together with its benefits and advantages, will be more fully understood upon reference to the following detailed description when taken in conjunction with the drawings annexed hereto, in which:

FIGURE 1 is a diagrammatic end view, partly in section, of a photographic device embodying the present invention, showing a photographic sheet in its passage through the liquid-holding container;

FIG. 2 is a diagrammatic plan view of the liquid-holding container shown in FIGURE 1, partly sectioned along line 2—2 in FIGURE 1, with the photographic sheet material and associated guide means removed;

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FIG. 3 is another view of the container shown in FIG. 2, in perspective and partly cut-away;

FIG. 4 is a view similar to FIG. 3, showing the guide means which normally extends within the liquid-holding container during treatment of photographic sheet material;

FIG. 5 is a fragmentary perspective view, partly in section, showing a portion of the scrubbing members which form a part of the present invention;

FIG. 6 is a schematic view of a continuous photographic processing device which includes the present invention, as a part thereof; and

FIG. 7 is a diagrammatic view of the continuous processing device shown schematically in FIG. 6, illustrating one method of supplying processing liquid to the liquid-holding container.

Referring now to the drawings, there is shown a liquid-holding container 9 in which there is a quantity of liquid 11 for treating photographic sheet material 12 as it passes through container 9.

Sheet material 12 comprises an elongated photographic print which, in the illustrated embodiment of the invention, may be in the form of a positive transparency produced by a silver transfer-reversal process; and, as pointed out in the aforesaid Land et al. Patent, No. 2,873,660, the sheet 12 is advantageously treated by the method disclosed in copending application Serial No. 555,433, filed December 27, 1955, in the names of Edwin H. Land et al. The print as formed prior to treatment in container 9 comprises a support sheet for a plurality of silver images over which there is a water-soluble protective film of a plastic material formed during processing of the print. In accordance with the method of the aforesaid copending application Serial No. 555,433, the print is washed by the liquid 11 to remove any residual photographic reagents which may adversely affect the stability of the image or cause discoloration of the image highlights upon reaction with oxygen in the atmosphere. At the same time, it is desirable to maintain the plastic film on the print for protecting the image and accordingly, the treating liquid 11 may comprise, in addition to water, a water-miscible organic liquid (nonsolvent for the plastic) for preventing dissolution of the plastic film, together with an agent adapted to harden the plastic film and make it more water insoluble, as by cross linking.

In the form illustrated, container 9 is a relatively thin, deep, trough-like unit which may be molded, or otherwise constructed, from a suitable plastic material. Since the treating liquid 11 possesses corrosive properties the material selected for the container should be one that is not readily attacked by the liquid and may comprise polyethylene or some other material possessing similar properties.

The container has substantially flat side and end walls 13, 14, respectively, with the side walls tapering slightly inwardly from the top of the container to near the bottom thereof after which the side walls converge to form a substantially semicircular bottom portion 15. Midway of the bottom portion 15 an aperture is provided in the tank into which may be inserted a hollow L-shaped conduit 16 with the conduit being liquid-sealed to the container in any convenient manner. Conduit 16 is used for filling the container with the treating liquid in a manner to be described in greater detail hereafter.

As is best shown in FIG. 3, each of the end walls 14 has formed integral with its inner surface an elongated hairpin-like shoulder 17, each end of which is cut away at 18 to form a seat which cooperates with the shoulders 17 to hold a guide member 19 properly in place within the container. As is seen in FIG. 4, the guide member 19 has approximately the same configuration as container

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9 and is adapted to be nested therein, guide member ends 21 being cut away along their edges as at 22, such that the end portions remaining slide between the shoulders 17 when the guide member is inserted into the container. The upper portions 23 of guide ends 21 are not cut away so that the lower edges of these portions seat within the cutouts 18 and thus provide a positive stop against which the guide member can be pressed when it is inserted into container 9. Extending upwardly from the guide ends are a pair of apertured ears 24 which may be used to mount the container in a manner to be described in greater detail hereinafter. The cooperating parts of the guide member 19 and container 9 are dimensioned such that an approximately press fit is achieved when the guide member is inserted into the container. The resulting structure is substantially rigid and will thus stick together under normal use.

Guide member 19 is hollow and is provided with a pair of apertures 25 spaced along its bottom surface such that the liquid 11 may rise within the guide member when the liquid is added to container 9. This construction allows container 9 to hold a greater volume of solution, which will permit treating more sheet material before becoming chemically exhausted. Extending between the ears 24, there is a substantially flat trough-like member 26 which is secured to the inner faces of the ears and is spaced above the upper edges of the guide member side walls 27. Extending along one edge of trough 26 is a flexible squeegee element 28. Trough 26 serves as a cover for container 9 with its edge opposite the squeegee 28 being spaced from the upper edge of container side wall 13 to provide an opening in the container for ingress of the photographic sheet material 12. On the other side of container 9 in juxtaposition to squeegee 28 there is a second squeegee element 29, between which sheet 12 passes as it leaves container 9, with the squeegees 28, 29 thus forming a means of egress for the sheet 12 from container 9.

The side walls of guide member 19 are provided with a plurality of spaced angularly disposed ribs 31 which are best seen in FIG. 4 and which as seen in FIG. 1 have a substantially semicircular cross section. These ribs may be molded as an integral part of the guide member and are shown extending upwardly from left to right in FIG. 4, it being understood that similar ribs 32 on the opposite side extend upwardly from right to left.

As seen in FIG. 1, the bottom of guide member 19 (like the bottom of container 9) is substantially semicircular in shape and provides a smooth surface around which the sheet 12 passes as it traverses through container 9.

Affixed to the inner face of side walls 13 and extending substantially coextensive therewith are a pair of panels 33, 34, which have their vertical edges substantially abutting the inner surfaces of shoulders 17 and which have their lower transverse edges adapted to be received in grooves 35, 36, molded as an integral part of the interior portions of side walls 13. Each of these panels may be provided with slots 37 arranged in juxtaposition with the ribs 31, 32, into which slots may be fixedly mounted a plurality of flexible scrubbing elements 38.

The scrubbing elements 38 may be formed of rubber and the panels 33, 34 may be formed of a suitable plastic material, with the rubber held within the slots 37 by a suitable adhesive material. The panels in turn may be held in place against the inner sides of container 9 by a suitable adhesive material; in fact the panels could be integral with the container 9 except for the difficulties involved in securing the scrubbing elements 38 properly within slots 37. The two-part construction facilitates and simplifies the manufacture of the container.

Only one of the panel members has been shown with scrubbers affixed thereto although both panels could be provided with scrubbing elements if desired.

Each panel is provided with two pairs of spaced aux-

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iliary scrubbing members 39 arranged as shown in FIG. 2 which, like scrubbing members 38, are secured to the panels by insertion within appropriate grooves provided in the panels.

As with the container 9, the panels 33 and 34, the scrubbing elements 38, 39 and the guide member 19 are all formed of a suitable material which is not readily attacked by the liquid 11.

Considering now the use of the device so far described, and referring particularly to FIG. 4, the photographic sheet material 12 passes through the opening formed at the top of container 9 and down into treating liquid 11, the auxiliary scrubbing elements 39 bearing against the marginal edges of sheet 12 to both scrub the edges and press the sheet against the ribs 31. The sheet is guided around the semicircular bottom of guide member 19 and thence passes upwardly through liquid 11 and out of the container through the squeegees 28, 29.

As the sheet passes upwardly through the liquid, the surface to be treated is scrubbed by the flexible scrubbers 38, which action materially enhances the action of the liquid on the surface to be treated. The ribs 32 provide a backing surface on the other side of the sheet and, being in juxtaposition to the scrubbing elements 38, cooperate therewith to facilitate the scrubbing action.

Again, auxiliary scrubbers 39 mounted on panel 34 further scrub the marginal edges of sheet 12. Any excess liquid on the sheet is removed by the squeegees 28, 29 as the treated sheet leaves container 9.

If desired, the surface of the bottom parts of guide member 19 may be specially treated to minimize the friction between it and the photographic sheet and thus facilitate passage of the sheet thereover. A smooth coating could be applied to the surface of the bottom portion; alternatively, tape having a smooth surface could be affixed to the surface.

No agitation or motion of container 9 is required with the aforesaid arrangement, since the scrubbers, being thin and flexible, will vibrate and flex as the sheet passes through the liquid and such motion of the scrubbers will cause sufficient agitation of the liquid for effective treating.

FIGS. 6 and 7 illustrate a continuous photographic processor 41 in which the subject invention may be advantageously used and is of the type in which photographic prints are produced by the well-known silver transfer-reversal process. Processor 41 has an outer housing 42 for enclosing its various working parts, most of which are not shown herein for the sake of clarity and brevity. For example, the drive motor and associated transmission, heating and ventilating units, control switches and relays, etc. which normally form a part of such processors are not shown, since such components are well known and form no part of the present invention. However, the processor 41 will be briefly described in terms of its operation, just to illustrate how the present invention cooperates therewith.

Thus, the photographic sheet material 12 is initially in the form of a rotatably mounted positive supply roll 43 from which the sheet 12 is unrolled during processing. A photoexposed negative roll 44 is mounted within processor 41 and may comprise a conventional roll film cassette from which the photoexposed negative sheet 45 may be unrolled during processing. A supply of processing fluid 46 is provided together with a nozzle 47 for feeding the processing fluid between the sheets 12 and 45 as they are superposed between spread rollers 48, all in the well-known manner.

The superposed sheets then pass around a rotatably mounted drum 49 during which time the silver transfer-reversal process is substantially completed so that when the sheets 12 and 45 are separated at the separating rollers 51, the sheet 12 has a plurality of silver images therein and is then ready for treatment by the liquid 11 in the manner described above.

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After separation of sheets 12 and 45, the negative sheet 45 is wound upon a rotatably mounted negative take-up roll 52. The positive sheet 12 is guided through the container 9 after which it is wound up on a rotatably mounted positive take-up roll 53.

As is best seen in FIG. 7, the processor 41 is provided with a fixed post 54 over which the ears 24 may be slipped to hold the container 9 properly in place within the processor. An auxiliary support in the form of a semicircular bracket 55 is also provided to resiliently engage the bottom of container 9, so that the container may be easily snapped in position when it is desired to mount it within the processor. An access door (not shown) is provided in the side wall of processor 41 through which a flexible feed tube 56 may extend for connection to the conduit 16 extending from the bottom of container 9.

The other end of tube 56 is connected to a bottle 57 which contains a supply of treating liquid 11. Bottle 57 may be flanged at the base so that it can be inverted and slipped into the flanged bracket 58 mounted on the side wall of processor 41. So mounted, liquid 11 will flow by gravity into container 9. When it is desired to drain container 9 of its liquid contents, the bottle 57 is removed from bracket 58 and dropped down below the container 9 from which the liquid 11 will flow by gravity back into the bottle 57. In this manner, container 9 is easily filled and drained and the liquid 11 is confined within the bottle 57 when not in use. A suitable cap may be provided for bottle 57 when it is not in place on bracket 58 and flexible tube 56 has been disconnected.

Since certain changes may be made in the above apparatus without departing from the scope of the invention herein involved, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A photographic device for treating a strip of photographic sheet material with a liquid, comprising, in combination: a container for holding said liquid; means providing ingress and egress of the strip to and from said container; a rigid guide member nested within said con-

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tainer and having portions spaced therefrom to form a path therebetween through which said strip passes for treatment by said liquid of a surface portion thereof; and scrubbing means for contacting said treated surface portion comprising a plurality of spaced flexible rubber wipers mounted along an inner wall of said container, said guide member including a plurality of rib portions mounted in juxtaposition to said wipers to form a rigid backing for said strip when contacted by said wipers.

2. A photographic device for treating a strip of photographic sheet material with a liquid, comprising, in combination, a container for holding said liquid; means providing ingress and egress of the strip to and from said container; a rigid guide member nested within said container and having portions spaced therefrom to form a path therebetween through which said strip passes for treatment by said liquid of a surface portion thereof; said container having a relatively thin, deep, troughlike form and said guide member having a substantially similar form whereby said path therebetween is in the form of a substantially elongated U-shaped loop to permit the strip when passing through the container to start at the top of the container, go down and then up through the liquid and out of the top of the container; and scrubbing means for contacting said treated surface portion comprising a plurality of spaced flexible scrubbing elements mounted within said container along at least a portion of said path.

3. The invention defined by claim 2 wherein squeegee means are mounted within said container through which the strip passes after contact with said scrubbing elements.

4. The invention defined by claim 3 in which the container is provided with means at the bottom thereof to permit filling and draining the container of said liquid.

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