

[54] **PHOTOGRAPHING APPARATUS AND
PROCESS EMPLOYING A FILTER-
APPLICATOR**

[72] Inventor: **Walter G. Lehmann**, Somerville,
Mass.

[73] Assignee: **Polaroid Corporation**, Cambridge,
Mass.

[22] Filed: **Jan. 5, 1971**

[21] Appl. No.: **103,986**

[52] U.S. Cl. **95/13, 95/89 R, 118/266,**
222/213

[51] Int. Cl. **G03b 17/50**

[58] Field of Search 95/13, 89 R; 118/264, 265,
118/266, 267; 222/189, 214, 213, 103;
401/206

[56] **References Cited**

UNITED STATES PATENTS

2,403,717	7/1946	Harvey	95/13
2,987,955	6/1961	Sassenberg	118/264 X
3,097,584	7/1963	Wright	118/266 X

Primary Examiner—Samuel S. Matthews

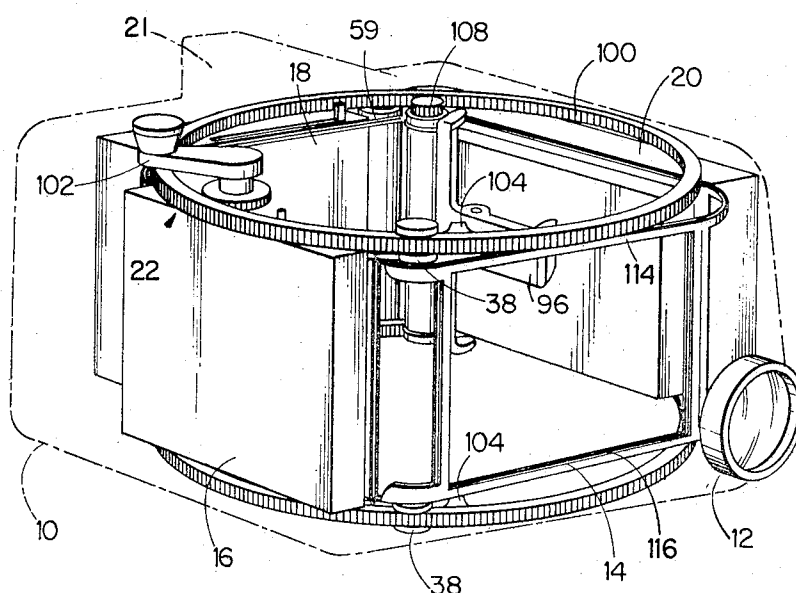
Assistant Examiner—Richard L. Moses

Attorney—Brown & Mikulka, William D. Roberson
and Robert L. Berger

[57] **ABSTRACT**

Photographic apparatus and process employing an applicator body disposed in communication with a container of processing liquid and adapted for conduction of the liquid to a surface of the body which is pressed into contact with the photosensitive area of an exposed sheet of photographic material. The applicator body is of filter material which upon contact with the liquid is pervious to the liquid and impervious to gas within a given range of pressure differential such that upon application of a suitable pressure to the source, gas-free liquid is conducted to the applicator surface and uniformly distributed thereat. Preferably, the container of the source of liquid and the applicator body are provided in a disposable assembly adapted for releasable mounting on a camera, and the container includes a plurality of deformable areas which may be selectively activated for repetitive application of a differential pressure to the applicator body in accordance with processing of successive film sheets. Additionally, a movable member mounted within the camera, for pressing of each film sheet into contact with the applicator body, includes a resilient non-planar surface having a raised surface portion configured for displacement of air from between the photographic material and the applicator as the photographic material is pressed thereagainst.

40 Claims, 10 Drawing Figures



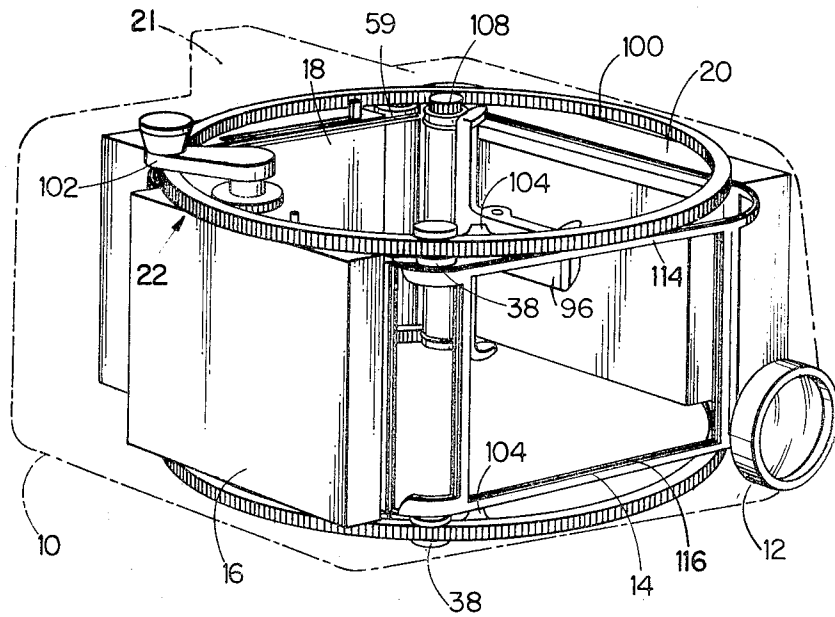


Fig. 1.

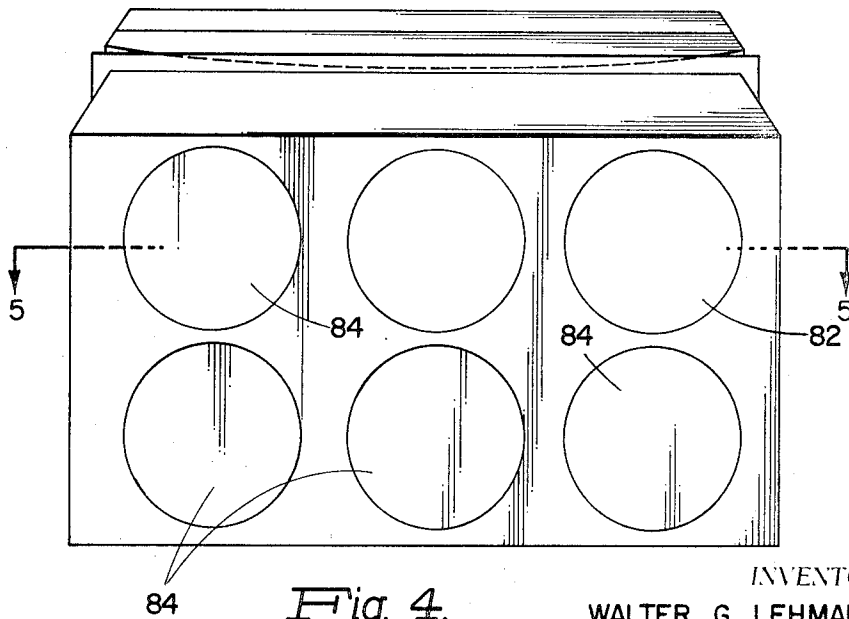


Fig. 4.

INVENTOR
WALTER G. LEHMANN
BY *Brown and Mikulka*
and
David R. Thornton
ATTORNEYS

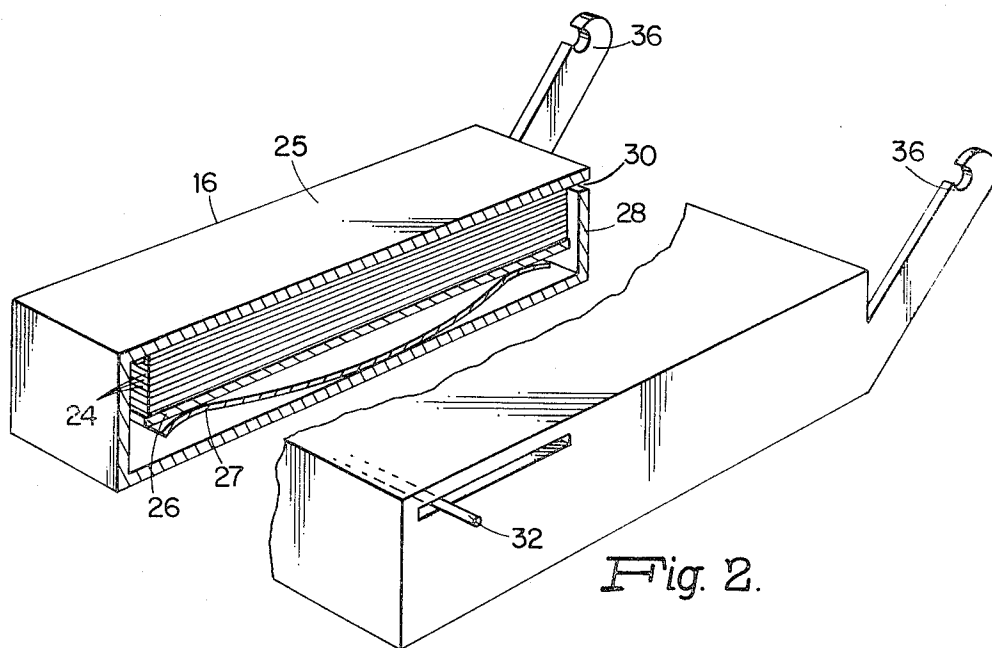


Fig. 2.

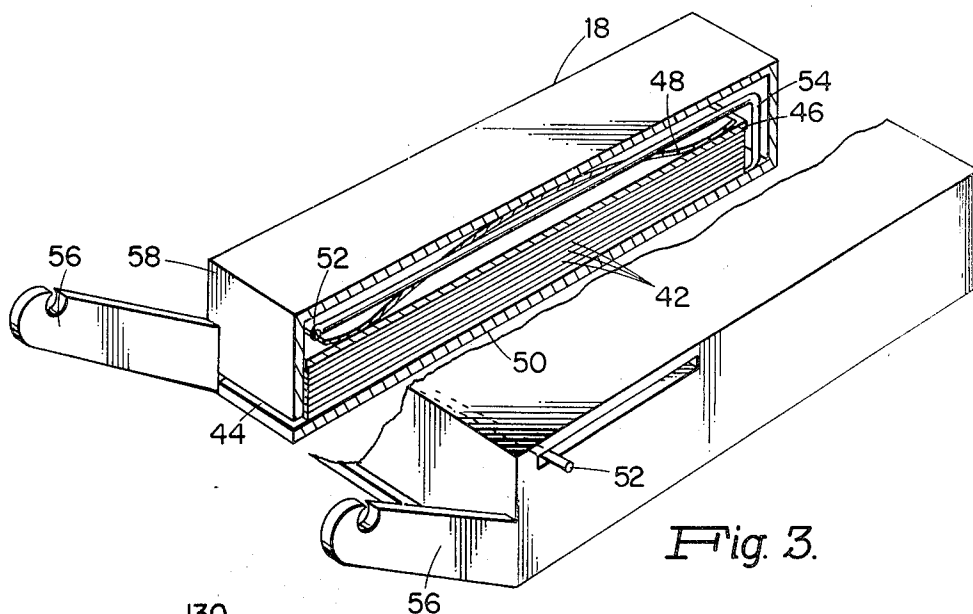


Fig. 3.

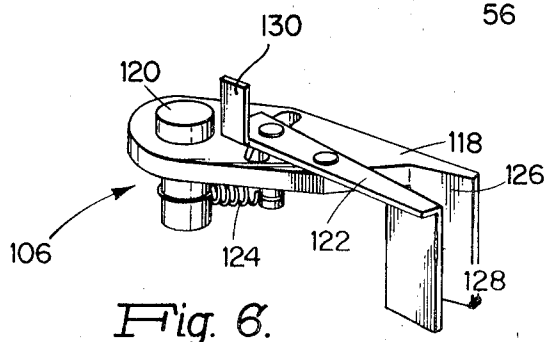
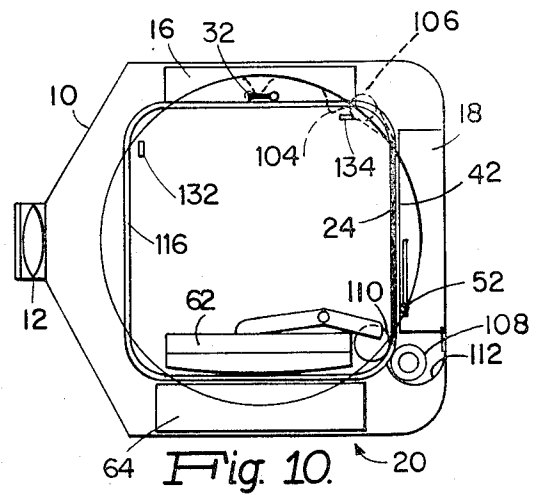
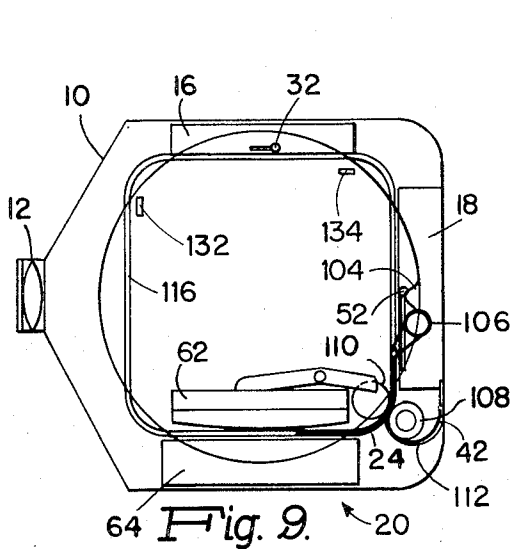
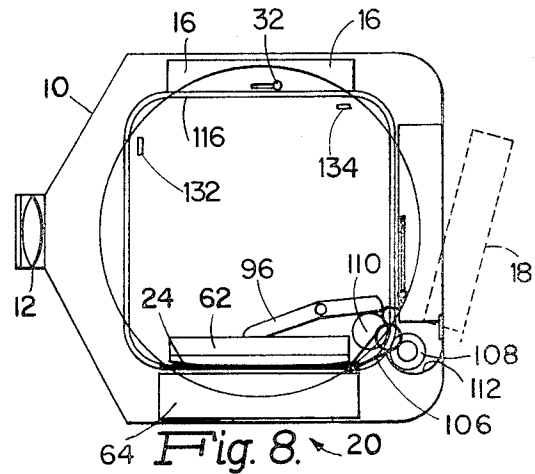
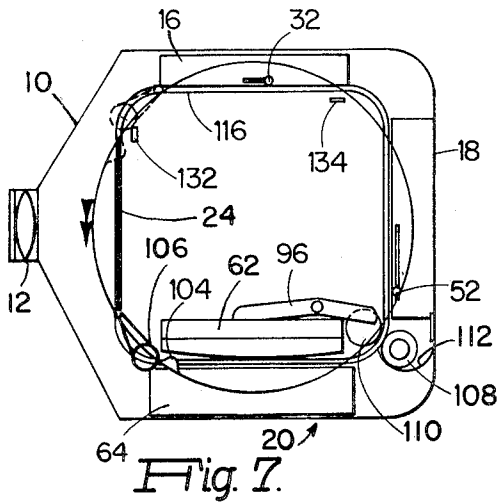
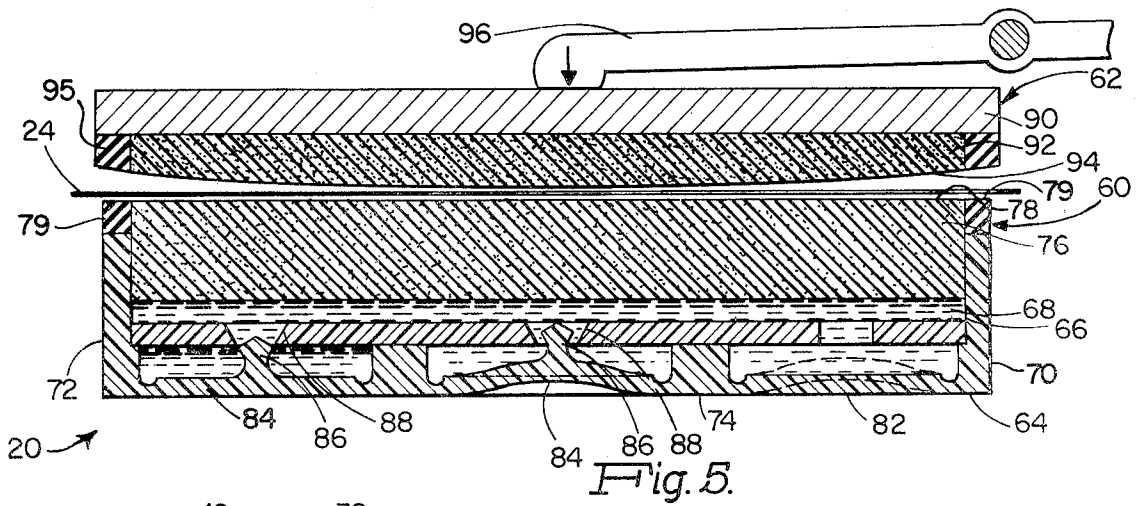


Fig. 6.

INVENTOR
WALTER G. LEHMANN
BY *Brown and Mikulka*
and
David R. Thornton
ATTORNEYS



INVENTOR

WALTER G. LEHMANN

BY *Brown and Mikulka*
and
David R. Thornton
ATTORNEYS

PHOTOGRAPHING APPARATUS AND PROCESS EMPLOYING A FILTER-APPLICATOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to photography and, more particularly, to improved photographic apparatus and process for applying liquid to photographic material.

2. Prior Art

In the photographic arts, following exposure, it is usually necessary to subject photographic material to a suitable processing liquid for a prescribed imbibition period. Generally, it is desirable to cover at least the photosensitive area of the photographic material with processing fluid having a minimum of entrapped gas which can prevent uniform wetting of areas of the sheet material. It is desirable to minimize the amount of processing liquid employed and to remove excess liquid following imbibition of the photographic material, and since the processing liquid is generally corrosive it must be suitably confined so as to protect the apparatus and the operator. However conventional photographic apparatus and processes generally require complicated structures for accomplishing these ends, and often fails to efficiently provide a rapid, uniform dispersion of gas-free processing liquid. Moreover, application of the processing liquid in portable apparatus such as a camera, with which the present invention is particularly concerned, further compounds the difficulties of storing and applying the liquid to successive photographic sheets since this often requires the application of predetermined quantities of the liquid, uniformly and at relatively high rates, and the necessity for so doing in apparatus that may be operated manually and presents the problem of precluding spillage.

Accordingly, it is an important object of this invention to provide improved photographic apparatus for applying processing liquid to photographic material.

Another object of the invention is to provide apparatus for uniformly distributing a predetermined quantity of processing liquid over an exposed sheet of photographic material.

A further object of the invention is to provide an applicator for efficiently distributing a predetermined amount of gas-free processing liquid uniformly over the photosensitized area of sheet-like photographic material.

A still further object of the invention is to provide a camera including apparatus for rapidly applying processing liquid to a photosensitive sheet following its exposure and for rapidly removing excess liquid from such sheet following the imbibition period.

A further object of the invention is to provide a container of a source of liquid adapted for repetitively dispensing predetermined amounts of processing liquid.

An additional object of this invention is to provide an improved process for applying processing liquid to a sheet of exposed photographic film material.

SUMMARY OF THE INVENTION

Broadly, this invention concerns apparatus for applying processing liquid from a source thereof to sheet-like photographic material having a photosensitized surface or predetermined area and comprises an applicator for permitting passage of such liquid and for precluding

passage of gaseous fluid, said applicator including a surface of equal or greater area than said predetermined area for conducting liquid from said source to said surface. A unique arrangement is provided for pressing such photo-sensitized surface against said body surface for effecting application of said liquid to said photographic material.

In its illustrated embodiment, the invention briefly comprises a camera of the self-developing type including a processing station adapted for receiving a source of processing fluid in communication with an applicator body having a surface of equal or greater area than the photosensitized area of the photographic material, and a support plate adapted to press the photographic material into contact with the applicator surface. The applicator comprises porous filter material which, within a given range of pressure differential, is liquid permeable and gas impermeable such that gas-free processing liquid is substantially uniformly distributed over the applicator surface upon application of suitable pressure differential between the source of processing liquid and that surface.

Preferably, the source of liquid is retained within a container having discrete deformable portions, each adapted to increase the source pressure by a prescribed amount in accordance with application of an external force thereto. One of the discrete portions is adapted for reversible deformation for repetitive dispensing of the liquid to a succession of such photographic sheets while the remainder of the deformable portions are adapted for irreversible deformation so as to maintain a substantially constant source pressure intermediate repeated applications of the liquid.

Means are also provided for efficient removal of air from between the photographic material and the applicator surface during contact of the photographic material thereto. This is accomplished in the illustrated embodiment by utilizing a support plate having a resilient, contoured surface tapered toward the marginal portions thereof so as to provide a progressively increasing area of contact between the photographic sheet material and the applicator surface for displacement of entrapped air towards the edges of the photographic material. Additionally, complementary sealing members are provided on the support plate and the applicator for sealing the film margins.

Briefly, in operation the processing liquid is applied to exposed photographic film material in accordance with the invention by first contacting a porous filter body to a source of processing liquid and permitting the processing fluid to permeate the body and be distributed on a given surface thereof, then depositing an exposed sheet of photographic material on the wetted surface with the photosensitized surface in contact therewith, and subsequently, applying a pressure differential between the body surface and the source so as to pass liquid therefrom while precluding passage of gaseous fluid so as to provide a substantially uniform distribution of liquid between the body surface and the photographic material.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, both as

to its organization and its method of operation together with additional objects and advantages thereof will best be understood from the following description of the preferred embodiment when read in connection with the accompanying drawings wherein like numbers have been employed in the different figures to denote the same parts and wherein:

FIG. 1 is a diagrammatic view in perspective of a photographic camera embodying the invention;

FIG. 2 is a diagrammatic view partially in section illustrating one film magazine employed in the camera of FIG. 1;

FIG. 3 is a diagrammatic view partially in section showing another film magazine employed in the camera of FIG. 1;

FIG. 4 is a diagrammatic view in perspective illustrating the processing station of the camera;

FIG. 5 is a view in section of the processing station taken along line 5—5 of FIG. 4;

FIG. 6 is a diagrammatic view in perspective of another operative element of the camera; and

FIGS. 7, 8, 9 and 10 are diagrammatic plan views of the interior of the camera and illustrating its operation.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The preferred embodiment of this invention is illustrated as a camera including apparatus facilitating application of a compatible processing liquid to a photosensitive image-recording sheet following its exposure and superposition of this sheet with an image-receiving sheet for formation of a visible image in the latter by a diffusion-transfer process. The apparatus and process of the invention while applicable to photography in general, is specially adapted to produce photographic transfer prints such as those described in U.S. Pat. No. 2,983,606 issued May 9, 1961 to Howard G. Rogers and utilizing integral multilayer image-recording sheets incorporating dye developers such as are disclosed in U.S. Pat. No. 3,345,163 issued Oct. 3, 1967 to Edwin H. Land et al, and to photographic film processing as described in U.S. Pat. No. 3,485,628 issued Dec. 23, 1969 to Edwin H. Land. As indicated in the latter patent, the multicolor image-recording sheet is first photoexposed to form a latent image, then permeated with an aqueous alkaline processing liquid, and finally, superposed with an image-recording sheet so as to produce a visible image therein.

As shown in FIG. 1, the apparatus provides a camera having a housing 10 providing a substantially light-tight structure including a conventional lens and shutter assembly 12 at the front thereof adapted to expose a photosensitive sheet presented at an exposure aperture 14. Releasably mounted at the left and rear sides of the housing 10 are film magazines 16 and 18 which supply the photographic sheets utilized in the camera. At the right side of the housing is a processing station 20, and the interior of the housing includes a transport mechanism 22 providing means for transport of sequential image-recording sheets 24 from magazine 16 to aperture 14, processing station 20 and to a rear section 21 of the camera where each is superimposed with a suitable image-receiving sheet 42 from magazine 18, as later explained in detail.

As shown in FIG. 2 magazine 16 provides means for storing and dispensing image-recording sheets 24. The sheets 24 are disposed within magazine 16 in a stacked relation and urged towards the upper face 25 of the magazine 16 by a pressure plate 26 in cooperation with a spring member 27 such that the uppermost sheet of the stack is positioned in alignment with an exit aperture 30 of the leading edge 28 of the magazine. A sheet engaging member 32 extends from the magazine 16 and is adapted for displacement towards the leading edge 28 for lateral ejection of the foremost sheet through aperture 30. Advantageously, sheet engaging member 32 may be spring biased by any conventional means (not shown) in a direction away from aperture 30 so as to provide automatic return to the engaging position following film ejection. Integral with the magazine 16 and extending from its leading edge 28 are a pair of extended arms 36 configured for releasable mounting of the magazine to the housing 10. Hence, arms 36 are designed to releasably engage post 38 of the housing 10 to permit pivotal movement of the magazine 16 to a closed position as shown in FIG. 1 where it is retained by any conventional locking means (not shown). In this position, edge 28 of the magazine adjoins the exposure aperture 14 within the housing 10.

Magazine 18 which is mounted at the rear of the camera, provides means for storing and dispensing of the image-recording sheets 24 in accordance with operation of the apparatus and, as shown in FIG. 2, contains a plurality of the image-recording sheets in a stacked relation with the lowermost of these sheets laterally aligned with an exit aperture 44. A pressure plate 46 in cooperation with a spring 48 urges the film stack towards the lowermost face 50, as shown in this figure. Slideably mounted within magazine 18 is a film engaging member 52 which includes a flexible tongue 54 adapted to drive each successive film sheet in a direction opposite to the displacement of the engaging member, or that is, to move the lowermost film sheet through aperture 44 as the engaging member is displaced in a direction away from this aperture. This is accomplished by any conventional means such as by confining tongue 54 within a track or channel (not shown) so as to force it to bend back on itself. The unit is completed by integral mounting arms 56 which extend from the leading edge 58 of the magazine for releasable pivotal mounting to housing 10, for example, by engagement with post 59 of the housing as shown in FIG. 1. A conventional latch (not shown) is employed to releasably secure the magazine 18 in a closed position with its exit aperture 44 located adjacent the feed rolls of the camera for dispensing of each image-recording sheet 42 thereto, as later explained in detail.

Processing station 20, as shown in FIGS. 4 and 5, includes a demountable applicator unit 60 which is configured for releasable mounting to housing 10 in an adjoining relationship to a film support member 62. The applicator unit 60 is made up of a box-like housing 64 which is closed at its open end by an applicator body 76. This forms a narrow cavity or internal chamber 66 between the rear wall 74 and body 76 for containing a source of processing liquid 68.

Preferably, applicator body 76 is a substantially inflexible member of porous material which operates to deliver gas-free liquid from source 68 to the exterior

surface 78 of the body. The exterior surface 78 is of slightly greater area or dimension than that of exposure aperture 14 whereby all of the photoexposed area of each film sheet may be disposed in contact with the applicator surface at a given time.

The body 76 is of so called membrane filter material, that is, microporous material having a sponge-like structure of small interconnected pores which provide a relatively high bubble pressure in the processing liquid, and hence, in cooperation with the surface tension of the liquid, preclude passage of gas up to relatively high pressure. Substantially coplanar with the applicator surface 78 is a sealing member or perimetric gasket 79 of 40 durometer rubber or the like which provides a rectangular surface enclosure and is intended to engage the perimetric margin of the film sheet 24 exteriorly of its photosensitized area.

Suitable membrane materials are glass, ceramic, carbon or plastic such as nylon or polyvinylchloride or other materials which are chemically inactive with the processing liquid and have a sufficiently small pore size, for example, $\frac{1}{2}$ micron to 10 microns diameter such that once contacted with the liquid it will pass the same while excluding passage of gas upon application of a low pressure differential to the body. That is, the applicator body is of a substance having sufficiently small pore size, which once contacted by the liquid, is liquid permeable but substantially gas impermeable at relatively low pressures. Inasmuch as the applicator body 76 precludes gas passage and includes a multiplicity of interlocking pores, it uniformly disperses liquid to its exterior surface 78. Stated otherwise, although the source of liquid may not provide uniform contact with the underside of the body 76, for example due to entrained gas in the source, the liquid tends to be carried uniformly throughout the body and produces a uniform distribution on the body surface 78. Hence, the applicator body 76 provides means for dispensing fluid from source 68 to the body surface 78 and for providing a substantially uniform distribution of liquid thereat.

It will be appreciated that the unique nature of the applicator provides rapid lateral flow of gas-free liquid to the photosensitive sheet, and simultaneously subjects all the photosensitive surface to the processing solution. Advantageously, the unit provides a slight excess of liquid during imbibition, then removes any remaining excess and returns it to the source. Hence, the arrangement not only minimizes the amount of source needed but also removes excess liquid from the photographic sheet prior to its withdrawal from the applicator unit. This is in contrast to capillary applicators which fail to provide gas-free wetting of the film sheet, fail to remove excess liquid following imbibition and additionally do not provide external control over the liquid flow. Stated otherwise, in capillary devices the fluid flow is caused by absorption into the film of the liquid which can result in non-uniform or incomplete wetting whereas, in the present case, liquid flow is controlled by the applied pressure differential.

In the rear wall 74 of container 64, means are provided for varying the pressure on source 68 and for thereby providing a suitable pressure differential between the source and the exterior surface 78 of the applicator body. These means include a plurality of

movable members 82 and 84 formed by discrete deformable portions of the rear wall 74, each of which are adapted to reduce the volume of the chamber and increase the interior pressure by a specific amount and thereby increase the source pressure accordingly. In this embodiment, the members 82 and 84 are portions of the rear wall 74 which are joined thereto by thin wall material to provide diaphragm-like areas which may be depressed, from their location coplanar with the rear wall, into chamber 66 to reduce the volume and increase the internal pressure of the latter. One member 82 is adapted for reversible operation for providing reversible pressure variations and is preferably, elastically coupled to the rear wall. For example, the container is constructed of material having some elasticity such that the deformable portion tends to return to its original location. In operation, member 82 is depressed to dispense liquid from the source 68 and then released to return excess liquid to the source. In contrast to member 82, members 84 are adapted for irreversible operation, and include an interior latch 86 for locking each in its depressed location responsive to engagement of the latch with recess 88. The latter members are designed for non-repetitive operation and function to bring the chamber back up to the original pressure following each operation of member 82. Hence, each of the deformable members 84 compensates for the reduction in source volume (or source pressure) resulting from the absorption of liquid in each processed film sheet.

In a specific example, which is given for purposes of illustration and not intended to be limiting, a 4x5 inch sheet of photosensitive material of the type disclosed in the aforementioned U.S. Pat. No. 2,983,606 was processed in the described processing station which contained an aqueous, alkaline solution having a low viscosity substantially that of water and containing:

	Percent
Potassium hydroxide	10.0
N-benzyl- β -picolinium bromide	2.0
Benzotriazole	3.5
Zinc nitrate	0.5

The applicator unit was constructed with an acrylic container body having an internal volume of approximately 1.5 cubic inches and a membrane filter wall of slightly greater than 3x4 inches in length and width. The membrane filter, which was 3/16 inch thick, acrylonitrile polyvinylchloride copolymer reinforced with nylon, with a mean pore size of 1.2 microns and a porosity of approximately 70 percent, formed the front of the container; and the rear of the container, included several 1 inch diameter movable wall portions of rubber material. All but one of the movable members included an internal latch.

A film support member 62 made up of a support plate 90 covered by an arcuate surface layer 92 of urethane foam having a density of 10 pounds per cubic foot was employed. Both the applicator filter surface 78 and the support were perimetrically bordered by sealing margins 79 and 95, respectively of rubber having a durometer reading of about 40. The chamber of the container was filled with the above solution which permeated the filter applicator and wetted its exterior surface.

After exposure, the photosensitized surface of the sheet was positioned over the applicator surface and progressively pressed into contact with it by forcing the film support member against the rear of the photographic material. Then, the non-latching deformable portion was depressed to a depth of approximately .050 inch which increased the source pressure to about 5 psi and dispensed about 1 cc. of gas-free liquid to the photosensitive surface.

The depressed portion was held in its activated position for about 8 seconds, then released to return excess fluid to the source. Immediately following this, the photographic sheet was removed from the applicator surface and pressed into superposition with an image-receiving sheet for formation of a visible image therein.

Thereafter, one of the self-latching deformable areas was depressed and locked in its depressed condition by its internal latch. This compensated for the reduced source volume and returned the source pressure to approximately its original value. A second photographic sheet was then exposed and the above steps repeated to produce its recorded image.

Applicator unit 60 is releasably mounted on the camera housing 10 by any conventional latching means (not shown) with its applicator surface 78 disposed in juxtaposition with film support member 62 which during camera operation, as later explained in detail, is selectively driven by lever 96 towards applicator unit 60 to press the film sheet against surface 78 in accordance with operation of the camera. To insure complete wetted contact of the film sheet with the applicator surface 78, the support member 62 includes means for removing air from between the interposed sheet and the applicator surface. Thus, the film support member 62 includes a support plate 90 which carries a resilient surface layer 92 of compressible material such as urethane foam of 10 pounds per cubic foot density or the like having a curved exterior surface 94 which tapers from a raised or extended central portion towards the margins such that as the support plate is moved towards applicator 60, to press the image-receiving sheet 24 into contact therewith, contact between the sheet and applicator surface 78 initially is a small restricted area which is progressively enlarged towards the edges of the structure so as to drive air towards the sheet margin and from between the sheet and applicator surface. Thus it will be recognized that the unit wipes air or gas from the applicator surface as the sheet is deposited and then precludes gas conduction during dispensing.

Carried at the perimeter of the plate 90 in juxtaposition with gasket 79 is a second perimetric gasket 95 of resiliently deformable material such as elastomer, for example, 40 durometer butyl rubber or the like. Gaskets 79 and 95, which are of resilient deformable material and cooperate to seal the margins of sheet 24 to the applicator 60, should be less compressible than the surface layer 92 so that during operation of the unit, the margins remain sealed while film sheet 24 is deflected slightly away from the applicator surface 78 responsive to the liquid pressure.

As previously indicated, the support member 62 and the applicator 60 are mounted at the side of the camera housing 10, as shown in FIG. 1, adjoining exposure aperture 14 such that film sheets may be disposed

within the processing station following their exposure. The support member 62 is permanently mounted in the housing for movement towards the exterior surface thereof while applicator unit 60 is releasably mounted in the exterior wall of the housing with its applicator surface 78 in juxtaposition with film engaging surface 92 of the support member.

As shown in FIG. 1, film transport system 22 includes a ring gear 100 which is mounted for rotation about the vertical axis of the camera in accordance with operation of hand crank 102. Extending from ring gear 100 and interiorly thereof is a lever or lug member 104 which is adapted for operation of the components of the camera during rotation of the ring gear. Also depending from ring gear 100 is a film engaging or film gripping member 106 which is shown in detail in FIG. 6. As shown in the latter figure, the gripping member 106 includes a pair of coupled lever members 118 and 122 adapted for engaging a film sheet between their sheet-engaging surfaces 126 and 128 in accordance with actuation of arm 130. In this embodiment, the gripping member 106 is biased to a normally closed position by spring 124, and is pivotally mounted on shaft 120 beneath ring gear 100 in position for engagement of the film sheets during camera operation. In this regard, the gripping member 106 is spaced slightly to the right of lug 104, or that is, leads lug 104 in a counterclockwise direction looking down on the camera.

Included within the interior of the camera is a pair of upper and lower channels or track 114 and 116 within which the film sheet is moved during camera operation. Additionally, a pair of feed rolls 108 and 110 are rotably mounted at the rear of the housing 10 and adapted to superpose the film sheets after imbibition. The feed rolls 108 and 110 are coupled to the gear ring 100 by conventional means (not shown) and rotated therewith.

In the operation of the camera, as shown in FIGS. 7-10, the ring gear 100 is initially positioned with lug 104 located clockwise of film engaging member 32 of magazine 16 when the camera is viewed from the top. As the hand crank 102 is rotated to move the ring gear 100 in a counterclockwise direction lug 104 engages the member 32, drives it towards the front of the camera and ejects an image-recording sheet 24 from the magazine 16 within the channels 114 and 116 and within the film engaging surfaces 126 and 128 of gripping member 106. The latter are held in an open position at this time in accordance with engagement of the gripping member against a release lug or trip lug 132 which is fixedly mounted to the left of aperture 14. Continued rotation of the gear ring 100 closes gripping member 106 and draws the image recording sheet 24 into position at exposure aperture 14 where a conventional shutter release (not shown) is activated to photoexpose the photosensitive surface of the sheet. At this time gear ring 100 has been rotated to the position shown in FIG. 7 wherein actuating lug 104 and gripping member 106 are positioned at the trailing edge of aperture 14. Further rotation of gear ring 104 then draws the film sheet 24 into position within processing station 20 and automatically actuates lever member 96 which moves member 62 into engagement with the sheet 24 and presses its photosensitive surface against the applicator body 76. The operator of the camera then

presses the dispensing member 82 at the rear of container 64 to inject liquid through applicator 76 to the photosensitive surface. That is, deformation or the depressing of portion 82 increases source pressure and applies a positive pressure differential between source 68 and surface 78.

In this embodiment, the imbibition time is controlled by the length of time the operator holds the deformable portion in its depressed condition. Hence, after a proper interval of, for example, 8 seconds the operator releases member 82 which elastically tends to return to its original position. This reduced source pressure and withdraws excess fluid from the vicinity of the film sheet 24. The ring gear 100 is then further rotated to release lever member 96, open the processing station 20 and draw film sheet 24 between feed rolls 108 and 110.

As the film sheet 24 enters the feed rolls 108 and 110, it is superposed within an image-receiving sheet, dispensed from magazine 18 in accordance with actuation of its film engaging member 52 by contact with lug 104. Hence, as lug 104 passes across magazine 18 it strikes film engaging member 52 and drives it along with the moving ring gear 100, as shown in FIG. 9. Consequently film engaging member 52 dispenses an image-receiving sheet 42 in a clockwise direction, that is, toward the processing station 20 where a baffle plate 112 forces it around roll 108 into engagement with image-recording sheet 24 and between the feed roll in superposition therewith. The operation is completed as shown in FIG. 10, when gripper member 106 reaches a position adjoining the trailing edge of magazine 18 where it engages a second release lug or trip lug 134. Magazine 18 is then pivoted to an open position for removal of the superposed sheets. At this stage of the operation, lug 104 is back to its initial position in readiness for engagement with film engaging member 32 for dispensing of a second image-recording sheet 24.

For subsequent exposures, the unit is operated in substantially the same manner, with however, the additional activation of one of the irreversible portions 84. Hence, since a small amount of liquid is imbibed by each film sheet during the processing and applicator body 78 will not admit air to the chamber, release of portion 82 withdraws excess liquid from the applicator surface 78, but results in reduced pressure on source 68 due to the fluid loss. Consequently, one of the irreversible portions 84 is activated following each application of processing liquid (or just prior to subsequent application) to the film sheet so as to return the source pressure to its original value whereby reversible portion 82 will again be ready for dispensing a prescribed amount of liquid to the next successive sheet. Hence, the irreversible portions are activated to return the source pressure to its original value. Consequently, only portion 82 is depressed for processing of the initial film sheet whereas portions 84 and 82 are activated in that order for processing of subsequent film sheets. It should be understood that since the irreversible portions 84 only compensate for the imbibition loss, they need not provide as great a pressure change as that of portion 82, and hence, may be of smaller area, etc.

Many other variations and different embodiments are possible within the scope of these teachings. For instance, in some applications it may be desirable to utilize

a conventional pump or other means for varying the reservoir pressure so as to provide proper pressure differential across the applicator body. Moreover, various mechanisms for transporting the film sheet into position with the applicator member will be suitable and different arrangements for removing air from between the film sheet and the applicator surface may be employed. For example, the raised surface portion of the pressure member may be located along one edge rather than in the center, or the pressure member may be a substantially planar surface which is initially contacted against a given edge of the film sheet and then progressively pressed into contact with the remainder of the sheet so as to drive air towards the opposite edge. Additionally, although the applicator body is illustrated as an integral body of filter material, it could of course be a laminated unit having a supporting perforated substrate or supporting base of large pore material which allows liquid and gas to pass to a thin surface membrane (for example 140 microns thick) of filter material. In this case, the substrate provides essentially a supporting function while the filter membrane controls the exclusion of gas. Advantageously, the use of a composite body allows efficient operation with a smaller source only a small amount of liquid is stored in the thin membrane.

Since these and other variations of the invention and its modes of utilization may be made within the scope of the present teachings, the preferred embodiment described herein is therefore illustrative and not restrictive, the scope of the invention being indicated by the appended claims and all variations which come within the meaning of the claims are intended to be embraced therein.

I claim:

1. A camera for exposing photographic material and for applying processing liquid thereto, said camera comprising:

means for receiving such photographic material in an exposure station of said camera;

means for exposing an area of such photographic material when it is so received in said exposure station;

means for permitting passage of such liquid from a source thereof to such material and for precluding passage of gaseous fluid whereby such liquid may be applied to such photographic material without including entrained gas in dispensed portions of such liquid, said liquid passing and gas precluding means including one surface of at least substantially equal in area to such exposed area; and

means for positioning such exposed area of such photographic material on said surface.

2. The camera of claim 1 wherein said liquid passing and gas precluding means comprises a porous filter medium which in cooperation with the surface tension of such liquid permits passage of such liquid and precludes passage of gaseous fluid within a given range of pressure differential.

3. The camera of claim 1 wherein said liquid passing and gas precluding means comprises a porous medium having a pore size in the range of 0.5 to 10 microns.

4. The camera of claim 1 additionally including means for establishing a pressure differential across said liquid passing and gas precluding means to effect

the flow of such liquid from such source to such exposed area of photographic material.

5. The camera of claim 1 additionally including means for sequentially exposing a plurality of sheets of such photographic material, and means for repetitively establishing a differential pressure across said liquid passing and gas precluding means for effecting passage of gas-free liquid from such source to each of such successive sheets following their exposure, respectively.

6. The camera of claim 1 additionally including a container for retaining such source of fluid in communication with said liquid passing and gas precluding means, and means for selectively establishing a pressure differential across said liquid passing and gas precluding means to effect a flow of liquid therethrough, and said establishing means includes means for varying the volume of said container.

7. The camera of claim 6 wherein said container includes a plurality of deformable wall portions, one of said portions being adapted for reversible variation of said container volume for repetitively establishing said differential pressure and the others of said portions being adapted for irreversible variation of said volume for maintaining a predetermined pressure within said container intermediate operation of said one portion.

8. The camera of claim 1 including means for removing gaseous fluids from between such photographic material and said one surface.

9. Photographic apparatus for applying processing liquid from a source of processing fluid over sheet-like photographic material having a photosensitive surface of predetermined area, said apparatus comprising:

means including one surface at least substantially equal in area to such predetermined area for permitting passage of such liquid from said source to said one surface and for precluding passage of gaseous fluid therefrom; and

means for positioning the predetermined area of such photographic material on said one surface.

10. The apparatus of claim 9 wherein said liquid passing and gas precluding means comprises a porous filter medium which in cooperation with the surface tension of such liquid permits passage of such liquid and precludes passage of gaseous fluid within a given range of pressure differential.

11. The apparatus of claim 9 wherein said liquid passing and gas precluding means comprises a porous medium having a pore size in the range of 0.5 to 10 microns.

12. The apparatus of claim 11 wherein said porous filter medium has a mean pore size of about 1 micron.

13. The apparatus of claim 9 additionally including means for selectively establishing a pressure differential across said liquid passing and gas precluding means to effect passage of liquid from such source to such predetermined area while precluding passage of gaseous fluid thereto.

14. The apparatus of claim 9 additionally including sealing means perimetrically positioned around said one surface for contact with the perimetric margin of such photographic material when it is positioned on said one surface.

15. The apparatus of claim 9 wherein said liquid passing and gas precluding means in a porous filter medium having another surface adapted for communi-

cation with such source of liquid, and additionally including means for selectively applying a positive pressure differential between said surfaces such that said one surface is at lower pressure than said another surface for conducting liquid to said one surface and for selectively establishing a negative pressure differential between said surfaces such that said one surface is at higher pressure than said another surface for removal of excess liquid from said one surface.

16. The apparatus of claim 9 additionally including means for selectively establishing a reversible pressure differential across said liquid passing and gas precluding means for dispensing gas-free liquid to and for withdrawing excess liquid from such photographic material when it is positioned on said one surface.

17. The apparatus of claim 9 additionally including a container for retaining such source of fluid in communication with said liquid passing and gas precluding means, and said container including at least one deformable wall portion for selective variation of the volume of said container for establishing said pressure differential.

18. The apparatus of claim 9 additionally including means for repetitively establishing a predetermined pressure differential across said liquid passing and gas precluding means so as to effect flow of gas-free liquid to said one surface for sequential application of such liquid to a plurality of such photographic sheets.

19. The apparatus of claim 18 additionally including a container for retaining such source of fluid in communication with said liquid passing and gas precluding means, and said pressure establishing means includes repetitively providing a predetermined pressure on such source of fluid.

20. The apparatus of claim 19 wherein said pressure establishing means includes means for repetitively varying the volume of said container by a given amount for dispensing and withdrawing such liquid, and means for progressively reducing the chamber volume by a given amount intermediate said repetitive variation so as to compensate for the reduction of source volume resulting from absorption of such liquid by each successive sheet of photographic material.

21. The apparatus of claim 20 wherein said container includes a plurality of deformable wall portions, one of said wall portions being adapted for reversible deformation for repetitively establishing said differential pressure across said liquid passing and gas precluding means and another of said portions being adapted for irreversible deformation for maintaining a predetermined pressure within said container intermediate operation of said one wall portion.

22. The apparatus of claim 9 including means for removing gaseous fluids from between such photographic material and said one surface.

23. The apparatus of claim 22 wherein said gas removing means includes means for removing gaseous fluid from between such photographic material and said surface as such photographic material is positioned thereagainst.

24. The apparatus of claim 22 wherein said means for removing gaseous fluids includes means for initially contacting a restricted portion of such photographic material to said surface and progressively enlarging the area of contact to displace gaseous fluid toward at least one edge of such photographic material.

25. The apparatus of claim 9 wherein said position means comprises:

a body having another surface of substantially equal or greater area than such exposed area for supporting such photographic material; and

means for displacing at least one of said bodies towards the other for pressing such photographic material against said one surface when such material is located between said surfaces.

26. The apparatus of claim 25 wherein said another surface of said second body comprises a resilient exterior surface configured to initially press a restricted area of said photographic material into contact with said one body surface and progressively increase the area of contact in a direction toward the margin of such photographic material responsive to said displacement of said bodies towards one another.

27. The apparatus of claim 26 wherein said exterior surface includes a raised surface portion tapered towards at least one margin of said another surface.

28. Photographic apparatus for applying processing liquid from a source of processing fluid over sheet-like photographic material having a photosensitive surface of predetermined area, said apparatus comprising:

means having one surface of substantially equal or greater than said predetermined area and for permitting passage of liquid between said source and said surface and for precluding passage of gaseous fluid therebetween responsive to application of given range of pressure differential thereto;

means for positioning the photosensitive surface of such photographic material on said one surface; and

means for reversibly establishing a pressure differential within said range of pressure differentials between said surface and such source for effecting reversible passage of liquid therebetween while precluding passage of gaseous fluid.

29. An applicator for distributing processing liquid from a source of processing fluid to sheet-like photographic material having a photosensitive surface of predetermined area, said applicator comprising:

means for receiving such source of processing fluid; means including a first surface at least substantially equal in area to such predetermined area for conducting liquid from said receiving means to said one surface and for substantially precluding passage of gaseous fluids therefrom.

30. The applicator of claim 29 wherein said receiving means is a container of given volume having deformable wall portions adapted for reducing said volume and increasing the pressure on such source.

31. The applicator of claim 29, wherein said liquid conducting and gas precluding means comprises porous filter material which in cooperation with the surface tension of such liquid permits passage thereof and precludes passage of gas between said receiving means and said one surface responsive to application of a pressure differential to said filter material within a predetermined range of pressure differential.

32. The applicator of claim 31 wherein said receiving means is a container, and said porous filter material comprises one major wall of said container.

33. A camera for exposing photographic material and for applying processing liquid thereto, said camera comprising:

a substantially lighttight housing;

means for receiving at least one sheet of such photosensitive material at a first position within said housing and adjoining its perimeter;

means for applying processing liquid to such photosensitive sheet at a second position within said housing and adjoining its perimeter, said applying means including filter means for permitting passage of such liquid from a source thereof without including entrained gas in dispensed portions of such liquid;

means for exposing such photosensitive sheet at a position within said housing intermediate said first and second position; and

means for transporting such sheet from said first position through said intermediate position to said second position.

34. A camera for exposing photographic material and for applying processing liquid thereto, said camera comprising:

a substantially lighttight housing;

means for receiving at least one sheet of such photosensitive material at a first position within said housing and adjoining its perimeter;

means for exposing such photosensitive sheet at a position within said housing intermediate said first and second position;

means for receiving another sheet of such photographic material within said housing in a third position adjoining its perimeter and intermediate said first and second positions; and

means for transporting such one sheet from said first position through said intermediate position to said second position and from said second position to said third position for superposition thereat with such another sheet.

35. A process for applying a processing liquid to exposed photographic film material comprising the steps of:

contacting a source of processing liquid with a porous filter body which in cooperation with the surface tension of said liquid is pervious to said liquid and is substantially impervious to gas when a pressure differential below a given maximum is applied to said body;

permitting the processing liquid to permeate said body and to wet a given surface thereof;

depositing an exposed sheet of photographic material on said wetted surface with the photosensitized surface of said photographic material in contact therewith; and

establishing a pressure differential below said given maximum between said surface of said body and said source so as to conduct gas-free liquid therefrom to said photosensitized surface.

36. A process for applying a processing liquid to exposed photographic film material comprising the steps of:

contacting a source of processing liquid with a porous filter body which in cooperation with the surface tension of said liquid is pervious to said liquid and substantially impervious to gas within a given range of applied pressure differential;

permitting the processing liquid to permeate said body and to wet a given surface thereof;

depositing an exposed sheet of photographic material on said wetted surface with the photosensitized

surface of said photographic material in contact therewith;
 establishing a pressure differential between said surface of said body and said source so as to conduct gas-free liquid therefrom to said photosensitized surface; and
 reversing said pressure differential so as to conduct excess liquid from said photographic material to said source following a predetermined imbibition period.

37. A process for applying a processing liquid to exposed photographic film material comprising the steps of:

contacting a source of processing liquid with a porous filter body which in cooperation with the surface tension of said liquid is pervious to said liquid and substantially impervious to gas within a given range of applied pressure differential;
 permitting the processing liquid to permeate said body and to wet a given surface thereof;
 depositing an exposed sheet of photographic material on said wetted surface with the photosensitized surface of said photographic material in contact therewith;
 establishing a pressure differential between said surface of said body and said source so as to conduct gas-free liquid therefrom to said photosensitized surface; and
 removing gas from between said photosensitized surface and said wetted body surface prior to establishment of said pressure differential.

38. The process of claim 37 wherein a portion of restricted area of said photographic material is initially pressed into contact with said wetted body surface and said area of contact is then progressively enlarged in a

direction toward a margin of said photographic material to displace gas towards the edges of said photographic material and thereby remove said gas from between said photosensitized surface and said wetted body surface.

39. Photographic apparatus for applying processing liquid from a source of processing fluid to the photosensitized surface of sheet-like photographic material, said apparatus comprising:

means for permitting passage of such liquid from such source and for precluding passage of gaseous fluid therefrom including a porous filter medium which in cooperation with the surface tension of such liquid permits passage of such liquid and precludes passage of gaseous fluid within a given range of pressure differential;

means for positioning at least a portion of such photosensitized surface on one surface of said filter medium; and

means for applying a pressure differential within said given range between said one surface and such source of liquid so as to effect passage of such liquid from such source to such portion of such photographic material while precluding passage of gaseous fluids thereto.

40. The apparatus of claim 39 additionally including means providing a perimetric margin around said one surface of said filter medium, and wherein said one surface is substantially equal to or less than the area of such portion of such photographic material, and said positioning means includes means for locating such portion of such photographic material on said one surface such that it extends over the full area thereof and to said margin.

* * * * *

40

45

50

55

60

65