Aug. 16, 1966 A. J. SABLE ETAL 3,266,405

PHOTOGRAPHIC APPARATUS

Filed July 26, 1963 6 Sheets-Sheet 1

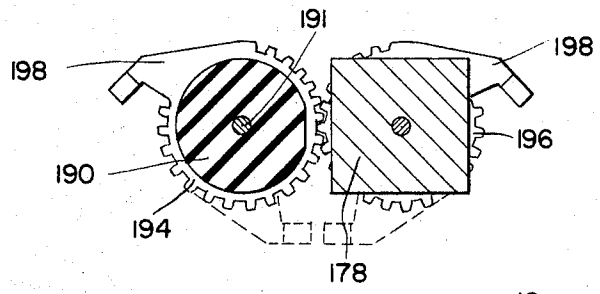


FIG. 8

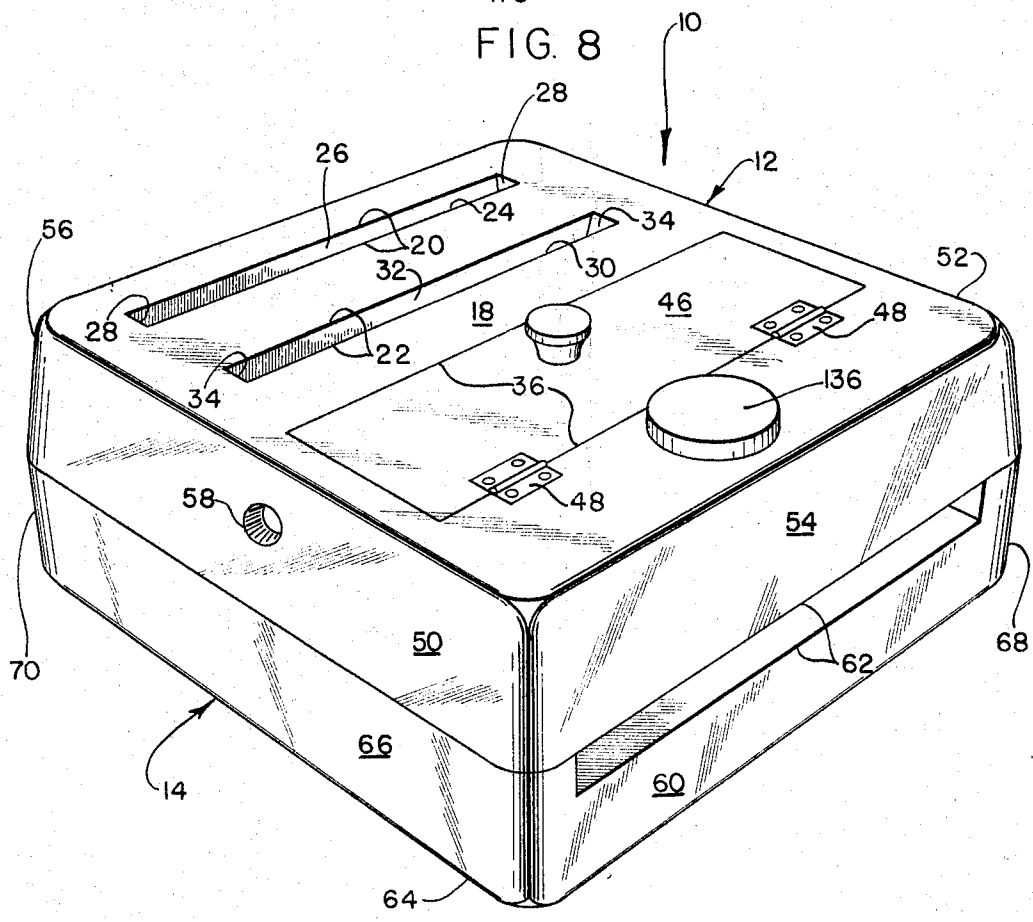


FIG. 1

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PHOTOGRAPHIC APPARATUS

Filed July 26, 1963 6 Sheets-Sheet 2

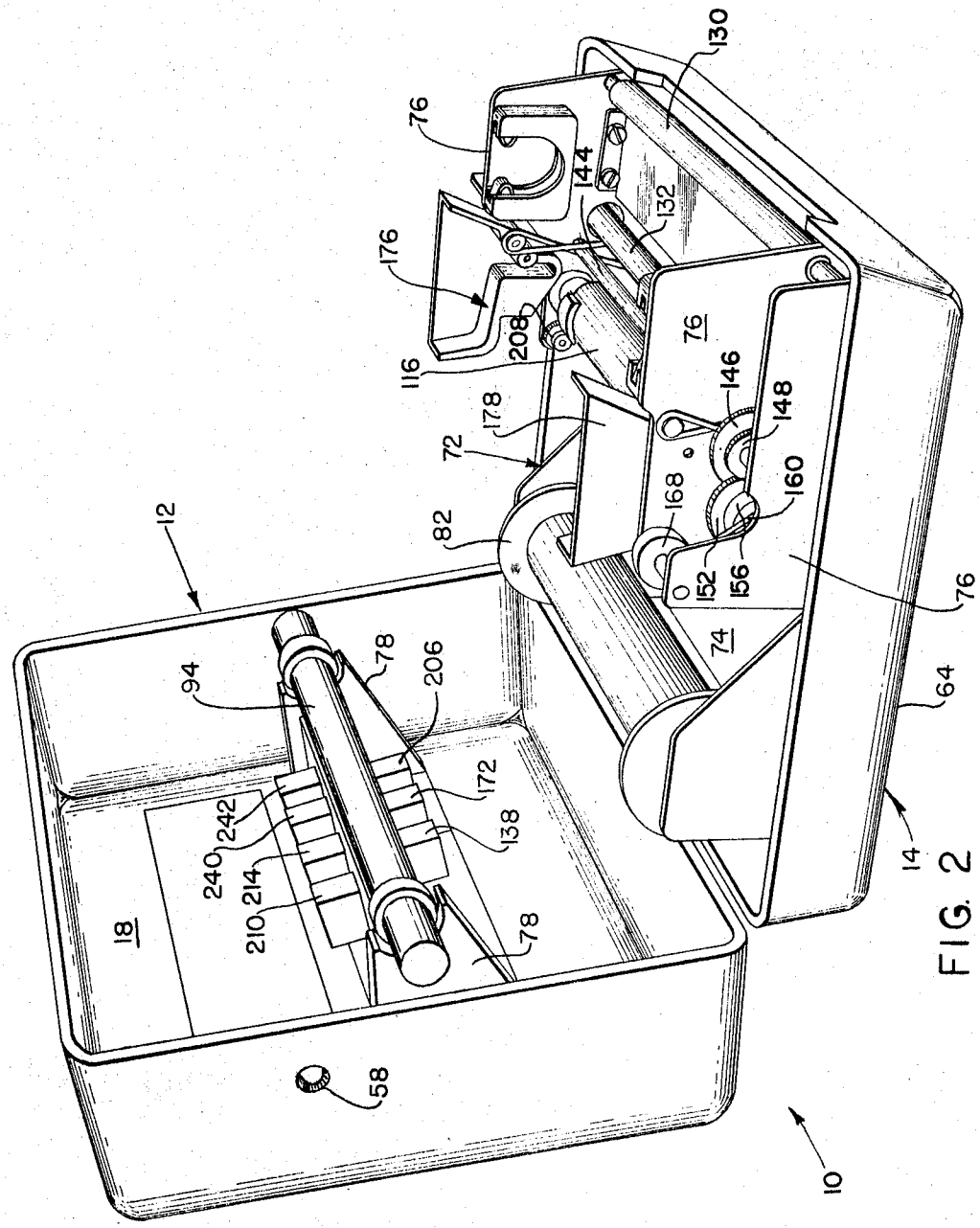


FIG. 2

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PHOTOGRAPHIC APPARATUS

Filed July 26, 1963 6 Sheets-Sheet 3

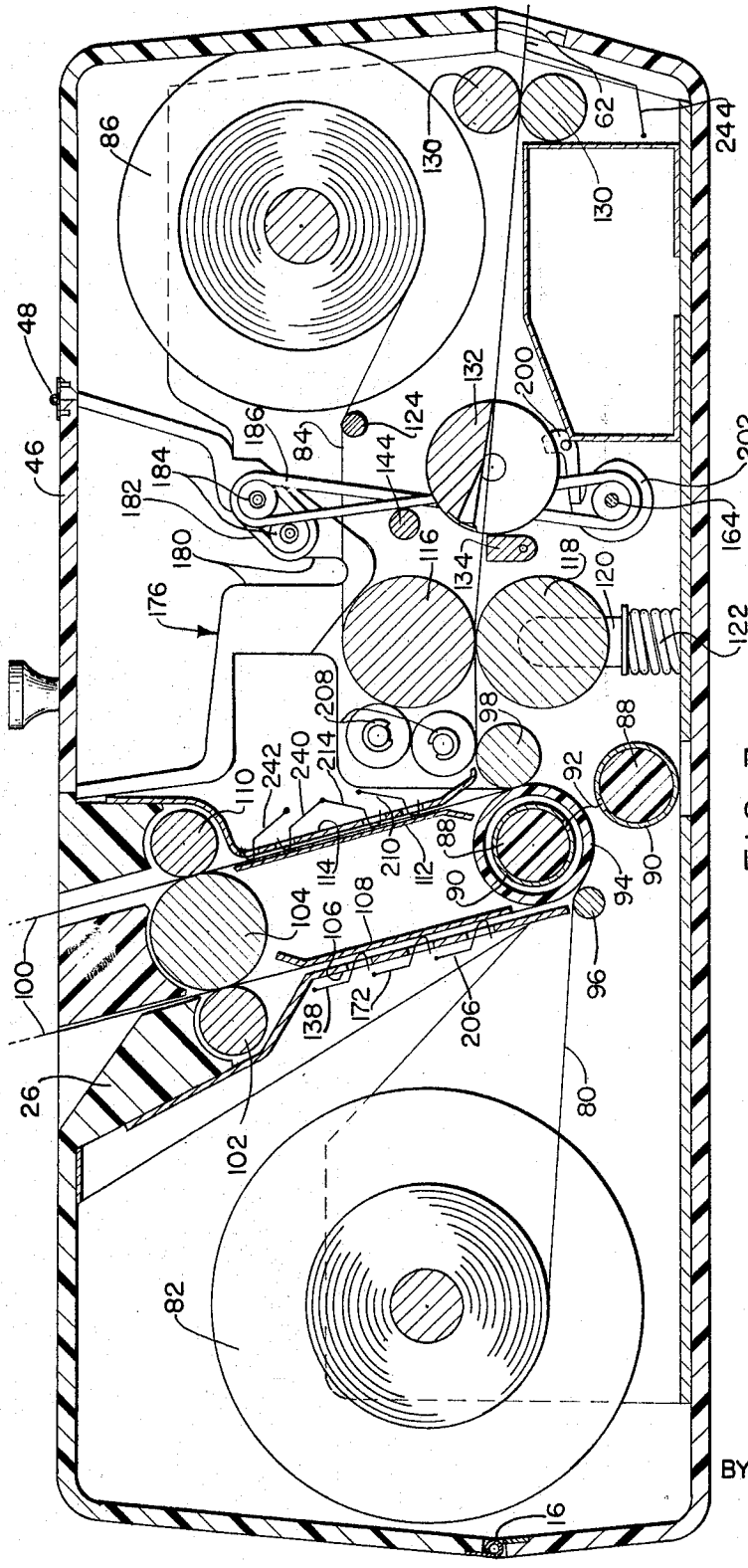


FIG. 3

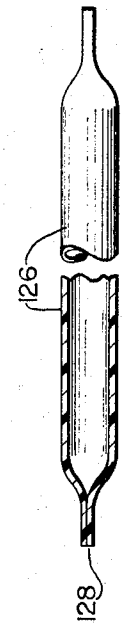


FIG. 4

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PHOTOGRAPHIC APPARATUS

Filed July 26, 1963 6 Sheets-Sheet 4

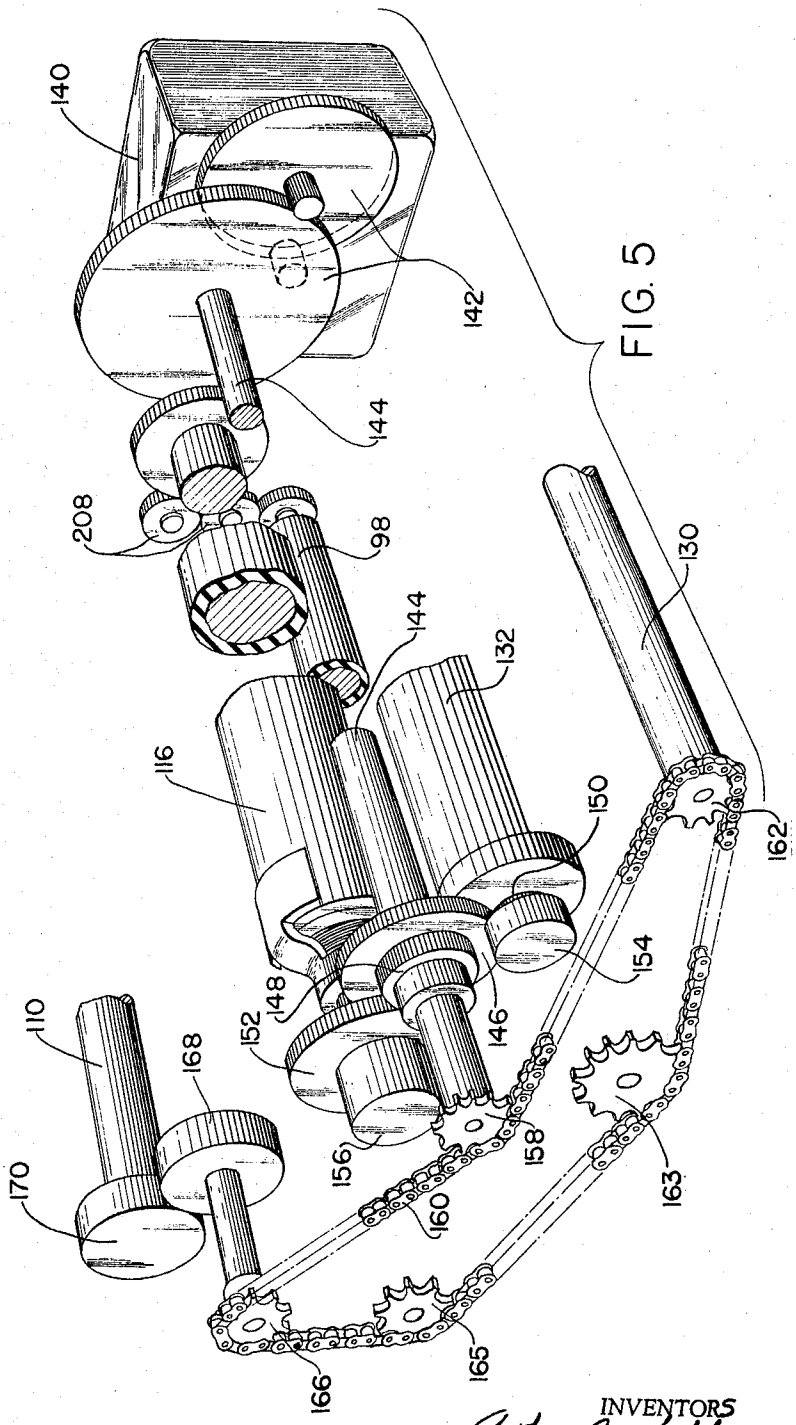


FIG. 5

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PHOTOGRAPHIC APPARATUS

Filed July 26, 1963 6 Sheets-Sheet 5

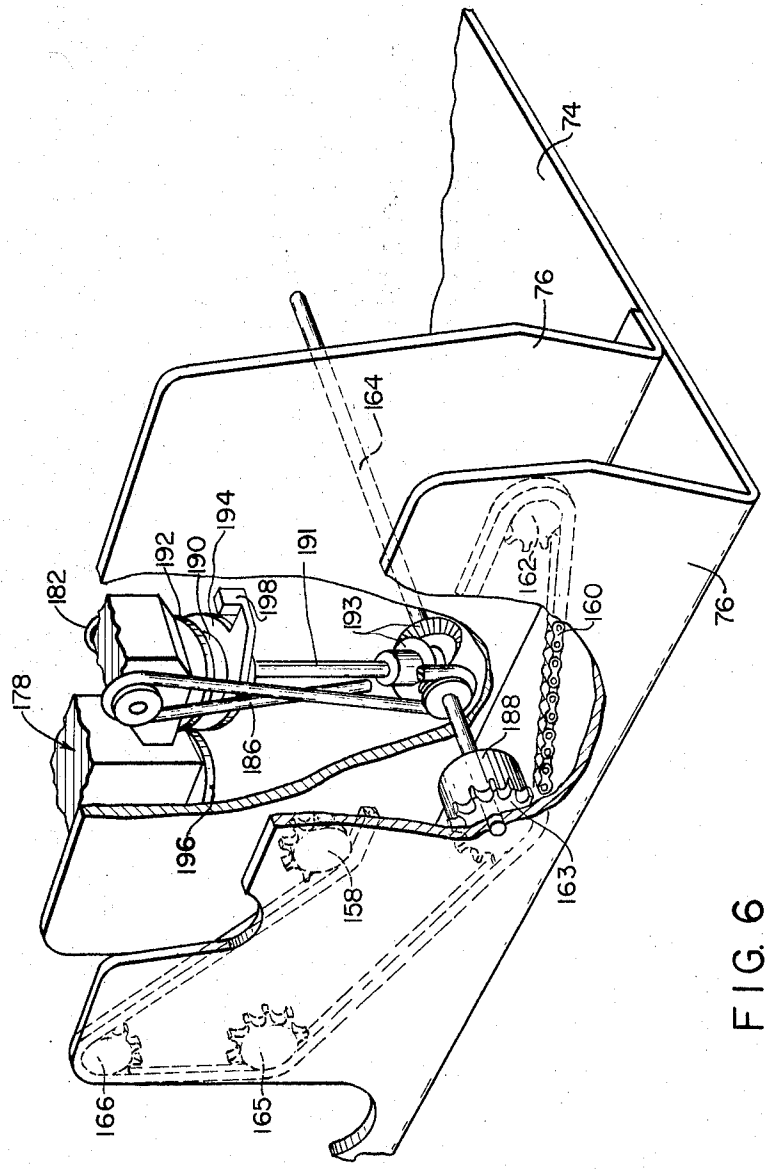


FIG. 6

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PHOTOGRAPHIC APPARATUS

Filed July 26, 1963 6 Sheets-Sheet 6

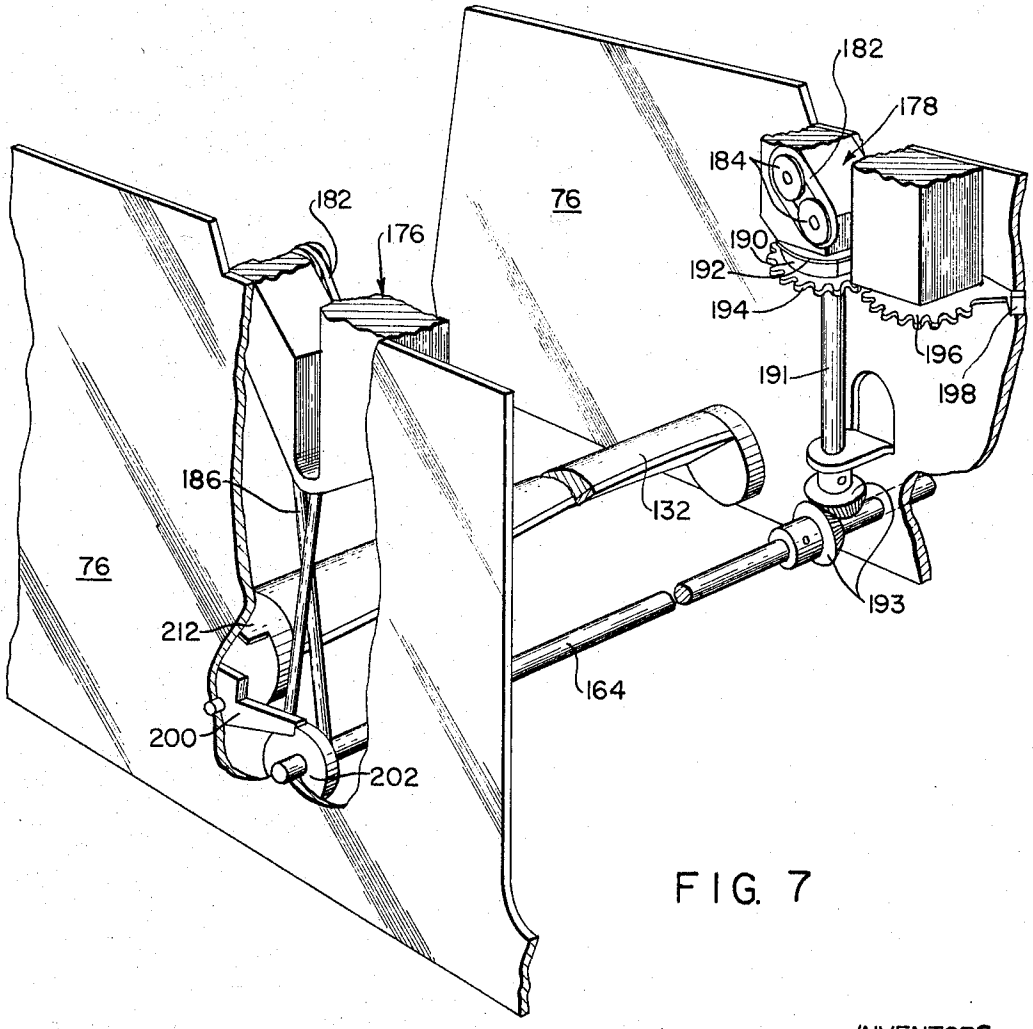


FIG. 7

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United States Patent Office 3,266,405 Patented August 16, 1966

3,266,405

PHOTOGRAPHIC APPARATUS

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Filed July 26, 1963, Ser. No. 297,851
15 Claims. (Cl. 95—89)

This invention relates to photography and, more particularly, to photographic apparatus for processing photographic materials.

Generally, the present invention is concerned with apparatus comprising means for treating a photosensitive sheet by superposing it with a second sheet and distributing a processing liquid in a layer between the superposed sheets. The photosensitive sheet comprises a layer of a photosensitive heavy metal salt, such as silver halide, on a suitable support. A portion of the photosensitive sheet is exposed to form a latent image therein and the exposed portion of the photosensitive sheet superposed on the second or image-receiving sheet. A viscous processing liquid is distributed between the sheets as a layer covering at least the exposed portion to form a positive transfer image on the second sheet.

In apparatus of the type with which the present invention is concerned, the processing liquid is initially contained in an elongated tubular container and is discharged from the container onto either the photosensitive or second sheets by compressing a portion of the container while moving the container in the direction of its elongation to eject the liquid at an end of the container.

The invention is shown incorporated in a device for making copies of original documents. Features common to document copiers of this type include means for feeding an original document into the apparatus and superposing it with the photosensitive sheet during the exposure thereof, exposing the sheet by either direct or reflex exposure, separating the original from the photosensitive sheet, superposing the photosensitive sheet on the second sheet, introducing the processing fluid between the two sheets and advancing the superposed sheets between a pair of juxtaposed members to distribute the processing liquid between the sheets.

The document copier embodying the present invention is designed as a portable, electrically operated, semi-automatic device which will produce uniformly good copies of original documents of varying sizes. In most similar devices, the container of processing liquid is manually introduced into the apapratus and placed adjacent the photosensitive or second sheet, manually compressed and then manually withdrawn from the housing to discharge the enclosed fluid onto the adjacent sheet.

An object of the present invention is to provide apparatus for processing photographic materials which includes means for automatically positioning a container of processing fluid adjacent the photosensitive or image-receiving sheet and then compressing at least a portion of the container to facilitate discharging the enclosed processing fluid onto the adjacent sheet.

Another object is to provide novel apparatus for advancing a portion of the container positioned adjacent the photosensitive or image-receiving sheet in the direction of its elongation from the apparatus into a position where it may be grasped and withdrawn from the apparatus.

Still another object is to provide novel apparatus for the processing of photographic materials which includes means for advancing the containers of processing liquid one at a time from a storage position among a plurality of containers into position adjacent the photosensitive or image-receiving sheet, further advancing it to a position where it may be grasped and withdrawn from the apparatus to discharge the enclosed liquid onto the adjacent sheet, and then compressing at least a portion of the container adjacent the sheet.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

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 exemplified in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in conjunction with the accompanying drawing wherein:

FIGURE 1 is a perspective view of document-copying apparatus embodying one form of the present invention;

FIG. 2 is a perspective view of components of the apparatus of FIGURE 1, shown with the housing of the apparatus open in an inoperative position;

FIG. 3 is a sectional view of the apparatus of FIGURE 1, the section being taken substantially midway between the sides of the housing;

FIG. 4 is a fragmentary view, partially in section, of a container used for introducing processing fluid into the apparatus;

FIG. 5 is a perspective fragmentary view, partially in section, showing components of the apparatus;

FIGS. 6 and 7 are perspective fragmentary views, partially in section, of apparatus comprising means for locating, compressing and advancing the container of FIG. 4; and

FIG. 8 is a plan view of apparatus comprising means for advancing and compresing the container of FIG. 4.

Reference is now made to FIGS. 1 through 3 wherein is illustrated one form of photographic document-copying apparatus embodying the invention. Housing **10**, mounting and enclosing the operative components, comprises an upper housing section **12** pivotably secured to a lower housing section **14** by a hinge **16**, said hinge being located at one end, called the rear end, of the apparatus. The two sections are pivotable between the closed or operative position shown in FIG. 1 and the open or inoperative position shown in FIG. 2, in which the housing sections are separated to permit loading the photographic sheet material into the apparatus.

Upper housing section **12** comprises an upper wall **18** in which are located an inlet passage **20** and an exit passage **22** through which the original document to be copied can be introduced into and fed from the apparatus. Inlet passage **20** is defined by convergent walls which may be designated forward wall **24**, rear wall **26** and side walls **28**. Exit passage **22** is similarly defined by forward wall **30**, rear wall **32** and side walls **34**. An opening **36**, located adjacent a storage area in which a number of containers are stored prior to use, is also located in upper wall **18**. The cover **46** of opening **36** is pivotably connected to upper wall **18** by hinges **48**. Housing section **12** also comprises side walls **50** and **52**, designated left and right side walls respectively, a forward wall **54**, and a rear wall **56** to which the upper portion of hinge **16** is connected.

Lower housing section **14** comprises a forward wall **60**, portions of which serve to define withdrawal opening **62**, bottom wall **64**, left and right side walls **66** and **68**, and rear wall **70** to which the lower portion of hinge **16** is connected.

The operative components of the document-copying apparatus are mounted on support members or chassis carried within housing **10** on the upper and lower housing sections. These support members include a lower

chassis **72** comprising a base plate **74**, which rests on bottom wall **64** of housing section **14**, and side plates **76** extending upwardly from the base plate. The upper chassis comprises support members **78** extending downwardly from upper wall **18** of housing section **12**, and securely mounted on upper wall **18**.

Lower chassis **72** includes means for mounting the photosensitive and image-receiving sheet used in the apparatus. The photosensitive sheet **80**, preferably in the form of an elongated strip, is supplied on a conventional spool **82**, said spool being mounted at its ends for rotation between side plates **76** near the rear end of housing **10**. The image-receiving sheet **84**, also in the form of an elongated strip, is contained on a similar spool **86**, mounted for rotation between the side plates **76** near the forward end of the apparatus.

The apparatus includes means for exposing a photosensitive sheet comprising two sources of illumination and means for conducting the photosensitive sheet and original document in superposition past the illumination sources. Each source comprises a light-conducting cylindrical bar **88** enclosed in an opaque cylindrical tube **90** which is provided with an axial slot **92** equal in length to the width of the photosensitive sheet for transmitting the actinic light emitted from bar **88** to the photosensitive sheet. The light source for each bar comprises a small incandescent lamp mounted within the end section of tube **90** adjacent to the end of bar **88**. One illumination source is mounted on upper support members **78** in upper housing section **12**; the other on lower chassis **72** in lower housing section **14**. As the superposed photosensitive sheet and original document are guided between the two sources, the photosensitive sheet may, by utilizing one source or the other, be subjected to either a direct exposure wherein the photosensitive sheet is exposed to light transmitted through to it through the original document, or to a reflex exposure wherein the actinic light is transmitted through the photosensitive sheet to the surface of the original document and is then partially reflected back to the photosensitive sheet to form a developable image therein.

The means for guiding the photosensitive sheet and original document between the two illumination sources include a transparent cylindrical tube **94** surrounding the upper illuminating source and mounted for rotation on upper support members **78**. An elongated guide rod **96** is mounted between side plates **76** with its axis parallel with the axis of tube **94** and its periphery spaced slightly at a distance from the periphery of tube **94**. Guide roll **98**, engaging tube **94** along its periphery, is mounted for rotation between side plates **76** with its axis parallel to tube **94**.

Photosensitive sheet **80** is conducted from spool **82**, between guide rod **96** and tube **94**, around a portion of the cylindrical surface of tube **94** and between the tube and guide roll **98**. The axial slots **92** in tubes **90** are positioned so that the actinic light transmitted from either of bars **88** will expose the portion of the photosensitive sheet **80** that is supported by cylindrical tube **94** between guide rod **96** and guide roll **98**.

The means for guiding the original document, designated **100** in FIG. 3, into superposition with the photosensitive sheet, comprises a pair of rolls, inlet roll **102** and central roll **104**, mounted for rotation in juxtaposition between upper support members **78**. Rolls **102** and **104** engage the original document along a line lying in a plane substantially tangent to the surface of tube **94** at a line closely adjacent rod **96** and tube **94** and, in conjunction with light-sealing elements **106** and **108** which extend, respectively, from rear wall **26** to a point closely adjacent rod **96**, and from central roll **104** to a point closely adjacent tube **94**, guide the original document between rod **96** and tube **94** and into superposition for exposure with the photosensitive sheet.

The apparatus comprises means for separating original document **100** from the photosensitive sheet following exposure of the latter in superposition with the original and for then guiding the original out of the apparatus. Outlet roll **100** and control roll **104** are mounted for rotation between upper support member **78** so as to engage original document **100** along a line lying in a plane substantially tangent to tube **94** and guide roll **98**. A pair of light-sealing elements **112** and **114**, which extend downwardly from rolls **104** and **110**, respectively, to positions closely adjacent tube **94** and roll **98**, assist in separating the original document from the photosensitive sheet and guiding the original into the bite of the outlet roll. Elements **106**, **108** also serve to prevent light from entering the apparatus through the inlet and exit passages and fogging or overexposing the photosensitive sheet.

After the original document has been separated from the exposed photosensitive sheet and guided out of the apparatus, the exposed sheet is superposed with a second or image-receiving sheet **84** and a layer of a processing liquid distributed between the sheets to form a copy of the original document on the second sheet. The means for distributing the liquid include a pair of pressure-applying rolls **116** and **118**. Roll **116** is mounted for rotation on lower chassis **72**. Roll **118** is mounted for rotation between a pair of movable members **120** mounted on lower chassis **72** so as to provide for limited movement of roll **118** relative to roll **116**. A spring mechanism **122** is provided for biasing roll **118** toward roll **116**.

The exposed portion of photosensitive sheet **80** is guided around a portion of guide roll **98** and then between the pressure-applying rolls. Image-receiving sheet **84** is conducted from spool **86**, around guide rod **124** mounted between side plates **76** parallel to spool **86**, around a portion of roll **116** and into superposition with the photosensitive sheet. The portion of the image-receiving sheet between guide rod **124** and roll **116** provides a substantially horizontal surface on which the mass of processing fluid may be deposited. Since spools **82** and **86** are both mounted on lower chassis **72**, the photosensitive and image-receiving sheet may be threaded between rolls **116** and **118** while housing sections **12** and **14** are separated in the inoperative position.

In the apparatus shown, the processing liquid is supplied in an elongated tubular container very much like a conventional drinking straw. This container, designated **126** in FIG. 4, includes a cavity of substantially uniform cross section, approximately equal in length to the width of the exposed portion of photosensitive sheet and filled with the processing liquid. Both ends of the containers are sealed with one end, designated **128**, adapted to become unsealed to form a discharge mouth through which the processing liquid may be discharged in response to a hydraulic pressure generated within the enclosed liquid. In the disclosed apparatus, the container is placed transverse the image-receiving sheet with end **128** located adjacent the margin of the image-receiving sheet most distant from opening **58**. The portion of the container adjacent the lateral edge of the image-receiving sheet nearest opening **58** is then compressed and the container withdrawn from the apparatus. This withdrawal creates a hydraulic pressure in the enclosed liquid and causes end **128** of the container most distant from opening **58** to become unsealed and the contents to be ejected therefrom in the form of a uniformly distributed elongated mass extending across the substantially horizontal portion of the image-receiving sheet between guide rod **124** and pressure-applying roll **116**. The means for locating the container adjacent the image-receiving sheet and for discharging the liquid from the container will be described in detail hereinafter.

After the processing liquid has been discharged onto the image-receiving sheet, the photosensitive and image-receiving sheets are advanced in superposition between the pressure-applying rolls to distribute the processing liquid between the superposed sheets, toward the trail-

ing end of the exposed area of the photosensitive sheet, as a layer covering the exposed area.

The superposed sheets with the liquid between them are required to remain in darkness during a predetermined period, at the end of which they may be guided out of the housing and separated. The means for transporting the superposed sheets through the housing in a light-tight environment and guiding them from the housing comprise a pair of withdrawal rolls **130** mounted in juxtaposition for rotation on lower chassis **72** withing housing **10** and adjacent withdrawal opening **62**.

A rotary knife **132** and anvil **134** are provided adjacent the pressure-applying rolls on the side thereof nearest withdrawal opening **62** for severing the exposed and processed portion of the superposed sheets from the remaining sheet material as the superposed sheets pass between the knife and anvil. After the exposed and processed portions of the photosensitive and image-receiving sheets have been severed from the unprocessed sheet material, the superposed sheets are advanced out of the housing through withdrawal opening **62**. If the superposed sheets are separted, the photosensitive sheet may be discarded; the image-receiving sheet comprises a copy of the original document.

In the illustrated apparatus, the operational sequence is controlled by a number of switches and sensing devices located in inlet and exit passages **20** and **22**, on upper wall **18**, and adjacent tapered and withdrawal openings **58** and **62**. A person using the apparatus must adjust a switch, designated **136** in FIGURE 1 and mounted on upper wall **18**, to selectively determine whether direct or reflex exposure is required and to control the intensity of the actinic light, introduce the original document to be copied partially into inlet passage **20**, withdraw a container of processing liquid through tapered opening **58**, and then separate the exposed and processed photosensitive and image-receiving sheets as they are advanced from the housing. All other operations are performed automatically.

When original document **100** is introduced into inlet passage **20**, its leading edge trips a switch **138** in passage **20** illuminating the selected light source and actuating electric motor **140**, mounted in lower housing section **14**. As illustrated in FIG. 5, motor **140** acts through a pair of reduction gears **142** to drive power transmitting rod **144**, mounted for rotation on lower chassis **72** and extending transverse the lower chassis from adjacent motor **140** to adjacent lower side wall **66** of housing **10**.

A pair of coaxial juxtaposed gears **146** and **148** are mounted on rod **144** adjacent side plate **76** on the side thereof most distant from motor **140**. One of the gears, gear **146**, engages gear **150** mounted coaxially with rotary knife **132**. The other, gear **148**, engages gear **152** mounted coaxially with pressure-applying roll **116**. Gears **150** and **152** are designed to rotate freely with respect to knife **132** and pressure-applying roll **116**, respectively, so that rolls **116** and **118** and knife **132** are not actuated at this time.

A sprocket **158** mounted on the end of power transmitting rod **144** most distant from motor **140** drives a chain **160** to transmit torque to gear **162** mounted coaxially with and keyed to the upper of withdrawal rolls **130** and to gear **166** on the upper portion of side plate **76**. Gear **166** is mounted coaxially with a friction wheel **168** which engages a second friction wheel **170** mounted in upper housing section **12**. The drive system is designed so that inlet, exit and withdrawal rolls are driven at the same peripheral speed. Drive chain **160** also engages an idler gear **165** on lower side wall **66**, and gear **163** which drives the means for positioning, advancing and compressing the fluid filled containers.

Rolls **102** and **104** advance the original document until the document's leading edge trips a second switch **172**, mounted on light sealing element **106**, deactivating motor **140**, to stop the advancement of the original document.

In the illustrated apparatus, switch **138** which actuated motor **140** is also designed to actuate novel apparatus for advancing a container of processing fluid from the storage area adjacent opening **36**, in which a plurality of containers are stored, into a position closely adjacent and transverse the portion of image-receiving sheet lying between guide rod **124** and pressure-applying roll **116**, advancing the container from this position in an axial direction until the end most distant from end **128** extends through tapered opening **58**, and then compressing the portion of the container adjacent the edge of the image-receiving sheet nearest opening **58**. The container is then manually withdrawn from the housing to discharge the enclosed fluid from the container onto the image-receiving sheet. Withdrawing the container also trips a third switch (not shown) mounted on side wall **50** adjacent opening **58** reactivating motor **140**. The novel means for advancing and compressing the fluid filled container will be described in detail hereinafter. It should be noted that the container is not advanced out of opening **58** until after the original document has been introduced into the apparatus and that the operating cycle will not continue until the container has been completely withdrawn.

As the original document is further advanced, its leading edge trips a fourth switch **206** on light sealing element **106** engaging the pressure-applying rolls **116** and **118** for advancing the photosensitive and image-receiving sheets. As illustrated in FIG. 5, clutch **156**, keyed to roll **116** and normally spaced apart from gear **152**, is mounted coaxially with roll **116** on the side of gear **152** most distant from motor **140**. Gear **152**, as previously noted, is driven by motor **140**, but is mounted for rotation relative to roll **116**. When switch **206** is tripped, a solenoid (not shown) moves clutch **156** into engagement with gear **152**.

Since the superposed original document and photosensitive sheet should not move relative to each other during exposure of the photosensitive sheet, the inlet, outlet and pressure-applying rolls are designed to rotate at the same peripheral speed. A gear train, designated **208** in FIG. 3, is provided to insure that guide roll **98** and cylindrical tube **94** rotate at the same peripheral speed as do the pressure-applying rolls.

As the exposed photosensitive sheet and original document pass between tube **94** and guide roll **98**, they are separated, the original document passing between light-sealing elements **112** and **114** into exit passage **22** and the photosensitive sheet being advanced into superposition with the image-receiving sheets. As the original document enters the exit passage, its leading edge releases a fifth switch **210** mounted on light-sealing element **114** adjacent guide roll **98** engaging knife **132** to sever the superposed photosensitive and image-receiving sheets along a line closely adjacent the leading edge of the exposed portion of the photosensitive sheet.

As illustrated in FIG. 5, clutch **154**, keyed to knife **132** and designed to normally be disengaged from gear **150**, is mounted coaxially with knife **132** on the side of gear **150** most distant from motor **140**. Gear **150**, as previously noted, is driven by motor **140** and mounted for rotation relative to knife **132**. Switch **210** acts through a solenoid (not shown) to engage clutch **154** and gear **150**, and cause rotary knife **132** to rotate against anvil **134** to sever the superposed sheets. In the preferred embodiment, clutch **154** is designed to disengage itself from gear **150** after one complete revolution to allow the processed sheets to be further advanced between the knife and the anvil.

As the original document is advanced out of the housing its trailing edge releases switches **240** and **242**, mounted on light-sealing element **114** adjacent outlet roll **110**. Switch **240** is designed to reactivate the rotary knife **132** to sever the superposed sheets along a line closely adjacent the trailing edge of the exposed and processed portions of the photosensitive and image-receiving sheets;

switch **242** disengages clutch **154** and gear **150** to stop the rotation of the pressure-applying rolls.

The present invention, illustrated in FIGS. 6, 7, and 8, includes means for advancing a container of processing liquid from the storage area into a position parallel with and closely adjacent to the image-receiving sheet; advancing the container in an axial direction through tapered opening **58** until at least a portion of the container extends outside housing **10** and the remainder of the container extends transverse the portion of the image-receiving sheet onto which the liquid is to be discharged, and then compressing the portion of the container adjacent the lateral edge of the image-receiving sheet nearest opening **58** so that the liquid will be discharged onto the image-receiving sheet when the container is completely withdrawn from the housing. The illustrated apparatus also includes means for insuring that the plurality of containers located between the storage area and the image-receiving sheet are substantially parallel to said sheet thereby insuring the proper advancement of the containers into position adjacent the image-receiving sheet.

Before use, a number of containers are located in the storage area in upper housing section **12**. The means for advancing the containers into position adjacent the image-receiving sheet includes a pair of end blocks, **176** and **178**, which comprises the sides and bottom of the storage area. As illustrated in FIG. 2, end blocks **176** and **178** are arranged so that the central portion of the document-copying apparatus is easily accessible for loading the rolls of sheet material into the device. Each end block includes a vertical slot **180**, one side of which has been partially removed at a 45° angle, for guiding the containers into position adjacent the image-receiving sheet and the means for advancing the containers from the apparatus. The top surface of the end blocks is slightly inclined toward slots **180**. A belt **182** is mounted on a pair of wheels **184** adjacent the inclined portion of each slot so that the portion of the belt parallel to the inclined portion frictionally engages the periphery of the adjacent fluid-filled containers. Belts **182** are driven by a second pair of belts **186** connecting drive shaft **164** which extends transverse the apparatus between end blocks **176** and **178** and the upper of wheels **184** on each end block.

As illustrated in FIGS. 7 and 8, the means for advancing the container located at the bottom of slots **180** closely adjacent the image-receiving sheet, until an end portion of the container extends partially out of housing **10** through tapered opening **58**, comprises a spacer **192** and a rubber drum **190** mounted for rotation on shaft **191** adjacent the bottom of slot **180** on end block **178** nearest the tapered opening. Drum **190** and spacer **192** are essentially cylindrical, except that the portion of each that is adjacent slot **180** has been removed to allow the fluid-filled containers to drop freely to the bottom of slots **180**. When shaft **191** is rotated, the peripheral surface of drum **190** engages the container most closely adjacent the image-receiving sheet between drum **190** and the surface of slot **180** opposite the drum and advances the container partially out of the apparatus; spacer **192** simultaneously rotates between the container to be advanced and the containers located above it in slots **180** to insure that only the container most closely adjacent the image-receiving sheet will be advanced and compressed.

As illustrated in FIG. 6, gear **163** which engages drive chain **160** is mounted on drive shaft **164** so that it is free to rotate with respect to shaft **164**. A clutch **188** mounted coaxially with and keyed to shaft **164** is originally spaced apart from gear **163** but is adapted to move into engagement with gear **163** in response to the tripping of switch **138** by the original document. When clutch **188** and gear **163** are engaged, torque is transmitted from motor **140** to drum **190** and spacer **192** through a pair of level gears mounted on shafts **191** and **164**.

The means for compressing the fluid-filled containers after the advancement of an end portion through the tapered opening comprise a pair of jaws **198** on gears **194** and **196** which are mounted in engagement for rotation on either side of slot **180** on end block **178**. Gear **194** mounted coaxially with drum **190** and keyed to drum **190** and gear **196** rotate in response to the rotation of drum **190** to advance jaws **198**, as shown in FIG. 8, from the position illustrated to the position indicated by the dashed outline in which the jaws are in compressive engagement with the fluid-filled container. Gears **194** and **196** are designed for moving jaws **198** into engagement with the container immediately after the end portion of the container has been advanced through opening **58** into a position where it may be grasped and completely withdrawn from the apparatus. As the jaws **198** move into engagement, a pawl **200**, mounted on lower chassis **72** near the end of drive shaft **164** most distant from opening **58**, drops into the single recess on ratchet gear **202** to lock drive shaft **164**, which is spring biased for counterclockwise rotation (as seen in FIG. 7), and to lock jaws **198** in compressive engagement with the fluid-filled container. When pawl **200** is released drive shaft **164** will rotate counterclockwise to separate jaws **198** and rotate spacer **192** and drum **190** to their original positions.

Belts **182** and bevel gears **193** are designed so that the portion of belts **182** that is in contact with the fluid-filled containers in slots **180** will move upward while drum **190** is rotating to advance the desired container out of the apparatus. This upward movement agitates the containers adjacent the inclined portions of slots **180** and insures that the containers remain parallel. When pawl **200** is released, the portion of belts **182** engaging the containers is driven downward thereby forcing the containers downward until one of the containers is loctaed adjacent the image-receiving sheet in position for advancement and compression during the next document-copying cycle.

The present invention has been described with reference to a device in which the fluid-filled containers are advanced in parallel relationship from the storage area adjacent opening **36** to the position adjacent the image-receiving sheet. This parallel relationship insures that two or more containers will not cross or otherwise jam during advancement so that a container will be advanced into position for compression during every document-copying cycle. It should be apparent that a number of equivalent means for insuring continuous advancement could be satisfactorily incorporated with the remaining parts of the apparatus without departing from the scope of the invention.

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. In photographic apparatus for treating a photographic sheet by distributing a processing liquid over at least a portion of said sheet during movement of said sheet through said apparatus, in combination:

an opening in said apparatus for admitting one of said containers lengthwise;

first advancement means comprising an advancement member for engaging an end portion of one of said containers and advancing said one container from said storage means in a direction substantially perpendicular to the elongation of said container to a position adjacent said sheet and extending transversely of the direction of movement of said sheet in alignment with said opening in response to movement of said advancement member; and

a second advancement means for engaging said one container in said position and moving said one con-

tainer in the direction of the elongation thereof relative to said sheet to advance at least an end portion of said one container from said apparatus through said opening;

said second advancement means comprising a drum mounted within said apparatus adjacent said sheet and said opening, said drum having a substantially cylindrical surface for engaging said container and being mounted for rotation adjacent the lateral edge of said sheet nearest said opening, being normally disposed with said surface out of contact with said one container and being rotatable into frictional engagement with the peripheral surface of said one container in said position, and means for rotating said drum into and in frictional engagement with said one container to advance the latter from said position through said opening;

said first advancement means being coupled with said second advancement means and being responsive thereto for advancing another of said containers from said storage means subsequent to advancement of said one container from said apparatus by said second advancement means.

2. The apparatus of claim 1 in which said second advancement means include means for spacing all but said one of said plurality of said containers away from said position during rotation of said drum, said means comprising a substantially cylindrical disc mounted coaxially with said drum on the end thereof nearest said first advacement means for movement in response to the rotation of said drum to a position intermediate said one container in said position and the remainder of said plurality of containers.

3. In photographic apparatus for treating a photographic sheet by distributing a processing liquid over at least a portion of said sheet during movement of said sheet through said apparatus, in combination:

an opening in said apparatus for admitting one of said containers lengthwise;

first advancement means comprising an advancement member for engaging an end portion of one of said containers and advancing said one container from said storage means in a direction substantially perpendicular to the elongation of said container to a position adjacent said sheet and extending transversely of the direction of movement of said sheet in alignment with said opening in response to movement of said advancement member;

a second advancement means for engaging said one container in said position and moving said one container in the direction of the elongation thereof relative to said sheet to advance at least an end portion of said one container from said apparatus through said opening; and

a pressure member movable into engagement with said container in said position for applying compressive pressure progressively to the remaining portion of said container as said remaining portion is advanced from said apparauts through said opening.

4. The apparatus of claim 3 in which said pressure member is normally disposed out of engagement with said container and is moved by said second advancement means into engagement with said container after advancement of a predetermined length of said container, including said end portion, from said apparatus through said opening.

5. The apparatus of claim 4 in which said second advancement means comprise an advancement member mounted adjacent said sheet and said opening, said member normally being disposed out of engagement with said one container in said position and being movable into and in frictional engagement with said one container in said position for moving said one container from said position, and in which said pressure member is coupled with said advancement member for advancing said pressure member into engagement with said container in response to movement of said advancement member.

6. The apparatus of claim 5 in which said advancement means include means for spacing all but one of said plurality of containers away from said position during movement of said advancement member and said engagement means to insure that only said one container in said position is advanced and compressed.

7. The apparatus of claim 5 in which said advancement member comprises a drum having a substantially cylindrical surface for engaging said container mounted for rotation adjacent the lateral edge of said sheet nearest said opening, said surface of said drum being rotatable into and in frictional engagement with said container for moving said container.

8. The apparatus of claim 7 in which said second advancement means include means for spacing all but said one of said plurality of containers away from said position during rotation of said drum, said means comprising a substantially cylindrical disc mounted coaxially with said drum between the latter and said first advancement means for rotation in response to rotation of said drum to a position intermediate said one container in said position and the remainder of said plurality of containers.

9. The apparatus of claim 7 in which said engagement means comprises a pair of engagement members mounted adjacent said opening on opposite sides of said position for movement into compressive engagement with said one container in response to the rotation of said drum.

10. The apparatus of claim 11 in which said first advancement means comprise an advancement element disposed in engagement with an end portion of at least said one container for advancing said end portion from said storage means into said position.

11. The apparatus of claim 10 in which said first advancement means include means for engaging said one container during the advancement thereof from said storage means to align the axis of said one container parallel with said position prior to the advancement of said one container into said position.

12. In photographic apparatus for treating a photographic sheet by distributing a processing liquid over at least a portion of said sheet during movement of said sheet through said apparatus, in combination:

means for locating an elongated tubular container within said apparatus in a position adjacent said sheet and transversely of the direction of movement of said sheet;

an opening in said apparatus for admitting said container lengthwise;

advancing means including an advancement member normally disposed out of engagement with said container and mounted for movment into and in frictional engagement with said container for moving said container in the direction of its elongation relative to said sheet to advance at least an end portion of said container from said apparatus through said opening; and

engagement means within said apparatus adjacent said opening and normally disposed out of engagement with said container, said engagement means being coupled with said advancement means and responsive thereto for moving said engagement means into engagement with said container after advancement of a predetermined length of said container, including said end portion, from said apparatus to apply compressive pressure to the remaining portion of said container as said remaining portion is advanced from said apparatus through said opening.

13. The apparatus of claim 12 in which said advancement member comprises a drum having a cylindrical surface for engaging said container, mounted for rotation adjacent the lateral edge of said sheet nearest said opening, said surface of said drum being movable by rota-

tion of said drum into and in engagement with said container to move said container through said opening.

14. The apparatus of claim 13 in which said engagement means are normally disposed out of engagement with said container and are coupled with said drum and responsive to movement thereof for moving said engagement means into engagement with at least a portion of said one container.

15. In photographic apparatus for treating a photographic sheet by distributing a processing liquid over at least a portion of said sheet during movement of said sheet through said apparatus, in combination:

means for locating an elongated tubular container within said apparatus in a position adjacent said sheet and transversely of the direction of movement of said sheet;

an opening in said apparatus for admitting said container lengthwise;

advancing means including an advancement member normally disposed out of engagement with said container and mounted for movement into and in frictional engagement with said container for moving said container in the direction of its elongation relative to said sheet to advance at least an end portion of said container from said apparatus through said opening;

engagement means within said apparatus adjacent said opening and normally disposed out of engagement with said container, said engagement means being coupled with said advancement means and responsive thereto for moving said engagement means into engagement with said container after advancement of a predetermined length of said container, including said end portion, from said apparatus through said opening to apply compressive pressure to the remaining portion of said container as said remaining portion is advanced from said apparatus through said opening; and

storage means for holding a plurality of said containers within said apparauts, said means for locating the first-mentioned container in said position including means for advancing said containers substantially perpendicular to the elongation thereof from said storage means until at least one of said containers is located in said position.

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