

Oct. 3, 1961

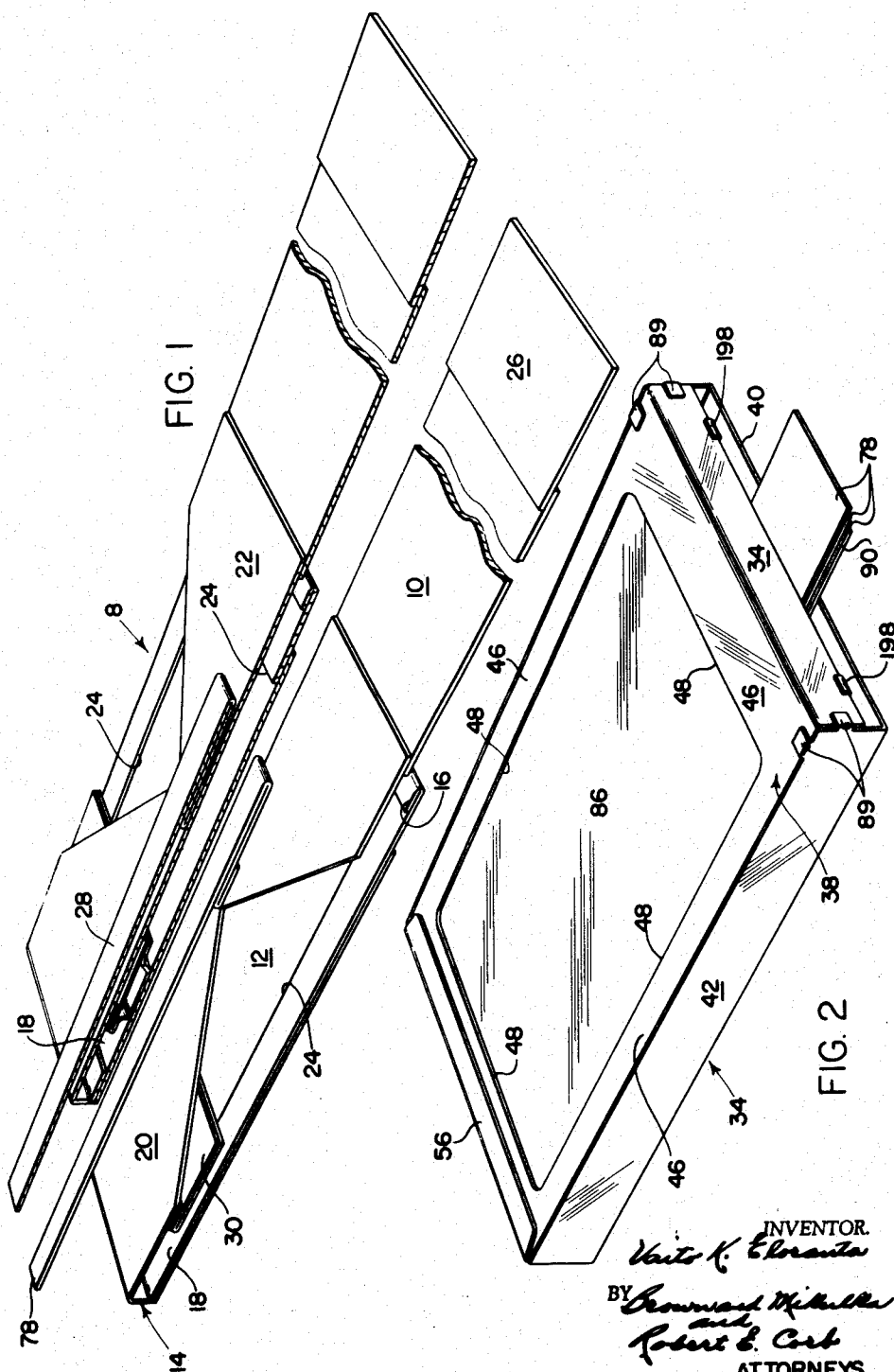
V. K. ELORANTA

3,002,437

PHOTOGRAPHIC PRODUCTS

Original Filed July 16, 1958

9 Sheets-Sheet 1



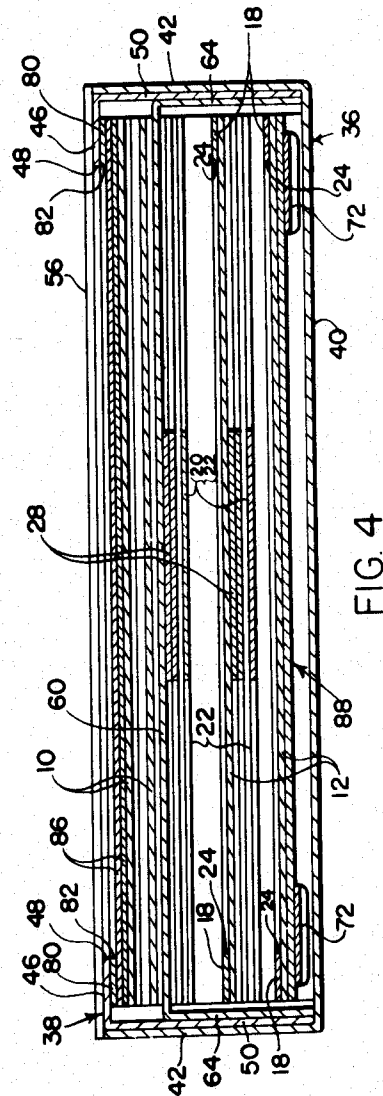
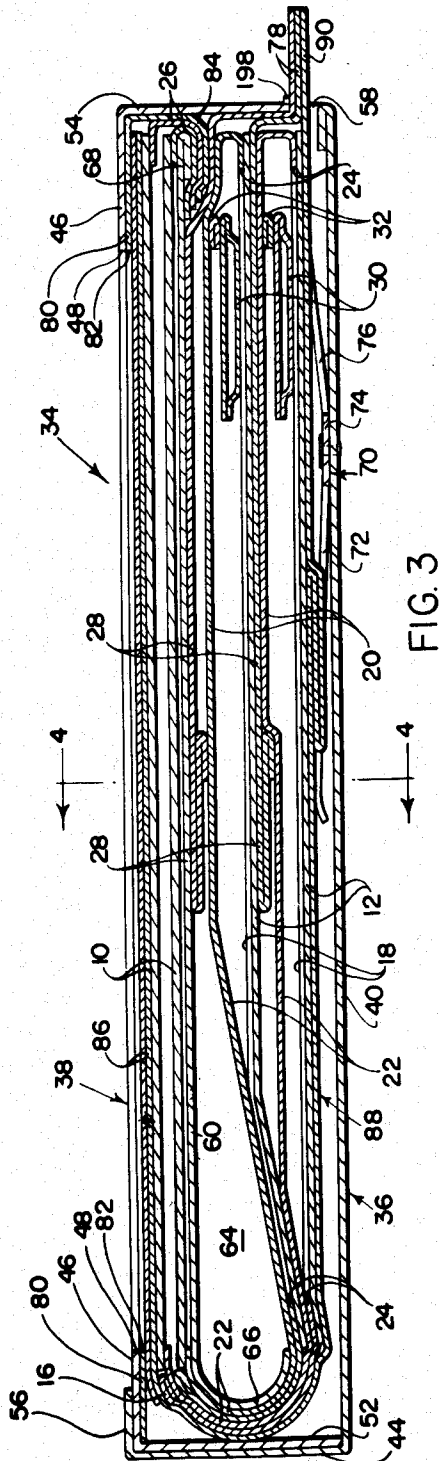
Oct. 3, 1961

V. K. ELORANTA
PHOTOGRAPHIC PRODUCTS

3,002,437

Original Filed July 16, 1958

9 Sheets-Sheet 2



INVENTOR.
Vaito L. Eloranta
BY *Gronow and Mikulka*
and
Robert E. Corb
ATTORNEYS

Oct. 3, 1961

V. K. ELORANTA
PHOTOGRAPHIC PRODUCTS

3,002,437

Original Filed July 16, 1958

9 Sheets-Sheet 3

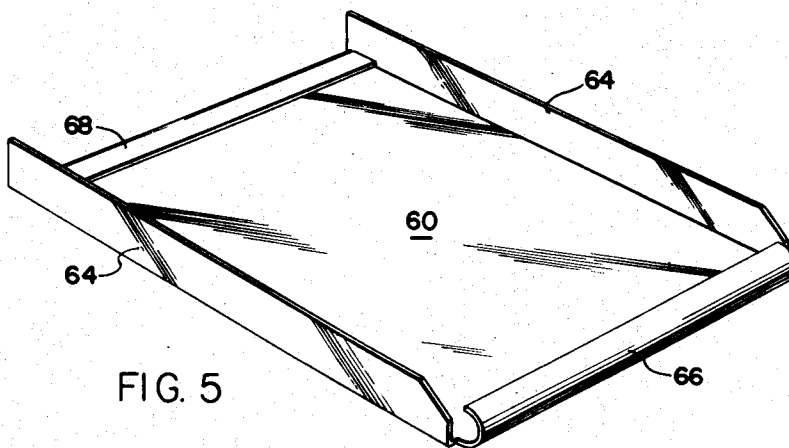


FIG. 5

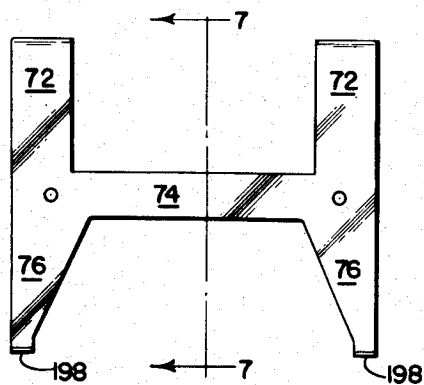


FIG. 6

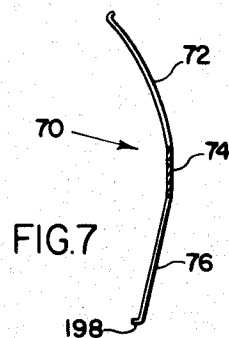


FIG. 7

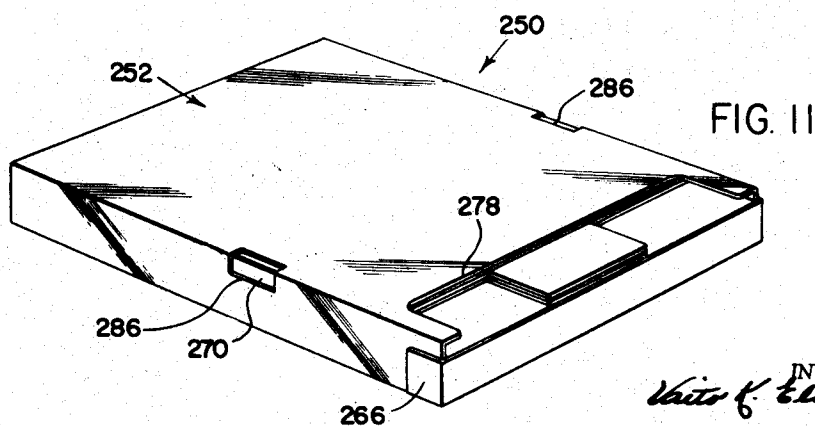


FIG. 11

INVENTOR.
V. K. Eloranta
BY *Brown and Mikulski*
Robert E. Gies
ATTORNEYS

Oct. 3, 1961

V. K. ELORANTA
PHOTOGRAPHIC PRODUCTS

3,002,437

Original Filed July 16, 1958

9 Sheets-Sheet 4

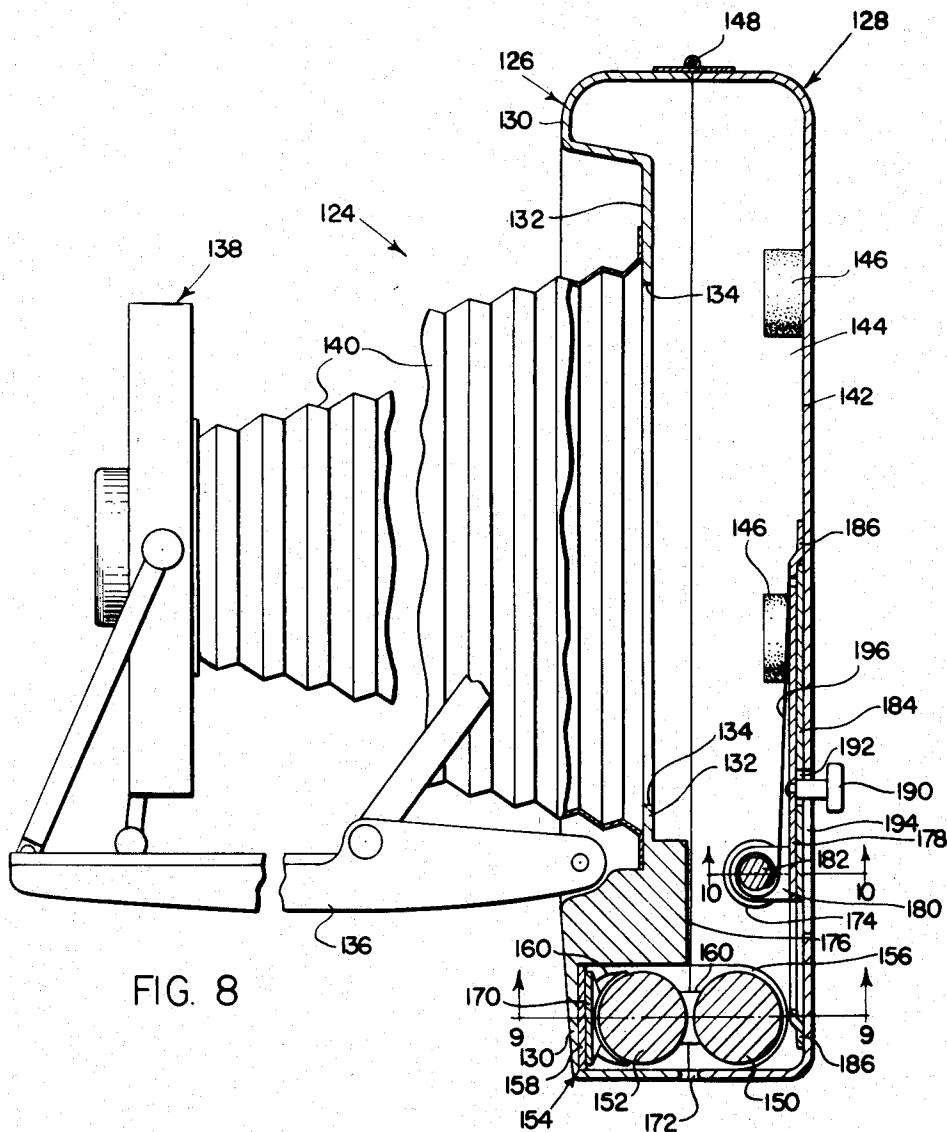


FIG. 8

INVENTOR
V. K. Eloranta
BY *Edward M. Miller*
Robert E. Goss
ATTORNEYS

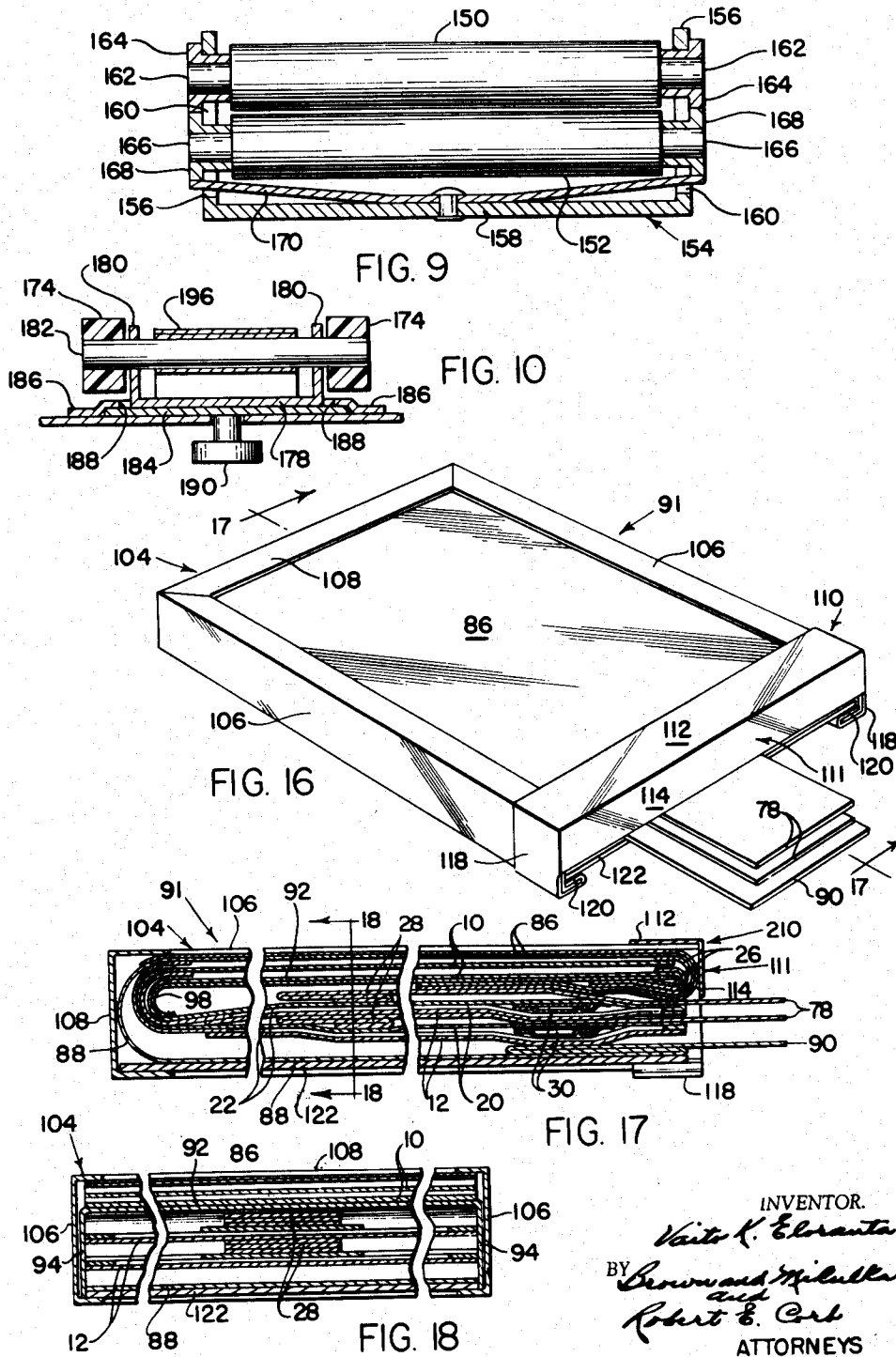
Oct. 3, 1961

V. K. ELORANTA
PHOTOGRAPHIC PRODUCTS

3,002,437

Original Filed July 16, 1958

9 Sheets-Sheet 5



Oct. 3, 1961

V. K. ELORANTA

3,002,437

PHOTOGRAPHIC PRODUCTS

Original Filed July 16, 1958

9 Sheets-Sheet 6

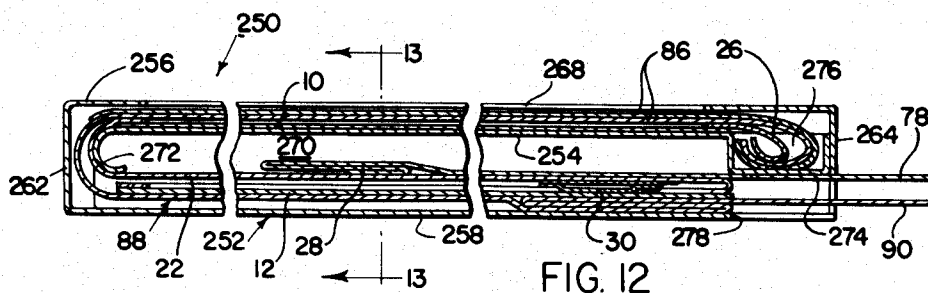


FIG. 12

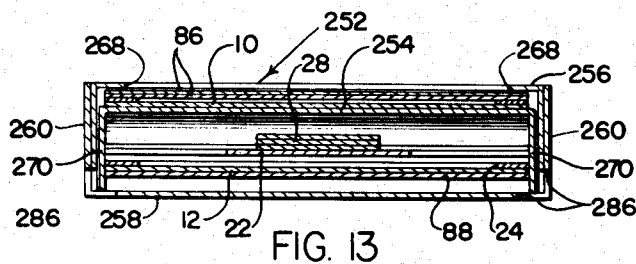


FIG. 13

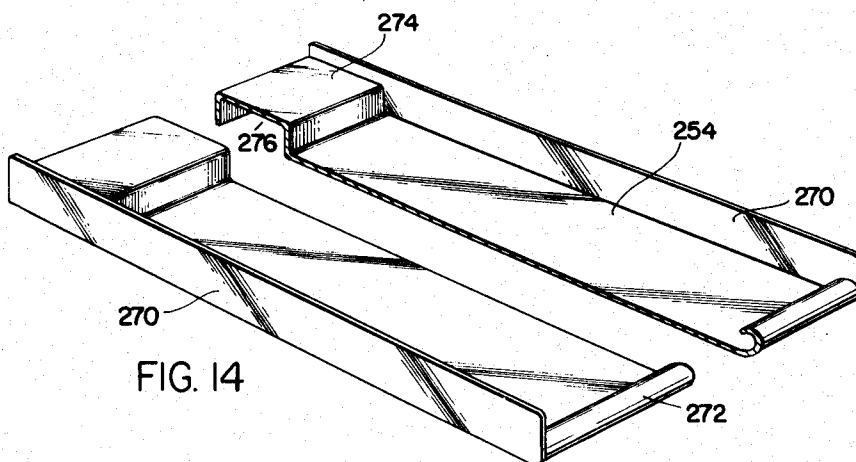


FIG. 14

INVENTOR.
Kito K. Eloranta
BY *Command Milalla*
and
Robert E. Corb
ATTORNEYS

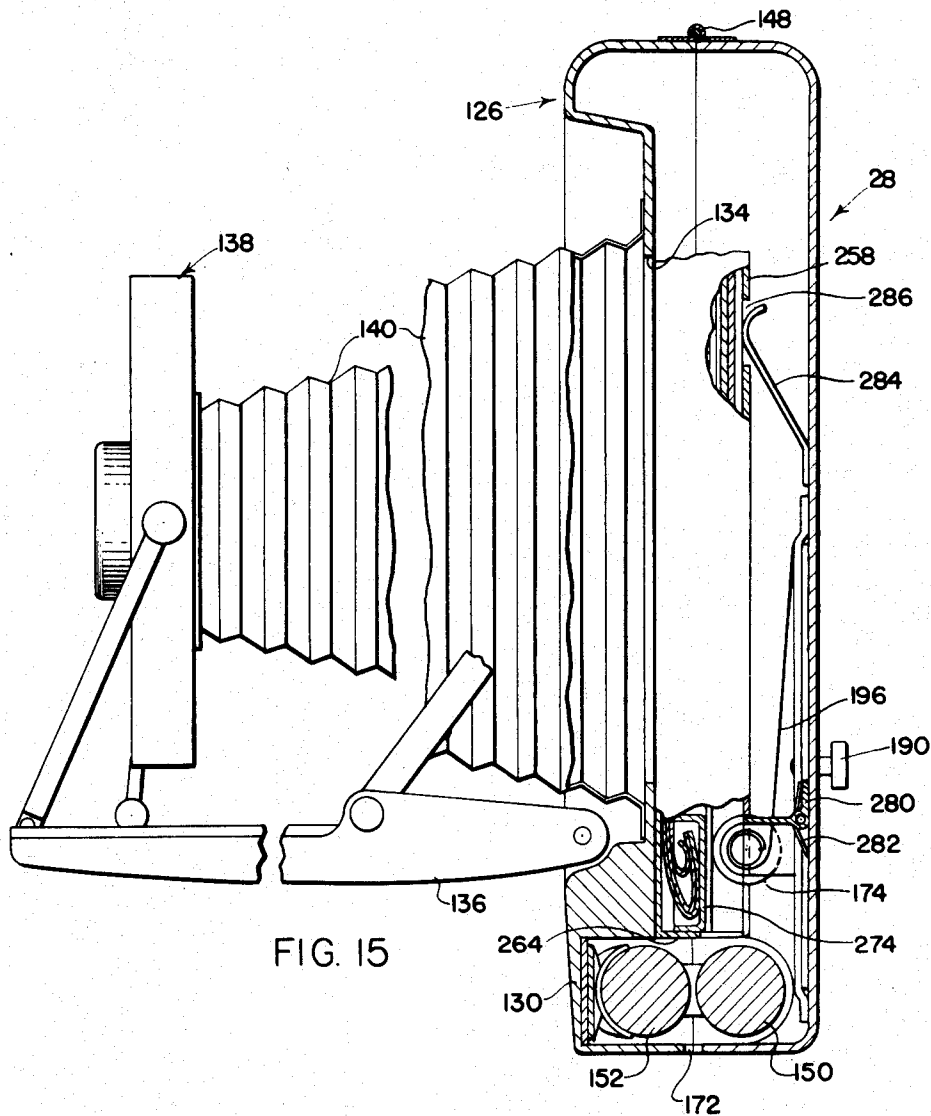
Oct. 3, 1961

V. K. ELORANTA
PHOTOGRAPHIC PRODUCTS

3,002,437

Original Filed July 16, 1958

9 Sheets-Sheet 7



INVENTOR.
Vaisto K. Eloranta
BY *Brown and McMillan*
Robert E. Corb
ATTORNEYS

Oct. 3, 1961

V. K. ELORANTA
PHOTOGRAPHIC PRODUCTS

3,002,437

Original Filed July 16, 1958

9 Sheets-Sheet 8

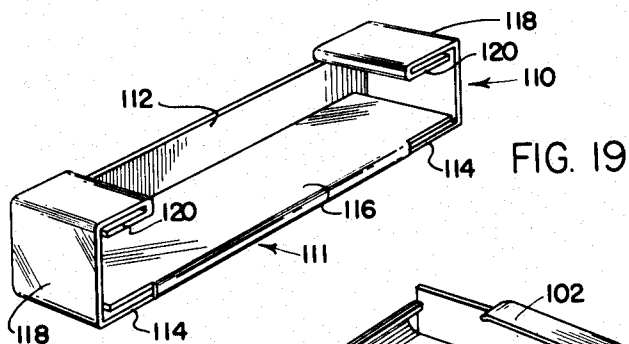


FIG. 19

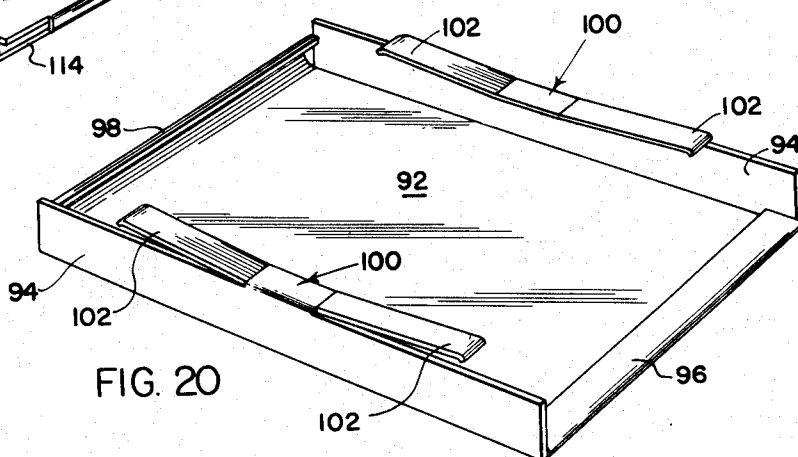


FIG. 20

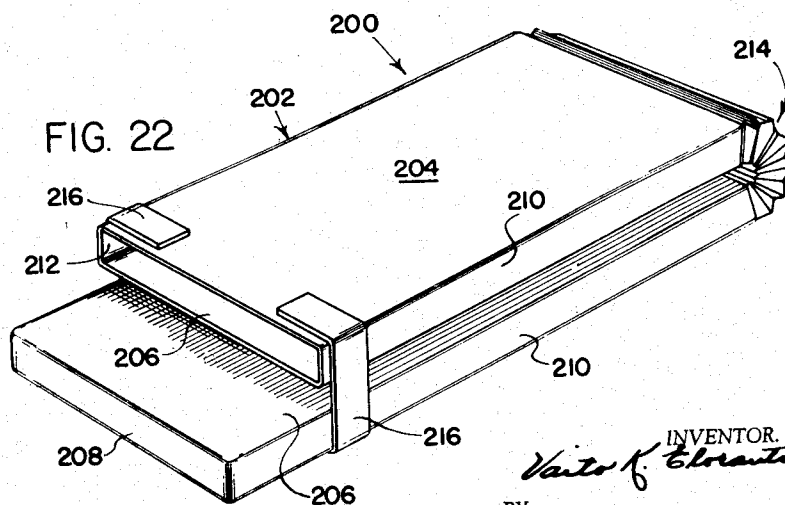


FIG. 22

INVENTOR.
V. K. Eloranta
BY
Robert F. Corb
ATTORNEYS

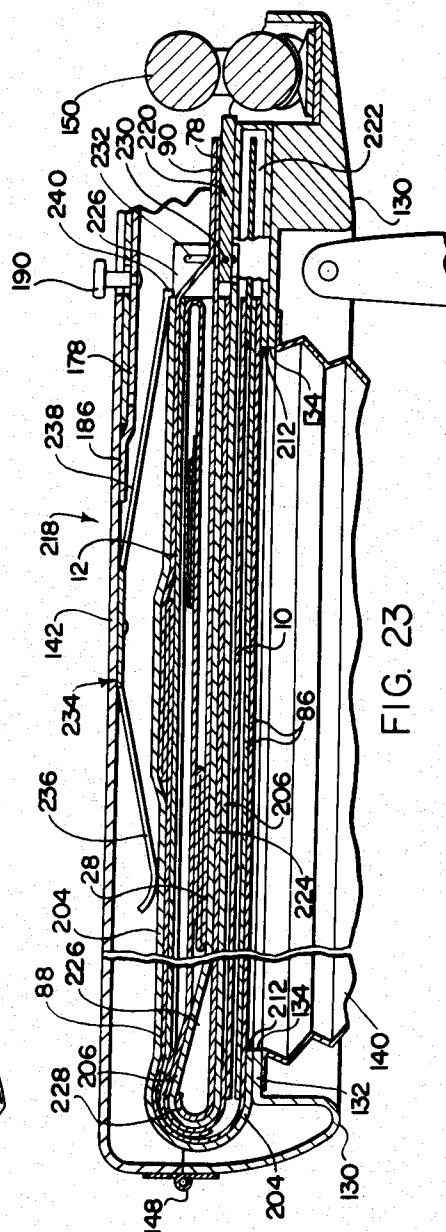
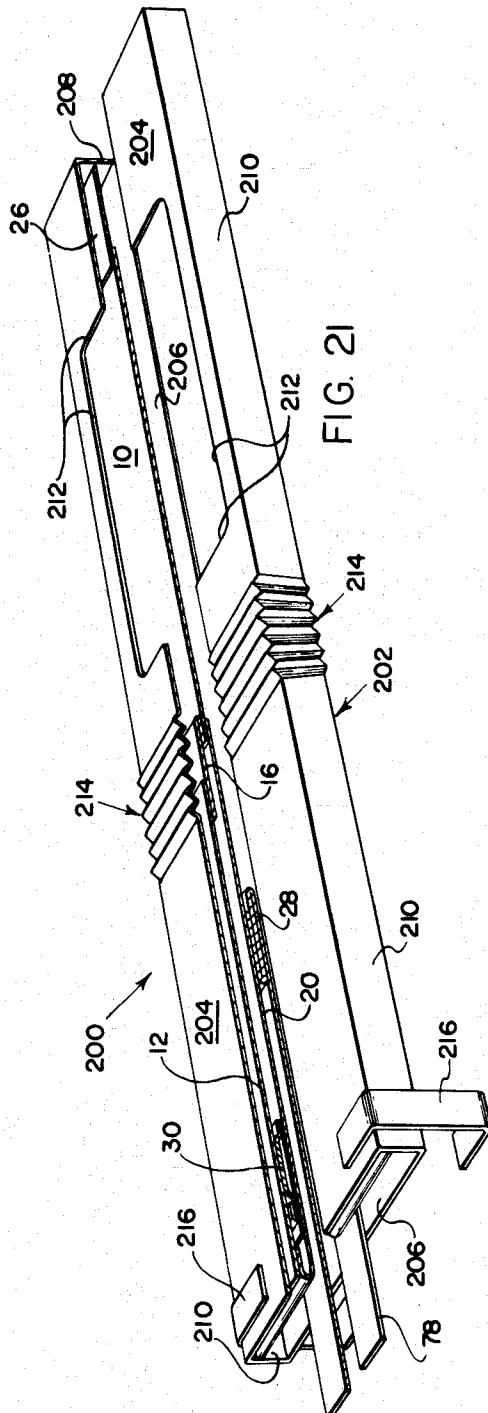
Oct. 3, 1961

V. K. ELORANTA
PHOTOGRAPHIC PRODUCTS

3,002,437

Original Filed July 16, 1958

9 Sheets-Sheet 9



INVENTOR.
V. K. Eloranta
BY *Brown and Mikulka*
Robert E. Corb
ATTORNEYS

1

3,002,437

PHOTOGRAPHIC PRODUCTS

Vaito K. Eloranta, Needham, Mass., assignor to **Polaroid Corporation**, Cambridge, Mass., a corporation of Delaware

Original application July 16, 1958, Ser. No. 749,024.
Divided and this application Aug. 25, 1960, Ser. No. 51,942

47 Claims. (Cl. 95—13)

This invention relates to novel photographic apparatus and products useful in said apparatus, and, more particularly, to apparatus adapted to effect the exposure and processing of photosensitive sheet materials, and photographic products including photosensitive materials and fluid compositions for processing said sheet materials.

A variety of forms of photographic apparatus have been proposed wherein a photosensitive sheet is exposed and processed by a fluid composition distributed between the photosensitive sheet and another sheet superposed therewith. Whether in the form of a camera, or a film pack or film pack holder intended to be employed in conjunction with a camera or other exposure means, such apparatus generally includes means for holding a photosensitive sheet for exposure, means, such as a pair of pressure-applying members, for distributing a processing fluid between the photosensitive sheet and another sheet superposed therewith, and means for effecting the movement of the sheets between the pressure-applying members. Generally, apparatus of the type with which the present invention is concerned is intended to be employed with a plurality or assemblage of film units, each comprising a photosensitive sheet, a second sheet and a container of fluid processing composition. The photosensitive sheet is exposed and thereafter processed by being moved in superposition with the second sheet between a pair of pressure-applying members for distributing the fluid processing composition between the sheets. A preferred arrangement for superposing the sheets and moving them between the pressure-applying members has been to provide a leader or leaders attached to each film unit and projecting from the apparatus whereby they may be grasped for moving the sheets comprising the film units within the apparatus and for drawing the film units between the pressure-applying members.

Objects of the invention are: to provide novel photographic apparatus for exposing and processing photosensitive elements of film units, each comprising a photosensitive element, a second element and a leader coupled with said elements, said apparatus comprising means for containing a plurality of said film units with said leaders contained completely within said apparatus and means for advancing a portion of each of said leaders, one at a time and in proper sequence, from said apparatus; to provide apparatus of the type described comprising a pair of pressure-applying members between which said film units are adapted to be withdrawn directly from said apparatus and means for feeding said leaders, one at a time, from said apparatus between said pressure-applying members; to provide apparatus as described comprising manually engageable means movable through a predetermined distance for moving a leader attached to a film unit through a substantially greater distance between a pair of pressure-applying members from said apparatus; and to provide apparatus as described characterized by its compactness, simplicity and inexpensiveness of construction and its ease and dependability of operation.

Other objects of the invention are: to provide photographic apparatus of the type described including means for containing a plurality of photosensitive sheets arranged in stacked relation and in position for exposure,

2

and a plurality of second sheets arranged in stacked relation apart from said photosensitive sheets and adapted to be superposed therewith, said means including a spacing element disposed between said photosensitive and second sheets and spring means for biasing said element so as to urge said photosensitive sheets into position for exposure; and to provide apparatus of the above type wherein said spring means includes means for engaging and retaining said second sheets within said apparatus during movement of another of said film units through and from said apparatus.

Further objects of the invention are: to provide a novel photographic film assemblage adapted to use in the apparatus of the invention and comprising a plurality of film units, each of which includes a photosensitive sheet, a second sheet and leader means connecting said sheets and means for enclosing said film units with said photosensitive sheets arranged in stacked relation for exposure, said second sheets arranged in stacked relation apart from said photosensitive sheets and each of said leader means being so disposed within said enclosure means that it can be partially withdrawn from said enclosure means without affecting the movement of said film unit which it comprises, and thereafter can be completely withdrawn for moving said photosensitive and second sheets of said film unit into superposition and from said enclosure means; to provide a film assemblage as described wherein said enclosure means comprises a cover sheet, for said photosensitive and second sheets, including means for withdrawing said cover sheet from said assemblage, and means for engaging edge portions of said assemblage; to provide film assemblages as described including means for separating said stacks of photosensitive and second sheets and urging said photosensitive sheets into position for exposure; to provide film assemblages as described wherein said means for urging said photosensitive sheets into position for exposure includes means for retaining said second sheets within said enclosure means during movement of one of said photosensitive sheets into superposition with one of said second sheets in response to withdrawal of one of said leader means from said assemblage; and to provide an assemblage of photosensitive and second sheets of the type described wherein said enclosure means of said assemblage comprises a single envelope folded upon itself to provide two sections for containing said photosensitive and second sheets in separated relation.

Still another object of the invention is to provide a novel photographic film unit adapted to use in the photographic apparatus of the invention and to be incorporated in the film assemblage of the invention, said film unit including a photosensitive sheet, a second sheet, leader means connecting said sheets, second leader means attached to the first-mentioned leader means for cooperating with the latter to move said photosensitive sheet from a position apart from said second sheet, in a plane generally parallel with said second sheet, into superposition therewith and moving both of said sheets between a pair of pressure-applying members.

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, and the product possessing the features, properties and the relation of components which are exemplified in the following detailed disclosure, and the scope of the application of which will be indicated 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 connection with the accompanying drawings wherein:

FIGURE 1 is a fragmentary, perspective view of a film unit embodying the invention;

FIG. 2 is a perspective view of one form of film pack comprising a plurality of film units shown in FIG. 1;

FIG. 3 is a longitudinal, sectional view of the film pack of FIG. 2 taken substantially midway between the sides;

FIG. 4 is a sectional view taken along the line 4—4 of FIG. 3;

FIG. 5 is a perspective view of one of the components of the film pack of FIG. 2;

FIGS. 6 and 7 are, respectively, plan and elevational views of another component of the film pack of FIG. 2;

FIG. 8 is a sectional view, taken substantially midway between the sides, of photographic apparatus in the form of a camera embodying the invention;

FIG. 9 is a sectional view taken along the line 9—9 of FIG. 8;

FIG. 10 is a sectional view taken along the line 10—10 of FIG. 8;

FIG. 11 is a perspective view of another form of film pack embodying the invention;

FIG. 12 is a longitudinal, sectional view of the film pack of FIG. 11 taken substantially midway between the sides;

FIG. 13 is a sectional view taken along the line 13—13 of FIG. 12;

FIG. 14 is a perspective view of a component of the film pack of FIG. 11;

FIG. 15 is a fragmentary sectional view taken adjacent one side through photographic apparatus in the form of a camera embodying the invention;

FIG. 16 is a perspective view of another form of film pack embodying the invention;

FIG. 17 is a longitudinal, sectional view of the film pack of FIG. 16 taken substantially midway between the sides;

FIG. 18 is a sectional view taken along the line 18—18 of FIG. 17;

FIG. 19 is a perspective view of a component of the film pack of FIG. 16;

FIG. 20 is a perspective view of another component of the film pack of FIG. 16;

FIG. 21 is a perspective view, partially in longitudinal section, of another form of assemblage of film units shown at one stage in its assembly;

FIG. 22 is a perspective view of the assemblage of FIG. 21; and

FIG. 23 is a fragmentary, sectional view of another form of a camera embodying the invention.

Generally, the photographic apparatus of the invention may be in the form of a camera, camera back, film pack, film pack holder or cassette adapted to be employed with a film pack or assemblage comprising a plurality of individual film units. The apparatus includes means for holding the film pack during exposure, means for feeding individual leaders attached to said film units from said apparatus in proper sequence whereby each leader may be grasped for withdrawing a film unit from the apparatus following exposure thereof, and means for effecting the processing of each film unit as it is withdrawn from the apparatus. The film pack or assemblage comprising the invention and adapted to be employed in said apparatus includes a plurality of film units, each comprising a photosensitive sheet, a second sheet adapted to be superposed with the photosensitive sheet following exposure thereof, a container of a fluid processing composition adapted to be distributed between the superposed photosensitive and second sheets to effect the processing thereof, and leader means for moving the photosensitive and second sheets into superposition and in engagement with means for distributing the processing fluid.

Reference is now made to FIGS. 1 and 3 of the drawings wherein there is illustrated a film unit 8 embodying

the invention. Film unit 8 comprises a first or photosensitive sheet 10 and a second or image-receiving sheet 12. The photosensitive sheet is generally rectangular and comprises a layer of photosensitive material carried on a suitable support. The photosensitive material may comprise any of the materials used in photography, including, for example, the silver halides or other photosensitive heavy metal salts having a developable latent image formed therein by exposure, the ferric salts and the diazonium compounds. The support for the photosensitive layer may comprise any of the flexible sheet materials generally used for film base including paper, plastics and the like, and is preferably opaque to light actinic to the photosensitive material, or it includes a layer which is opaque to actinic light. Second sheet 12 is at least coextensive in area with the area or frame of the photosensitive sheet to be exposed and also comprises a flexible sheet material such as paper, plastic and the like. The second sheet, in the form shown, is substantially coextensive in size with the photosensitive sheet and is also opaque to light actinic to the photosensitive material. While the second sheet may merely aid in the spreading of a fluid processing composition in a thin layer on the photosensitive sheet, in a preferred form of the film unit the second sheet is adapted to provide a support for a positive transfer image produced, for example, by a silver halide diffusion-transfer reversal process, such as described in U.S. Patents Nos. 2,543,181, issued February 27, 1951, and 2,662,822, issued December 15, 1953, both in the name of Edwin H. Land. The second sheet, accordingly, may comprise an image-receiving layer, such as described in the above-mentioned patents, carried on a flexible support sheet.

The photosensitive and second sheets are mounted on an elongated carrier sheet 14 formed of a flexible material such as paper, plastic and the like. Carrier sheet 14 is adapted to perform several functions, including providing a leader for connecting the photosensitive and second sheets, properly locating or registering the sheets relative to one another when the sheets are superposed, mounting a container of a fluid processing composition, cooperating in the spreading of the fluid in a layer of predetermined thickness between the photosensitive and second sheets, determining the area to be processed and the dimensions of the transfer image produced in the second sheet and collecting any excess processing fluid. Carrier sheet 14 comprises a trailing end section 16, a rectangular intermediate section 18 preferably coextensive with second sheet 12, a first tapered or convergent section 20 and a second tapered or convergent section 22, the latter two sections being adapted to function as leaders and for mounting a container of processing fluid. Image-receiving sheet 12 is mounted on intermediate section 18 with the receiving layer of sheet 12 located adjacent the carrier sheet. Intermediate section 18 is provided with a generally rectangular aperture 24 defining the area of the image-receiving sheet against which the fluid processing composition is spread and wherein a transfer image is produced. The lateral margins of intermediate section 18 adjacent the sides of aperture 24 cooperate in a manner to be described for confining the processing fluid between the sheets and for controlling the thickness of the layer of fluid spread between the sheets. Photosensitive sheet 10 is secured at its leading edge to the end edge of second tapered section 22 with the emulsion surface of the photosensitive sheet facing in the same direction relative to the carrier sheet as the image-receiving layer of second sheet 12. A trailer sheet 26 is provided attached to the trailing edge of photosensitive sheet 10 and is adapted to cooperate with trailing end section 16 of carrier sheet 14 for collecting and retaining excess processing fluid in a manner to be described hereinafter.

A narrow, elongated leader strip 28 is provided se-

5

cured to second tapered section 22 at the juncture of sections 20 and 22 substantially midway between the leading edge of second sheet 12 and the leading edge of photosensitive sheet 10. The first and second tapered sections of the carrier sheet are adapted to be folded at this point midway between the photosensitive and second sheets and the film unit is processed by drawing leader 28 and the tapered sections in superposed relation between means for applying compressive pressure to the film unit. The photosensitive and second sheets are thus registered with one another in superposed relation by drawing on leader 28 so as to cause the tapered sections to fold at a point intermediate the leading edges of the photosensitive and second sheets. As a means for overcoming any tendency of first tapered section 22 to peel from leader 28 where the leader and tapered section are attached, the two tapered sections 20 and 22 may be made somewhat longer than the minimum required and portions of the surfaces of the tapered sections opposite leader 28 on both sides of the fold or crease are adhered to one another.

The photosensitive and second sheets are adapted to be processed by a fluid composition carried in a rupturable container, designated 30, mounted on first tapered section 20. The container is formed substantially as shown in the above-mentioned U.S. Patent No. 2,543,181 and comprises a rectangular blank of fluid- and air-impervious sheet material folded longitudinally upon itself to provide two walls bonded together at their margins to form an elongated cavity for the processing fluid. The longitudinal seal is weaker than the end seals and is adapted to become unsealed in response to hydraulic pressure generated within the fluid contents of the container by the application of compressive pressure thereto. Container 30 is mounted on first tapered section 20 on the side thereof opposite second sheet 12 by a hinge strip 32. The container extends substantially from side to side of the carrier sheet and the liquid cavity thereof is preferably at least as wide as aperture 24 in the carrier sheet. Container 30 is mounted with the longitudinal edge, which is adapted to become unsealed, facing the second sheet and located adjacent the leading edge thereof.

Film unit 8, when assembled for exposure, is positioned with first and second tapered sections 20 and 22 folded at the first tapered section adjacent the leading edge of the second sheet against the image-receptive surface of the second sheet. Second tapered section 22 is folded adjacent the leading edge of photosensitive sheet 10 so that the latter is folded back against the first and second tapered sections with the emulsion surface of the photosensitive sheet facing in the same direction as the image-receptive surface of the second sheet. It will be noted that in this position of film unit 8 the photosensitive layer of the photosensitive sheet is located outermost so that it can be exposed. The image-receptive layer of the second sheet faces inwardly and the first and second tapered sections of the carrier sheet are disposed between the photosensitive and second sheets. Container 30, in this assembled position of the film unit, is disposed with the longitudinal edge, adapted to become unsealed, facing the trailing end of the second sheet and the leading end of the photosensitive sheet.

An assemblage of film units, in the form of a film pack 34, is illustrated in FIGS. 2 through 7 of the drawings. The film pack comprises a housing formed of a rear section 36 and a forward section 38 preferably adapted to fabrication from thin sheet metal. Rear section 36 includes a rear wall 40, side walls 42 and an end wall 44. Forward housing section 38 comprises a forward wall 46 having a rectangular exposure aperture 48, side walls 50, a trailing end wall 52 projecting from the forward wall by substantially the same amount as the side walls and a leading end wall 54 which projects from the forward wall by a lesser amount. The two housing sections are assembled together with side walls 50 of forward section 38 located between side walls 42 of rear

6

section 36. A lip 56 is provided on end wall 44 adapted to be folded over the trailing end of forward wall 46 for retaining the two housing sections in assembled position. In the assembled position of the housing sections there is formed a housing having a rectangular opening in its forward wall and a narrow slot or opening 58 in its leading end wall between the rear edge of leading end wall 54 and rear wall 40.

Mounted within the film pack housing is a substantially flat pressure plate 60 having dependent flanges 64 at its sides, a rolled end section 66 at its trailing end and a folded edge portion 68 at its leading end, the folded edge portion being provided for the purpose of adding structural stability to the pressure plate. The pressure plate is mounted within the housing with flanges 64 and rolled end section 66 extending toward rear wall 40 of the housing, and is so dimensioned that the pressure plate extends substantially from side to side and from end to end of the housing. A generally H-shaped spring 70 is provided secured to the rear wall of the housing for urging the pressure plate forward against the forward wall of the housing across aperture 48. Spring 70, in the form shown, comprises a pair of curved spring arms 72 extending toward the trailing end of the housing and the forward wall thereof and connected by a transverse member 74. Spring 70 also includes a pair of engagement arms 76 extending from transverse member 74 in a direction opposite spring arms 72 and constructed to perform a function which will be described in greater detail hereinafter. Spring arms 72 are adapted to bear against the rear of pressure plate 60, urging it toward the forward wall of the film pack housing.

Each film unit 8 of the film pack is disposed within the housing with the photosensitive sheet thereof located forward of the pressure plate between the pressure plate and the forward wall of the housing. The rectangular intermediate section 18 of each film unit 8 is bent around rolled end section 66 and the second sheet, first and second tapered sections and leader strip are disposed behind the pressure plate between it and the rear wall of the housing. A plurality of film units 8 are provided in the housing, each arranged in the same manner with the photosensitive sheets arranged in one stack in front of the pressure plate and the second sheets arranged in another stack behind the pressure plate. The photosensitive sheets extend across aperture 48 in position for exposure through the aperture and the second sheets are located between spring arms 72 and the pressure plate so that the force of the springs is transmitted to the pressure plate through the second sheets. It will be noted that the ends of spring arms 72 are so located with respect to tapered sections 20 and 22 that the spring does not bear against the tapered sections.

Each leader strip 28 is folded back upon itself toward the trailing end of the film pack and thence forward, so that only a relatively short portion of the leader strip projects beyond the leading edge of the second sheet from between the second sheet and the photosensitive sheet. This short leader portion, designated 78, of leader strip 28 projects from the housing through slot 58. The trailer sheets 26, attached to the trailing ends of the photosensitive sheets, are folded around and behind the trailing end of pressure plate 60 so as to lie between the latter and the second sheets and portions of the carrier sheet also disposed behind the pressure plate. Trailing end section 16 of each carrier sheet, which extends from the trailing end of each second sheet, is folded forward upon itself and is bent around the rolled end section 66 of the pressure plate so as to lie between the rolled end section and the trailing end wall of the housing.

A means is provided for precluding exposure of photosensitive sheets 10 by light entering the slot 58. In the form shown, this means comprises an elongated sheet 80 of a light-opaque material substantially equal in width to forward wall 46 and substantially longer than the forward

wall. Light-shielding sheet 80 is secured to the inner surface of forward wall 46, is provided with an aperture 82 coincident with aperture 48 in the forward wall, and includes a leading end section 84 disposed adjacent leading end wall 54 and extending rearward and between the portions of trailer sheets 26 folded around the leading end of pressure plate 60 and the second and carrier sheet stacked behind the pressure plate. The film pack assemblage also includes means for closing apertures 48 and 82 to prevent exposure of the photosensitive sheets through said apertures. This last-mentioned means comprises a pair of cover sheets 86 located in superposed relation across apertures 48 and 82 between the forward wall and the foremost photosensitive sheet 10. Cover sheets 86 are formed of a light-opaque sheet material, for example black paper, and both sheets are provided in superposed relation to preclude any chance of exposure of the foremost photosensitive sheet due to minute holes in the cover sheets. A leader 88 is provided connected to the leading end of the cover sheets located at the trailing end of the film pack. Leader 88 extends around the rolled end section of the pressure plate between the second elements and rear wall 40 of the rear housing section. Leader sheet 88 is folded back upon itself and includes a leading end section 90 projecting from the housing through slot 58. The fold in the leader sheet is provided to permit partial withdrawal of the leader sheet from the housing prior to movement of cover sheets 86 in response to withdrawal of the leader sheet.

The forward and rear housing section, the spring and the pressure plate should have some structural strength and rigidity and, accordingly, are preferably formed of sheet metal. The two housing sections are retained together at their leading ends by any suitable means such as tapes or by tabs 89 formed on the side walls 42 of the rear housing section.

Another form of film pack embodying the invention is illustrated in FIGS. 16 through 21. This film pack designated 91, is characterized by an assembly which eliminates the front and rear housing sections, thereby effecting a saving in the material required for the film pack housing. The film pack 91 comprises a pressure plate 92, similar in most respects to pressure plate 60, having two lateral dependent flanges 94, a rolled trailing end section 96, and a folded leading end section 98. Lateral flanges 94 include spring portions 100 which project inwardly toward one another and mount pairs of spring arms 102 extending generally parallel to flanges 94 and biased away from pressure plate 92. The arrangement of film units 8 and cover sheets 86 is essentially the same as the arrangement thereof in film pack 34. Instead of a housing, however, there is provided a U-shaped enclosure member 104 having two lateral portions 106 for engaging the sides of the film pack and a transverse end portion 108 for engaging the trailing end of the film pack. Enclosure member 104 comprises a strip of sheet metal having a U-shaped or channel-shaped cross section and is engaged around the side and the trailing end of the film pack. The film pack also includes a retaining member 110 formed of sheet metal and secured at the leading end of the film pack in engagement with the leading ends of lateral portions 106 for retaining the enclosure member in surrounding relation to the film pack. Retaining member 110 in the form shown comprises a single blank of sheet metal folded to form an L-shaped transverse member 111 having a forward portion 112 which extends in front of the leading edge portion of the film pack and, together with lateral portions 106 and end portions 108 of enclosure member 104, cooperates to define an aperture in the front of the film pack. Transverse member 111 includes an outer end wall portion 114 adapted to provide a leading end wall for the film pack. The transverse member includes an inner end wall portion 116 providing slots adapted to receive the leading end sections of lateral portions 106. Retaining member 110 also in-

cludes end sections 118 which extend rearward to the exterior of lateral portions 106 at the leading ends of the latter and thence toward one another at the rear of lateral portions 106. End sections 118 include folded sections 120 which are engaged around portions of the leading ends of lateral portions 106.

A rear wall is provided for the film pack assemblage by a rectangular panel 122 formed of a relatively rigid sheet material such as cardboard. Panel 122 is secured to leader sheet 88 and is disposed behind the second sheet within the enclosure formed by U-shaped member 104. When the film pack has been loaded into the camera or other apparatus which is to be employed, panel 122 may be withdrawn along with cover sheet 86 from the film pack by drawing on leader 88 and the leading end section 90 thereof. As previously noted, the pressure plate includes two pairs of spring arms 102 which project inwardly toward one another from lateral flanges 94 of the pressure plate. The second sheet of the film unit, together with panel 122, is disposed between spring portion 100 and the pressure plate so that spring arm 102 will bear against the inside of the channel-shaped lateral portions 106, thereby urging the pressure plate forward toward the front of the film pack so as to position the photosensitive sheet for exposure against the forward sides of channel-shaped lateral portion 106 and end portion 108 and forward portion 112 of transverse member 111. In still another alternative embodiment of film pack 91, the springs may be eliminated entirely and springs may be provided as elements of the camera or apparatus in which the film pack is intended to be employed.

Reference is now made to FIGS. 8 through 10 of the drawings wherein there is shown photographic apparatus embodying the invention and adapted for employing film packs of the type described. The apparatus may be in the form of a cassette, film pack adapter or film pack holder for use with a camera or, as shown, in the form of a camera 124 comprising a forward housing section 126 and a rear housing section 128. Forward housing section 126 includes a forward housing wall 130 having a recessed section 132 including an aperture 134 through which exposures can be effected. A hinged forward wall 136 is provided for covering recessed section 132 and mounting a conventional lens and shutter assembly 138, the latter being connected to recessed section 132 by a collapsible bellows 140 secured at one end to the lens and shutter assembly and secured at its rear end to the recessed section around aperture 134. In lieu of forward wall 136, lens and shutter assembly 138 and the bellows 140, the forward and rear housing sections of the apparatus may be constructed in the form of a camera back or film pack adapter intended to be mounted on and coupled with the back of a camera.

Rear housing section 128 includes a rear wall 142 which cooperates with forward housing section 126 to provide a chamber 144 behind aperture 134 for containing a film pack, of the type described, in position for exposure across aperture 134. This film pack, for example that designated 34 and shown in FIG. 2, is adapted to be mounted in chamber 144 with forward wall 46 of the pack against the rear surface of recessed section 132 and with aperture 48 in alignment with aperture 134. Resilient means such as pads 146 may be provided on rear wall 142 for holding the film pack against recessed section 132 of forward wall 130. Rear housing section 128 is preferably pivotally mounted on forward housing section 126 adjacent one end of the housing, herein shown and designated for purposes of description as the upper end of the housing, by hinge 148, thereby permitting the separation of the two housing sections for loading of a film pack into chamber 144. Suitable latch means (not shown) of conventional type are provided at the opposite (lower) end of the housing for retaining the two housing sections

together in the closed or operative position shown in the drawings.

The film units comprising the film pack are adapted to be exposed and thereafter processed by being withdrawn from the camera between a pair of pressure-applying members for distributing a processing fluid between the photosensitive and second sheets of each film unit. Camera 124, accordingly, comprises a pair of pressure-applying members in the form of elongated rolls 150 and 152 comprising a pressure-applying device mounted within the housing adjacent the lower end thereof. Pressure-applying rolls 150 and 152 are mounted for pivotal movement in juxtaposition with their axes in a common plane and are biased toward one another for applying compressive pressure to the sheets of a film unit as said film unit is drawn therebetween. As a means for mounting pressure-applying rolls 150 and 152, there is provided a generally U-shaped support member 154 having a pair of parallel arms 156 joined by a connecting member 158. Each of arms 156 includes a keyhole-shaped slot 160. Roll 150 is provided with stub shafts 162 at its ends rotatably journaled in bushings 164 engaged in slots 160. Roll 152 is mounted in a similar manner for rotation about stub shafts 166 extending from its ends and journaled in bushings 168 engaged in slots 160. A spring 170 is provided mounted intermediate its ends on connecting member 158 between the latter and roll 152 with its ends in engagement with bushings 168 for urging roll 152 toward roll 150.

Spreading of the processing fluid from a container 30 between a photosensitive sheet 10 and second sheet 12 is effected by advancing the sheets in superposition between rolls 150 and 152 commencing with the leading end portions of the sheets in the region of the container. In order to insure spreading of the fluid in a layer of predetermined depth completely over the area of the second sheet bordered by aperture 24, the amount of fluid usually provided in container 30 is in excess of that required for the layer of fluid. Trailing end section 16 and trailer sheet 26 are adapted to cooperate with rolls 150 and 152 for collecting and retaining any excess fluid spread from between the trailing ends of the photosensitive and second sheets. This is accomplished by constructing the pressure-applying rolls and bushings 164 and 168 so that the bushings engage one another and retain the rolls spaced apart from one another by a fixed minimum amount providing a gap between the rolls having a depth substantially greater than the combined thickness of the trailing end section 16 and trailer sheet 26. By virtue of this arrangement, as the trailing end section and trailer sheet move between the rolls, a space is provided between the trailing end section and trailer sheet in which excess fluid may be collected and retained. The minimum depth of the gap between rolls 150 and 152 is approximately equal to the combined thicknesses of photosensitive sheet 10, second sheet 12 and the layer of fluid to be spread therebetween.

As previously noted, trailing end section 16 is folded back upon itself to form two adjacent portions which cooperate to function in the manner of a container for collecting and retaining any excess processing fluid. As the photosensitive and second sheets are drawn between the pressure-applying members, the folded sections of trailing end section 16 tend to remain spaced apart slightly so that any excess processing fluid enters between the two folded sections and is retained therein as the folded sections move between the pressure-applying members, in spite of any application of compressive pressure to the folded sections by the pressure-applying members. This form of trapping means finds particular utility where the minimum gap between the pressure-applying members is small so that the spacing between the trailing end section 16 and trailer sheet 26 is also small and might prove insufficient to retain all of the excess fluid squeezed

from between the trailing ends of the photosensitive and second sheets.

It has been found that the fluid processing composition is spread by the pressure-applying members between the sheets along a front shaped in the form of a tongue so that only the intermediate portions of trailing end section 16 and trailer sheet 26 (trapping sheets) perform a trapping function. Means may be provided in the apparatus camera for causing the fluid to be advanced, during spreading, along a front which more closely approximates a straight line perpendicular to the direction of spreading of the fluid. In this way the entire width of the trapping sheets is utilized allowing the trapping sheets to be made shorter and still provide the requisite trapping space. The means for accomplishing this more uniform spreading comprises a second, or auxiliary, pair of pressure-applying members. The pressure-applying members of the second pair are biased toward one another so as to exert insufficient pressure to rupture the container of processing fluid. Rupture of the container and spreading of the fluid is accomplished by the primary pair of pressure-applying members while the second pair function to restrict the spreading of the fluid in the region of the mid-portion of the sheets and are so constructed as to exert pressure primarily on the mid-portion of the sheets.

Pressure-applying rolls 150 and 152, support member 154 and their associated elements comprise a unit mounted on forward housing section 126 between forward wall 130 and rear wall 142 adjacent the lower end of the camera housing. An opening 172 is provided in the lower end of the housing in alignment with the gap between the pressure-applying rolls to permit movement of the sheet materials between the rolls and from the camera.

The film pack, mounted within the camera, is positioned for exposure and disposed entirely within the camera with leaders 78 and 90 located within the camera on the inside of rolls 150 and 152. The camera, accordingly, includes means for advancing leaders 78 and 90, one at a time, between the pressure-applying rolls from the camera through opening 172 in the lower end of the camera housing where the leaders may be grasped for drawing cover sheets 86 and the film units from the camera between the pressure-applying rolls. In order to maintain the overall size of the camera as small as possible, the spacing between the pressure-applying rolls and the lower or leading end of the film pack is kept to a minimum and is, in fact, substantially less than the length of the leader advanced between the rolls from the camera through passage 172. Accordingly, the means for advancing the leaders, and which engage the leaders at a position intermediate the pressure-applying rolls and the film pack, are movable in engagement with the leaders through a distance which is substantially less than the distance that the leaders are moved.

The leader advancing means are manually operable from the exterior of the camera and, in the form shown, comprise a pair of rolls 174 having friction-generating surfaces adapted to engage the leaders while rolls 174 are simultaneously moved downward toward pressure-applying rolls 150 and 152 and are rotated (counterclockwise). Rolls 174 are mounted adjacent rear wall 142 between the lower or leading end of the film pack and pressure-applying rolls 150 and 152 are adapted to be displaced toward the front of the camera for engaging and advancing the leaders. To facilitate engagement of the leaders there is provided a backing member located in front of the leaders and against which rolls 174 are adapted to act. Rolls 174 are formed of a material having a high coefficient of friction such as rubber, while the leaders, being formed of paper, and the rear surface of backing member 176 have a relatively lower coefficient of friction so the rolls can engage and move

the rearmost leader relative to any remaining leaders and to the backing member.

As a means for mounting and rotating rolls 174, there is provided a support plate 178 preferably formed of a resilient sheet material such as sheet metal. Support plate 178 is elongated and generally rectangular in shape and includes a pair of upstanding support brackets 180 on one end extending parallel to one another toward the front of the camera housing for mounting rolls 174. Rolls 174 are secured to the end of a shaft 182 mounted for rotation on support brackets 180 with the rolls disposed outside of the brackets and the peripheries of said rolls projecting forward of the brackets. Support plate 178 is secured at its end opposite rolls 174, to a slide plate 184 mounted for sliding or reciprocating rotating movement against the inner surface of rear wall 142 by a retaining plate 186. Slide plate 184 is wider than support plate 178 and is engaged at its edges between rear wall 142 and portions of retaining plate 186 surrounding a slot 188 in the retaining plate. Retaining plate 186 is so formed and slot 188 is so dimensioned as to permit support plate 178 to extend through slot 188 and be reciprocated in the direction of the ends of the camera housing.

Support plate 178 is normally positioned with its lower end (mounting rolls 174) against slide plate 184 and, being resilient, can be deformed forward away from the slide plate for moving rolls 174 toward backing member 176 and into engagement with leaders located between the rolls and backing member. A manually engaged button 190 is secured to support plate 178 and projects rearward from the housing through an opening 192 in slide plate 184 and a slot 194 in rear wall 142. Button 190 is adapted to be engaged and pressed inward and downward for simultaneously deforming support plate 178 so as to move rolls 174 forward toward member 176 into engagement with leaders and for moving the support plate and rolls downward toward rolls 150 and 152 with rolls 174 held in engagement with a leader.

As a preferred means for rotating rolls 174 in a counterclockwise direction as said rolls are moved downwardly toward rolls 150 and 152 in engagement with a leader held against backing member 176, there is provided a negator spring 196 secured at one end to shaft 182, coiled around the shaft in a counterclockwise direction and secured at its other (upper) end with respect to rear wall 142, preferably on retaining plate 186 above rolls 174. By virtue of this arrangement, as shaft 182 and rolls 174 are displaced downwardly relative to the camera housing, negator spring 196 is caused to uncoil, imparting a counterclockwise rotary movement to the rolls. The negator spring performs the additional function of returning rolls 174 upward to their initial position when button 190 is released by virtue of the tendency of the negator spring to recoil itself.

An alternate arrangement (not shown) for rotating rolls 174 as they are displaced downwardly and returning the rolls from their displaced position may comprise a flexible connecting element such as a wire cord or the like, fixed at one end to the camera housing at a position above rolls 174. A section of the flexible element intermediate its ends is coiled around shaft 182 in a counterclockwise direction and is secured to the shaft. The element is connected at its other end to an extension spring which is in turn connected to the upper end of support plate 178. In this arrangement, as the rolls are moved downward, the portion of the connecting element between the fixed end and the point of attachment to shaft 182 and which is wound around the shaft unwinds from the shaft, rotating the shaft and rolls. A portion of the connecting element between the shaft and the spring is coiled on the shaft and the spring is tensioned so that, when button 190 is released, the spring returns the rolls from their displaced position.

Camera 124, when loaded with a film pack such as film pack 34, is adapted to be employed for making photographs by first engaging button 190 and pressing the button

inward and downward for advancing leader 90 connected to cover sheets 86 between pressure-applying rolls 150 and 152 through passage 172 from the camera. Leader 90 may then be grasped for drawing cover sheets 86 around the end of pressure plate 60, from the film pack, between the pressure-applying rolls, and from the camera. Each film unit is processed following exposure in a similar manner. The operator engages button 190, pressing it inward and downward for advancing a leader 78 between the pressure-applying rolls from the camera, so that the leader may be grasped for drawing the photosensitive sheet 10 around rolled end section 66 of pressure plate 60 into superposition with the corresponding second sheet 12, and then drawing the photosensitive and second sheets in superposition between the pressure-applying rolls from the camera. During movement of second tapered section 22 and then the photosensitive sheet around the trailing end of the pressure plate and into superposition with the second sheet, first tapered section 20 is required to roll upon itself, this action being facilitated by virtue of the taper of the two sections and by creasing or prefolding the carrier sheet along a transverse line at the junction of sections 20 and 22.

As cover sheets 86 or a photosensitive sheet 10 are being drawn around the end of pressure plate 60 and behind the pressure plate from the film pack, frictional forces may be exerted by the moving sheets on the sheets remaining in the pack, tending to move the second sheets 12 contained in the pack from the pack toward the pressure-applying rolls. Means are provided for preventing movement of the second sheets through opening 58 from the pack and, in the form shown, this means comprises short dependent flanges 198 on the ends of engagement arms 76. Engagement arms 76 extend through opening 58 in the leading end of the film pack and flanges 198 project toward the front of the film pack so as to engage the leading edge of the rearmost second sheet 12 and prevent movement of the rearmost second sheet through opening 58 from the film pack. Engagement arms 76 extend on opposite sides of leaders 90 attached to the film units so as not to interfere with movement of the leaders and so as to engage the leading end of the rearmost second sheet during movement of the leaders through opening 58. When the photosensitive sheet of a film unit has been drawn into superposition with the second sheet of the same film unit, which second sheet is the rearmost second sheet of the pack, the two sheets are drawn through opening 58, deflecting the free ends of engagement arms 76.

Reference is now made to FIGS. 11 through 14 of the drawings wherein there is shown another form of film pack, designated 250, embodying the invention and comprising a housing or container 252 adapted to be fabricated from stiff paper or cardboard, and having, as its only metal part, a pressure plate 254 formed of thin sheet metal. Container 252 is generally parallelepiped in shape, having a rectangular forward wall 256 and a rear wall 258, both substantially equal in width to film unit 8 and equal in length to the portion of film unit 8 comprising photosensitive sheet 10 and trailer sheet 26 or the portion comprising second sheet 12 and portion 78 of leader 28 projecting beyond the leading end of the second sheet. Forward and rear walls 256 and 258 are joined together by side walls 260 and a trailing end wall 262 to form a container open at its leading end. A leading end wall 264 is provided joined to forward wall 256 and extending toward rear wall 258 across the open leading end of container 252 for partially closing the leading end of the container. Container 252 is preferably formed from two blanks of relatively stiff sheet material such as cardboard, with side walls 260 and end wall 262 comprising overlapping portions of the two blanks. End wall 264 preferably comprises a flap on the leading end of the panel of the blank comprising forward wall 256 and is folded across the open leading end of the container after a plurality of film units 8 and pressure plate 254 have been loaded into the container. The flap

comprising leading end wall 264 is held in place by tabs 266 secured to side walls 260. Forward wall 256 is provided with a rectangular exposure aperture 268 through which photosensitive sheets positioned within the container are adapted to be exposed.

Pressure plate 254 is substantially rectangular in shape, being approximately equal in width to film units 8 and including rearwardly extending lateral flanges 270, a rolled end section 272 at its trailing end between lateral flanges 270 and a step or raised section 274 at its leading end having a substantially flat support surface and a generally U-shaped cross section. Pressure plate 254 is mounted within container 252 with flanges 270 disposed against side walls 260 and extending toward rear wall 258 and step 274 located adjacent leading end wall 264. A plurality of film units 8 are mounted within container 252 in essentially the same manner as in film pack 34 with photosensitive sheets 10, located between pressure plate 254 and forward wall 256, in alignment with exposure aperture 268 and with second sheets 12 and the leaders dispersed behind the pressure plate between it and rear wall 258. Trailer sheets 26 are disposed in a recess 276 formed by the forward side of step 274, while portions 78 of leaders 28 are located within the container supported on the rear surface of step 274 between the latter and rear wall 258. Film pack 250 also includes cover sheets 86 located across aperture 268 in closing relation thereto and a leader 88 having a leading end section 90 also supported on step 274.

A portion of photographic apparatus, such as a camera adapted for employing film pack 250, is illustrated in FIG. 15 of the drawings and includes pressure-applying means and leader means substantially as shown and described in connection with camera 124. This apparatus differs from camera 124, however, in regard to the means for supporting the leaders for engagement with rolls 174, this last-mentioned means being a part of the film pack instead of the camera; and with regard to the spring for urging pressure plate 254 and the photosensitive sheets forward into position for exposure and the means for engaging and retaining the leading ends of the second sheets in the film pack during withdrawal movement of a leader from the film pack, the last-mentioned means comprising elements of the camera rather than the film pack.

To permit rolls 174 to engage leaders supported on the rear surface of step 274, rear wall 258 is provided with a generally U-shaped recess or cut-away section 278 in the region of rear wall 258 overlying step 274. A pair of L-shaped engagement members 280 are provided pivotally mounted at the intersection of the arms of each of said members on rear wall 142 at opposite sides of rolls 174. Each of engagement members 280 is mounted with one arm extending forwardly toward step 274 and with the other arm extending upwardly adjacent rear wall 142 for positioning the first-mentioned arm. Means such as tension springs 282 are provided for urging engagement members 280 in a clockwise direction (viewing FIG. 15) into the operative position shown. The forwardly extending arms of members 280 are adapted to engage the leading edge of the rearmost film unit adjacent opposite sides of leaders 90 and portions 78 for preventing movement of the second sheets during withdrawal movement of a leader.

A pair of springs 284 are provided mounted at their ends on rear wall 142 adjacent the sides of the camera housing. The free ends of springs 284 are adapted to extend forwardly for engaging flanges 270 of the pressure plate 254 of a film pack 250 mounted within the camera housing for urging the pressure plate forward. To permit engagement of the flanges of the pressure plate by springs 284, openings 286 are provided in the lateral edge portions of film pack 250 extending through rear wall 258 and side walls 260. A relatively flexible sheet material, such as black paper, plastic, cloth or the like,

may be provided for covering openings 286 to prevent the admission of light through the openings into the film pack.

Still another form of film pack 200 embodying the invention is illustrated in FIGS. 21 and 22 of the drawings and comprises a plurality of film units 8, cover sheets 86 and a container or envelope 202 for enclosing the film units and cover sheets. The construction of film pack 200 is such as to eliminate the necessity for a rigid container or housing, a pressure plate and springs for biasing the pressure plate, these elements being provided as part of the apparatus in which the film pack is adapted to be exposed and processed. Envelope 202 is substantially equal in length and width to film unit 8 as shown in FIG. 1, that is, equal in length to the portion of the film unit including first and second tapered sections 20 and 22, photosensitive sheet 10 and trailer sheet 26 and adapted to be positioned for exposure in front of the pressure plate. Envelope 202, in the partially assembled form of the film pack shown in FIG. 21, comprises a first rectangular panel 204, a second rectangular panel 206, and a trailing end panel 208 and side panels 210 connecting the first and second panels to form a container open at one end, the open end being designated the leading end.

Envelope 202 comprises two sections, the first or leading end section including the open end of the container being approximately equal in length to the portion of film unit 8 including second sheet 12, and adapted to contain the second sheets of a plurality of film units. The second or trailing section is substantially longer than the first section, being approximately equal in length to a photosensitive sheet and trailer sheet 26, and is adapted to contain the photosensitive and trailer sheets of a plurality of film units. A rectangular exposure aperture 212 is provided in the portion of first panel 204 comprising the second section of envelope 202 whereby photosensitive sheets positioned within the second section may be exposed. The first and second envelope sections are joined by an intermediate section 214 wherein first panel 204 and side panels 210 are provided with expansible pleats, or folds, which permit folding of the first and second sections at intermediate section 214 back upon one another (as shown in FIG. 22), so that the two sections of second panel 206 are disposed innermost adjacent one another and the first and second sections of first panel 204 are disposed outermost.

Film pack 200 is assembled by introducing a plurality of film units 8 into envelope 202 in stacked relation with trailer sheets 26 located at the trailing end of the envelope against end panel 208 and photosensitive sheets 10 underlying exposure aperture 212. A pair of cover sheets 86 are introduced along with the film units so as to close exposure aperture 212. The second sheets and the leaders of the film units and cover sheets are disposed within the first section of the container with the leading end portions of the leaders projecting through the open end of the container. The container is then folded upon itself at intermediate section 214 so that the two sections of first panel 204 located outermost and with a portion of the second section of the container, which is longer than the first section of the container because of the necessity for accommodating trailer sheets 26, extend beyond the leading open end of the first section of the container. Suitable means, such as tapes 216, are provided for joining the two sections of the container adjacent the open end of the container and at the lateral margins of the two sections, for retaining the two sections in the folded, assembled position with a space between the first and second container sections.

It will be noted that, except for the trailer sheets, the film units in the assembled pack 200 are arranged in substantially the same positions as they are in pack 34, shown in FIG. 3. The photographic apparatus in which pack 200 is adapted to be employed includes a spring and pressure plate, the pressure plate being adapted to be posi-

tioned between the first and second sections of the container and the spring being adapted to act against panel 204 of the first section of the container. Photographic apparatus of this type is illustrated in FIG. 23 of the drawings in the form of a camera 218, similar, insofar as the exposure means, pressure-applying means and leader-advancing means are concerned, to camera 124, shown in FIG. 8. Camera 218 includes a backing member 220 against which rolls 174 operate, and a space 222 is provided between backing member 220 and forward wall 130 adapted to receive and hold the trailing end portion of the second section of container 202.

A pressure plate 224, having lateral flanges 226 projecting rearwardly at its edges and a rolled end portion 228 at its upper end, is provided in chamber 144. Pressure plate 224, similar in most respects to pressure plate 60, is mounted for pivotal movement at its lower end on pins 230 secured in backing member 220 and projecting into slots 232 in the lower ends of flanges 226. This mounting arrangement not only permits the pressure plate to be pivoted about pins 230 but allows for movement of the pressure plate toward and away from recessed section 132. A generally H-shaped spring 234, similar to spring 70, is mounted within chamber 144 on rear wall 142. Spring 234 includes a pair of spring arms 236 extending upwardly and forwardly and a pair of engagement arms 238 extending downwardly and forwardly toward the upper end of backing member 220.

Film pack 200 is adapted to be loaded into camera 218 by removing the rear housing section and pivoting the free end of pressure plate 224 outward so that the film pack can be slipped over the pressure plate so that the two sections of envelope 202 are disposed on opposite sides of the pressure plate and rolled end portion 228 thereof is located against the inside of folded intermediate section 214 of envelope 202. The pressure plate is then pivoted forward so that the second section of the container, including the photosensitive sheets, is disposed between the pressure plate and recessed section 132 with exposure aperture 212 of the container coincident with exposure aperture 134 in recessed section 132. The first section of the container is located behind the pressure plate and the rear housing section 128 is then moved to a closed position so that spring arms 236 bear against the film pack, urging the pressure plate and photosensitive sheets forward against recessed section 132 into position for exposure.

As a means for preventing movement of the rearmost second sheet from envelope 202 toward the pressure-applying rolls during withdrawal of a leader from the envelope and during movement of a photosensitive sheet 10 from the second section of the envelope into the first section of the envelope into superposition with the rearmost second sheet, engagement arms 238 of spring 234 are provided with short, forwardly projecting flanges 240 adapted to engage the leading edges of the second sheets and function in a similar manner to flanges 198, previously described in connection with the construction and operation of camera 124.

This application is a division of my copending application Serial No. 749,024, filed July 16, 1958.

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

What is claimed is:

1. A photographic product comprising a photosensitive sheet including a frame adapted to be exposed within photographic apparatus, a second sheet having an area approximately coextensive with said frame and adapted to be superposed therewith for aiding in the distribution of a fluid processing composition between said frame and area, a connecting element at least equal in length to said

second sheet, said connecting element being joined at its ends to the leading ends of said photosensitive and second sheets, and a leader attached to said connecting element intermediate said leading ends of said sheets, said connecting element being folded adjacent said leading end of said second sheet into superposed relation with said second sheet, said photosensitive and second sheets being disposed with the leading end of each of said sheets located adjacent the trailing end of the other and with said connecting element located between said photosensitive and second sheets, said leader being attached to said connecting element between the latter and said photosensitive sheet and extending therebetween, from its point of attachment to said connecting element, toward said leading end of said photosensitive sheet and being folded upon itself so as to extend from between said photosensitive sheet and said connecting element and said second sheet at the leading end of said second sheet.

2. The photographic product of claim 1 wherein said photosensitive sheet comprises a photosensitive material selected from the class consisting of the heavy metal salts, ferric salts and diazonium compounds and said second sheet comprises a material for receiving a transfer image resulting from treatment of said photosensitive sheet following exposure thereof by a fluid processing composition distributed between said photosensitive and second sheets.

3. A photographic product comprising a photosensitive sheet including a frame adapted to be exposed within photographic apparatus, a second sheet having an area at least coextensive with said frame and adapted to be superposed therewith for aiding in the distribution of a fluid processing composition between said frame and area, a connecting sheet at least equal in length to said second sheet, said connecting sheet being joined at its ends to the leading ends of said first and second sheets, a portion of said connecting sheet being creased along a transverse line intermediate said leading ends of said photosensitive and second sheets, and a leader attached to said connecting sheet at said creased portion, said connecting sheet being folded adjacent said leading end of said second sheet into superposed relation with said second sheet, said photosensitive and second sheets being disposed with the leading end of each of said sheets located adjacent the trailing end of the other and with said connecting sheet located between said photosensitive and second sheets, said leader being attached to said connecting sheet between the latter and said photosensitive sheet and extending therebetween, from its point of attachment to said connecting sheet, toward said leading end of said photosensitive sheet and being folded upon itself so as to extend from between said photosensitive sheet and said connecting and second sheets at the leading end of said second sheet.

4. The photographic product of claim 3 wherein said photosensitive sheet comprises a photosensitive material selected from the class consisting of the heavy metal salts, ferric salts and diazonium compounds, and said second sheet comprises a material for receiving a transfer image resulting from treatment of said photosensitive sheet following exposure thereof by a fluid processing composition distributed between said photosensitive and second sheets.

5. The photographic product of claim 3 wherein said connecting sheet is creased along a transverse line substantially midway between the leading edge of said frame of said photosensitive sheet and the leading edge of said area of said second sheet.

6. The photographic product of claim 3 wherein said connecting sheet is substantially equal in width to said photosensitive and second sheets in the end regions of said connecting sheet at which it is joined to said photosensitive and second sheets, and the sides of said connecting sheet taper from said end regions toward the line at which said connecting sheet is creased.

7. The photographic product of claim 3 wherein said leader is attached to a portion of said connecting sheet adjacent said transverse line on the side thereof closest said leading end of said photosensitive sheet, and said portion and a corresponding portion of said connecting sheet on the opposite side of said transverse line are folded along said line into contact with one another and are adhered together in face-to-face contact.

8. A photographic product comprising a photosensitive sheet including a substantially rectangular frame surrounded by a border and adapted to be exposed within photographic apparatus, a second sheet having an area approximately coextensive with said frame surrounded by a border and adapted to be superposed with said frame for aiding in the distribution of a fluid processing composition between said frame and area, a connecting sheet at least equal in length to said second sheet and being joined at its ends to the leading ends of said photosensitive and second sheets; and a leader attached to said connecting sheet substantially midway between the leading edges of said frame and area, said connecting sheet being folded adjacent the leading end of said second sheet into superposed relation with said second sheet, said connecting sheet being folded adjacent said leading end of said photosensitive sheet, said photosensitive and second sheets being disposed with the leading end of each of said sheets located adjacent the trailing end of the other and with said connecting sheet located between said photosensitive and second sheets, said leader being attached to said connecting sheet between the latter and said photosensitive sheet and extending therebetween, from its point of attachment to said connecting sheet, toward said leading end of said photosensitive sheet and being folded upon itself so as to extend between said photosensitive sheet and said connecting and second sheets at the leading end of said second sheet.

9. A photographic product comprising a photosensitive sheet including a frame adapted to be exposed within photographic apparatus, a second sheet having an area approximately coextensive with said frame and adapted to be superposed therewith for aiding in the distribution of a fluid processing composition between said frame and area, a connecting element at least equal in length to said second sheet, said connecting element being joined at its ends to the leading ends of said photosensitive and second sheets, a leader attached to said connecting element intermediate said leading ends of said sheets, said connecting element being folded adjacent said leading end of said second sheet into superposed relation with said second sheet, and a rupturable container of said fluid processing composition attached to said connecting element between the latter and said second sheet at a location on said connecting element intermediate the point of attachment of said leader to said connecting element and said leading end of said second sheet, said photosensitive and second sheets being disposed with the leading end of each of said sheets located adjacent the trailing end of the other and with said connecting element located between said photosensitive and second sheets, said leader being attached to the surface of said connecting element opposite said container and extending between said connecting element and said photosensitive sheet, from the point of attachment of said leader to said connecting element, toward said leading end of said photosensitive sheet and being folded upon itself so as to extend in the opposite direction from between said photosensitive sheet and said connecting element and said second sheet at the leading end of said second sheet.

10. The photographic product of claim 9 wherein said fluid processing composition within said container comprises an agent capable of reacting with the photosensitive material of said photosensitive sheet following exposure thereof to effect the formation of a visible photographic image.

11. The photographic product of claim 9 wherein said

photosensitive sheet comprises a photosensitive material selected from the class consisting of the heavy metal salts, ferric salts and diazonium compounds, and said fluid processing composition within said container includes an agent capable of reacting with said photosensitive material following exposure thereof to effect the formation of a visible photographic image.

12. The photographic product of claim 11 wherein said fluid processing composition includes an agent capable of reacting with said photosensitive material to produce transferable image-forming substances, and said second sheet comprises a material for receiving said image-forming substances and supporting a visible transfer image.

13. The photographic product of claim 9 wherein said photosensitive sheet comprises a photosensitive silver halide and said fluid processing composition comprises a developer for silver halide.

14. A photographic product comprising a photosensitive sheet including a frame adapted to be exposed within photographic apparatus, a second sheet having an area approximately coextensive with said frame and adapted to be superposed therewith for aiding in the distribution of a fluid processing composition between said frame and area, a connecting element at least equal in length to said second sheet, said connecting element being joined at its ends to the leading ends of said photosensitive and second sheets, a leader attached to said connecting element intermediate said leading ends of said sheet, said connecting element being folded adjacent the leading end of said second sheet into superposed relation with said second sheet, a rupturable container of said fluid processing composition attached to said connecting element between the latter and said second sheet at a location on said connecting element intermediate the point of attachment of said leader to said connecting element and said leading end of said second sheet, said container being elongated and having a discharge mouth at one longitudinal edge extending transversely of said sheets, and hinge means for mounting said container with said discharge mouth directly away from said leading end of said second sheet and with said container spaced from the leading edge of said area of said second sheet along said second sheet and said connecting element a distance at least equal to the width of said container, said hinge means being secured to said connecting element and to said container along the longitudinal edge thereof opposite said discharge mouth, said photosensitive and second sheets being disposed with the leading end of each of said sheets located adjacent the trailing end of the other with said connecting element being located between said photosensitive and second sheets, said leader being attached to the surface of said connecting element opposite said container and extending between said connecting element and said photosensitive sheet, from the point of attachment of said leader to said connecting element, toward said leading end of said photosensitive sheet and being folded upon itself so as to extend in the opposite direction from between said photosensitive sheet and said connecting element and said second sheet at the leading end of said second sheet.

15. The photographic product of claim 14 wherein said photosensitive sheet comprises a photosensitive material selected from the class consisting of the heavy metal salts, ferric salts and diazonium compounds, and said fluid processing composition within said container includes an agent capable of reacting with said photosensitive material following exposure thereof to effect the formation of a visible image.

16. A photographic product comprising a photosensitive sheet including a substantially rectangular frame surrounded by a border and adapted to be exposed within photographic apparatus, a second sheet having an area approximately coextensive with said frame surrounded by a border and adapted to be superposed with said frame

for aiding in the distribution of a fluid processing composition between said frame and area, a connecting sheet at least equal in length to said second sheet and being joined at its ends to the leading ends of said photosensitive and second sheets, a leader attached to said connecting sheet substantially midway between the leading edges of said frame and area, said connecting sheet being folded adjacent the leading end of said second sheet into superposed relation with said second sheet, a rupturable container of said fluid processing composition attached to said connecting sheet between the latter and said second sheet at a location on said second sheet intermediate the point of attachment of said leader to said connecting sheet and said leading end of said second sheet, said container being elongated and having a discharge mouth at one longitudinal edge extending transversely of said sheets, and hinge means for mounting said container with said discharge mouth directed away from said leading end of said second sheet and with said container spaced along said second sheet and said connecting sheet from said leading edge of said area a distance at least equal to the width of said container, said hinge means being secured to said connecting sheet and to said container along the longitudinal edge thereof opposite said discharge mouth, said photosensitive and second sheets being disposed with the leading end of each of said sheets located adjacent the trailing end of the other with said connecting sheet being located between said photosensitive and second sheets, said leader being attached to the opposite surface of said connecting sheet from said container and extending between said connecting sheet and said photosensitive sheet, from its point of attachment to said connecting sheet, toward said leading end of said photosensitive sheet and being folded upon itself so as to extend in the opposite direction from between said photosensitive sheet, and said connecting and second sheets at the leading end of said second sheet.

17. A photographic product comprising a photosensitive sheet including a frame adapted to be exposed within photographic apparatus, a second sheet having an area at least coextensive with said frame and adapted to be superposed therewith for aiding in the distribution of a fluid processing composition between said frame and area, a connecting sheet at least equal in length to said second sheet, said connecting sheet being joined at its ends to the leading ends of said first and second sheets, a portion of said connecting sheet being creased along a transverse line intermediate said leading ends of said photosensitive and second sheets, a leader attached to said connecting sheet at said creased portion, said connecting sheet being folded adjacent said leading end of said second sheet into superposed relation with said second sheet, a rupturable container of said processing composition attached to said connecting sheet between the latter and said second sheet at a location on said connecting sheet intermediate said creased portion and said leading end of said second sheet, said container being elongated and having a discharge mouth at one longitudinal edge extending transversely of said sheets, and hinge means for mounting said container with said discharge mouth directed away from said leading end of said second sheet toward the trailing end thereof and with said container spaced from the leading edge of said area of said second sheet along said second sheet and connecting sheet a distance at least equal to the width of said container, said hinge means being secured to said connecting sheet and to said container along the longitudinal edge thereof opposite said discharge mouth, said photosensitive and second sheets being disposed with the leading end of each of said sheets located adjacent the trailing end of the other and with said connecting sheet located between said photosensitive and second sheets, said leader being attached to said connecting sheet between the latter and said photosensitive sheet and extending therebetween, from its point of attachment to said connecting sheet, toward said leading end of said photosensitive sheet and

being folded upon itself so as to extend from between said photosensitive sheet and connecting and second sheets at the leading end of said second sheet.

18. The photographic product of claim 17 wherein said photosensitive sheet comprises a photosensitive material selected from the class consisting of the heavy metal salts, ferric salts and diazonium compounds, and said fluid processing composition comprises an agent capable of reacting with said photosensitive material following exposure thereof to effect the formation of a visible photographic image.

19. The photographic product of claim 18 wherein said fluid composition includes an agent capable of reacting with said photosensitive material to produce transferable image-forming substances, and said second sheet comprises a material for receiving said image-forming substances and supporting a visible transfer image.

20. The photographic product of claim 17 wherein said photosensitive sheet comprises a photosensitive silver halide and said fluid processing composition comprises a silver halide developer.

21. A photographic product including a plurality of film units each comprising a photosensitive sheet including a frame adapted to be exposed, a second sheet having an area approximately coextensive with said frame and adapted to be superposed therewith for aiding in the distribution of a fluid processing composition between said frame and area, a connecting element extending between the leading ends of said photosensitive and second sheets and a leader attached to said connecting element intermediate said leading ends of said sheets, said connecting elements being folded adjacent said leading end of said second sheet into superposed relation with said second sheet, said photosensitive and second sheets of each of said film units being disposed with the leading end of each of said sheets located adjacent the trailing end of the other and with said connecting element located between said photosensitive and second sheets, said leader of said each film unit being attached to said connecting element thereof between said connecting element and said photosensitive sheet and extending therebetween, from its point of attachment to said connecting element, toward said leading end of said photosensitive sheet and being folded upon itself so as to extend from between said photosensitive sheet and said connecting element and said second sheet at said leading end of said second sheet, a housing for enclosing said film units, and separating means within said housing for dividing said housing, said photosensitive sheets being positioned within said housing in stacked relation adjacent one side of said separating means, said second sheets and said connecting elements being positioned in stacked relation adjacent the opposite side of said separating means with said connecting elements bent around one end of said separating means adjacent said leading ends of said photosensitive sheets and said leaders projecting from said housing adjacent said leading ends of said second sheets.

22. The photographic product of claim 21 wherein said housing includes forward and rear walls between which said separating means is mounted, said photosensitive sheets being disposed between said separating means and said forward wall, said forward wall including an opening at least coextensive with said frames of said photosensitive sheets for permitting exposure of the latter, a light-shielding element is provided disposed within said housing between said photosensitive sheets and said forward wall across said opening, said light-shielding element including a leader bent around the end of said separating means adjacent leading ends of said photosensitive sheets and extending between said separating means and said rear wall from the end of said housing adjacent said leading ends of said second sheets, said housing being provided with an opening therein adjacent the leading ends of said second sheets through which said leaders comprising said film units and said leader

comprising said light-shielding element extend from said housing.

23. The photographic product of claim 21 wherein said housing includes forward and rear walls at least coextensive in area with said photosensitive and second sheets, said separating means is at least coextensive in area with said photosensitive and second sheets and is disposed between said forward and rear walls, said photosensitive sheets are located between said forward wall and said separating means, said forward wall is provided with an exposure aperture, and said product includes a resilient means for urging said separating means toward said forward wall for urging said photosensitive sheets against said forward wall across said aperture in position for exposure.

24. The photographic product of claim 23 wherein said resilient means comprises a spring mounted on said rear wall.

25. The photographic product of claim 23 wherein said resilient means comprises springs mounted on said separating means adjacent the lateral edges thereof for bearing against said rear wall of said housing.

26. The photographic product of claim 23 wherein said housing comprises generally coextensive forward and rear walls connected by side walls, said separating means comprises a generally flat plate, at least equal in width to said film units, disposed between said forward and rear walls and having flanges at its sides extending toward said rear wall on opposite sides of said film units, said photosensitive sheets being located between said separating means and said forward wall, said rear and side walls having openings at their common edges for allowing means, comprising the photographic apparatus in which said product is employed, to project into said housing into engagement with said flanges for urging said separating means toward said forward wall and retaining said photosensitive sheets in position for exposure against said forward wall across said aperture therein.

27. The photographic product of claim 23 wherein said separating means comprises a generally flat plate extending from side to side of said housing and having lateral flanges projecting toward said rear wall adjacent opposite sides of said film units.

28. The photographic product of claim 27 wherein said resilient means comprises springs mounted on said lateral flanges for engaging the rear wall of said housing and urging said separating means toward the forward wall.

29. The photographic product of claim 21 wherein said housing comprises a forward wall having an exposure aperture therein at least coextensive with said frames of said photosensitive sheets and a rear wall, said photosensitive sheets being positioned in a stack between said forward wall and said separating means with said frames in alignment with said aperture, and said product includes a light-shielding element provided in said housing between said photosensitive sheets and said forward wall, said light-shielding element extending across said aperture in closing relation thereto and being bent around said end of said separating means adjacent said leading ends of said photosensitive sheets, and a leader coupled with said light-shielding means, extending through said housing between said separating means and said rear wall and projecting from said housing at the end thereof adjacent said leading ends of said second sheets, a portion of said leader being doubled back upon itself in the region thereof between said separating means and said rear wall.

30. A photographic product including a plurality of film units each comprising a photosensitive sheet including a frame adapted to be exposed, a second sheet having an area approximately coextensive with said frame and adapted to be superposed therewith for aiding in the distribution of a fluid processing composition between said frame and area, a connecting element joined at its ends

to the leading ends of said photosensitive and second sheets and a leader attached to said connecting element intermediate said leading ends of said sheets, said connecting element being folded adjacent said leading end of said second sheet into superposed relation with said second sheet, said photosensitive and second sheets of each of said film units being disposed with the leading end of each of said sheets located adjacent the trailing end of the other and with said connecting element located between said photosensitive and second sheets, said leader being attached to said connecting element between the latter and said photosensitive sheet and extending therebetween, from its point of attachment to said connecting element, toward said leading end of said photosensitive sheet and being folded upon itself so as to extend from between said photosensitive sheet and said connecting element and said second sheet at the leading end of said second sheet, and means for enclosing said film units and positioning said photosensitive sheets together in stacked relation and said second sheets and connecting elements together in stacked relation apart from said photosensitive sheets, with said leaders extending from between said sheets at the leading ends of said second sheets.

31. A photographic product including a plurality of film units each comprising a photosensitive sheet including a frame adapted to be exposed, a second sheet having an area approximately coextensive with said frame and adapted to be superposed therewith for aiding in the distribution of a fluid processing composition between said frame and area, a connecting sheet joined at its ends to the leading ends of said first and second sheets, a portion of said connecting sheet being creased along a transverse line intermediate said leading ends of said photosensitive and second sheets, and a leader attached to said connecting sheet at said creased portion, said connecting sheet being folded adjacent said leading end of said second sheet into superposed relation with said second sheet, said photosensitive and second sheets of each of said film units being disposed with the leading end of each of said sheets located adjacent the trailing end of the other and with said connecting sheet located between said photosensitive and second sheets, said leader being attached to said connecting sheet between the latter and said photosensitive sheet and extending therebetween, from its point of attachment to said connecting sheet, toward said leading end of said photosensitive sheet and being folded upon itself so as to extend from between said photosensitive sheet and said connecting sheet and second sheet at said leading end of said second sheet, and means for enclosing said film units and positioning said photosensitive sheets together in stacked relation and positioning said second sheets and connecting sheets together in stacked relation apart from said photosensitive sheets, with said leaders extending from between said sheets at the leading ends of said second sheets.

32. The photographic product of claim 31 wherein said photosensitive sheet comprises a photosensitive material selected from the class consisting of the heavy metal salts, ferric salts and diazonium compounds, and said fluid processing composition within said container includes an agent capable of reacting with said photosensitive material following exposure thereof to effect the formation of a visible image.

33. The photographic product of claim 31 wherein said connecting sheet is creased along a transverse line substantially midway between the leading edge of said frame of said photosensitive sheet and the leading edge of said area of said second sheet.

34. The photographic product of claim 31 wherein said connecting sheet is substantially equal in width to said photosensitive and second sheets in the region of said connecting sheet at which it is joined to said photosensitive and second sheets, and the sides of said connecting sheet taper from said end regions toward the line at which said connecting sheet is creased.

35. A photographic product including a plurality of film units each comprising a photosensitive sheet including a frame adapted to be exposed, a second sheet having an area approximately coextensive with said frame and adapted to be superposed therewith for aiding in the distribution of a fluid processing composition between said frame and area, a connecting element joined at its ends to the leading ends of said photosensitive and second sheets, a leader attached to said connecting element intermediate said leading ends of said sheets, said connecting element being folded adjacent said leading end of said second sheet into superposed relation with said second sheet, and a rupturable container of said fluid processing composition attached to said connecting element between the latter and said second sheet at a location on said connecting element intermediate the point of attachment of said leader to said connecting element and said leading end of said second sheet, said photosensitive and second sheets of each of said film units being disposed with the leading end of each of said sheets located adjacent the trailing end of the other and with said connecting element located between said photosensitive and second sheets, said leader being attached to the surface of said connecting element opposite said container and extending between said connecting element and said photosensitive sheet, from the point of attachment of said leader to said connecting element, toward said leading end of said photosensitive sheet and being folded upon itself so as to extend from between said photosensitive sheet and said connecting element and said second sheet at the leading end of said second sheet, and means for enclosing said film units and positioning said photosensitive sheets together in stacked relation and said second sheets and elements together in stacked relation apart from said photosensitive sheets, with said leaders extending from between said sheets at the leading ends of said second sheet.

36. The photographic product of claim 35 wherein said fluid processing composition within each of said containers comprises an agent capable of reacting with the photosensitive material of each of said photosensitive sheets following exposure thereof to effect the formation of a visible photographic image.

37. The photographic product of claim 35 wherein said photosensitive sheet comprises a photosensitive material selected from the class consisting of the heavy metal salts, ferric salts and diazonium compounds, and said fluid processing composition within said container includes an agent capable of reacting with said photosensitive material following exposure thereof to effect the formation of a visible image.

38. The photographic product of claim 37 wherein said fluid composition includes an agent capable of reacting with said photosensitive material to produce transferable image-forming substances, and said second sheet comprises a material for receiving said image-forming substances and supporting a visible transfer image.

39. A photographic product including a plurality of film units each comprising a photosensitive sheet, a second sheet adapted to be superposed with said photosensitive sheet for aiding in the distribution of a fluid processing composition between said sheets, a connecting element extending between the leading ends of said photosensitive and second sheets and a leader attached to said connecting element intermediate said leading ends of said sheets, said connecting element being folded adjacent said leading end of said second sheet into superposed relation with said second sheet, said photosensitive and second sheets of each of said film units being disposed with the leading end of each of said sheets located adjacent the trailing end of the other and with said connecting elements located between said photosensitive and second sheets, said leader of each film unit being attached to said connecting element thereof between said

connecting element and said photosensitive sheet and extending from between said photosensitive sheet and said connecting element and second sheet at the leading end of said second sheet, a housing, including forward and rear walls, for enclosing said film units, and separating means within said housing between said forward and rear walls, said photosensitive sheets being arranged in stacked relation between said separating means and said forward wall, said second sheets and said connecting element being arranged in stacked relation between said separating means and said rear wall and with said connecting element bent around one end of said separating means adjacent said leading ends of said photosensitive sheets, said forward wall having an exposure aperture therein through which said photosensitive sheets may be exposed, said housing including an opening in one end adjacent said leading ends of said second sheets and through which said photosensitive and second sheets may be withdrawn, said leaders extending through said opening from said housing.

40. The photographic product of claim 39 including means within said housing between said rear wall and said separating means for engaging the leading ends of said second sheets in the region of said opening for restricting the movement of said second sheets through said opening.

41. The photographic product of claim 39 wherein said leader is substantially narrower than said second sheets, and resilient means are provided mounted on said rear wall, biased toward said forward wall, and extending into engagement with said second sheets at least on one side of said leaders in the region of said opening for restricting movement of said second sheets through said opening.

42. The photographic product of claim 39 wherein said separating means comprises a substantially flat plate, said rear wall includes an opening adjacent said leading ends of said second sheets, and means are provided within said housing underlying the last-mentioned opening for supporting said leaders within said opening.

43. The photographic product of claim 42 wherein said means for supporting said leaders comprises a rearwardly extending step on said separating means.

44. The photographic product of claim 42 wherein said separating means is provided with lateral flanges projecting toward said rear wall adjacent opposite sides of said film units, and said rear wall is provided with openings at its lateral edges for allowing means, comprising the photographic apparatus in which said product is employed, to project into said housing into engagement with said flanges for urging said separating means toward said forward wall and retaining said photosensitive sheets in position for exposure against said forward wall.

45. The photographic product of claim 39 wherein said housing comprises an elongated envelope having first and second walls and an opening in one end, said film units being mounted within said envelope between said first and second walls with said photosensitive sheets arranged in stacked relation within a first portion of said envelope opposite said open end, said second sheets, connecting elements and leaders being arranged in stacked relation in a second portion of said envelope adjacent said open end with said leaders extending from said envelope, said envelope being folded upon itself intermediate said first and second portions so that said first wall comprises said forward and rear walls of said housing and said second wall comprises said separating means.

46. The photographic product of claim 45 wherein said envelope comprises end walls extending from end to end of said envelope and joining said first and second walls, and said first wall and said side walls are pleated in the region between said first and second portions where said envelope is folded.

47. The photographic product of claim 45 wherein

25

said exposure aperture is provided in said first wall of said envelope in the region of said first portion thereof and a covering sheet is provided within said envelope underlying said exposure aperture, said cover sheet including a leader extending through said second portion 5

26

of said envelope and from the open end thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

2,554,889 Wolff ----- May 29, 1951