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Whall

[11] **3,871,010**

[45] **Mar. 11, 1975**

[54] **SPREAD ROLLER SYSTEM FOR SELF DEVELOPING TYPE PHOTOGRAPHIC APPARATUS**

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

[22] Filed: **May 2, 1974**

[21] Appl. No.: **466,416**

[52] **U.S. Cl.** ..... **354/86,** 100/155 R, 100/163 R, 354/304

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

[58] **Field of Search** ..... 354/86, 85, 304; 100/155 R, 160, 176, 163 R

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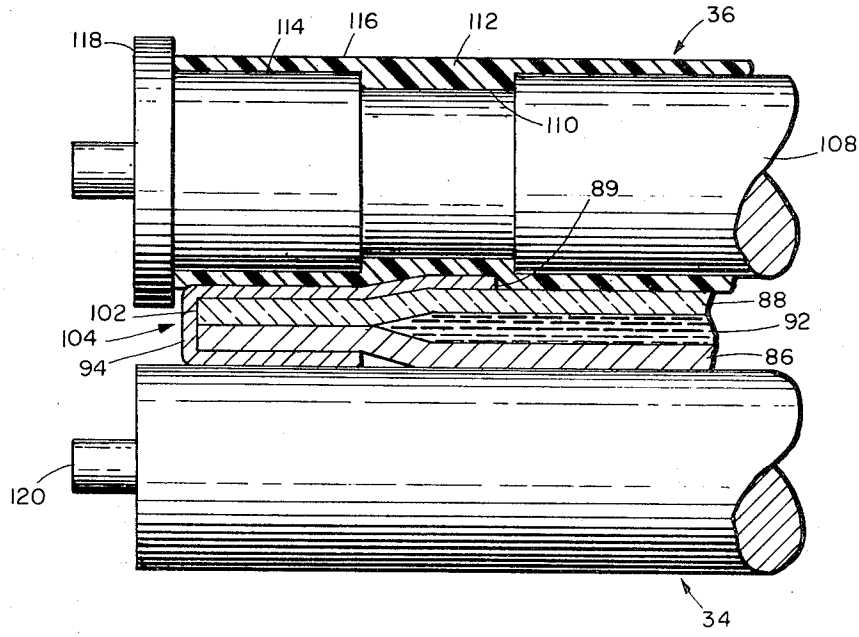
Primary Examiner—Richard L. Moses

Attorney, Agent, or Firm—Alfred E. Corrigan

[57] **ABSTRACT**

Photographic apparatus including film-advancing fluid processing means for use with a self-developing photographic film unit including a first image-recording sheet element secured in superposed face to face relation with a second image-receiving sheet element by external binding means secured to and overlapping the longitudinal and lateral edges of the sheet elements and defining, in part, an exposure area of the film unit, the film unit adapted to be processed to produce a visible image as a processing fluid is distributed between the sheet elements, coextensive with the exposure area, in a layer with a predetermined cross-sectional configuration. The film-advancing fluid processing means includes a pair of rotatably mounted juxtaposed pressure applying rollers resiliently urged toward one another and adapted to spread the processing fluid between the sheet elements of the film unit as it is advanced between the rollers. At least one of the rollers is a structure including a generally rigid support member with a pair of spaced apart annular grooves therein, a layer of high-friction resilient material overlying the support member and having an internal configuration similar to that of the support member and an external configuration that is a substantially cylindrical sheet-contacting surface being relatively more deformable in those portions overlying the annular grooves of the support member whereby the binding means on the surface of the second sheet element along the longitudinal edges of the film unit, when disposed within these deformable portions, are permitted to move toward the annular grooves of the support member during spreading of the processing fluid between the sheet elements.

12 Claims, 7 Drawing Figures



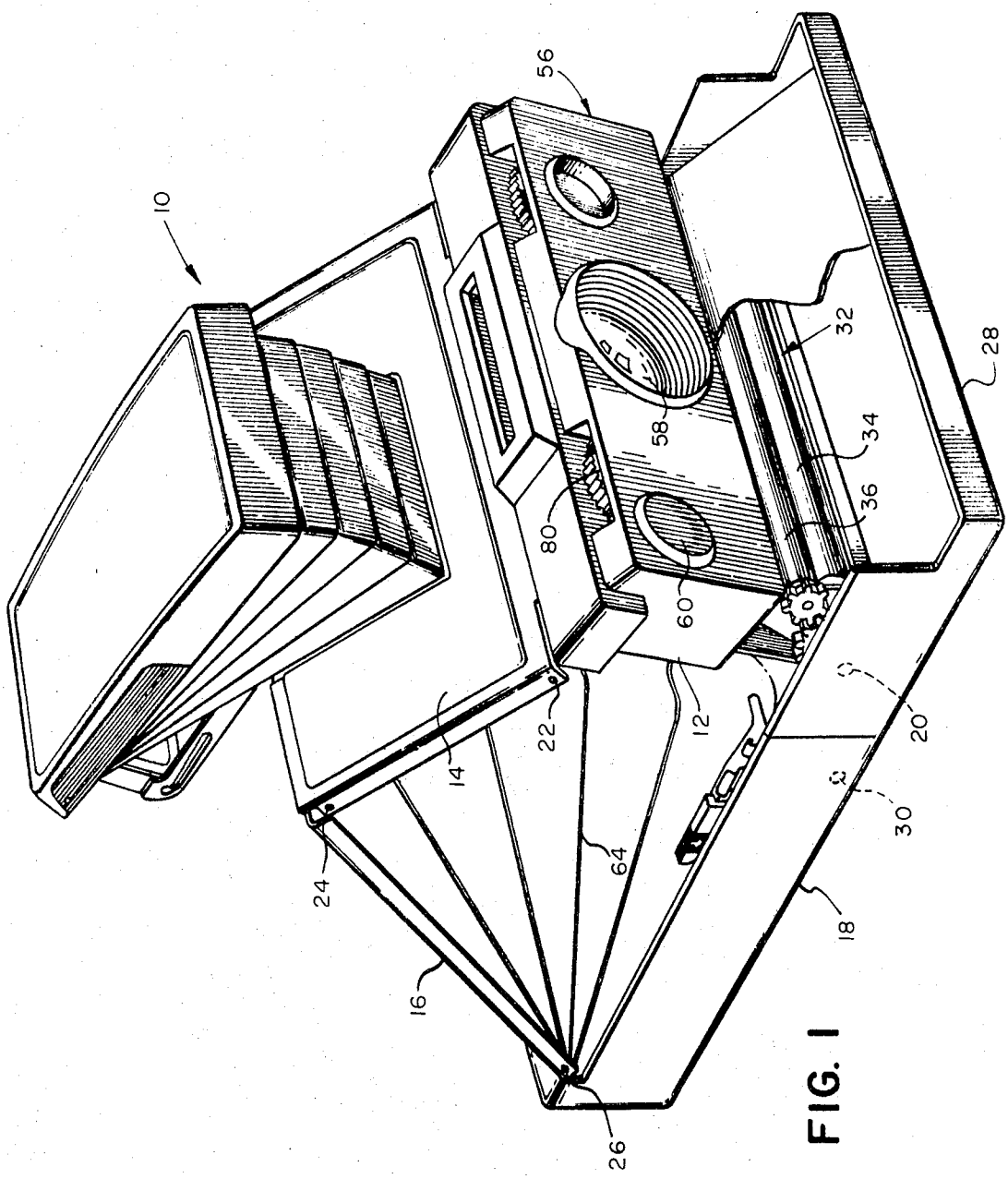


FIG. 1

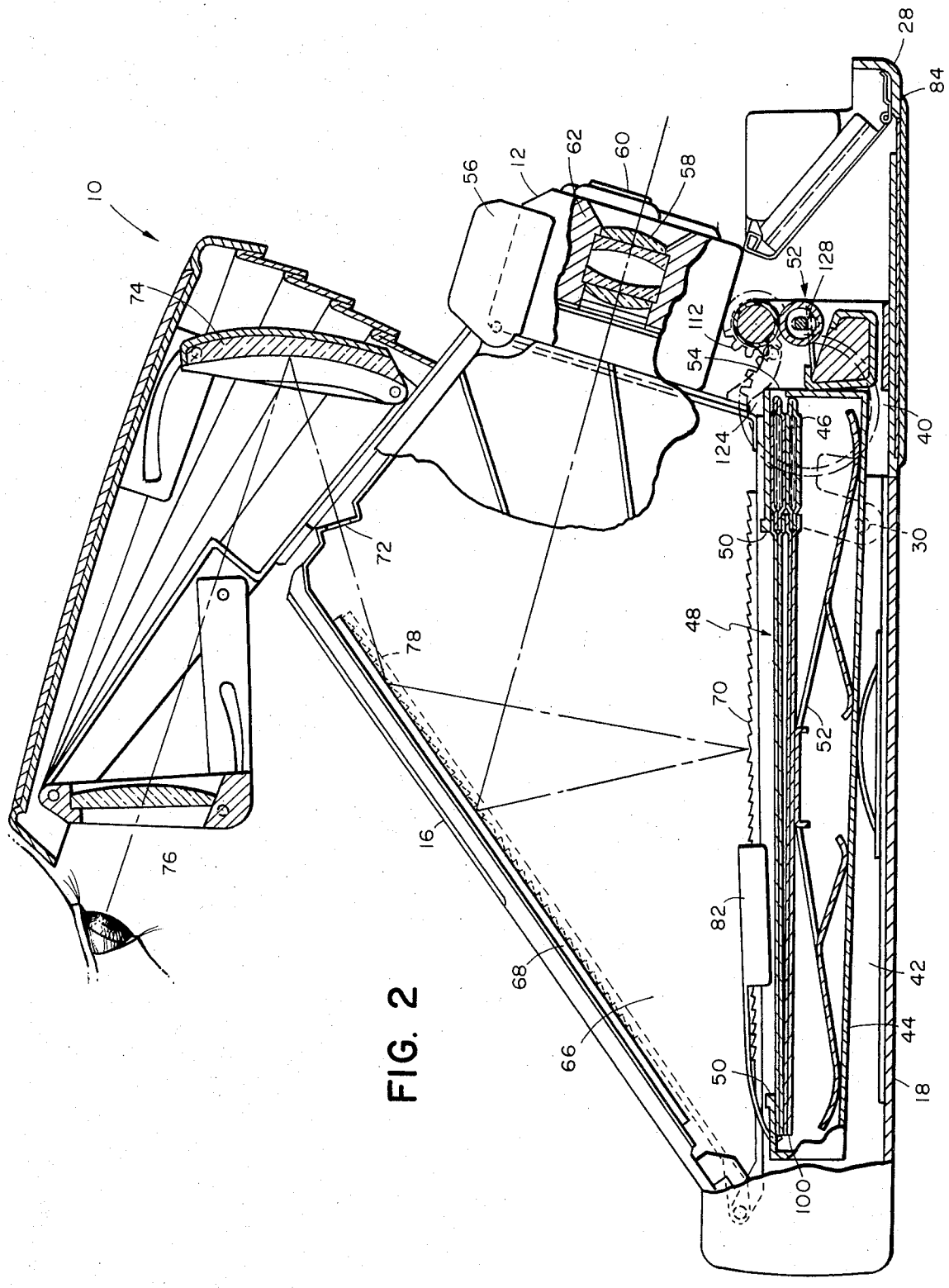

10
74
56
12
62
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124
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FIG. 2

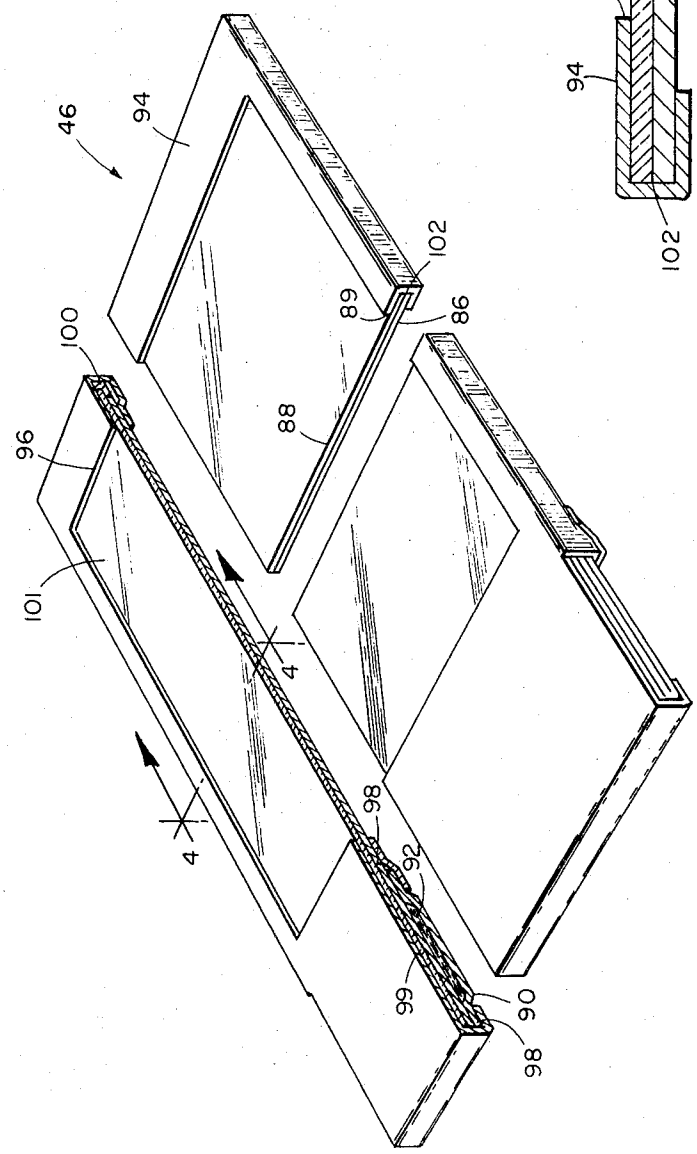


FIG. 3

FIG. 4

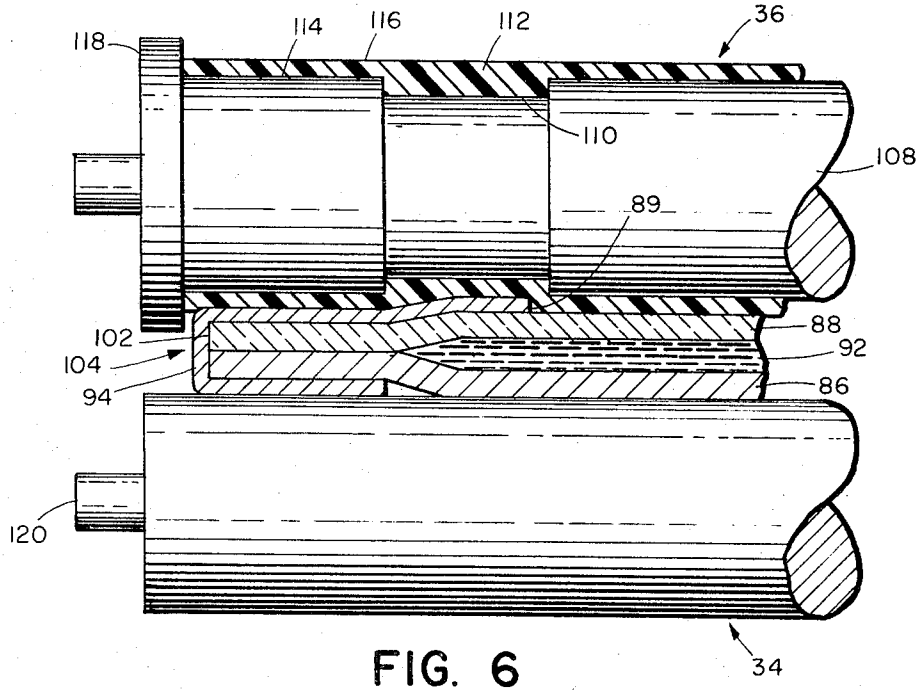

118
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116
112
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108
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102
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94
88
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86
120
34

FIG. 6

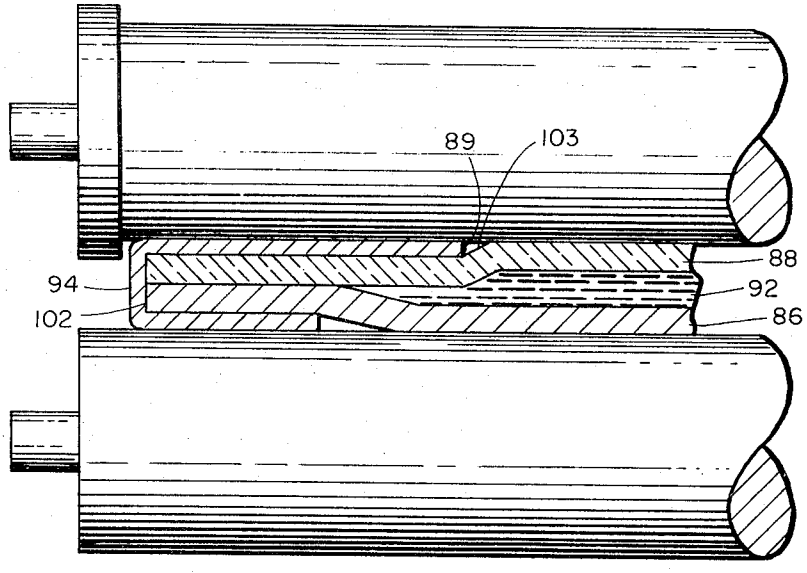

89
103
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94
92
102
86

FIG. 5

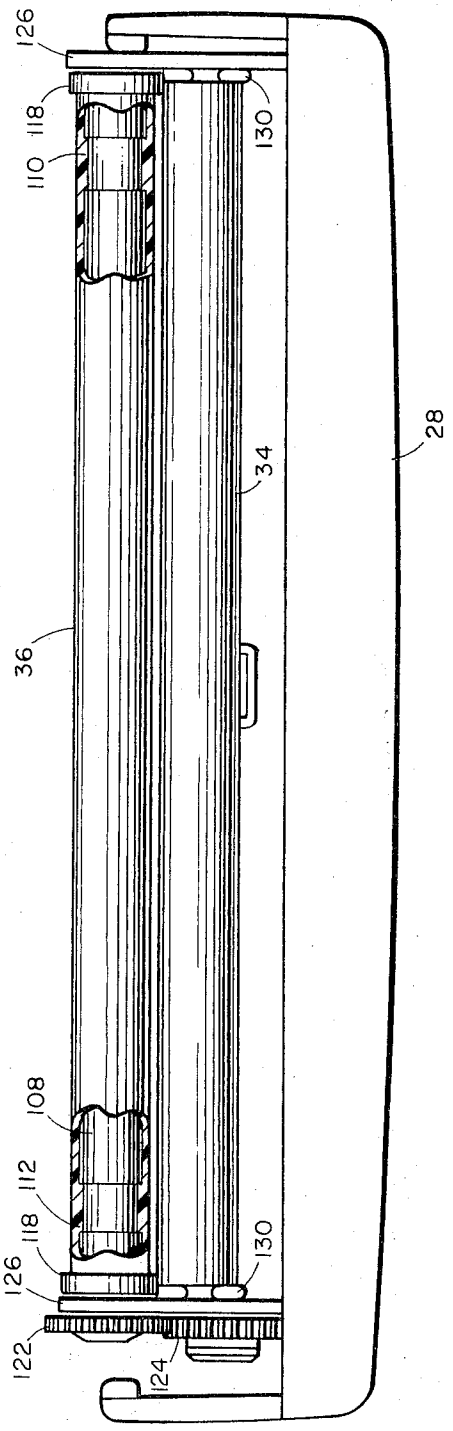


FIG. 7

SPREAD ROLLER SYSTEM FOR SELF DEVELOPING TYPE PHOTOGRAPHIC APPARATUS

REFERENCE TO RELATED APPLICATION

This application is related to copending application Ser. No. 466,415, filed on even date herewith by James M. Whall and entitled "Spread Roller System For Self-Developing Type Photographic Apparatus".

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to photography and, more particularly, to an improved film advancing-fluid spreading apparatus.

2. Description of the Prior Art

Processing apparatus for use with self-developing photographic systems are common in the literature of the photographic arts. Their basic functions in facilitating the production of a visible image from an exposed photosensitive element of a self-developing type film unit are well known. However, for a more thorough understanding of the features of the present invention, it will be helpful to briefly review in a systems context the basic functions of processing apparatus, the problems related to these functions, and the implications on both of recent trends in system sophistication aimed at furhter simplifying user's tasks.

To begin with, the attractiveness of the self-developing photographic system, for both amateur and professionals alike, resides principally in its ability to produce, at reasonable cost, high quality finished black and white or color photographic prints within seconds or minutes after the picture is "snapped", i.e., an exposure made. This is made possible by virtue of synergistic relationships between the system components, e.g., camera, film, and processing apparatus, that enable an image of the scene to be recorded by the camera on a photosensitive image-recording element forming part of a film unit and subsequently treated with a processing fluid in such a way that the fluid is confined to the exposed film unit and prevented from contacting other system components or coming into contact with the person or clothing of the user. Unlike conventional photographic film products the self-developing film unit contains all the photographic materials necessary for the production of a visible image. In this instance, the exposed image-recording element of the film unit is developed and as a function of development, an image-wise distribution of image-forming components is formed and transferred to a superposed image-receiving element. The development and diffusion transfer are effected by the application of a predetermined amount of a viscous processing fluid between the superposed elements in a layer whose cross-section is of predetermined configuration. In a typical film unit, the processing fluid is stored in a pressure rupturable container sometimes referred to as a "pod"; such pods usually being attached to one of the photographic elements of the flim unit.

The distribution of the processing fluid between the superposed elements is facilitated by the fluid processing apparatus which usually forms an integrated part of the camera. Generally this processing apparatus employs a pair of spreader members which exert a compressive force on the film unit, i.e., the pod and superposed photographic elements, as it is advanced between them. The compressive force first ruptures the pod releasing the processing fluid therefrom and subsequently progressively spreads the released fluid between the superposed photographic elements in a layer of predetermined cross-sectional configuration as further advancement occurs. The quality of the final image critically depends on the proper cross-sectional configuration of the processing fluid layer which depends, among other things, on the degree to which the desired layer configuration is influenced by the external cross-sectional configuration of the film unit and the corresponding geometry of the contacting surface of the spreader members. To be more specific on this last point, as it relates to the present invention, it should be emphasized that, historically, the cross-sectional configuration of the fluid layer is substantially rectangular in shape, the external configuration of the film unit substantially rectangular in shape, and the spreader members mounted in juxtaposed relation substantially parallel. In the short, the geometry problems were minimal because of the similarity in shape between the film unit and the spreader members contacting the film unit surfaces. But these film units generally contained separable elements, one of which contained the finished print and the other disposable waste materials, whose construction easily accommodated the parallel roller surfaces. More recent film units like that, for example, described in U.S. Pat. No. 3,415,644 granted to Edwin H. Land on Dec. 10, 1968 produce a waste free finished print of the type used with the present invention. Commerically available films of this type generally have a croos-sectional configuration that varies, while the fluid layer requirements still call for a substantially rectangular cross-sectional shape. In order to solve this problem of imcompatible geometry, the available processing apparatus provide cutout relief sections in their spreader members which permit the film unit to expand under the pressure of the processing fluid in such a way that the fluid layer has a substantially rectangular cross-section over the exposure area while the film unit generally does not. As will be seen later, the present invention will provide an alternate, more economical, solution to this problem. To review, the basic functions of processing apparatus are, to confine the processing fluid to a film unit out of contact with the user and the camera in which the film unit is exposed and processed, while at the same time, to distribute the fluid in such a way that all portions of the exposed area of a photosensitive image-recording material are treated with the proper amount of fluid as defined by a predetermined cross-sectional configuration of the fluid layer.

The more sophisticated systems, aimed at further reducing the user's tasks, impose additional requirements on the processing apparatus because the system complexity naturally increases as user participation decreases. Furthermore these newer systems exhibit other desirable features, as for example, their light weight, compactness, and the ability to advance the film unit automatically to produce a waste free print. This means that the processing apparatus, since the advancing is done by automatic means, have spreader members with sheet-contacting surfaces that facilitate transport, be highly effective and reliable all without damaging the surface of the finished print. In this respect, at least one of the spreader members should have a high-friction surface which is non-abrasive with respect to the film surface.

In view of the foregoing discussion of the basic functions, the requirements of sophistication, and the overriding cost factor, the difficulty of producing process-

ing apparatus that satisfy all these criteria can be fully appreciated. While present commerical systems like that described in U.S. Pat. No. 3,776,842 granted to James M. Whall on Oct. 23, 1973 satisfy these requirements, it is apparent that improvements in terms of reduced costs and increased effectiveness enhance the attractiveness of the self-developing system and consequently will increase the market substantially. One of he primary reasons why the cost of producing apparatus satisfying all the functions descirbed above is relatively high relates to the number of manufacturing steps required to make a high-friction non-abrasive roller surface. The process involves precisely grinding a stainless steel roller, coating it with a primer, casting a block of urethane around the roller, and finally precision grinding the urethane to the desired surface configuration with appropriate relief sections. Because of the tolerances involved and the difficulty in grinding the urethane surface in the relief areas of the roller surface without damaging them by stripping the urethane from the stainless steel roller, it is evident that both a reduction in the number of machining operations and an elimination of the relief grinding operation in particular would substantially reduce the cost of producing such apparatus as described herein. Therefore, an object of this invention is to provide a spreader roller structure requiring minimum manufacturing steps.

Yet another object of this invention is to provide an improved apparatus of the film advancing type.

An additional object of the present invention is to provide an apparatus of the type indicated having improved effectiveness and reliability at reduced cost.

A further object of this invention is to provide an improved apparatus of the type indicated wherein the surface of one of the spreader members is of relatively high-friction and has portions relatively more deformable than others.

SUMMARY OF THE INVENTION

In its illustrated embodiment, the present invention has been depicted as a film-advancing fluid processing assembly preferably forming an integral part of a camera for use with a self-developing film unit. The film unit comprises a first image-recording sheet element secured in superposed face to face relation with a second image-receiving sheet element by external binding means, secured to and overlapping the longitudinal and lateral edges of the sheet elements and defining, in part, an exposure area of the film unit, the film unit adapted to be processed to produce a visible image as a processing fluid is distributed between the sheet elements, coextensive with the exposure area, in a layer with a predetermined cross-sectional configuration.

In an illustrated embodiment, the film-advancing fluid processing assembly comprises a pair of juxtaposed pressure applying rollers, rotatably mounted between a pair of spaced apart support members and continuously urged towards one another by resilient means. The support members include elongated slots which facilitate translatory motion of one of the rollers with respect to the other. Spaced apart annular collars are provided adjacent opposite ends of one of the rollers and extend to contact respective bearing surfaces on the other roller to define a minimum spacing between the rollers when under the influence of the resilient urging means, the minimum spacing facilitating the introduction of the film unit between the rollers. The invention, thus arranged, is paricularly adapted to spread the processing fluid in a layer of predetermined cross-sectional configuration between the sheet elements of the film unit, as it is advanced between the rollers. In this respect, one of the rollers has a high-friction selectively deformable sheet-contacting surface adapted to facilitate film advancement and cooperate with the film unit to determine the desired fluid layer configruation.

This roller is a roller structure including a generally rigid support member having a pair of spaced apart annular grooves therein and a layer of high-friction resilient material overlying the support member having an internal configuration similar to that of the support member and an external configuration defining a substantially cylindrical sheet-contacting surfce being relatively more deformable in those portions overlying the annular groovees of the support member, whereby the binding means on the surface of the second sheet element along the longitudinal edges of the film unit, when disposed within these more deformable portions, are permitted to move toward the annular grooves of the support member, during spreading of the processing fluid between the sheet elements.

Preferably, the resilient layer of high-friction material is comprised of a suitable elastomer as, for example, urethane and the relatively rigid support member comprised of carbon or stainless steel.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with other objects and advantages thereof, will best be understood from the following description of the illustrated embodiment when read in connection with the accompanying drawings wherein like numbers have been employed in the different figures to denote the same parts and wherein:

FIG. **1** is a perspective view diagrammatically depicting a collapsible camera for use with self-developing film, the camera being disposed in its operative condition and incorporating the present invention;

FIG. **2** is a diagrammatic, partially cut-away, side elevation view of the camera shown in FIG. **1**;

FIG. **3** is a diagrammatic perspective sectioned view of a self-developing film unit;

FIG. **4** is a cross-sectional elevation, taken along line **4—4**, of the film unit shown in FIG. **3**;

FIG. **5** is a diagrammatic elevation showing a partially broken away cross-section of the film unit of FIG. **3** disposed between a pair of rollers;

FIG. **6** is a view similar to FIG. **5** showing the film unit of FIG. **3** disposed between the rollers of the invention; and

FIG. **7** is a diagrammatic, partially cut-away, front elevation view of the fluid processing assembly of the camera shown in FIG. **1**.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In its illustrated embodiment, the present invention is depicted as being incorporated in a compact collapsible camera **10** for use with self-developing film. The camera **10** generally conforms to the camera structure disclosed and described in considerable detail in U.S. Pat. No. 3,714,879, entitled "Reflex Camera" by Edwin H. Land et al. The camera **10** is illustrated in its

operative condition in FIG. 1. Referring now to FIG. 1, it will be seen that camera 10 includes a plurality of housing members 12, 14, 16, and 18 that are pivotally connected to one another at pivots 20, 22, 24, and 26 for relative movement between the extended operative condition of FIG. 1 and a compact collapsed condition (not shown). Additionally, a housing member 28 extending in front of housing member 18 is pivotally connected thereto at pivot 30 for movement in a clockwise direction as view in FIG. 2 for purposes which will later be described. Housing member 28 includes means for mounting a fluid processing assembly 32 including juxtaposed spreader members 34 and 36 urged toward one another by resiliently biasing means. The present invention is particularly concerned with the nature of this fluid processing assembly 32 which will be discussed in considerable detail hereinafter.

When the camera 10 is disposed in its extended operative condition of FIGS. 1 and 2, the fluid processing assembly 32 is positioned across an entrance 40 to a film magazine chamber 42. The pivotal connection between housing members 18 and 28 permits the latter to be rotatably moved with respect to the former to move fluid processing assembly 32 from its blocking position across entrance 40 thereby creating access to film magazine chamber 42 so that a film magazine 44 may be loaded therein. Each film magazine 44 includes a plurality of film units 46 which may take any suitable form but will generally have a form elaborated on hereinafter. Additionally each such film magazine 44 is provided with a picture framing aperture 48, not shown in full, but defined in part by longitudinal edge portions 50 of film magazine 44. When the film magazine 44 is properly located within the film magazine chamber 42, framing aperture 48 becomes positioned so that it is aligned with the optical system of camera 10 to facilitate exposure operations and picture framing. Within film magazine 44 is a spring assembly 52 that continuously urges the film units 46 toward framing aperture 48 so that outermost film unit is located in the focal plane of camera 10 for exposure purposes. An elongated opening 54 is provided in the housing of film magazine 44 to facilitate the advancement of each film unit 46 from the magazine towards the fluid processing assembly 32 after an exposure is made.

The member 12 comprises a housing 56 for the camera's lens assembly 58, an actuator button 60, and a shutter assembly 62, not shown in detail, but disposed within housing 56 and comprising suitable electro-optical-mechanical means for determining and regulating exposure intervals. Additionally, member 12 in cooperation with members 14, 16, 18, and collapsible bellows 64, forms a six-sided exposure chamber 66.

The optical system of camera 10 in addition to lens assembly 58 further comprises optical means that cooperate with lens assembly 58 to provide alternate folded light paths for light rays emanating from the scene and passing through the lens elements of lens assembly 58. The nature of these light paths and the associated means for producing them may best be understood by relating them respectively to the modes of operation of camera 10 while it is in its extended operative condition. The modes of operation referred to may be conveniently classified in functional terms as the viewing and focusing mode and the exposing and processing mode. In the viewing and focusing mode an image of the scene is brought to the user's eye as rays from the scene pass through the lens elements of lens assembly 58, reflect from a fixed mirror 68 located on the interior wall of housing member 16. Located immediately above and overlying the focal plane of camera 10 is a Fresnel mirror 70 which takes the light rays reflected from fixed mirror 68 and redirects them in a focused bundle of rays and projects them back to mirror 68 then through a small exit hole 72 onto an aspheric mirror 74. From the aspheric mirror 74 the light rays pass through a magnifying eye lens 76 which facilitates viewing the scene.

During the exposure processing mode Fresnel mirror 70 is displaced from its position overlying the focal plane of camera 10 to a position immediately adjacent to and overlying fixed mirror 68. Shown in phantom in FIG. 2 on the reverse side of the Fresnel mirror 70 is seen a plain mirror 78 rigidly attached thereto which reflects light rays coming in through the lens elements of lens assembly 58 onto the surface of the film unit 46.

This unique arrangement of optical elements provides the camera 10 with a single-lens reflex capability which permits the camera user to select the subject matter of the scene and subsequently focus the image for best sharpness. Located in housing number 56 is a focus wheel 80 which when rotated causes a forward-rearward displacement of the lens elements in lens assembly 58 thereby permitting the user to adjust the sharpness of the subject matter image.

To initiate the exposing and processing mode of operation of camera 10, the user depresses actuator button 60 located in housing 56. The depression of actuator button 60 engages means, not shown, in camera 10 which effect a sequential series of camera system operations that ultimately result in a finished photograph. The first of these operations closes a normally open shutter 62 located in housing 56 thus producing an internal light-tight condition in exposure chamber 66. subsequently the Fresnel 70 moves from its position covering the focal plane of camera 10 to its position shown in phantom in FIG. 2 thereby uncovering photosensitive film unit 46 and positioned to direct light rays coming from the focused subject matter to the film unit 46 instead of the alternate path to the eye. Shutter 62 then reopens and the exposure is begun. After an appropriate exposure interval the shutter 62 again closes and the exposure chamber 66 is again in a light-tight condition. At this time the Fresnel 70 is automatically repositioned to cover the exposed film unit and return exposure chamber 66 to its initial state. While the Fresnel 70 is returning to its initial position covering the focal plane of camera 10, a sequence of events is initiated during which the exposed film unit 46 is automatically advanced through the elongated opening 54 of film magazine 44 and into operative relationship with fluid processing assembly 32. It is with the interrelationships that occur between the exposed film unit 46, film-advancing means and the fluid processing assembly 32 that occur during this last sequence of events that is the particular concern of the present invention which will be described in more detail hereinafter. After the exposed film unit 46 passes through an exit slot 84, shutter 62 then reopens and camera 10 returns to its viewing and focusing mode.

Before proceeding to the details of the invention it may be useful at this point to analyze the foregoing description for user activity for purposes of estimating the sophistication of the photographic system described.

These activities may reasonably be reduced to four in number; that is, loading the camera with film, selecting the subject matter of the scene, focusing the camera and depressing the actuator button. When these few steps are contrasted with the described system operation, it is evident that the level of user participation is very low and that of the system relatively high. This simplification in the user's tasks in taking a picture is obviously achieved because the photographic system assumes some of the more traditional roles reserved for photographic system users. The result, of course, is that the system becomes more complex and therefore relatively more difficult to manufacture and control at reasonable costs. The cost motivation behind the present invention therefore should be more fully appreciated when it is understood how the present invention accomplishes its critical systemic functions while at the same time being relatively less expensive to manufacture than presently available commerical units.

The interactions that occur between the film unit **46** and the fluid processing apparatus **32** may best be understood by first becoming acquainted with the structure and nature of these two assemblies and then to examine the interaction in view of the fluid-processing and flim-advancing requirements discussed previously. To review briefly, though, after the film unit **46** is exposed and is brought into contact with the fluid processing apparatus **32** it is continually advanced therethrough and during advancement a compressive force is exerted on the film unit **46** which ruptures a container **90** and progressively spreads the processing fluid within the film assembly.

Reference is now made to FIG. **3** wherein film unit **46** is illustrated as comprising a first rectangular photosensitive image-recording sheet element **86** located in superposed relation with a second rectangular image-receiving sheet element **88,** the latter having a length exceeding that of the former by at least the shorter dimension of the pressure rupturable container **90** containing a processing fluid **92.** Container **90,** or the pod as it is often called, is mounted adjacent a leading edge **98** of the image-recording element **86** and underlying an extended portion **99** of image-receiving element **88** being disposed to discharge its fluid contents between the elements **86** and **88** when subjected to compressive pressure. The processing fluid **92** has a viscosity suitable to facilitate is distribution between the elements **86** and **88** while at the same time aiding in its confinement to the film unit **46** out of contact with other system components and the system user. In this connection, elements **86** and **88** are secured in superposition by binding means **94** which serve to define an exposure area **101,** retain the lateral edges of the elements in face to face contact while under compressive load, and facilitate an integrated waste-free film unit.

With respect to exposure, image-receiving element **88** is transparent and adapted to allow actinic radiation to pass through it to be received by image-recording element **86.** Also in this connection the transparent image-receiving element **88** is adapted for viewing the final picture. Consequently, an aperture **96** has been provided in binding means **94** such that it limits the area of image-recording element **86** exposed to actinic radiation by its position on the external surface of image-receiving element **88.** From its position on the surface of image-receiving element **88** defining the lateral edges of the exposure area **101,** binding means **94** extends outwardly towards leading edge **98** of the film unit, toward a trailing edge **100,** and towards longitudinal edges **102,** overlapping all the edges and secured to the external surface of image-recording element **86** extending inwardly along this surface to define longitudinal margin portions **104** of greater thickness than the portions thereof intermediate longitudinal edges **102** adjacent the exposure area. More specifically, the cross-section of the film unit as a result of this binding technique is variable as illustrated in part in FIG. **4** with the inward extensions of binding means **94** on the external surface of element **88** defining in part the lateral edge **89** of the exposure area which extends inwardly a distance greater than the inward extension of binding means **94** on the external surface of element **86.** Although the binding technique serves the requirements discussed above, it introduces a problem in distributing the processing fluid **92** as it should be in a region **103** (See FIG. **5**) adjacent the lateral edges **89** of the exposure area **101** as the fluid is distributed in a longitudinal direction from the leading edge **98** to the trailing edge **100** of flim unit **46.**

The problem of distributing the processing fluid in region **103** is clearly illustrated by referring to FIG. **5** and assuming that the pressure applying members of the fluid processing apparatus comprise rigid rollers resiliently biased toward one another. It is apparent that during the spreading of the processing fluid **92,** the pressure applying members will retain the sheet elements **86** and **88** in face to face relationship in the region of longitudinal edge portions **104** while permiting the medial portions of the element in the region of the exposed area **101** to separate under the influence of the hydraulic pressure of the processing fluid until the external surfaces of the sheet elements **86** and **88** come into contact with the sheet-contacting surfaces of the rollers. Under these conditions the thickness of the processing fluid in the medial portions of the exposed area will be approximately equal to twice the thickness of the binding means **94** but, as can be seen in FIG. **5,** in this region **103** immediately adjacent the lateral edge **89** of the exposure area **101** there exists a fluid layer thickness transition where the processing fluid thickness will range from twice the thickness of binding means **94** to a single thickness. This is caused by local geometric constraints in that region the result of which is insufficient processing fluid at he lateral edges **89** of the picture area causing unacceptable image formation there. This condition is aggravated by processing fluid absorbtion in adjacent regions further reducing the quantity of fluid available to process the exposed photosensitive image-recording element **86** of film unit **46** to form an image in region **103.** The solution to this problem of insufficient fluid at the lateral edges **89** of the exposed area **101** is to permit further expansion to occur laterally between the sheet elements **86** and **88** in the region underlying and intermediate the inward extensions of the binding means **94** on the external surfaces of the sheet elements **86** and **88.** This can be achieved by providing a recess in the form of an annular grove in one of the rollers whose depth preferably equals the thickness of the binding means **94** and whose location overlies the region where the expansion is required. This was the solution of choice taken in presently available commerical apparatus for use with film units of the type described herein. Although this worked effectively, the cost for manufacturing such a

roller and the additional requirement that the surface have high-frictional characterisics made the roller relatively expensive. Therefore an alternate solution was indicated which satisfied all the requirements of fluid processing apparatus discussed above while at the same time being relatively less expensive. This alternate solution referred to is the particular subject of the present invention and can best be understood by referring to FIGS. **6** and **7**. Fundamentally, the problem of insufficient processing fluid **92** near the lateral edges **89** of the exposure area **101** of film unit **46** can be viewed as an incompatability between the required cross-sectional configuration of processing fluid layer between the sheet elements **86** and **88** in the region corresponding to the exposure area and the pressure expanded cross-sectional configruation of the film unit **46**. An alternate solution is to provide a pressure sensitive deformable sheet-contacting surface that has regions relatively more deformable than others which allow expansion of the film unit under the influence of hydraulic pressure such that the expanded external configuration of the film unit **46** during processing and film-advancement determines the desired cross-sectional configuration of the processing fluid layer in the exposed region of the film unit.

FIG. **6** illustrates the pair of spreader members **34** and **36** of fluid processing apparatus **32** with film unit **46** disposed therebetween during processing and film-advancement. Spreader member **36** is shown as a roller structure including a generally rigid support member **108** made of, for example, stainless steel and means **110** defining a recess at opposite ends of support member **108**, each of which is adapted to overlie a longitudinal edge portion **104** of film unit **46**. The recess means **110** is an annular grove whose width is greater than the lateral distance between the respective edges of the inward extensions of binding means **94** on the surface of sheet elements **86** and **88**. Overlying support member **108** is a layer **112** of a high-friction resilient material whose interior surface **114** has a configuration similar to that of support member **108** and whose exterior surface **116** is substantially cylindrical. The surface **116** of support member **108** thus formed being capable of relatively more deformation in the region overlying the annular recesses. Additionally, a pair of annular collars **118**, one of which is shown in FIG. **6**, are provided to define a minimum gap between members **34** and **36** to facilitate the introduction therebetween of film unit **46**. The manufacturing process of making member **36** comprises machining support member **108**, coating it with a primer, and casting thereon the layer **112** of a suitable elastomeric material as, for example, urethane whose outside configuration is substantially cylindrical. In contrast to the previously described manufacturing steps this is obviously less involved and therefore less expensive. Spreader member **34** is a roller comprised of a suitable rigid material such as carbon or stainless steel, provided with journals **120** for rotation about its longitudinal axis.

Attention is now directed to another important aspect of fluid processing apparatus of this type, namely, film-advancing. As mentioned earlier, after an exposure is made, the film unit **46** is advanced into operative relationship with fluid processing assembly **32**. the film unit advancement is achieved as a result of a film picking mechanism **82** picking up the trailing edge **100** of film unit **46** and advancing it out of film magazine **44** via elongated opening **54** when motion is imparted to picking mechanism **82** by a suitable camera motor and gear train assembly (not shown). In this connection spreader member **36** constitutes a drive roller in that it has a spur gear **122**, see FIG. **7**, axially connected thereto which in turn is also coupled to the camera motor through an appropriate gear train, not shown in its entirety, but comprising a pinion **124**. A suitable timing device (not shown) initiates rotatroy motion of spreader member **36** prior to the introduction of film unit **46** into fluid processing apparatus **32**. Since annular collars **118** contact the surface of spreader member **34** it facilitating turn also rotates at this time thereby facilitaing the introduction of film unit **46** between the spreader members **34** and **36** and also as a result insures a smooth progression of the film unit **46** throughout the fluid spreading process. Because of the surface characteristics of film unit **46**, it is necessary to provide a high-friction sheet-contacting surface to at least one of the spreader member surfaces to provide a non-slipping traction force which insures a continuous fluid-processing operation. This is provided for by the exterior surface **116** of elastomeric layer **112**, which incidentally is non-abrasive and therefore will not damage the surface of element **88** through which the picture is viewed.

Referring now to FIGS. **7** and **2** fluid processing assembly **32** is shown disposed in housing member **28**. It can be seen that spreader members **34** and **36** are rotatably mounted in juxtaposed relationship between spaced apart support brackets **126**. Support brackets **126** have portions defining elongated slots **128** which permit spreader member **34** to be linearly displaced with respect to spreader member **36** during the passage of film unit **46** therebetween. Additionally, a torsion spring **130** resiliently urges spreader member **34** toward spreader member **36** keeping the two spreader members in contact when no film unit is between them and providing the necessary pressure to spread processing fluid **92** within film unit **46** while it is disposed between the spreader elements **34** and **36**.

Thus a film-advancing fluid-processing apparatus has been provided that fulfills the functional requirments for this type of apparatus and that can be manufactured with fewerr manufacturing operations and at relatively lower cost. The embodiment described herein is illustrative and not restrictive, the scope of the invention being indicated by the appended claims and all variations which come within the meaning of the claims are intended to be embraced therein.

What is claimed is:

1. Photographic apparatus including means for spreading a processing fluid in a layer between first and second superposed sheet elements, at least one of the elements forming part of an exposed rectangular area of a film unit, the elements secured in superposed relationship by spaced apart longitudinal edge binding means secured to the external surfaces of the sheets and overlapping longitudinal edge of the elements, the binding means extending inwardly from the longitudinal edges of the first element on the external surface thereof to define lateral edges which in part define the exposure area and inwardly from the longitudinal edges of the second element to a distance shorter than the inward extension on the surface of the first element, the elements thus secured having longitudinal margin portions of greater thickness than the portions thereof in-

termediate the longitudinal edges, said spreading means comprising:

a first member having a first sheet-contacting surface; and

a second member mounted in juxtaposed relation to said first member and adapted to define a pressure generating gap therewith through which the sheet elements are adapted to be advanced during spreading of the processing fluid, said second member including a generally rigid support member, means defining a pair of laterally spaced apart recesses in said support member, said recesses being adapted to respectively overlie the longitudinal margin portions of the superposed sheet elements from a lateral point intermediate the longitudinal edge on the surface of the second element and the lateral edge defining the exposure area on the surface of the first element and extending inwardly to a lateral point at least coextensive with the lateral edge defining the exposure area on the surface of the first element as the sheet elements are advanced between said first and second members, and a layer of relatively high-friction resilient material located in overlying relation to said support member, said layer including an external surface defining a second sheet-contacting surface and an interior surface having a configuration similar to that of said support member; said second sheet-contacting surface of said second member being capable of relatively more surface deformation on those portions of the said second surface overlying said recesses whereby the inwardly extending lateral edges of the binding means on the surface of the first element may move toward said recesses during spreading of the processing fluid.

2. Photographic apparatus as defined in claim **1** further including means for resiliently urging one of said first and second members toward the other member.

3. The apparatus of claim **2** wherein said first member comprises a rotatably mounted elongated roller the first sheet-contacting surface of which has a length greater than the distance intermediate the lateral edges of the inward extension of the longitudinal edge binding means on the surface of the second element.

4. The apparatus of claim **3** wherein said support member of said second member comprises a rotatably mounted elongated roller wherein said recess means comprises a pair of annular grooves.

5. The apparatus of claim **4** wherein said second sheet-contacting surface has a substantially cylindrical configruation.

6. The apparatus of claim **4** further including means for driving at least one of said rollers to cause said one roller to impart rotary motion to the other of said rollers prior to the introduction of the pair of sheet elements between said rollers and to cause said second high-friction sheet-contacting surface to advance the pair of sheet elements between said rollers once the pair of sheet elements have been brought into operative relationship therewith, the spacing between said first and second sheet-contacting surfaces being defined by the thickness of the longitudinal margin portions of the secured superposed sheet elements.

7. The apparatus of claim **4** further including means for limiting the movement of said rollers towards one another under the influence of said urging means to define a minimum spacing between said first and second sheet-contacting surfaces thereby facilitating the introduction therebetween of the sheet elements.

8. The apparatus of claim **7** wherein said movement limiting means includes a pair of annular collars provided with bearing surfaces mounted on one of said rollers and extending towards the other said roller, and supporting surfaces on said other roller to respectively engage said collar bearing surfaces, said bearing and supporting surfaces comprising relatively low-friction non-resilient surfaces, said annular collars being spaced apart a distance greater than the width of the sheet elements and respectively located adjacent opposite ends of said second sheet-contacting surface, said collars imparting rotary motion to said first roller when under the influence of driving means prior to the advancment of the sheet elements between said rollers.

9. The apparatus of claim **1** wherein said support member of said second member is comprised of stainless steel and said layer of resilient material is comprised on an elastomer.

10. The apparatus of claim **9** wherein said elastomer is urethane.

11. The apparatus of claim **4** wherein said layer of resilient material is comprised of an elastomer.

12. The apparatus of claim **11** wherein said elastomer is urethane.

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