Jan. 22, 1957 P. D. BARTLETT 2,778,269

PHOTOGRAPHIC APPARATUS

Filed Dec. 31, 1951 2 Sheets-Sheet 1

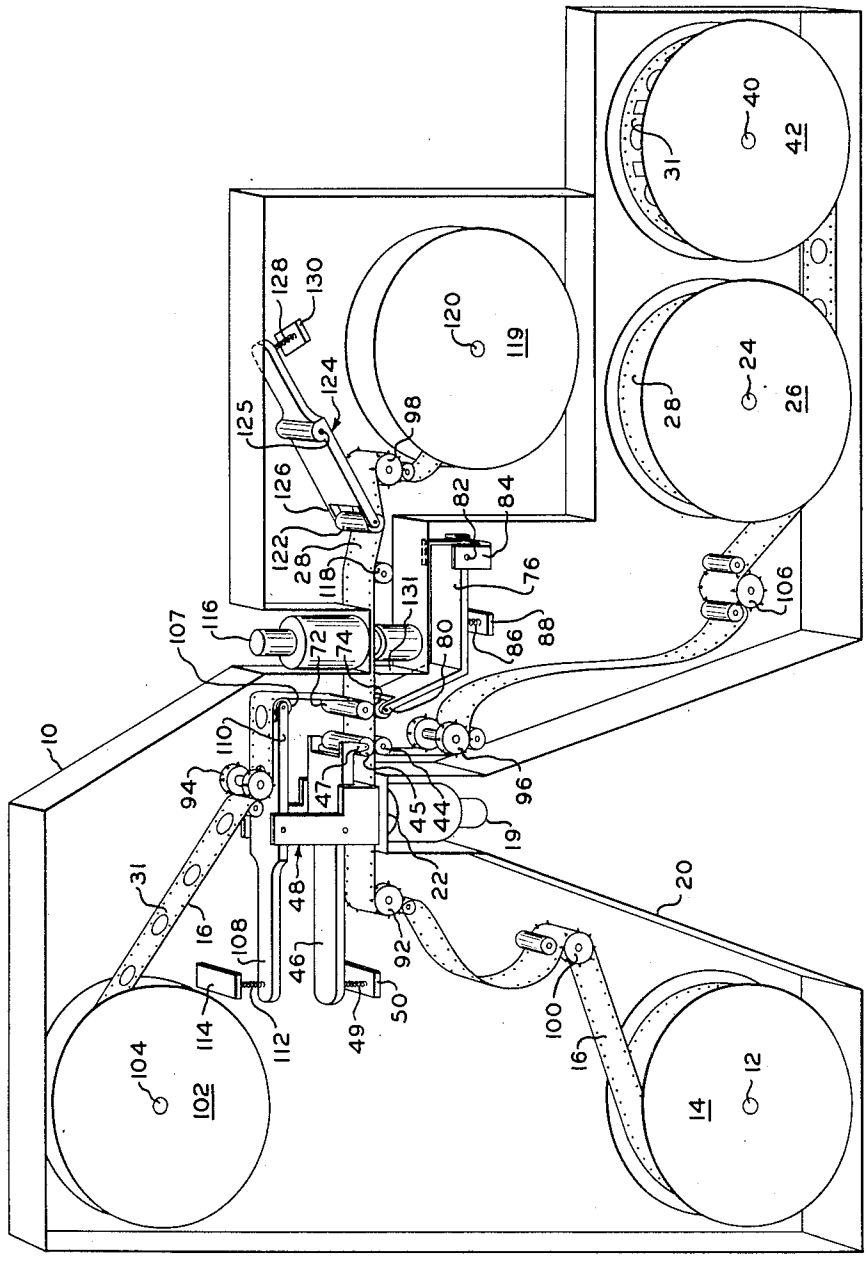


FIG. 1

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Jan. 22, 1957 P. D. BARTLETT 2,778,269

PHOTOGRAPHIC APPARATUS

Filed Dec. 31, 1951 2 Sheets-Sheet 2

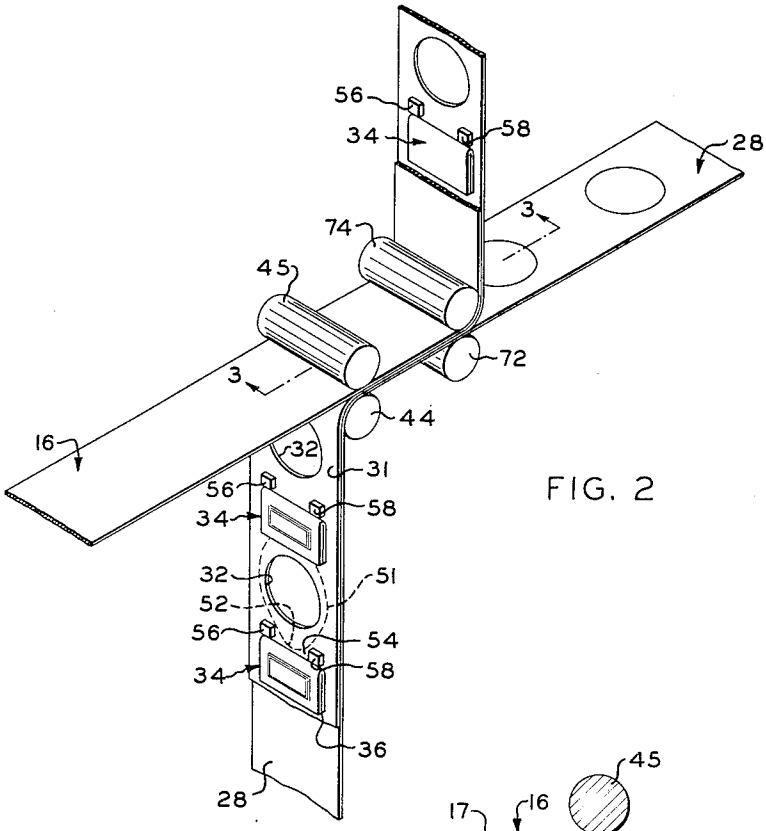


FIG. 2

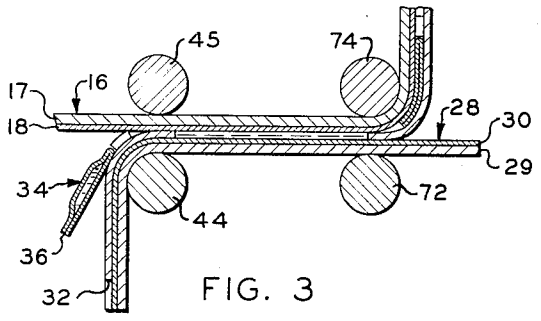


FIG. 3

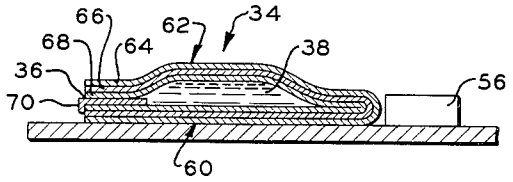


FIG. 4

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United States Patent Office 2,778,269 Patented Jan. 22, 1957

2,778,269

PHOTOGRAPHIC APPARATUS

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Application December 31, 1951, Serial No. 264,301

2 Claims. (Cl. 88—24)

The present invention relates to photography and more particularly to a photographic apparatus.

An object of the present invention is to provide a photographic apparatus for processing at least a latent image on a photosensitive strip by superposing the photosensitive strip on another strip and by spreading processing composition between the two strips, and wherein novel means are provided for supplying said processing composition to the two strips and for assuring that said processing composition is predeterminedly distributed between the two strips for proper processing.

Another object of the present invention is to provide apparatus of the above type comprising a third strip which is interposable between the aforementioned two strips and which has at least one opening therethrough and at least one container for processing composition attached thereto.

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

The invention accordingly comprises the apparatus possessing the construction, combination of elements and arrangement of parts which are exemplified in the following detailed disclosure, and the scope of the application of which will be 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 schematic perspective view of an apparatus embodying the present invention;

Fig. 2 is a schematic detail view of three strips that are operatively mounted in the device of Fig. 1;

Fig. 3 is an exaggerated cross section of Fig. 2 taken substantially along the line 3—3; and

Fig. 4 is an exaggerated detail cross section of elements of the structure shown in Fig. 3.

Photographic apparatus of the type herein illustrated generally includes means for processing an exposed photosensitive strip by superposing this strip on another strip and by spreading a thin layer of processing composition between the two strips. The photosensitive strip may comprise a silver halide layer. In one form thereof, the other strip comprises a silver precipitating layer. The processing composition, for example, may comprise a developer, a silver halide solvent and an alkali. In practice, superposition of the strips with a thin layer of processing composition therebetween is accomplished by advancing the strips between a pair of pressure-applying members. The result of this procedure is to develop the latent image on the photosensitive strip to silver in order to form in a frame of the photosensitive strip a soluble silver complex from unexposed silver halide for transfer to the other strip. This complex, at least in part, may be transferred by imbibition to the image-receiving area of the other strip where it may be developed to silver to produce a positive print.

The photographic process and various species of photosensitive and other strips herein referred to are described

in detail in Patent No. 2,543,181, issued to Edwin H. Land on February 27, 1951, for Photographic Product Comprising a Rupturable Container Carrying a Photographic Processing Liquid. It is, of course, to be understood that the apparatus herein described is not limited to use with any particular species of photosensitive or other strip, these terms being used in their broadest sense to indicate a first strip which is photosensitive and a second strip which merely may aid in spreading the processing composition over the surface of the first strip or which may, if desired, possess other characteristics.

The illustrated embodiment of the herein disclosed invention is a photographic device which is adapted to expose frames of a photosensitive strip in rapid succession in order to form on the strip a succession of latent images, to rapidly transform the latent images into a succession of positive prints and to enable observation of the positive prints by means of a projector. Devices of this character have wide application in diverse fields. As one example of such an application, mention may be made of apparatus for projecting onto a viewing screen the representations produced on the cathode ray tube of a television set. Other such examples are described in detail in the following patent applications: application Serial No. 244,822, filed on September 1, 1951, by Edwin H. Land et al. for Apparatus and Method for Indicating the Position and Motion of Phenomena in Space; and application Serial No. 245,692, filed on September 8, 1951, by Edwin H. Land for Photographic Apparatus (now abandoned).

In the illustrated apparatus, a third strip of novel design is provided for supplying processing composition for spreading between a photosensitive strip and another strip and for assuring spreading of a predetermined character. The third strip has a succession of openings therethrough which are registrable with frames on the photosensitive strip and has affixed thereto a succession of containers of processing composition, one opening being associated with one container. When interposed between the photosensitive and other strip, the third strip acts to separate the surface of the photosensitive strip from the surface of the other strip by a distance which is substantially equal to its thickness. Thus, processing liquid fed between the photosensitive and other strip so as to flow into the opening provided by the third strip is caused to spread in a layer of predetermined thickness. By virtue of processing composition so distributed for a predetermined processing time, a latent image in a frame of the photosensitive strip may be developed into a positive print on the other strip. At the completion of the processing time, superposed portions of the photosensitive strip and the other strip are separated to render the positive print available for viewing by projection or otherwise.

Referring now to the drawings, wherein like numerals designate like parts, Fig. 1 discloses a photographic apparatus embodying a preferred form of the present invention, the working components of which are mounted and enclosed in such means as a lighttight housing 10.

Mounting means for carrying a supply of photosensitive material is positioned within housing 10. This mounting means, as shown, comprises a shaft 12, which is suitably secured to housing 10, and a spool 14 rotatably mounted on shaft 12. The supply of photosensitive material, as shown, is a photosensitive strip 16 coiled on spool 14. Strip 16 may comprise a base 17 and a photosensitive layer 18 on one side of the base. Base 17, by way of example, may comprise any suitable paper or organic plastic. Photosensitive layer 18 preferably comprises an emulsion of silver halide. In the illustrated embodiment, strip 16 is conventional 35 mm. photographic film pro-

vided with successive apertures along the edges thereof which are adapted to engage the teeth of a sprocket.

As a means for exposing successive frames of strip 16, a suitable lens and shutter assembly 19, which may be broadly similar to the exposure means of a conventional motion picture camera, is provided. As shown, housing 10 is provided with a corridor 20 which is defined by a plurality of re-entrant walls and within which is mounted assembly 19. The end wall 22 of corridor 20 is provided with an aperture by virtue of which light passing through assembly 19 may reach frames of strip 16.

Mounting means for carrying a supply of image-receiving material is positioned within housing 10. This mounting means, as shown, comprises a shaft 24, which is suitably secured to housing 10, and a spool 26 rotatably mounted on shaft 24. The supply of image-receiving material, as shown, is an image-receiving strip 28 coiled on spool 26. Strip 28 may comprise a base layer 29 and an image-receiving layer 30. The base layer, as shown, is composed of a suitable transparent organic plastic. By way of example, it is possible to use in image-receiving layer 30 certain compounds and elements whose presence during the transfer process has a desirable effect on the amount and character of the silver precipitated during positive print formation. For this purpose, such materials as, for example, metallic sulfides and selenides, thiooxalates and thioacetamides have been disclosed in copending applications Serial No. 727,385, filed by Edwin H. Land on February 8, 1947, for Photographic Product and Process (now Patent No. 2,698,245), Serial No. 7,795, filed by Edwin H. Land on February 12, 1948, for Photographic Process (now Patent No. 2,647,056), and Serial No. 164,908, filed by Edwin H. Land on May 29, 1950, for Photographic Silver Halide Transfer Product and Process (now abandoned and replaced by application Serial No. 449,995, filed August 16, 1954, and issued as Patent No. 2,698,237 on December 28, 1954). Other precipitating agents have been proposed, such as the colloidal metals and specifically colloidal silver. It is also desirable, as disclosed in the said copending applications, to provide, as the vehicle for the silver precipitating agents in layer 30, a macroscopically continuous film that consists of submacroscopic agglomerates of minute particles of a suitable water-insoluble, inorganic, preferably siliceous, material, such, for example, as silica aerogel. The use of such a vehicle for the precipitating agents tends to aggregate the silver that is precipitated into its most effective form for print making. Strip 28 is provided with successive apertures along the edges thereof which are adapted to be engaged on the teeth of a sprocket and by virtue of which strip 28 may be aligned with strip 16.

In the illustrated embodiment, a third strip of novel design is provided for supplying processing composition for spreading between latent images on strip 16 and the surface of strip 28 and for assuring spreading of a predetermined character. In the form thereof as shown, this means comprises a masking or third strip 31 provided with a succession of openings 32 (Fig. 2) and having a succession of processing composition containers 34 attached thereto, one of openings 32 being associated with one of containers 34. Strip 31 may be composed of a thin material which is predeterminedly deformable under given compressive forces, such, for example, as kraft paper or an organic plastic film. Openings 32 are at least as large in area as are the positive prints produced on strip 28. Openings 32 are spaced apart center-to-center by a distance equal to the center-to-center distance between the frames of strip 16. The rearward edge of each container 34 provides a rupturable mouth 36 through which a processing composition 38 held by the container may be ejected toward the opening 32 associated therewith.

Mounting means for carrying a supply of strip 31 is positioned within housing 10. This means, as shown, comprises a shaft 40, which is suitably secured to housing 10, and a spool 42 rotatably mounted on shaft 40. The supply of strip 31 is coiled on spool 42. Strip 31 is provided with successive apertures along the edges thereof which are adapted to be engaged on the teeth of a sprocket and by virtue of which strip 31 may be aligned with strips 16 and 28.

Strips 16 and 28 may be superposed with strip 31 interposed therebetween in such a manner that frames of strip 16 and openings 32 of strip 31 are in registration. When the three strips are so superposed as to bear this relationship, opposed compressional forces may be applied to opposite sides of strips 16 and 28 in order to eject processing composition 38 from a container 34 and to spread the processing composition into the region defined by an associated opening 32. In practice, a pair of pressure-applying means may be provided for generating the necessary compressional forces.

In the illustrated embodiment, the pressure-applying means are shown as a pair of rollers 44 and 45. Roller 44 is rotatably mounted on suitable means affixed to housing 10. A lever 46, having a pair of arms 47 at one of its ends, rotatably mounts roller 45. Lever 46, in turn, is pivotally mounted on a pair of brackets 48 which are affixed by suitable means to housing 10. Viewing Fig. 1, lever 46 is urged in a clockwise direction by such means as a helical spring 49, one extremity of which is secured to the left end of lever 46 and the other extremity of which is secured to housing 10 as by means of a bracket 50. The adjacent surfaces of rollers 44 and 45 define a point of initial superposition at which portions of strips 16 and 28 are initially superposed with a portion of strip 31 interposed therebetween.

In order to rupture successive containers 34 and to spread quantities of processing composition between successive frames of strip 16 and successive areas of strip 28, strips 16, 28 and 31 may be advanced between rollers 44 and 45. In Fig. 2, the approximate path, with relation to the above-identified elements, followed by a quantity of liquid 38 during release from container 34 and spreading thereof is shown in dotted lines at 51. Layer 51 extends from a mouth 36 with an initial width approximately equal to the width of an opening 32. From mouth 36, layer 51 expands toward the edges of strip 31 so that the outer limits thereof lie between the borders of opening 32 and the edges of strip 31. When layer 51 has spread so as to completely cover opening 32, it contracts to a narrow tongue 52 midway between the edges of strip 31. Tongue 52 is formed of processing composition in excess of that spread within opening 32. Container 34 is provided with a quantity of processing composition 38 in excess of the absolute minimum required for filling the region defined by opening 32 in order to assure proper spreading notwithstanding adverse conditions of temperature and humidity and maldistribution of the liquid as a result of nonuniform rupture of the container and nonuniform spreading.

In accordance with the present invention, the herein disclosed product is so constructed that liquid 38, in excess of that spread within opening 32, is neatly trapped between strips 16 and 31 and is prevented from escaping into portions of the photographic apparatus where its presence is not desired. The construction furthermore is such that the liquid in excess of that spread within opening 32 is prevented from passing to a succeeding opening 32.

Referring to Fig. 2, it will be noted that an opening 32 lies closer to the leading one than to the trailing one of a pair of containers 34 between which it is located. A section 54 of strip 31, lying between the rearward edge of opening 32 and the forward edge of the trailing container of the pair, serves as a trapping area for collecting liquid in excess of that spread within opening 32. The product is so constructed that trapping area 54 is spaced from a superposed portion of strip 16 during advancement of the strips between rollers 44 and 45. In the

present embodiment, this construction includes a pair of difficulty compressible members 56 and 58, positioned at opposite ends of the forward edge of the trailing container of the pair. Area 54, the portion of the strip 16 superposed thereon, and members 56 and 58 define a trapping region which is large enough in volume to confine excess liquid and which will not appreciably change in volume when advanced between rollers 44 and 45. This trapping region acts to terminate spreading of processing composition 38 which has been ejected from the mouth 36 of a container and which has been spread within an opening 32. This construction permits extremely close spacing of successive frames of strip 16.

In the illustrated embodiment, each container 34 comprises a first portion 60 and a second portion 62, each portion being constructed of sheet material which comprises a plurality of plies. An outer ply 64 serves as a backing or support and is preferably formed of a thin, relatively inexpensive, tough material which may be composed of plastic but which is preferably a paper, such as kraft paper. Applied to the inner surface of ply 64 may be a thin layer 66 of a relatively vapor-impervious material, such as a metal foil. Coated on the surface of foil 66 is a further layer 68 of a suitable plastic which can be adhered to itself by the application of heat and/or pressure. Layer 68 is preferably liquid impervious in order to provide a protective coating for foil 66, thereby preventing the contents of container 34 from reaching and corroding foil 66. Coating 68 is relatively thin, being only sufficiently thick to be continuous.

Portions 60 and 62 are similar in peripheral outline and are bonded together at their side edges by the cohesion of layer 68 of portion 60 with layer 68 of portion 62, this cohesion being attained by the application of heat and/or pressure to these peripheral areas. Portions 60 and 62 are integral with each other at their forward edges. If desired, portions 60 and 62 may be bonded together at their forward edges by the cohesion of layer 68 of portion 60 with layer 68 of portion 62.

Portions 60 and 62 are bonded together at their rearward edges by a thin strip of adhesive 70 positioned therebetween. In order to assure a unidirectional release of the contents of container 34 upon the application of a squeezing force to the walls thereof, strip 70 is so constituted that the adhesive forces between strip 70 and coatings 68 are less than are the cohesive forces between coatings 68 of portions 60 and 62. In order to assure that a uniform peeling or separation of the marginal portions along the rearward edge of container 34 is obtained when container 34 is subjected to a liquid-releasing force, strip 70 is applied to the rearward edge in such a way that it extends from the very extremity thereof into the liquid-carrying cavity of container 34. Precautions are taken to insure that strip 70 extends to the extremity of the rearward edge even to the extent of having the material of strip 70 coated over this extremity, as shown in Fig. 4. A further precaution against the hazard of uneven seal consists of extending strip 70 beyond the ends of forward edges of container 34.

Portions 60 and 62 of container 34, in one preferred form, comprise a construction in which base 64 is a kraft paper, layer 66 is a silver or lead foil, and coating 68 is a thermoplastic material such as polyvinyl acetal, for example polyvinyl butyral, polyvinyl acetal or polyvinyl formal. It is to be understood that the composition of coating 68 may include suitable plasticizers and other materials which render the coating formed from the plastic composition more suitable for its purpose. For example, a composition comprising 60% to 72% by weight of polyvinyl butyral, 10% to 23% by weight of nitrocellulose, and approximately 5% by weight of dibutyl sebacate is particularly satisfactory as inner coating 68. When layer 68 is of the aforementioned composition, strip 70 may consist of ethyl cellulose or of a mixture of ethyl cellulose and paraffin, the mixture comprising at least 50% by weight of ethyl cellulose.

The processing composition within container 34 in some applications may have a predetermined minimum viscosity which produces, in cooperation with strip 70, a uniform and complete opening of mouth 36 when container 34 is advanced between rollers 44 and 45. Uniform spreading of processing composition 38 between strip 28 and a frame of strip 16 thus may be aided. The minimum viscosity, for example, may be of the order of at least 1000 centipoises at a temperature of 24° C. The desired viscosity may be obtained in the liquid content of the container by dissolving in the liquid a suitable high molecular weight polymer which will not decompose or otherwise lose its thickening properties due to reaction with the liquid or the reagents therein. For example, where the liquid composition in the container has water as its solvent, suitable plastics for increasing the viscosity of the liquid composition are the water-soluble, cellulosic plastic, such as hydroxyethyl cellulose and sodium carboxymethyl cellulose. This container structure is particularly suited for carrying highly alkaline solutions, such as solutions of photographic developing agents having a pH as high as 14.

As a result of the foregoing structure, the container in its filled and sealed condition is relatively deformable, and it becomes possible to mount the container on strip 31 and to wind strip 31 with containers mounted thereon into a roll having a relatively small radius.

The illustrated embodiment is so constructed that a frame of strip 16 and an area of strip 28 after advancing between rollers 44 and 45 remain in superposition for a predetermined processing time during which a latent image in the frame is processed into a positive print on strip 28. As a means for enabling separation of a positive print on strip 28 from portions of strips 16 and 31, with which it has been associated, a pair of rollers 72 and 74 are provided. As shown, roller 72 is rotatably mounted on a means suitably affixed to housing 10. A lever 76, having a pair of arms 80 at one of its ends, rotatably mounts roller 74. Lever 76, in turn, is pivotally mounted, as at 82, on a pair of brackets 84 which are affixed by suitable means to housing 10. Viewing Fig. 1, lever 76 is urged in a clockwise direction by such means as a helical spring 86, one extremity of which is secured to lever 76 and the other extremity of which is secured to housing 10 as by means of bracket 88. The adjacent surfaces of rollers 72 and 74 define a point of terminal superposition at which strip 31 is separated from strips 16 and 28. The point of terminal superposition is so spaced from the point of initial superposition that one latent image may be positioned therebetween for processing at a given time. It is, of course, to be understood that the distance between the point of initial superposition and the point of terminal superposition may be such that any integral number of latent images may be positioned therebetween for processing at a given time.

Means are provided for aligning strips 16, 28 and 31 with successive frames of strip 16 and openings 32 in registration for advancing the three strips between the pairs of rollers 44, 45 and 72, 74. Said means, in the form thereof as shown, are combined in the form of four synchronized intermittent sprockets designated by numerals 92, 94, 96 and 98.

In the illustrated embodiment, a steady feed sprocket 100 is provided for supplying strip 16 to sprocket 92 from spool 14. From sprocket 92, strip 16 extends between pairs of rollers 44, 45 and 72, 74 and thence past sprocket 94 to a take-up spool 102. Take-up spool 102 is rotatably mounted on a shaft 104 which in turn is affixed to housing 10. A steady feed sprocket 106 is provided for supplying strips 28 and 31 to sprocket 96 from spools 26 and 42, respectively. From sprocket 96, strips 28 and 31 extend into superposition and align-

ment with strip 16 between pairs of rollers 44, 45 and 72, 74.

From between rollers 72 and 74, strip 31 extends past sprocket 94 in contact with strip 16 and to take-up roll 102. As a means for producing a constant tension in those portions of strips 16 and 31 that extend from rollers 72 and 74 to sprocket 94, a roller 107 is spring-loaded against the outer surface of strip 16. A lever 108, having a pair of arms 110 at one of its ends, rotatably mounts roller 107. Lever 108, in turn, is pivotally mounted on brackets 48. Viewing Fig. 1, lever 108 is urged in a counterclockwise direction by such means as a helical spring 112, one extremity of which is secured to the left end of lever 108, and the other extremity of which is secured to housing 10 as by means of a bracket 114.

In the illustrated embodiment, spools 26 and 42 are so mounted that a portion of strip 31 may be brought into contact with a portion of strip 28 that is still coiled on spool 26. This arrangement assures smooth feeding of aligned portions of strips 28 and 31 to sprocket 106.

As a means for projecting or otherwise rendering visible images of successive positive prints which have been formed on strip 28, a lens and shutter assembly 116, which may be broadly similar to components of a motion picture projector, is provided. From between rollers 72 and 74, strip 28 extends past assembly 116 to a guide roller 118 and thence past sprocket 98 to a take-up spool 119. Spool 119 is rotatably mounted on a shaft 120 which in turn is affixed to housing 10. As a means for producing a constant tension in that part of strip 28 which extends between roller 118 and sprocket 98, a roller 122 is spring-loaded against the inner surface of strip 28. A lever 124, having a pair of arms 126 extending from one of its ends, rotatably mounts roller 122. Lever 124, in turn, is suitably pivoted to housing 10 as at 125. Viewing Fig. 1, lever 124 is urged in a counterclockwise direction by such means as a helical spring 128, one extremity of which is secured to the right end of lever 124 and the other extremity of which is secured to housing 10 as by means of a bracket 130.

Suitable light-seal means 131 are provided for preventing light emanating from projector 116 from reaching portions of strips 16, 28 and 31 which have not yet advanced between separation rollers 72 and 74.

For the purpose of simplicity, the present disclosure omits detailed drawings of the drive means now to be briefly described. In the present embodiment, the drive means is of conventional design and is provided with an electric motor for driving the working components of the herein described device. Intermittent sprockets 92, 94, 96 and 98 are driven by the electric motor through such means as a single revolution clutch coupled with a Geneva movement. Steady feed sprockets 100 and 106 are driven by the electric motor through suitable reduction gearing. Spools 14, 26 and 42 rotate by reason of the pull exerted on strips 16, 28 and 31 by steady feed sprockets 100 and 106. Spools 102 and 119 are driven through friction slip clutches of conventional design. Assemblies 19 and 116 and intermittent sprockets 92, 94, 96 and 98 are so synchronized that strips 16, 28 and 31 are in motion only when the shutter mechanisms of assemblies 19 and 116 are closed. In this manner, a latent image produced at a given time in a frame of strip 31 by assembly 19 is rendered visible as a positive image by assembly 116 at a given time thereafter.

In the operation of the illustrated processing device, strips 16, 28 and 31 are operatively extended from their respective supply spools to their respective take-up spools so that portions of the three strips extend in alignment from an initial point of superposition between rollers 44 and 45 to a terminal point of superposition between rollers 72 and 74. Frames of strip 16 and associated portions of strips 28 and 31 are then successively positioned between the aforementioned points of initial and terminal superposition. Now consider the aligned portions of strips that are advancing between rollers 44 and 45. When a container 34 advances between rollers 44 and 45, mouth 36 is ruptured and processing composition 38 is spread toward an opening 32. As advancement of the strips continues beyond the point of initial superposition, processing composition 38 is spread into opening 32 to form a uniformly thin layer between strip 28 and a frame of strip 16. The aforementioned frame and the portion of strip 28 with which it is associated now remain stationary between the point of initial superposition and the point of terminal superposition until the latent image in the frame has been processed so as to form a positive print on strip 28. Thereafter, advancement of the three strips is resumed and strip 28 is separated from strips 16 and 31 by rollers 72 and 74. Members 56 and 58 at the forward edge of container 34 limit the spread of excess processing composition from the container in the following manner. When advancement of the three strips is resumed, excess processing composition is spread beyond opening 32. As advancement continues, most of the excess composition will be forced into the region defined by members 56 and 58, area 54, and the portion of strip 16 superposed thereon. At this point, the thickness of members 56 and 58 causes separation of rollers 44 and 45. Now the excess is permitted to advance uncompressed between the rollers. Members 56 and 58 cause separation of rollers 72 and 74 in a similar manner.

It is expressly to be understood that means other than the succession of containers 34 affixed to strip 31 may be used to supply processing composition for spreading within the regions defined by openings 32. For example, the processing composition may be applied by means of the type disclosed in Patent No. 2,558,858, issued to Edwin H. Land on July 3, 1951, for Photographic Apparatus or by means of the type disclosed in Patent No. 2,435,718, issued to Edwin H. Land on February 10, 1948, for Photographic Process and Apparatus for Subjecting a Photographic Film to a Processing Fluid. Furthermore, the claimed pressure-applying members need not comprise a pair of rollers but may comprise a pair of suitably shaped plates or a plate and a roller.

Broadly, an apparatus or process embodying the present invention may employ a variety of photographic materials, including not only those related to silver halide, but additionally, for example, such materials as diazo compounds and ferric salts. The term "processing composition" as used herein is intended to include any reagent which acts to render a visible image more visible, as in the case of ferric salts, or an invisible image visible, as in the case of silver halide emulsions. It is apparent that the invention is not limited to materials sensitive to visible radiation but includes photographic materials sensitive to such other radiation as X-ray, ultraviolet or infrared.

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

What is claimed is:

1. Photographic apparatus for processing a first strip of photosensitive material having a succession of frames containing latent images, said photographic apparatus employing a second strip of receptive material for receiving visible images by transfer from said frames and a third strip of masking material having a succession of openings therein registrable with said frames, said photographic apparatus comprising a first pair of pressure-applying rollers defining an initial point of superposition toward which said first strip, said second strip

and said third strip advance in order that said first strip and said second strip become superposed and said third strip becomes interposed therebetween, a second pair of rollers defining a terminal point of superposition from which said first strip, said second strip and said third strip advance in order that said first strip and said third strip become separated from said second strip, a first supply spool for carrying a roll of said first strip, a second supply spool for carrying a roll of said second strip, a third supply spool for carrying a roll of said third strip, means for receiving said first strip, said second strip and said third strip, said first strip being disposed in a first path which extends from said first supply spool through said initial and terminal points of superposition to said receiving means, said second strip being disposed in a second path which extends from said second supply spool through said initial and terminal points of superposition to said receiving means, said third strip being disposed in a third path which extends from said third supply spool through said initial and terminal points of superposition to said receiving means, a first sprocket disposed along said first path between said first supply spool and said initial point of superposition, a second sprocket disposed along said second path between said second supply spool and said initial point of superposition and along said third path between said third supply spool and said initial point of superposition, a third sprocket disposed along said first path between said terminal point of superposition and said receiving means and along said third path between said terminal point of superposition and said receiving means, a fourth sprocket disposed along said second path between said terminal point of superposition and said receiving means, and a lens and shutter assembly disposed along said first path between said first sprocket and said initial point of superposition.

2. Photographic apparatus for processing a first strip of photosensitive sheet material having a succession of frames containing latent images, said photographic apparatus employing a second strip of receptive material for receiving visible images by transfer from said frames and a third strip of masking material having a succession of openings therein registrable with said frames, said photographic apparatus comprising pressure-applying means defining a pressure-applying region within which said first strip, said second strip and said third strip advance with said first strip and said second strip superposed and said third strip interposed therebetween, a first supply spool for carrying a roll of said first strip, a second supply spool for carrying a roll of said second strip, a third supply spool for carrying a roll of said third strip, a first take-up spool for receiving said first strip and said third strip, a second take-up spool for receiving said second strip, said first strip being disposed in a first path which extends from said first supply spool through said pressure-applying region to said first take-up spool, said second strip being disposed in a second path which extends from said second supply spool through said pressure-applying region to said second take-up spool, said third strip being disposed in a third path which extends from said third supply spool through said pressure-applying region to said first take-up spool, a first sprocket disposed along said first path between said first supply spool and said pressure-applying region, a second sprocket disposed along said second path between said second supply spool and said pressure-applying region and along said third path between said third supply spool and said pressure-applying region, a third sprocket disposed along said first path between said pressure-applying region and said first take-up spool and along said third path between said pressure-applying region and said first take-up spool, a fourth sprocket disposed along said second path between said pressure-applying region and said second take-up spool, and a lens and shutter assembly disposed along said second path between said pressure-applying region and said fourth sprocket.

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