

April 19, 1966

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3,246,739

PHOTOGRAPHIC PRODUCT

Filed Aug. 28, 1963

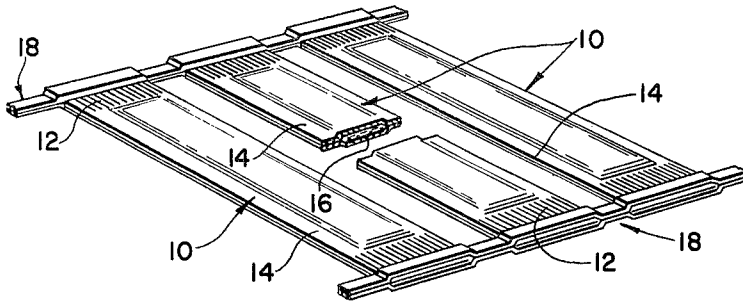


FIG. 1

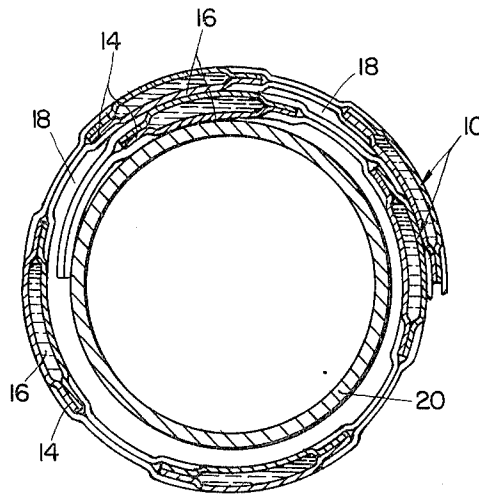


FIG. 2

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3,246,739

PHOTOGRAPHIC PRODUCT

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Filed Aug. 28, 1963, Ser. No. 305,178
5 Claims. (Cl. 206—56)

This invention relates to photographic products and particularly to photographic products containing liquids for processing photographic, photosensitive materials.

In U.S. Patent No. 2,543,181, issued February 27, 1951, in the name of Edwin H. Land, there is described a rupturable, disposable container releasably carrying a photographic processing liquid and constructed to release its liquid contents for uniform distribution over a predetermined area in response to the application of a compressive stress. The container generally comprises a pair of rectangular walls formed of a flexible sheet material sealed together in facing relation at their margins to form a cavity filled with the liquid. One of the longitudinal seals is weaker than the other seals and is designed to rupture and form a liquid discharge mouth when pressure is generated within the liquid contents of the cavity by the application of external compressive pressure to the container. Numerous photographic products, processes, and apparatus have been proposed involving the provision and use of elongated sheets of photosensitive material including a plurality of areas adapted to be processed, each by the contents of one of a plurality of containers. In such applications, a plurality of containers are provided, either associated initially with the sheet against which the processing liquid is to be distributed, or separately, in which case the containers are fed, one at a time, into association with each area of the sheet to effectuate the processing of that area.

Because the container are designed to rupture in response to the application of external compressive pressure, storage and handling of a plurality of containers either separately or in association with a sheet and feeding containers into association with a sheet, have presented the problem of premature rupture of the container and release of the container contents. This problem is aggravated by the fact that the liquid contents of the containers in many instances are quite viscous, harden on exposure to air and/or are highly corrosive.

An object of the invention is to provide a novel and improved photographic product comprising a plurality of containers of the type described which substantially reduce the danger of rupture of the containers during storage and handling and facilitate the feeding of the containers, one at a time, into association with a photographic sheet.

Copending U.S. patent application Serial No. 305,177 filed August 28, 1963 in the name of Gold et al., discloses photographic apparatus of the type in which a succession of areas of a photosensitive image-recording sheet are exposed, superposed with successive areas of a print-receiving sheet and processed by liquids contained in successive rupturable containers of the type described.

Other objects of the invention are: to provide a product useful in apparatus of this type comprising a plurality of containers connected with one another by a pair of elongated connecting elements to form a structure resembling a ladder in which the containers correspond to the rungs; and to provide a structure, as described, comprising a plurality of containers especially adapted to be tightly coiled and in which the connecting members are

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thicker than the containers to protect the containers against compression.

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

The invention accordingly comprises 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 drawing wherein:

FIGURE 1 is a fragmentary perspective view, partially in section, of the product of the invention; and

FIG. 2 is a sectional view of the product shown coiled about a mandril.

The product of the invention comprises a plurality of connected rupturable containers adapted to be employed in apparatus of the type described in the aforementioned application in which the containers are fed, one at a time, between a pair of sheets which are advanced together with the container between a pair of pressure-applying members for dispensing the fluid contents of the container and distributing the fluid over an area between the sheets. Each container, as it is fed between the sheets, is severed from the remaining containers all of which are supplied and stored in a coiled condition requiring relatively little space and facilitating their handling. The liquid contents of the container includes reagents for reacting with an exposed photographic photosensitive material to produce a visible image. The container's contents may, for example, comprise a viscous reagent of the type disclosed in the aforementioned U.S. patent for producing a transfer print by a diffusion transfer-reversal process. Reagents of this type, in addition to being viscous and susceptible to solidification on exposure to air, oxidize readily and are highly alkaline so that their premature release is to be avoided.

The containers comprising the invention shown in the drawing are substantially the same as those shown in the aforementioned patent. Each container, designated 10, comprises a single rectangular sheet of a material which is preferably water and oxygen impervious, folded medially to form facing walls which are secured to one another at their end marginal portions designated 12, and at their longitudinal marginal portions designated 14. The sheet material may comprise a multilayer sheet including, for example, an inner layer of a heat fusible material which is chemically inert to the processing agent and is impervious to the liquid of the agent, e.g., a polyvinyl acetal, such as polyvinyl butyral; an intermediate layer which is impervious to the processing agent, e.g., a metallic foil, such as lead or silver foil; and an outer backing layer providing a support for the other layers and formed of a material such as kraft paper. The two walls define between them an elongated generally rectangular cavity 16 which is filled with the liquid processing composition.

The longitudinal seal between marginal portions 14 is substantially weaker than the end seals between marginal portions 12 so that hydraulic pressure generated within the liquid in cavity 16 by the application of a compressive force to the walls of the cavity will separate marginal portions 14 throughout substantially their entire length. Various expedients have been proposed for forming the seals and insuring that the longitudinal seal is weaker than the end seal, and these include, for example, formation of the three seals by the application of heat and pres-

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sure with greater heat and pressure being applied to the end seals. In the form shown, the end marginal portions are ribbed in order to increase the strength of the end seal over that of the longitudinal seals. The longitudinal marginal portions open upon rupture of the seal, to provide a discharge mouth approximately equal in length to cavity 16 which facilitates the unidirectional release of the liquid contents of the cavity.

While it has been proposed to provide a plurality of containers in both connected and unconnected forms and feed the containers, one at a time, into association with a sheet on which the liquid contents of the containers is to be distributed, a practical solution to the problem of preventing rupture of the containers during storage and handling due to the application of compressive pressure to or bending of the containers has been lacking. The present invention contemplates a product comprising a plurality of containers and provides for convenient storing and handling of the containers without danger of leakage of the liquid due to compression or bending of the containers. The containers comprising the invention are connected to one another by a pair of narrow, elongated connecting members 18 secured in substantially parallel relation to the end marginal portions of the containers. The containers are positioned with longitudinal marginal portions in substantially parallel relation, facing in the same direction and are spaced from one another so that the structure resembles a ladder with the containers corresponding to the rungs of the ladder.

Connecting members 18 are formed of flexible sheet material such as paper, plastics, cardboard and the like, and in the form shown, each connecting member comprises two strips of sheet material secured in facing relation to opposite surfaces of end marginal portions 12 of the container and to each other intermediate the containers. Each of the connecting members is sufficiently flexible to permit bending upon itself while being sufficiently wide and hence stiff, to resist bending toward and away from the other connecting member.

The product of the invention comprising containers connected in the form of a ladder is designed to be coiled, as shown in FIG. 2, with the containers of successive convolutions protected against compression by providing connecting members having a thickness such that successive convolutions of each connecting member engage one another and support the containers out of contact with one another. Accordingly, the aggregate thickness of each connecting member and the end marginal portions of each container to which the connecting member is secured are at least equal to and preferably exceed the maximum thickness of any container so that the containers of successive convolutions are supported out of contact with one another by the connecting members which engage one another.

The strip of connected containers may be coiled directly upon a mandril 20, as shown in FIG. 2, conveniently and easily without danger of rupture of the containers due to the application of compressive pressure thereto, while the mandril (which may comprise a spool) functions as a convenient means for storing and dispensing the containers. Coiling of the containers provides a compact storage arrangement having the added advantage of preventing such bending of the containers as might cause leakage of their liquid contents. The coiled product may be handled, rolled, coiled, stored and loaded into processing apparatus in much the same manner as the coiled photographic sheets with which the containers are employed. Apparatus designed to employ the product, disclosed, for example, in the aforementioned application, include suitable means for severing connecting members 18 between successive containers to permit the containers to be fed, one at a time, into association with a sheet over which their liquid contents are to be distributed. The connecting members, when employed in

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such apparatus, also facilitate advancement of the containers between pressure-applying members which release and spread the liquid. The arrangement described facilitates feeding and handling of the containers since the containers are all connected, yet are easily separated and are capable of handling in the manner of a flexible sheet.

Since certain changes may be made in the above 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 drawing shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A photographic product capable of dispensing a plurality of discrete, predetermined quantities of a liquid photographic processing agent, said product comprising, in combination:

a plurality of elongated rupturable containers each comprising a pair of facing rectangular walls formed of a deformable sheet material and secured to one another at their marginal portions to form a cavity, said walls being secured together at a longitudinal marginal portion by a bond weaker than the bonds between the remaining marginal portions to provide at said longitudinal marginal portion a liquid-dispensing mouth which opens in response to pressure within the contents of said container generated by compressive pressure applied externally to said walls;

a predetermined quantity of said liquid photographic processing agent within said cavity of each of said containers; and

a pair of elongated connecting members secured in generally parallel relation to the end marginal portions of said containers at opposite ends thereof, said containers being arranged in spaced side by side relation with said liquid-dispensing mouths facing in the same direction;

the aggregate thickness of each of said connecting members and said end marginal portions to which it is secured in the region of each of said end marginal portions being at least equal to the maximum external thickness of any one of said containers to prevent compression of said containers when said plurality of containers and said connecting members are coiled upon themselves.

2. The photographic product of claim 1 in which each of said connecting members comprises a strip of sheet material sufficiently flexible to permit coiling of said strip and having a width sufficient to render said strip resistant to bending in a direction perpendicular to the direction of bending of said strip when coiled.

3. The photographic product of claim 1 in which the structure comprising said containers joined by said connecting members is coiled upon itself with successive convolutions of said connecting members contacting one another and supporting said containers of successive convolutions of said structure apart from one another.

4. A photographic product capable of dispensing discrete predetermined quantities of a liquid photographic processing agent, said product comprising, in combination:

a plurality of elongated rupturable containers, each comprising a pair of facing rectangular walls formed of deformable sheet material secured to one another at their marginal portions to form a cavity, said walls being secured together at a longitudinal marginal portion by a bond weaker than the bonds between the remaining marginal portions to provide at said longitudinal marginal portion a liquid-dispensing mouth which opens in response to pressure within the contents of said container generated by compressive pressure applied externally to said walls;

a predetermined quantity of said liquid photographic

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processing agent within said cavity of each of said containers; and

a pair of elongated, flexible connecting members secured in generally parallel relation to the end marginal portions of said containers at opposite ends thereof, said containers being arranged in spaced relation with said liquid dispensing mouths substantially parallel and facing in the same direction; each of said connecting members having a thickness at least equal to the maximum external thickness of each of said containers to prevent compression of said container when said plurality of containers and said connecting members are coiled.

5. The photographic product of claim 4 in which the structure comprising said containers joined by said connecting members is disposed in a coil having a plurality of convolutions and said connecting members of adja-

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cent convolutions contact one another for supporting said containers of adjacent convolutions apart from one another.

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