Sept. 29, 1953 E. H. LAND 2,653,732

SINGLE USE CONTAINER HAVING A SEALED PASSAGE ADAPTED TO BE UNSEALED UPON APPLICATION OF STRESS

Filed Feb. 5, 1949

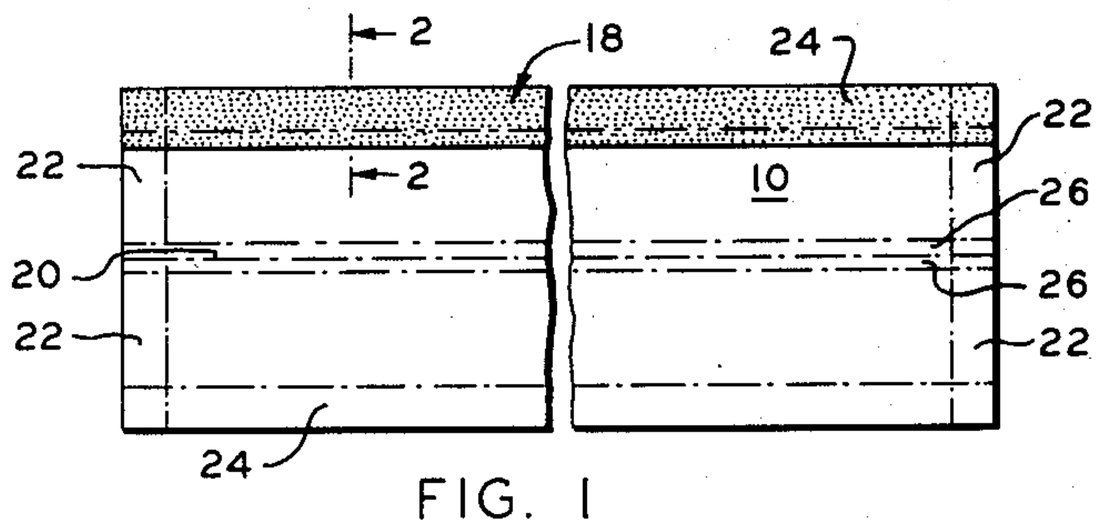

FIG. 1

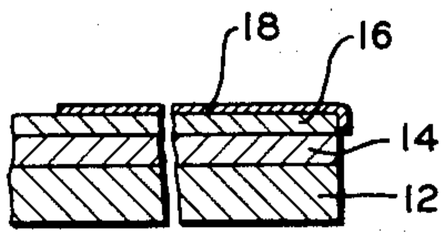

FIG. 2

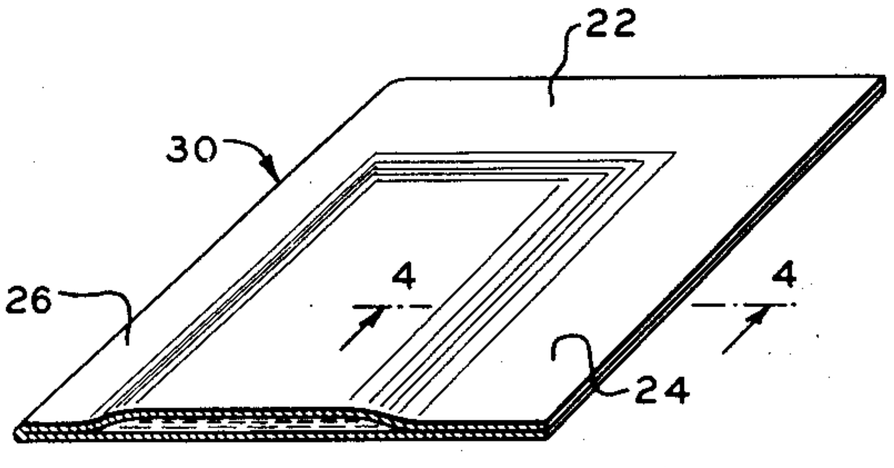

FIG. 3

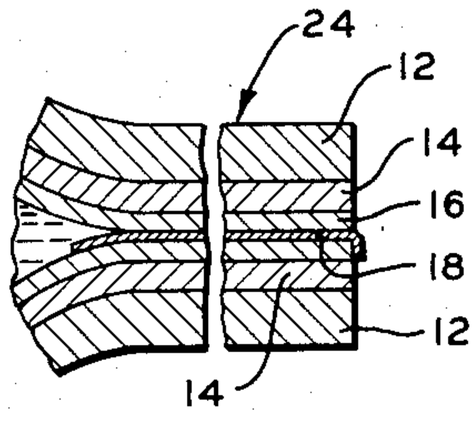

FIG. 4

FIG. 5

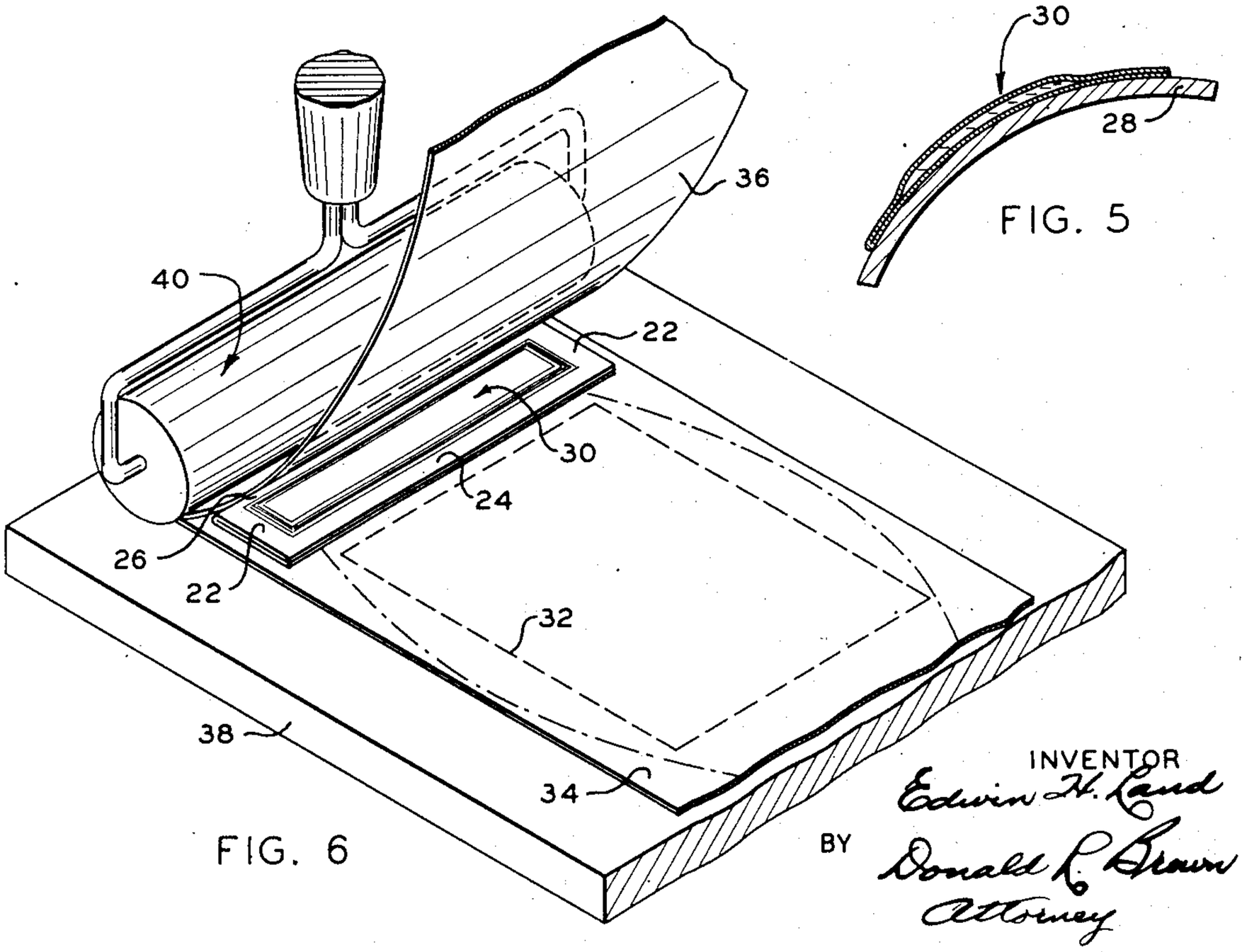

FIG. 6

INVENTOR
Edwin H. Land

BY
Donald L. Brown
Attorney

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SINGLE USE CONTAINER HAVING A SEALED PASSAGE ADAPTED TO BE UNSEALED UPON APPLICATION OF STRESS

Edwin H. Land, Cambridge, Mass., assignor to Polaroid Corporation, Cambridge, Mass., a corporation of Delaware

Application February 5, 1949, Serial No. 74,791

10 Claims. (Cl. 222—107)

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This invention relates to containers and has for a principal object the provision of a single use, disposable container so constructed that its contents can be directly spread therefrom in a thin layer to fully cover an area substantially as wide as the container is long and many times the width of the container.

Another object is the provision of a container having an elongated liquid-containing cavity and a sealed passage adjacent the long edge thereof, so constructed as to be uniformly unsealed throughout a length approximately equal to said cavity upon application of a suitable stress to the walls of the container.

A further object is to provide a novel container of the foregoing type which is flat and which, in its filled and sealed condition, is readily conformable to a curved shape without rupture of its seal, making possible the mounting of a plurality of such containers on a strip of sheet material which can be wound into a roll having a relatively small radius.

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 plan view, with parts broken away, of a blank from which one embodiment of the novel container of the present invention may be formed;

Fig. 2 is a fragmentary, sectional view taken substantially along the line **2—2** of Fig. 1;

Fig. 3 is a perspective view of a portion of the container structure of the present invention in its filled and sealed condition;

Fig. 4 is a section, taken substantially along line 4—4 of Fig. 3, showing the details of the sealed liquid-releasing passage of the container;

Fig. 5 is a sectional view showing the container mounted on a suitable base of a curvature which the container may readily assume without rupture; and

Fig. 6 is a somewhat diagrammatic perspective view, with parts broken away, illustrating an application of the container of the present invention.

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Frequently it is required that a small quantity of liquid material be applied in a relatively thin layer over a fairly large surface area. For example, a photosensitive film may be processed or a picture toned by applying on the surface thereof a layer of liquid containing the processing reagent or toning agent in solution. A dye or ink must be similarly applied to a hand press or printing block for producing sample prints or impressions. Adhesion of two elements also often necessitates a continuous layer of the adhesive between surfaces of said elements. The present invention comprehends an inexpensive, disposable container which makes available for such uses only so much liquid as is necessary for a single application in a condition for direct application to the surface to be treated, resulting in greater efficiency and economy of operation.

Structurally, the container is elongated, having a length at least twice its width and is relatively flat, having a depth which is only a fraction of its width. The container is deformble in its filled and sealed condition so that it may be curved in the direction of its width, for example about a radius equal to its width, without danger of rupturing its seal. A sealed passage extends the length of the container along one edge thereof, and is the weakest of the edge seals which define the liquid-containing cavity and which confine the contents in said cavity.

The contents of the container are of a viscosity exceeding a predetermined minimum viscosity and, in this viscous condition, cooperate with the container structure and the sealed passage to insure a uniform peeling apart of the walls of said sealed passage upon application of a squeezing force to the walls of the container. This force is applied to the entire length of the container as by a doctor blade, roll applicator or a pair of pressure rolls, and progresses widthwise of said container in the direction of the sealed passage. By equipping the container with a fairly wide, flat, liquid-containing cavity, and by suitably thickening the contents to give the same at least a predetermined minimum viscosity, the squeezing together of the container walls, particularly during the initial stages of the pressure application, insures an equalization of the hydraulic peeling pressure transmitted by the container contents to the sealed passage prior to rupture of the seal. The further squeezing together of the container walls during the progressive application of the liquid-releasing force produces a uniform and complete peeling apart of the marginal walls which constitute the sealed passage.

The container is fluid-tight and substantially water-vapor-impervious so that its contents may be kept intact for long periods of time, and the structure thereof is such that the contents of the container can be squeezed and distributed therefrom with the same ease and uniformity at any time during the several months which follow the forming, filling and sealing of the container. As a result the container can be stored for relatively long periods of time prior to use.

The container is preferably formed from a single, essentially rectangular blank folded medially. It may also be formed from two essentially rectangular blanks secured together at their marginal edges. It is so simply constructed that the blank or blanks from which the same is formed may be cut without waste from a single continuous strip of sheet material, permitting the material of the container walls to be processed, and the container to be filled, sealed and severed as part of one continuous operation.

Referring to Fig. 1 there is shown a blank **10** from which one embodiment of the novel container of the present invention may be formed, said blank, as shown, being substantially rectangular in shape and having a length equal to the container length, and a width approximately twice the width of the finished, filled container. The blank is preferably formed of a composite, deformable sheet material comprising a plurality of layers or plies (Fig. 2).

An outer layer **12** serves as a backing or support and is preferably formed of a thin, relatively inexpensive, tough material which may be a plastic but is preferably a paper, such as kraft paper. Applied to the surface of layer **12** is a thin film or sheet of a relatively vapor-impervious material, such as a metal foil **14**, and there is coated on the surface of said foil **14** a further layer **16** of a suitable plastic which can be adhered to itself by the application of heat and/or pressure. Layer **16** is preferably liquid-impervious in order to provide a protective coating for the metal foil **14**, thereby preventing the contents of the container from reaching the foil to corrode or otherwise deteriorate the same. Coatings **14** and **16** are relatively thin, being only sufficiently thick to be continuous.

Adjacent one long edge of the blank **10** there is provided a strip **18** of a suitable thermoplastic material which has a lesser affinity for the plastic of layer **16** than the latter plastic has for itself. Coating **18** is applied in such a way that it extends to the very edge of the blank along the entire length of the blank, precautions being taken to insure this condition even to the extent of having the material of said strip **18** coated over the edge as shown in Fig. 2.

The container **30** (Fig. 3) is formed by folding the blank along a substantial medial line **20** extending the length of the container, and then securing together the faces of the marginal portions **22** along the short edges of the container and the facing marginal surfaces **24** along the long edge of the container. These several marginal portions are secured together by the application of heat and/or pressure and, in addition, it is preferable to adhesively secure together a narrow strip **26** of the container walls adjacent the fold line **20**. This provides a thin leading edge for the container over which a suitable pressure-applying device, such as a pressure roll or a doctor blade, may be readily advanced to compress the container walls and effect the release of the container contents.

The seal along the long edge of the container is effected between the inner coating material **16** and the material of strip **18** which, as hereinbefore indicated, is a material which has a lesser affinity for the plastic of layer **16** than that plastic has for itself. Since short edge portions **22** are secured together by a bond formed by direct contact between the inner coating layers **16**, the latter bond is substantially stronger than the seal along the long edge.

This structure assures a unidirectional release of the contents of the container upon the application of a compressive squeezing force to the walls thereof. To make certain that a uniform peeling or separation of the marginal portions along the long edge of the container is obtained when the container is subjected to a liquid-releasing force, the strip **18** not only extends to the very edge of the blank but is also substantially wider than the width of the seal **24** and extends within the liquid-carrying cavity of the container as shown in Fig. **4**. A further precaution against the hazard of an uneven seal consists in displacing the long edge of the blank containing strip **18** just beyond the long edge of the blank (Fig. 4) which is adhered thereto. As a result, strip **18** projects beyond both long edges of the bond **24**.

In the formation of the container, the contents may be introduced as the container walls are being sealed together. For example, the long edges of the container blank may be sealed together before the blank is severed from the stock of material from which it is formed. During the sealing together of the long edges, the desired quantity of liquid content for the container is introduced between the folded walls of the blank and thereafter the short edges are sealed together and the finished container is severed from the remainder of the sheet stock. The sealing is preferably effected by the application of heat and/or pressure, and a uniform heat and/or pressure may be applied to all of the marginal portions being sealed together in view of the difference between the adhesive properties of the strip **18** and those of the material of inner coating **16**.

It is to be expressly understood that a greater strength differential between the short edge seals **22** and the rupturable long edge seal **24** may be obtained by subjecting the short edge seals to a greater heat and/or pressure during sealing than is used in forming said long edge seal. Similarly, it is possible, although less preferred, to use the same thermoplastic bonding materials for each of the seals **22** and **24** and to obtain the differential sealing effect by controlling the heat and/or pressure used in obtaining the seal, the heat and/or pressure applied to the short edge seals being substantially greater than the heat and/or pressure applied to the long edge seal.

The walls of container **30** in one preferred form comprise a construction in which base **12** is a kraft paper, layer **14** is a silver or lead foil, and coating **16** is a thermoplastic such as a polyvinyl acetal, for example polyvinyl butyral, polyvinyl acetal or polyvinyl formal. It is to be understood that the composition of plastic layer **16** 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 ½'' nitrocellulose, and approximately 5% by weight of dibutyl sebacate is particularly satisfactory as inner coating **16**. When layer **16**

is of the foregoing composition strip **18** 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.

As hereinbefore pointed out, the container contents have a predetermined minimum viscosity and are thickened, if necessary, to impart thereto this predetermined viscosity which cooperates with the seal and structure of the container to give a uniform and complete opening of the long seal **24** during use of the container and thereby insure a spread directly from the container over an area as wide as the length of the liquid-containing cavity of the container. This minimum viscosity should be of the order of at least 1000 centipoises at a temperature of 24° C. Such a viscosity provides adequate allowance for such variations in viscosity as may take place when the container is used in an environment where the temperatures are much higher than 24° C. The range of temperatures for which the operation of the container is intended is the range of ambient temperatures which would be encountered in various locations under varied climatic conditions, i. e., temperatures not exceeding 45° 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 plastics such as hydroxyethyl cellulose and sodium carboxymethyl cellulose.

In one preferred form of the container for spreading a liquid reagent to a thickness of approximately .003 inch over an area approximately 3 x 4 inches, a container 3½ inches long and having a maximum thickness of $\frac{1}{16}$ inch can be used. The overall width of such a container will be approximately ¾ inch and the width of seals **24**, **22** and **26** will be $\frac{3}{16}$ inch, $\frac{3}{16}$ inch and $\frac{1}{16}$ inch respectively. The overall thickness of the sheet material from which the container walls are formed may be .0048 inch, with layer **12** approximately .0025 inch thick, layer **14** approximately .0014 inch thick, and layer **16** approximately .0009 inch thick.

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 a suitable base **28** (Fig. 5) of a sheet material such as paper and to wind the paper with the container mounted thereon into a roll having a radius as small as the width of the container. In this way, it becomes possible to package a plurality of the containers in relatively compact and conveniently accessible form.

The use of the novel container structure of the invention is illustrated in Fig. 6 wherein the container contents are applied to an area **32** of a sheet material **34** for adhering said area to a corresponding area of a second sheet material **36**. The container **30** is located adjacent to area **32** with long seal **24** thereof contiguous to said area, and with said container between sheet materials **34** and **36**. This arrangement of elements may be positioned on a plate **38**, and a hand-operated squeegee roller **40** may be advanced over the assembly, beginning its travel at long edge **26** of the container. The downward pressure applied by roller **40** will determine the thickness of the film that is obtained when the contents of the container are squeezed from the container. During the early stage of the advance of the roller from the leading edge **26** widthwise of the container there is created a hydraulic pressure in the container contents which is uniformly distributed along the entire length of seal **24**. Continued advancement of roller **40** increases this pressure to the point where the seal is ruptured, the rupture uniformly peeling apart the walls of seal **24** to provide a discharge passage for the container contents equal to the length of seal **24** between seals **22**. The contents may thereafter be spread in a desired thickness over the area **32** by continued movement of said roller **40**, the construction of the container insuring an immediate spread wide enough to cover said area **32**.

It is to be understood that the container **30** may be adhesively or otherwise secured to the sheet **34** over which its contents are to be spread, the latter providing a spreading area adjacent the mouth or lip **24** of the container, which area is of a width at least as great as said dispensing lip is long, and is of a length many times the width of said container. Sheet **34** may merely serve as a liquid-spreading layer for effecting a uniform distribution of the liquid content of the container for processing an area of another element superposed on said sheet.

The container structure is particularly suited for carrying highly alkaline solutions such as solutions of photographic developing agents whose pH may be as high as 14.

This application is in part a continuation of my copending application, Serial No. 652,612, filed March 7, 1946 for "Fluid Containers," Patent No. 2,634,886, April 14, 1953.

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. As a new product, a single use, disposable, container having a liquid-containing cavity extending substantially the length thereof and holding a liquid for spreading directly from said container in a thin layer over an area substantially as wide as said cavity, said container having a sealed liquid-releasing passage along one edge thereof at least coextensive in length with said cavity, said passage comprising longitudinal marginal portions of the container walls bonded together in flat, face-to-face relation by a continuous film of adhesive material interlaid between the bonded marginal portions over the entire area of the bond, said film being applied in a width greater than said bond, the walls of the container having an inner coating of a thermoplastic resin, said thermoplastic resin having a different affinity for itself than for said film of adhesive material, said film of adhesive material being applied over said coating of thermoplastic resin at the bonded marginal portions of the container walls so that at said bonded marginal portions the film of adhesive material is between the surfaces of the thermoplastic resin.

2. As a new product, a single use, disposable, elongated, substantially rectangular, relatively flat container having a liquid-containing cavity extending substantially the length thereof and holding a viscous liquid for spreading directly

from said container in a thin layer over an area substantially as wide as said cavity, the viscosity of said liquid being at least of the order of one thousand centipoises at 24° C., said container having a sealed liquid-releasing passage along one edge thereof at least coextensive in length with said cavity, said passage comprising longitudinal marginal portions of the container walls bonded together in flat, face-to-face relation by a continuous film of adhesive material interlaid between the bonded marginal portions over the entire area of the bond, said sealed passage being the weakest liquid-retaining portion of said container, a single sheet of deformable material impervious to said liquid and substantially impervious to the vapor of said liquid providing the walls of said container, said sheet having a single fold extending lengthwise of said container substantially parallel to said passage, portions of said sheet adjacent said fold being pressed together to provide said container with a flat, relatively thin, leading edge adapted to offer a minimum resistance to the engagement and advance of a liquid-spreading member.

3. As a new product, a single use, disposable, substantially rectangular, relatively flat container having a liquid-containing cavity extending substantially the length thereof and holding a viscous liquid for spreading directly from said container in a thin layer, the viscosity of said liquid being at least of the order of one thousand centipoises at 24° C., said container having a sealed liquid-releasing passage along one long edge thereof, said passage comprising longitudinal marginal portions of the container walls bonded together in flat, face-to-face relation by a continuous film of adhesive material interlaid between the bonded marginal portions over the entire area of the bond, said sealed passage being the weakest liquid-retaining portion of said container, a single sheet of multi-ply, deformable material impervious to said liquid and substantially impervious to the vapor of said liquid providing the walls of said container, said sheet having a single fold extending lengthwise of said container substantially parallel to said passage, portions of said sheet adjacent said fold being pressed together to provide said container with a flat, relatively thin, leading edge adapted to offer a minimum resistance to the engagement and advance of a liquid-spreading member, the walls of the container having an inner coating of a thermoplastic resin, said thermoplastic resin having a different affinity for itself than for said film of adhesive material, said film of adhesive material being applied over said coating of thermoplastic resin at the bonded marginal portions of the container walls so that at said bonded marginal portions the film of adhesive material is between the surfaces of the thermoplastic resin.

4. As a new product, a single use, disposable, substantially rectangular, relatively flat container having a liquid-containing cavity extending substantially the length thereof and holding a viscous liquid for spreading directly from said container in a thin layer, the viscosity of said liquid being at least of the order of one thousand centipoises at 24° C., said container having a sealed liquid-releasing passage along one long edge thereof, said passage comprising longitudinal marginal portions of the container walls bonded together in flat, face-to-face relation by a continuous film of adhesive material interlaid between the bonded marginal portions of the container walls bonded together in flat, face-to-face relation by a continuous film of adhesive material interlaid between the bonded marginal portions over the entire area of the bond, said sealed passage being the weakest liquid-retaining portion of said container, a single sheet of multi-ply, deformable material impervious to said liquid and substantially impervious to the vapor of said liquid providing the walls of said container, said sheet having a single fold extending lengthwise of said container substantially parallel to said passage, portions of said sheet adjacent said fold being bonded together to provide said container with a flat, relatively thin, leading edge adapted to offer a minimum resistance to the engagement and advance of a liquid-spreading member, the walls of the container having an inner coating of a thermoplastic resin, said thermoplastic resin having a different affinity for itself than for said film of adhesive material, said film of adhesive material being applied over said coating of thermoplastic resin at the bonded marginal portions of the container walls so that at said bonded marginal portions the film of adhesive material is between the surfaces of the thermoplastic resin.

5. As a new product, a single use, disposable, substantially rectangular, relatively flat container having a liquid-containing cavity extending substantially the length thereof and holding a viscous liquid for spreading directly from said container in a thin layer over an area as wide as said cavity, the viscosity of said liquid being at least of the order of one thousand centipoises at 24° C., said container having a sealed liquid-releasing passage along one edge thereof at least co-extensive in length with said cavity, said passage comprising longitudinal marginal portions of the container walls bonded together in flat, face-to-face relation by a continuous film of adhesive material interlaid between the bonded marginal portions over the entire area of the bond, said film being applied in a width greater than said bond and extending beyond the bonded area of said marginal portions along both long edges of the bond, said sealed passage being the weakest liquid-retaining portion of said container, a single sheet of multi-ply, deformable material impervious to said liquid and substantially impervious to the vapor of said liquid providing the walls of said container, said sheet having a single fold extending lengthwise of said container substantially parallel to said passage, portions of said sheet adjacent said fold being bonded together to provide said container with a flat, relatively thin, leading edge adapted to offer a minimum resistance to the engagement and advance of a liquid-spreading member, the walls of the container having an inner coating of a thermoplastic resin, said thermoplastic resin having a different affinity for itself than for said film of adhesive material, said film of adhesive material being applied over said coating of thermoplastic resin at the bonded marginal portions of the container walls so that at said bonded marginal portions the film of adhesive material is between the surfaces of the thermoplastic resin.

6. As a new product, a single use, disposable, elongated container having a liquid-containing cavity extending substantially the length thereof and holding a viscous liquid for spreading directly from said container in a thin layer over an area as wide as said cavity, the viscosity of said liquid being at least of the order of one thousand centipoises at 24° C., said container having a sealed liquid-releasing passage along one edge thereof at least coextensive in length with said cavity, said passage comprising longitudinal marginal portions of the container walls bonded together in flat, face-to-face relation by a bond of substantially uniform strength, said sealed passage being the weakest liquid-retaining portion of said container, a single sheet of deformable material impervious to said liquid and substantially impervious to the vapor of said liquid providing the

walls of said container, said sheet having a single fold extending lengthwise of said container substantially parallel to said passage, portions of said sheet adjacent said fold being bonded together to provide said container with a flat, relatively thin, leading edge adapted to offer a minimum resistance to the engagement and advance of a liquid-spreading member.

7. As a new product, a single use, disposable container having a liquid-containing cavity extending substantially the length thereof and holding a liquid for spreading directly from said container in a thin layer, said container having a sealed liquid-releasing passage along one edge thereof paralleling said cavity, said passage comprising longitudinal marginal portions of the container walls bonded together in flat, face-to-face relation by a continuous film of adhesive material interlaid between the bonded marginal portions over the entire area of the bond, said film of adhesive material covering a portion only of the inner surface of the container walls, marginal portions of said container walls along two other edges of said container at opposite ends of said liquid-releasing passage being adhesively secured together in face-to-face relation, the seals at said two other edges being appreciably stronger than the seal at said passage and extending transversely of and connecting with the seal at said passage so that when the walls of the container are squeezed together in the direction of said passage the seal at said passage ruptures and the seals at said two other edges prevent the discharge of liquid except through said passage.

8. As a new product, a single use, disposable container having a liquid-containing cavity extending substantially the length thereof and holding a liquid for spreading directly from said container in a thin layer over an area as wide as said cavity, said container having a sealed liquid-releasing passage along one edge thereof at least coextensive in length with said cavity, said passage comprising longitudinal marginal portions of the container walls bonded together in flat, face-to-face relation by a bond of substantially uniform strength, said sealed passage being the weakest liquid-retaining portion of said container, marginal portions of said container walls along two other edges of said container at opposite ends of said liquid-releasing passage being adhesively secured together in face-to-face relation, the seals at said two other edges being appreciably stronger than the seal at said passage and extending transversely of and connecting with the seal at said passage so that when the walls of the container are squeezed together in the direction of said passage the seal at said passage ruptures and the seals at said two other edges prevent the discharge of liquid except through said passage.

9. As a new product, a single use, disposable, elongated container having a liquid-containing cavity extending substantially the length thereof and holding a viscous liquid for spreading directly from said container in a thin layer over

an area as wide as said cavity, the viscosity of said liquid being at least of the order of one thousand centipoises at 24° C., said container having a sealed liquid-releasing passage along one edge thereof at least coextensive in length with said cavity, said passage comprising longitudinal marginal portions of the container walls bonded together in flat, face-to-face relation by a bond of substantially uniform strength, said sealed passage being the weakest liquid-retaining portion of said container, a single sheet of multi-ply, deformable material impervious to said liquid and substantially impervious to the vapor of said liquid providing the walls of said container, said sheet having a single fold extending lengthwise of said container substantially parallel to said passage, said marginal portions of said container walls along two edges of said container at opposite ends of said liquid-releasing passage and said fold being adhesively secured together in face-to-face relation, the seals at said two other edges being appreciably stronger than the seal at said passage and extending transversely of and connecting with the seal at said liquid-releasing passage so that when the walls of the container are squeezed together in the direction of said passage the seal at said passage ruptures and the seals at said two other edges prevent the discharge of liquid except through said passage.

10. As a new product, a single use, disposable container having a liquid-containing cavity extending substantially the length of one dimension of said container and holding a liquid for spreading directly from said container in a thin layer over an area substantially as wide as the length of said cavity, said container having a sealed liquid-releasing passage along one edge thereof at least coextensive in length with said cavity, said passage comprising marginal portions of the container walls bonded together in flat, face- to-face relation by a continuous film of adhesive material interlaid between the bonded marginal portions over the entire area of the bond, the walls of the container having an inner coating of a resin, said resin having a different affinity for itself than for said film of adhesive material, said film of adhesive material being applied over said coating of resin at the bonded marginal portions of the container walls so that at said bonded marginal portions the film of adhesive material is between the surfaces of the resin.

EDWIN H. LAND.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,885,670	Avery	Nov. 1, 1932
2,103,389	Salfisberg	Dec. 28, 1937

FOREIGN PATENTS

Number	Country	Date
7,521	Great Britain	Mar. 28, 1906
234,484	Switzerland	Jan. 16, 1945