

June 17, 1952

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2,600,631

RESILIENT SPRING ENVELOPE FOR COLLAPSIBLE TUBES

Filed Aug. 10, 1949

FIG. 1.

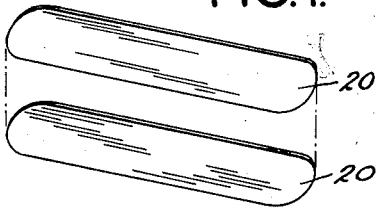


FIG. 2.



FIG. 3.

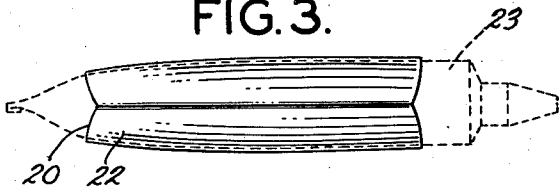


FIG. 5.

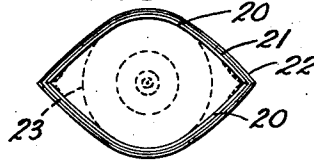


FIG. 4.

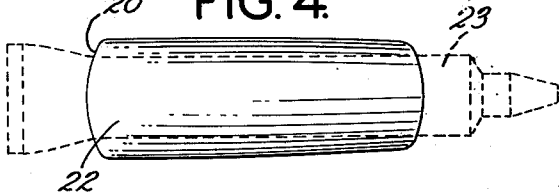


FIG. 6.

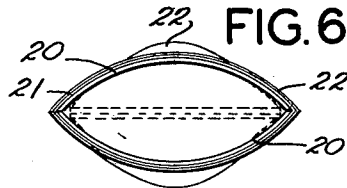
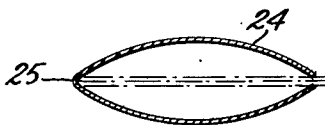


FIG. 7.

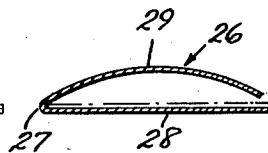


FIG. 8.

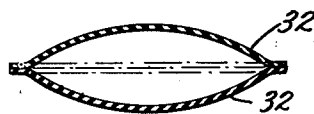


FIG. 9.

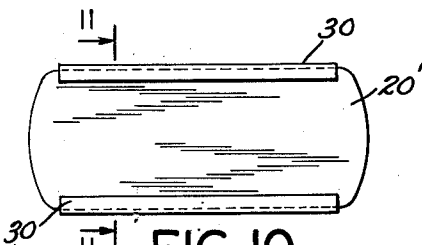


FIG. 10.

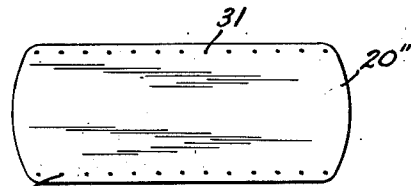


FIG. 11.



FIG. 12.

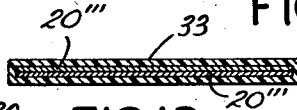


FIG. 13.

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## UNITED STATES PATENT OFFICE

2,600,631

RESILIENT SPRING ENVELOPE FOR  
COLLAPSIBLE TUBES

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Application August 10, 1949, Serial No. 109,578

5 Claims. (Cl. 222-103)

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This invention relates to a resilient spring envelope for collapsible tubes.

Broadly, it is an object of the invention to provide a resilient envelope for collapsible tubes to provide a continuous pressure against the walls of the tube to assure a sustained flow of the fluid, cream or other material in the tube.

Another object is to provide an envelope for collapsible tubes which will protect the tube against breakage or mutilation.

More particularly, it is an object of the invention to provide a flexible spring or envelope for collapsible tubes to exert automatic and continuous pressure, providing protection for the tube and permitting the tube to be handled easier and in a better manner.

It is among the objects of the invention to provide a flexible spring envelope for collapsible tubes with seated ball ends containing liquid or paste, such as lacquer dye for furs, silks and other fabrics, of simple, inexpensive construction, providing a continuous pressure against the walls of the tube so that the liquid, will at all times be fed automatically to the ball end providing automatic continuous flow of the material in the tube when desired.

Another object is to provide a resilient envelope for collapsible tubes, the pressure of which can be easily chosen depending upon the character of the liquid, cream, dye, ointment or other material to be dispensed from the tube.

The tubes for which the resilient envelope is particularly adapted are collapsible tubes with a ball point seated within a rigid walled ball socket at the applicator end of the tube. The dye, marking ink, or other incompressible liquid completely fills the tube. The resilient envelope exerts a sustained pressure against the collapsible walls of the tube to cause said walls to become displaced in direction to diminish the volumetric capacity as the dye or other liquid or cream is dispensed at the ball point, thereby maintaining the walls of the tube at all times in intimate engagement with the entire surface of the dye, or other liquid material in the tube and accordingly preventing the formation of voids in the tube. The sustained pressure against the outer walls of the tube is provided by the resilient envelope and is sufficient to overcome the resistance of the material from which the tube is made, such as lead or plastic so that the column of dye or other liquid or cream is pressed forward affirmatively to urge the ball against its seat. The resilient envelope extends longitudinally around the collapsible tube.

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Collapsible tubes used for dyes, marking ink, creams, oils, ointments and other similar materials are apt to become damaged by dropping, or punctured by coming in contact with other articles, and to crack or break by rolling or squeezing, thus permitting the contents to escape. The resilient envelope of the invention provides a protective covering for such tubes which can be easily applied and adequately enclose the tube preventing injury, providing ample space for advertising the product and automatically providing continuous pressure to dispense the contents of the tube when the ball end is used during applications of the contents.

In the dyeing of furs, silks and other materials, particularly, it is necessary to feed the dye continuously to the pelt, or other materials with an even and uniform flow of dye, to obtain clear marking, thus prevent loss of time due to stoppage of flow which oftentimes occurs in the ordinary flexible marking tube.

Normally, a residual amount of dye, or other material remains in the folded collapsible tube thus causing a percentage of loss of the contents of the tube. This invention saves such loss.

For a fuller understanding of the nature and objects of the invention, reference is had to the following detailed description, in connection with the accompanying drawings, in which are shown one or more of various possible embodiments of the several features of the invention.

Fig. 1 is a perspective view of a like pair of spring steel leaves;

Fig. 2 is a plan view of the two leaves shown in Fig. 1 held together by spirally wound adhesive tape;

Fig. 3 is a side view of the resilient envelope with a collapsible tube, shown in dotted lines, enclosed therein;

Fig. 4 is a plan view of the envelope and tube shown in Fig. 3;

Fig. 5 is a front end view of the envelope and tube shown in Figs. 3 and 4;

Fig. 6 is a rear end view of the envelope and tube of Fig. 5;

Fig. 7 is a sectional view of a modified form of resilient envelope;

Fig. 8 is a sectional view of another modified form of resilient envelope;

Fig. 9 is a sectional view of a tube made of resilient material;

Fig. 10 is a plan view of still another modified form of resilient envelope;

Fig. 11 is a sectional view taken through line 11-11 of Fig. 10; and

Fig. 12 is a plan view of still another modified form of resilient envelope.

Fig. 13 is a transverse sectional view of still another modification of the envelope.

Referring to the drawings, numeral 20 refers to a pair of like resilient spring steel leaves which are placed together and spirally wound with adhesive tape 21, as shown in Fig. 2. Tape 21 may be of any of the well known adhesive tapes now on the market, such as cloth, plastic, rubber, leather or like materials. A paper, plastic or similar covering 22 is then pasted over the tape 21 to give the envelope a finishing cover. Covering 22 provides adequate space for advertising, etc.

The adhesive tape 21 has sufficient strength to hold the opposed longitudinal edges of both leaf springs 20 together and permits the leaf springs to flex.

The type of tube 23, shown in dotted lines in the figures has a rigid walled socket for a movable writing point, preferably in the form of a ball, as is well known in the art, to which the dye, ink or other material passes. After the tube 23 is filled with material which may be of any desired viscosity depending upon the requirements from free flowing to a paste, the resilient spring steel leaves 20 are flexed or bowed by compressing the edges and the tube 23 is then slipped between the leaves 20 which thus forms an envelope, as best shown in Figs. 3 and 4. The leaves 20 press against the collapsible walls of the tube 23 in a direction substantially at right angles to the axis thereof. The bowed resilient leaves 20 exert a continuous pressure which is substantially uniform, since the pressure exerted by the envelope is substantially as great as when the tube is nearly empty as when it is full. This pressure is transmitted through the walls of the collapsible tube 23, through the body of dye, or the material in the tube and to the movable ball seated in the end of the tube. The ball picks up the dye, or other material from the cavity in which it is seated in an amount adequate to form a continuous line and as the dye is thus slowly used, the sustained pressure of the leaves 20 exerted against the walls of the tube 23 cause the dye to feed forward sufficiently and constantly to the ball, but no leak occurs since that pressure always maintains the ball against the seating tip.

The pressure exerted upon the walls of the tube 23 may vary by the use of steel of greater or lesser resiliency so that for use of a very viscous dye or cream greater spring pressure might be used than for a more fluid dye.

In the modification shown in Fig. 7, a single piece of spring steel 24 may be bent along the longitudinal center 25 and the device or envelope may be taped and covered in a manner similar to that shown and described for Figs. 1-6, inclusive.

In the modification shown in Fig. 8, a single piece of spring steel 26, may be bent at 27, one side 28, being flat and the other side 29 slightly bowed, or the flat side may be of rigid non-flexible metal and the bowed side may be of flexible spring steel. This device may also be taped and covered as that shown in Figs. 1-6.

In the modification shown in Fig. 9 the walls of the collapsible tube are made of resilient material, such as rubber or plastic forming two parallel leaves in a collapsed position and the longitudinal edges are vulcanized or welded. The tube is filled by exerting transverse pressure upon the longitudinal edges 32 causing the walls

to bow, as shown in Fig. 9. When the tube is sealed the resiliency of the rubber or plastic walls tends to cause the tube to collapse thus exerting a continuous pressure upon the ball point providing a continuous flow of the material within the tube.

In the modification shown in Figs. 10 and 11, the resilient spring steel leaves 20' are of the same shape as those shown in Fig. 1 and such leaves are held together at their longitudinal edges by clamping a pair of opposed channel members 30 along the edges of the leaves 20'.

In the modification shown in Fig. 12, a pair of spring steel leaves 20'' are spot welded adjacent the longitudinal edges as shown at 31. Of course, such leaves may be seam welded instead of spot welded.

In the modifications shown in Figs. 10, 11 and 12, these devices may be covered with paper, cardboard or plastic material to enhance the appearance.

The modified devices shown in Figs. 7, 8, 10 and 12 are used and applied on the tube in the same manner as that shown and described for Figs. 1-6, inclusive.

Fig. 13 is a transverse sectional view of still another modified form comprising a pair of spring steel leaves 20''' enclosed within a sleeve made of rubber, or plastic or cloth, or other material 33 to hold the leaves 20''' together at their edges while in a bowed or compressed condition. It is also possible to hold the edges of the leaves together by overlapping tape running longitudinally in a manner similar to that shown in Fig. 10.

The present invention may be advantageously applied by way of example with tubes for inks, creams, ointments, perfume, paste, mucilage and similar materials.

It is obvious that various changes and modifications can be made in the details of construction and arrangement of parts without departing from the general spirit of the invention.

I claim:

1. A resilient envelope adapted to operate on a collapsible tube for dispensing liquid and semi-solid materials, said envelope comprising two like spring steel leaves substantially rectangular in shape, adhesive tape spirally wound around said leaves holding said leaves together permitting said leaves to be bowed, said envelope exerting substantially uniform continuous pressure along at least a major portion of the length of said tube at substantially right angles to the axis thereof, progressively to collapse said tube as said material is emitted from one end of said tube to urge the walls of said tube into intimate engagement with the material within said tube and to exert forward pressure on the material within said tube.

2. The combination recited in claim 1 wherein the adhesive tape is covered with a finishing outer material.

3. A resilient envelope adapted to operate on a collapsible tube for dispensing liquid and semi-solid materials, said envelope comprising two like spring steel leaves substantially rectangular in shape, said leaves enclosed within a sleeve of resilient material, said sleeve holding said leaves together at their edges while in a bowed condition, said envelope exerting substantially uniform continuous pressure along at least a major portion of the length of said tube at substantially right angles to the axis thereof, progressively to collapse said tube as said ma-

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terial is emitted from one end of said tube to urge the walls of said tube into intimate engagement with the material within said tube and to exert forward pressure on the material within said tube.

4. A resilient spring envelope adapted to operate on a collapsible tube having a ball seated valve at one end held in position by a spring for dispensing liquid and semi-solid materials, said envelope comprising two like spring steel leaves substantially rectangular in shape, adhesive tape spirally wound around said leaves holding said leaves together permitting said leaves to be bowed, said envelope substantially circumscribing the major area of said tube, said envelope exerting substantially uniform continuous pressure along at least a major portion of the length of said tube at substantially right angles to the axis thereof, progressively to automatically collapse said tube as said material is emitted from one end thereof.

5. A resilient envelope adapted to operate on a collapsible tube for dispensing liquid and semi-solid material, said envelope comprising two spring steel leaves substantially rectangular in shape enclosed within a flexible material which maintains the edges of said leaves together permitting said leaves to be bowed, said envelope protecting said collapsible tube and exerting substantially uniform continuous pressure along at

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least a major portion of the length of said collapsible tube at substantially right angles to the axis thereof, progressively to collapse said tube as said material is emitted from one end of said tube to urge the walls of said tube into intimate engagement with the material within said tube and to exert forward pressure on the material within said tube.

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