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2,704,075

FLEXIBLE PLASTIC CONTAINER

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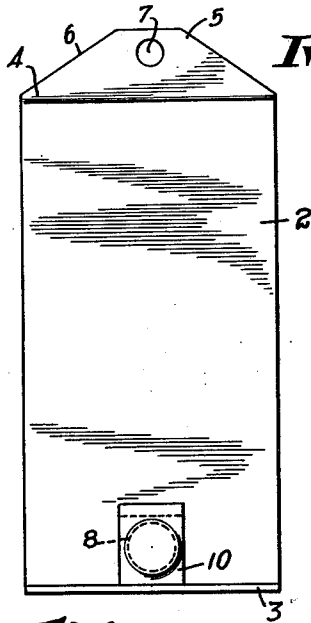


Fig. 1

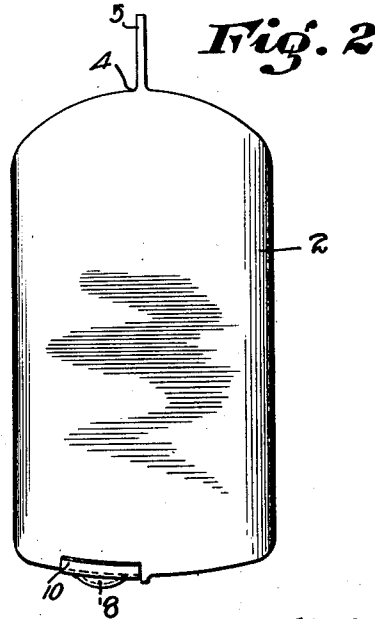


Fig. 2

Fig. 3

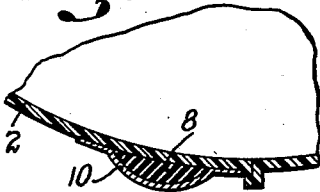


Fig. 5



Fig. 4

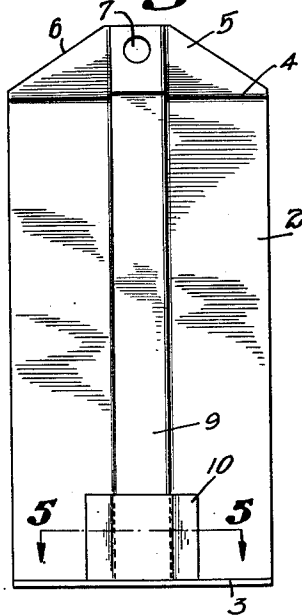


Fig. 6

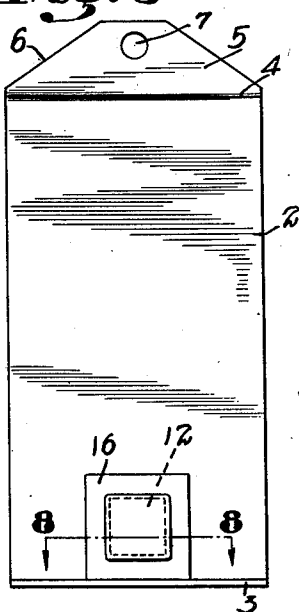


Fig. 7

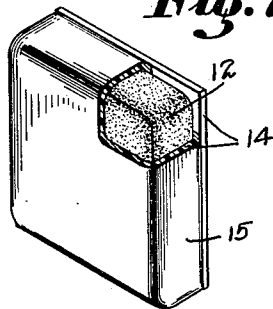


Fig. 8



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FLEXIBLE PLASTIC CONTAINER

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5 Claims. (Cl. 128—272)

This invention relates to a flexible plastic container, and refers particularly to such a container intended to hold or holding a sterilized material, such as a pharmaceutical solution. The invention is concerned particularly with the provision of a leakproof, sterilizable entrance to the container for the removal of its contents, or the injection of medication.

It has been proposed to market pharmaceutical products, such as sterile intravenous solutions, in flexible plastic containers. Problems arise connected with the difficulty of transferring the sterile solutions from the plastic container to a patient or of adding sterile medication to the solution, which problems do not exist when the sterile solutions are marketed in the more usual glass bottles with rubber stoppers. It is necessary to provide some means for making a sterile connection between a tubing and the contents of the plastic container. The simplest suggestion would be to attach a tubing to a sterile needle, such as a hypodermic needle, and thrust that needle through the wall of the plastic container, but the difficulty arises that the walls of the container are so thin and flexible that the needle is easily dislodged from its position and there is the possibility of leakage of solution between the needle and the plastic wall. Similarly, if the needle is withdrawn, as in the case of a hypodermic needle through which medication has been added, leakage results through the puncture in the container wall.

It is a general object of the present invention to provide a plastic container which may be entered by a hypodermic needle without danger of the hypodermic needle being dislodged and without danger of leakage around the needle, or after the needle is withdrawn.

In accordance with the present invention the thin-walled plastic container is provided with a thickened section of sufficient body to securely hold any hypodermic needle forced through the same, and at the same time provide sufficient body to insure a fluid-tight seal between the walls of the thickened body and the hypodermic needle to prevent leakage or to reseal the hole after the needle is withdrawn. Means are also provided to insure that this thickened portion of the container shall provide a sterile exterior surface so that a sterile connection can be made by piercing the same with a sterile needle. To provide such a sterile surface the thickened section of the plastic container has a cover formed of some pressure-sensitive material. This cover is adhesively held over the thickened section and permits the maintenance of a sterile surface under the cover, which may be exposed at the time of use by removing the cover.

The plastic containers proposed for sterile solutions are generally produced initially in the form of a thin-walled extruded tubing of plastic material, such as polyvinyl chloride or polyethylene, although numerous other plastic compositions may be utilized in producing the tubing. The tubing when produced is made into the container by a process of heat-sealing spaced-apart points of the tubing together after the inner section of the tubing has been filled with liquid. The problem of providing a thickened portion of the container which will act something like the rubber stopper of the ordinary glass bottle and provide sufficient body and thickness for proper penetration of a hypodermic needle is one requiring some technique in its solution. One method, in accordance with the present invention, is to modify the

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extruding dies used in extruding the tubing so as to provide a continuous thickened rib along the tubing to act as the thickened section required. This method while satisfactory in some cases has the disadvantage that the particular products used in making the tubing are somewhat lacking in the required properties for best gripping the hypodermic needle.

Another method is to attach some more rigid form of plastic material in the form of a smooth body to the side of the tubing either by heat-sealing or adhesive. This method, while satisfactory in some cases, also has disadvantages in the necessity of finding adequate adhesive material or in using a thermoplastic material which can be heat-sealed or fused with the side of the original tube.

A third and preferred method, in accordance with the present invention is to provide a body of rubber or gum rubber, which are the best materials known for sealing with a hypodermic needle, which in themselves, however, are difficult to seal to the tubing forming the container. To overcome this difficulty the body of rubber or gum rubber is covered on one or more sides with a thin wall of plastic which readily heat-seals to the tubing. Thus in the preferred form of the present invention a thickened body of gum rubber may be molded inside of plastic material of the same character as the tubing, or closely related thereto with an exposed margin of the material which will permit sealing to the tubing of the container.

The plastic containers of the present invention will be more fully understood from the following description of the preferred examples of the invention, which description is given in connection with the accompanying drawing, in which

Figure 1 is an elevation of a container made of a layflat tubing omitting the filling solution which embodies the present invention;

Figure 2 is an elevation at right angles to Figure 1 showing the container with the tubing expanded as when holding a liquid;

Figure 3 is a fragmentary section through the thickened section which serves as an entrance to the contents of the container;

Figure 4 is an elevation of a modified form of a layflat tubing container having been filled with solution;

Figure 5 is a fragmentary section along the line 5—5 of Figure 4;

Figure 6 is an elevation of a further modified form of the invention again embodying a layflat type of tubing container with figures representing the same empty;

Figure 7 is a perspective view of the enclosed rubber body used in producing the thickened section in Figure 6; and

Figure 8 is a section along the line 8—8 of Figure 6.

Now referring to the Figures 1 to 3 of the drawings, the container of the present invention is indicated as formed of a layflat tubing 2 which has been originally extruded in tubular form. At one end of the tube along the area 3 the layflat sides have been sealed together to close one end of the tubing and the container is severed from the remainder of the tubing, the sealing being done by heat-sealing of the two walls together. Similarly, at the upper end along the smooth area 4 the layflat sides have been sealed together to define the upper margin of the container, above which is a small smooth triangular section 5, the adjacent walls of which are heat sealed along the margin 6, which provides an opening 7 which may serve as a means for suspending the container in use.

Also in accordance with certain technique the container when desired may be filled with solution entering through openings made in the section 5 before completing the seal 4. Near the lower end of the container thus formed there is provided a pad 8 of flexible material which may be either gum rubber cemented to the wall of the tubing 2, or some relatively resilient plastic material, which may be heat-sealed or attached to the tubing 2. Over the pad 8 is provided a cover 10 of leakproof sterilizable material which is adhesive to the container. Various materials and construction may be used for the

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cover 10, for example, "Scotch Tape," the only requirement of the cover material being that it should be leakproof and pressure sensitive so that, like "Scotch Tape," when desired it may be stripped from the container to expose the pad 8. This cover, upon sterilization, allows the surface of the pad 8 to be held in a sterile condition until the removal of said cover. The pad 8 provides a thickened resilient section which permits puncturing with a hypodermic needle, or other larger needle, as desired to give entrance to the container 1 for the removal of the solution. By providing the thickened pad of resilient material this pad provides sufficient grip of the needle not only to resist accidental displacement of the needle but also to seal against leakage along the exterior of the needle, or after removal of the needle.

Now referring to Figures 4 and 5 of the drawings in this case, the tubing 2, which has the same lower seal 3, upper seal 4, and substantially triangular extension 5 as in the previous case, is made by an extrusion die which will extrude a thickened rib 9, any portion of which is adapted to thus form the enlarged pad of resilient material suitable for making attachments with a hypodermic needle. Preferably, near the lower end of the rib 9 there is provided the cover 10 of pressure sensitive adhesive flat type material which is adhesively held to the walls of the tubing 2 but is removable to expose the section of the rib 9 covered thereby which can by this means be maintained in sterile condition.

Now referring to Figures 6, 7 and 8 of the drawings, the container 2 is indicated as similar in construction to that of Figure 1 and similar elements are similarly numbered. In this form of the invention I employ a pad of resilient material 12, which pad of resilient material is enclosed either as a sandwich between two sheets of plastic material, as indicated at 14, which may be heat-sealed to the tubing 2, or molded entirely within such plastic, and in either case there is provided a marginal flange around the pad 12 of the plastic material as indicated at 15, by which means a heat-seal is made uniting the two coverings 14 of plastic material and the walls of the tubing 2 together, thus joining the pad of material firmly to the container 2, even where the pad of material is composed of some suitable material, such as gum rubber, which is not in itself heat-sealable to the tubing 2. Again in this form of the invention the cover 16 is employed, which again may be produced of any pressure sensitive, adhesive, waterproof material, such as "Scotch Tape" and the like, capable of holding the surfaces below it sterile until extracted when the container is to be employed.

While the particular forms of the invention herein described are well adapted to carry out the objects of providing plastic containers with a more adequate outlet or more adequate means by which entrance may be made to solution therein through needles, various changes and modifications may be made and this invention is of the scope set forth in the appended claims.

I claim:

1. A plastic container, the body of which is formed of lay-flat plastic tubing, the lay-flat sides of said tubing being sealed together at the opposite ends of the formed

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container, the container being provided near its lower end with a pad providing a resilient thickened section for holding and self-sealing with a needle piercing the same, said pad being attached to the tubing, and a covering of pressure-sensitive adhesive, waterproof material enclosing the thickened pad for retaining the same sterile.

2. A plastic container, the body of which is formed of lay-flat plastic tubing, the lay-flat sides of said tubing being sealed together at the opposite ends of the formed container, the container being provided near its lower end with a pad providing a resilient thickened section for holding and self-sealing with a needle piercing the same, said pad being attached to the tubing, and a covering of pressure-sensitive adhesive, waterproof material enclosing the thickened pad for retaining the same sterile, the pad being a section of a continuous rib extruded along with the extrusion of the tube forming the container.

3. A plastic container, the body of which is formed of lay-flat plastic tubing, the lay-flat sides of said tubing being sealed together at the opposite ends of the formed container, the container being provided near its lower end with a pad providing a resilient thickened section for holding and self-sealing with a needle piercing the same, said pad being attached to the tubing, and a covering of pressure-sensitive adhesive, waterproof material enclosing the thickened pad for retaining the same sterile, the pad being composed of resilient rubber having coverings of plastic material which are heat-sealed to the tubing of the container for thus attaching the pad to the container.

4. A plastic container for sterile solutions which comprises, a layflat type of tubing heat-sealed at spaced-apart points to define a container, a pad of resilient material which is not heat-sealable to the tubing, said pad being sandwiched between covers of plastic material which are heat-sealable to the tubing, the coverings enclosing the pad being heat-sealed to the tubing near its lower end, said resilient pad being self-sealing with the needle piercing the same and a removable pressure-sensitive adhesive, waterproof covering adhesively united to the tubing and maintaining enclosed the pad and its covering materials.

5. A layflat plastic container, the body of which is formed of layflat plastic tubing, the layflat sides of said tubing being sealed together at opposite ends to form a container, the container being provided near its lower end with a pad providing a resilient thickened section for self-sealing and for holding a needle piercing the same, said pad being attached to the tubing over such a limited area of one of the layflat sides of the container as to permit said side to lay flat against the opposing side when the container is empty.

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