Aug. 27, 1963 B. E. BALDWIN 3,101,841

NEEDLE PACKAGE

Filed May 24, 1961

Fig. 1.

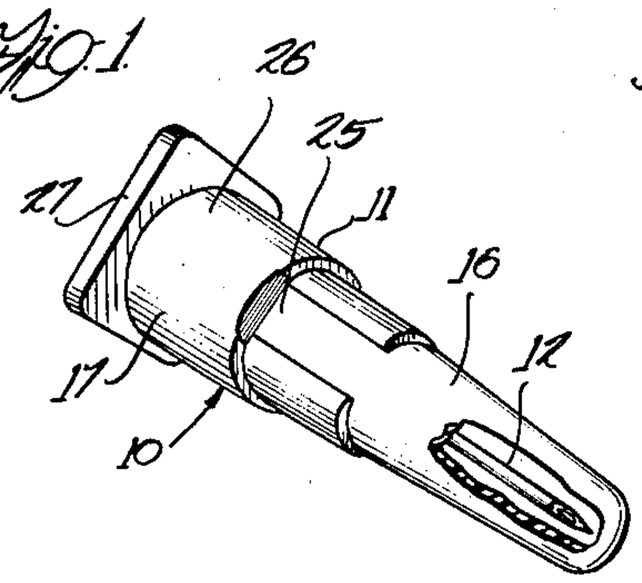


Fig. 2.

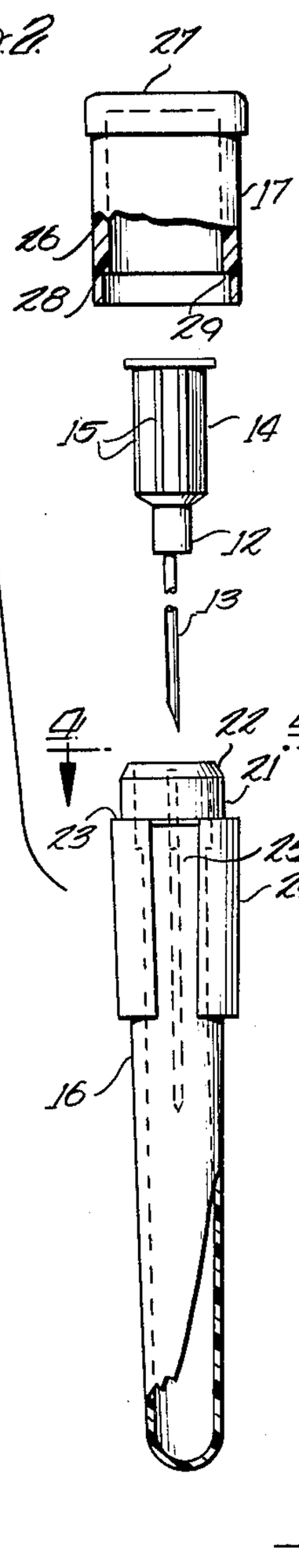


Fig. 3.

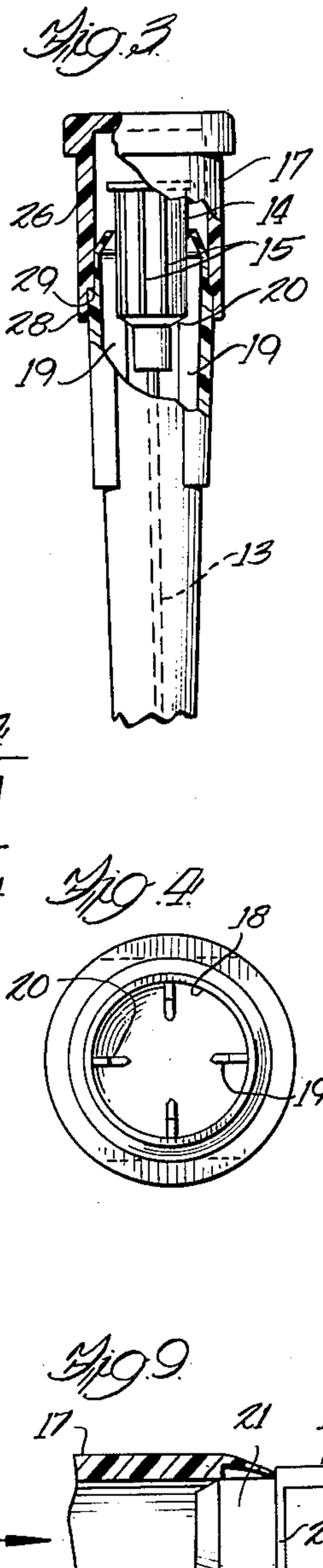


Fig. 5.

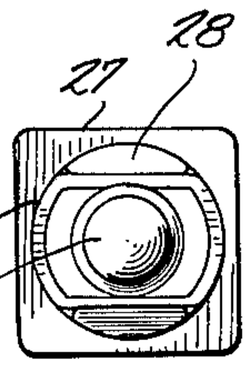


Fig. 6.

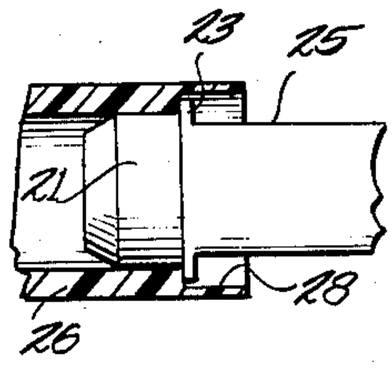


Fig. 4.

Fig. 7.

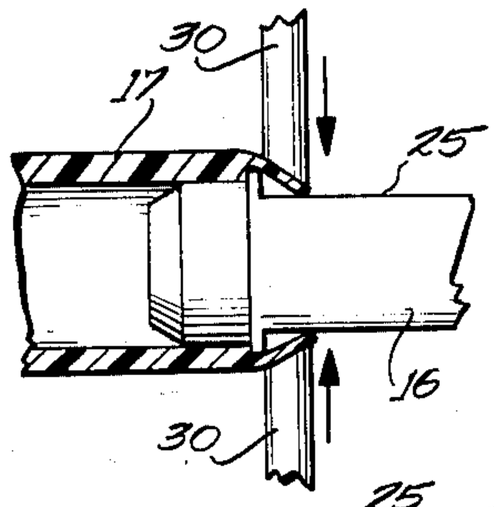


Fig. 8.

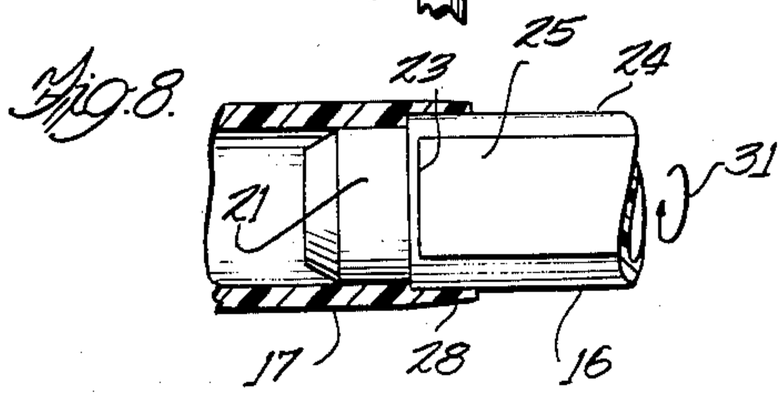
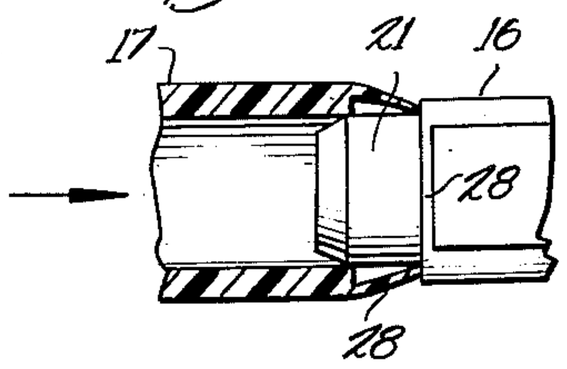


Fig. 9.



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NEEDLE PACKAGE

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This invention relates to a needle package, and more specifically, to a container particularly suited for the packaging of single-use hypodermic needles.

With the advent of improved techniques for manufacturing low cost hypodermic needles, the use of presterilized single-use needles is now becoming increasingly popular. Ordinarily, such needles are individually packaged in disposable plastic containers and the caps for such containers are heat-sealed or heat-welded in place in order to reduce the possibilities of needle contamination prior to use. When it is desired to remove a needle from such a container, the cap is simply rotated to break the heat seal or weld and is then pulled off of the body to expose the needle hub.

It is of course extremely important that a needle be in sterile condition at the time it is removed from the container and it is in this respect that the above-described containers for single-use needles are not entirely satisfactory. First of all, the cap of such a container is ordinarily capable of being replaced upon the body and, therefore, should it appear that the seal or weld of a closed container has been broken, the possibility arises that the cap has been previously removed and that the needle is contaminated. One trouble is that a broken weld or seal may not be readily detectable, especially if the separate portions of the weld happen to be in substantially matching relation and, in any case, scrutiny of the welded area is unlikely in an emergency situation or in any situation requiring quick action in preparing and using a hypodermic syringe. To this should be added the fact that the breaking of the weld by relative rotation of the parts is not usually audible and is not otherwise detectable except by visual inspection; therefore, a user might easily twist the cap from a container without realizing that the needle has been previously exposed and is in fact contaminated.

Accordingly, it is a principal object of the present invention to overcome the aforementioned defects and disadvantages of prior packages for single-use needles. Another object is to provide an improved needle package having a cap which is impossible as a practical matter to replace once it has been removed. A further object is to provide a package in which an audible signal, indicating an unlocking of the cap, is emitted when the cap has been pulled a preselected axial distance along the container body.

Other objects will appear from the specification and drawings in which:

FIGURE 1 is a perspective view showing a needle package embodying the present invention, the tapered end of the container body being cut away to reveal the end portion of the needle contained therein;

FIGURE 2 is an exploded side elevational view of the needle package, the parts of the container being shown partly in section;

FIGURE 3 is a broken elevational view, taken partly in section, showing the assembled package;

FIGURE 4 is an enlarged end view of the container body taken along line 4—4 of FIGURE 2;

FIGURE 5 is an end view of the complete package, the view being taken from the package's tapered end;

FIGURE 6 is a broken sectional view illustrating a preliminary step in the assembly of the container sections,

the hypodermic needle being omitted for clarity of illustration;

FIGURE 7 is a broken sectional view similar to FIGURE 6 but showing a final step in the sealing of the container;

FIGURE 8 is a broken sectional view similar to FIGURES 6 and 7 but showing the sealed container after the cap and body thereof have been rotated relative to each other;

FIGURE 9 is a broken sectional view illustrating the practical extent of re-connection of the container parts after they have been separated.

In the embodiment of the invention illustrated in the drawings, the numeral **10** generally designates a needle package comprising a container **11** and a hypodermic needle **12**. The needle has a pointed cannula portion **13** and a hub portion **14** provided with longitudinal ribs **15**. Since the needle may be entirely conventional and since the present invention is concerned more particularly with the container for such a needle, a more detailed description of the needle is believed unnecessary herein.

Container **11** is preferably formed from a plastic material because of the relatively low cost and combustibility of such materials. A plastic container may be incinerated after use. Polypropylene has been found particularly suitable because of its ability to withstand sterilizing temperatures although other plastic materials and other materials such as metals might also be used if they have the necessary qualities of deformability and flexibility and have sufficiently high melting points so that the needles might be heat or steam sterilized while in the containers. Where plastic materials are used, it is desirable to form at least a portion of the container from a transparent or semi-transparent material so that the contents of the package may be observed without opening the container.

The container **11** is composed of two sections: a body **16** and a cap **17**. The elongated hollow body is of generally circular cross section and is gradually tapered, as shown most clearly in FIGURES 4 and 2. The large end of the tapered body is provided with an opening **18** while the reduced end is closed and rounded.

Within the hollow body are a plurality of longitudinally extending and circumferentially spaced ribs **19** which snugly receive the hub portion **14** of the needle **12**. Preferably, the integral ribs of the plastic body are adapted to interlock with the ribs **15** of the needle hub to prevent relative rotation of the needle and body when the parts are arranged as shown in FIGURE 3. It will be noted that the ribs are stepped at **20** to provide a ledge for limiting the extent of axial movement of the hub into the container body, thereby preventing contact between the pointed end of the needle and the closed end of the body **16**. While four ribs are shown in FIGURE 4, it will be understood that a greater or smaller number may be provided to perform the same functions.

With regard to the external configuration of the container body, it will be observed that adjacent the body's open end is a cylindrical sleeve portion **21** having an externally chamfered or tapered mouth **22**. At the opposite end of the sleeve portion is a shoulder **23** having circular peripheral limits of substantially greater diameter than the sleeve portion. The enlarged intermediate portion **24** extends a substantial distance from the shoulder **23** towards the closed end of the body and is interrupted along at least one side portion thereof to provide a recess or depression **25**. Preferably a pair of depressions **25** are provided on diametrically opposite sides of the body. It will be observed that the shoulder portion **23** projects outwardly from the container body be-

tween sleeve portion 21 on one side and recesses 25 on the other (FIGURES 6–8).

Cap 17 is generally cup-shaped having a cylindrical side wall 26 and a non-circular end wall 27. In the illustration given, the end wall is rectangular in shape; however, it is to be understood that other non-circular shapes might be used which would also facilitate the gripping and twisting of the cap with reference to the body. At the open end of the cap, the cylindrical side wall 26 is provided with a skirt portion 28 of greater internal diameter. An internal shoulder 29 delineates the integrally formed skirt and cylindrical side wall portions.

Referring to FIGURES 3 and 6 it will be observed that the diameter of shoulder portion 23 of the container body is greater than the internal diameter of the main portion of the cap 17 but smaller than the internal diameter of skirt portion 28. As a result, when the cap is fitted over the open end of the body it may be advanced axially until its internal shoulder 29 engages the shoulder portion 23 of the body 16, at which point further axial advancement is prevented by the abutting shoulders.

FIGURE 7 illustrates how the cap and body sections of the containers may be locked together. A pair of dies 30 forceably engage diametrically opposed edge portions of the skirt and crimp them inwardly into recesses or depressions 25. The dies should be heated to a temperature sufficient to cause a softening and a permanent crimping of the edges of the plastic cap without causing the plastic of the respective parts to fuse. Thus, when the dies are withdrawn, the skirt portion of the cap retains the deformed or crimped appearance represented in FIGURES 7 and 1.

The crimping of the cap firmly holds the parts of the container together and, assuming that the container and needle are sterile at the time of assembly, the tight sealing contact between the outer surface of the sleeve portion 21 and the inner side wall surface of the cap maintains the hypodermic needle in sterile condition. Preferably, the external dimensions of the sleeve are slightly greater than the cap's internal dimensions to produce a tight seal between the resilient parts when they are forced together.

To open the container, it is necessary only to rotate the respective sections 90 degrees and then pull them apart. The rotation step is illustrated in FIGURE 8, arrow 31 indicating that the body 16 of the container has been rotated relative to cap 17 so that the crimped portions of skirt 28 have been forced out of the depressions 25 and now ride outwardly over the surface of the enlarged intermediate portion 24. Thereafter, the two sections of the container are simply pulled axially apart, the skirt 28 being relieved of radial tension and returning to its previous crimped condition. Since the smallest internal transverse dimension of the crimped cap is still larger than the smallest external diameter at the chamfered end of the sleeve 21, the cap may be fitted upon the sleeve where it may be left loosely in place as a temporary closure after initial opening of the package. Any effort to urge the cap back into its original position will be forcefully opposed by engagement between the crimped ends of the cap and the shoulder 23 of the body, as illustrated in FIGURE 9. As the force exerted to replace the cap is increased, the crimped ends will tend to wedge even more tightly against the shoulder and sleeve and therefore, for all practical purposes, the cap cannot be returned to the original position of FIGURE 7.

The non-replaceability of the cap is, as mentioned previously, an important safety factor since the user is assured that where a cap is in place the hypodermic needle has not been previously exposed and contaminated. Visual inspection is unnecessary for determining whether the cap of any given container is or is not fully in place. A cap refitted upon the sleeve portion of the body is loose and easily removed therefrom whereas a cap having its skirt portion crimped about the shoulder portion 23 of the body fits tightly and can be rotated only with deliberate effort. More important, the crimped skirt of the flexible plastic cap, as the cap is pulled axially off of the container body from the position illustrated in FIGURE 8, emits a distinct and audible popping or snapping sound. The production of such a sound as the cap is rotated and then pulled from the body indicates to the user that the package had been fully sealed and that the needle container therein could not have been previously exposed.

While in the foregoing I have disclosed an embodiment of the invention in considerable detail for purposes of illustration it will be understood by those skilled in the art that many of these details may be varied without departing from the spirit and scope of the invention.

I claim:

1. A container for hypodermic needles comprising a hollow body open at one end thereof, said body having a circumferentially-extending shoulder portion adjacent said open end and having a side wall depression between said shoulder portion and the body's opposite end, and a cap formed from a flexible resilient material and receiving the open end and shoulder portion of said body, said cap providing a skirt having at least a portion of the edge thereof crimped inwardly into said depression for locking said cap and body together, said skirt in its normal crimped condition defining an opening smaller than the outer cross sectional dimensions of said shoulder, said crimped edge portion of said skirt being resilient and being flexible outwardly to increase said opening to a size at least as large as said shoulder for permitting removal of said cap from said body, said skirt springing back to its normal crimped condition after said cap has been separated from said body, thereby preventing replacement of said cap over said shoulder and upon said body.

2. The structure of claim 1 in which said body also has a side wall enlargement between said shoulder portion and said opposite end, said crimped edge portion of said skirt being capable of flexing outwardly and riding out of said depression and upon said enlargement when said body and cap are rotated with respect to each other, whereby, when said cap and body have been rotated to withdraw said crimped edge portion from said depression the cap and body may be pulled axially apart.

3. A container for hypodermic needles comprising a hollow body open at one end thereof, said body having a sleeve portion adjacent said open end and having an enlarged intermediate portion between said sleeve portion and the opposite end of the body, said enlarged intermediate portion being provided with a side wall depression defining a shoulder between the same and said sleeve portion, and a cap formed from a flexible and resilient material rotatably receiving the sleeve portion and shoulder of said body, said cap having a skirt with an edge portion thereof crimped inwardly into said depression for locking said cap and body together, said skirt in its normal crimped condition defining an opening smaller than the outer cross sectional dimensions of said shoulder, said crimped edge portion of said skirt being resilient and being flexible outwardly to increase said opening to a size at least as large as said shoulder when said body and cap are rotated to cam said crimped edge portion out of said depression, thereby permitting removal of said cap from said body, said edge portion being capable of springing back into its original crimped condition after said cap is separated from said body to prevent replacement of said cap over said shoulder and upon said body.

4. The structure of claim 3 in which said intermediate portion exclusive of the depression thereof is of substantially the same diameter as said shoulder.

5. A container for hypodermic needles comprising a hollow body open at one end thereof, said body having a sleeve portion of reduced diameter adjacent said open end and having an enlarged intermediate portion adjacent said sleeve portion, said intermediate portion having

a plurality of external recesses in the wall thereof, each of said recesses defining a shoulder between the same and said sleeve portion, said intermediate portion between said recess having substantially the same diameter as the outer limits of said shoulder, and a flexible and resilient plastic cap rotatably receiving the sleeve portion of said body and having a skirt extending over and beyond said shoulder, said skirt having edge portions thereof crimped inwardly into said depressions for locking said body and cap together, said skirt in its normal crimped condition defining a non-circular opening smaller than the outer cross sectional dimensions of said shoulder, said crimped edge portions of said skirt being resilient and being capable of flexing outwardly to increase said opening to a size substantially the same size as said shoulder when said body and cap are rotated to cam the crimped edge portions out of said depressions, thereby permitting axial separation of said cap and body, said crimped edge portions also being capable of springing back into their original state after said cap has been separated from said body to prevent replacement of said cap over said shoulder and upon said body.

6. The structure of claim 5 in which said skirt in its normal crimped condition defines an opening larger than the outer diameter of said sleeve, whereby, said cap may be replaced upon the sleeve portion of said body after said parts have been separated.

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