

[54] **PREPUNCTURED CLOSURE**

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[51] Int. Cl. **B65d 51/00**

[58] Field of Search **215/37, 38 R, 40**

[56] **References Cited**

UNITED STATES PATENTS

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Primary Examiner—George T. Hall

[57] **ABSTRACT**

A closure is provided which consists of three parts and is particularly usable with a container of the type having an open top. The three components are (1) a flat elastomeric member closing the open top, (2) a flexible impermeable and tearable barrier layer, and (3) a cap overlying the barrier and the flat member to seal the combination to the container. An arcuate slit is provided in the flat member, the slit being substantially resealed by the elastomeric properties of the seal member. However, the slit permits the insertion there-through of a plastic canula so that a dosage may be removed without substantial exposure of the contents of the container to contamination.

5 Claims, 8 Drawing Figures

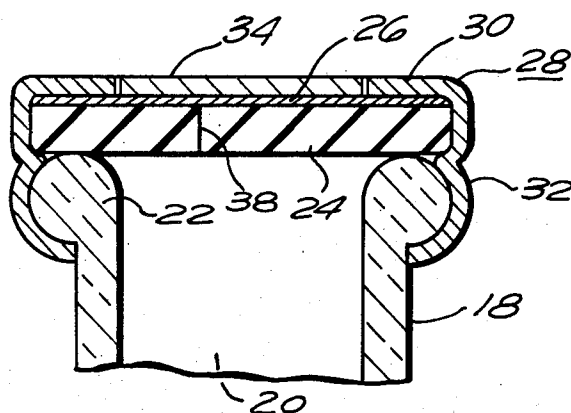


FIG. 1

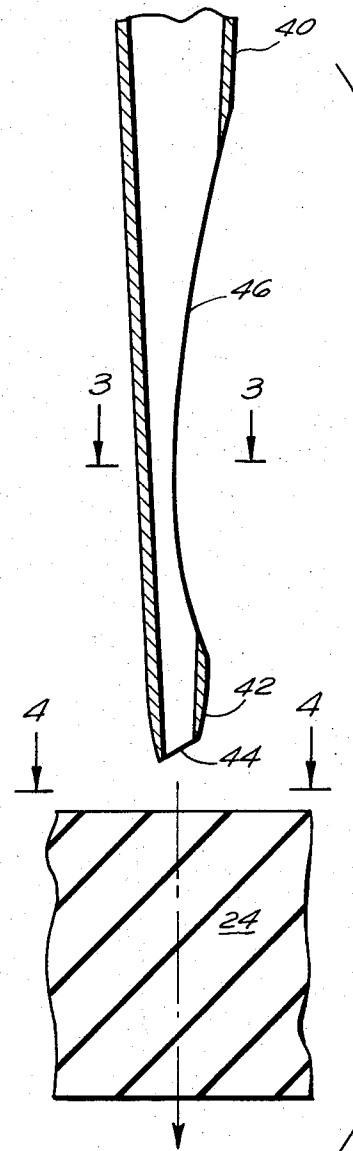
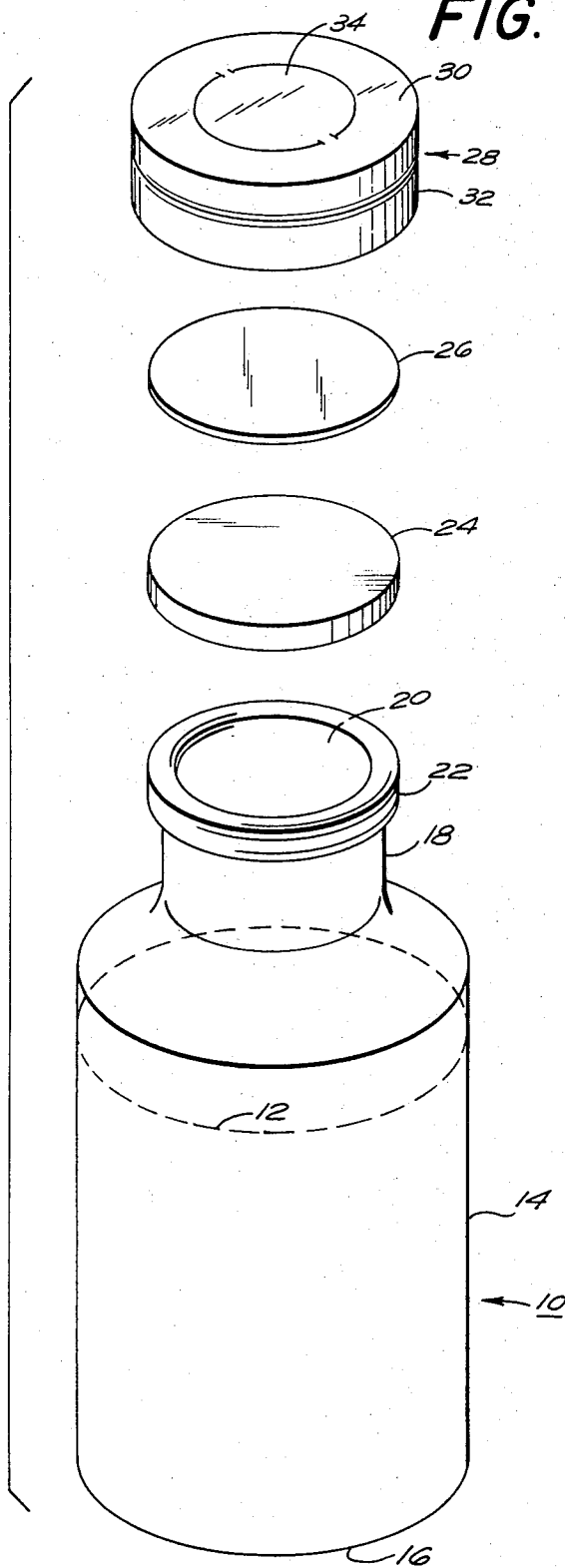


FIG. 2

FIG. 3

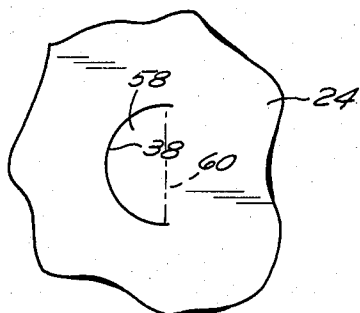


FIG. 4

FIG. 6

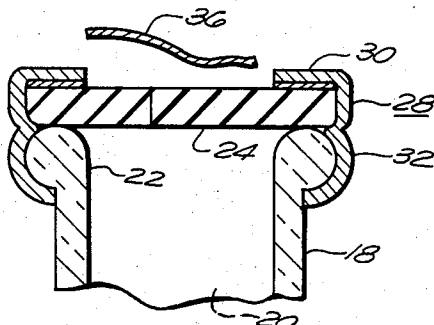
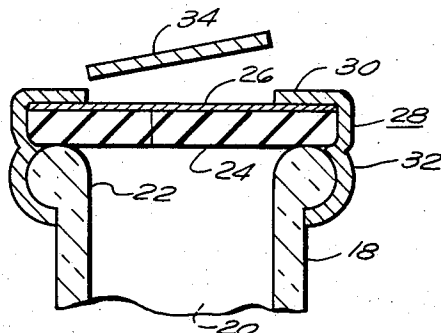


FIG. 7

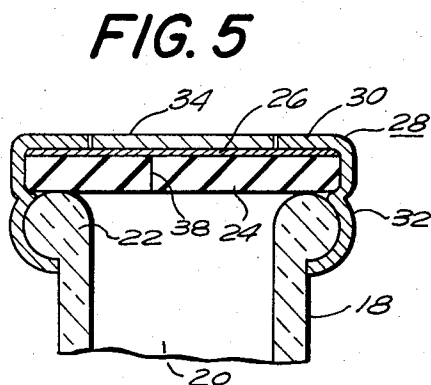
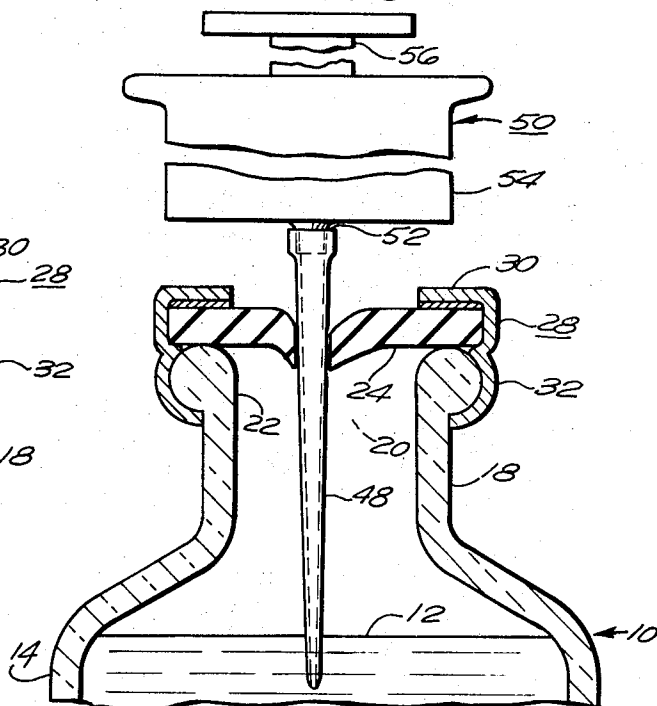


FIG. 5

FIG. 8



PREPUNCTURED CLOSURE

BACKGROUND OF THE INVENTION

This invention relates to closures and, more particularly, to closures which may be advantageously used with containers or vials holding medicaments.

For economy's sake, it is often desirable to package medicaments in multi-dosage containers or vials. The reason for doing this is to achieve a reduction in the cost of packaging and to facilitate mass treatment. Mass treatment is advantageously used in veterinary medicine practices such as the treatment of a herd of cows for mastitis. In practice, the veterinarian or farmer first must puncture the normal rubber seal or cap on a multi-dosage container of a mastitis medicament and then insert a canula or needle through the punctured or prepunctured cap to remove a dosage. Generally, when the cap is provided without a prepunctured opening, a hollow needle or similar tool is used to provide the initial puncture in the seal. In such a system, the hollow needle has a tendency as it widens (since the needle is tapered) to core out a portion of the seal. This core may drop into the medication or it may loosely hang from the seal on the inner side within the container or vial. Later, when a canula is inserted, the core may interfere with the withdrawal of the dose. Of course, the fact that the seal itself must be punctured is also a problem since a needle may not be readily available for that purpose.

It has been suggested to provide prepunctured vials which are utilized for this purpose. Normally, the punctures are enlarged openings which are covered by some suitable barrier or cap material. The problem with large openings is that once the protective cap is removed, the medicament within the container may become contaminated through the opening. It has also been suggested to use preformed slits in the form of a cross. Such a prepuncture is found in U.S. Reissue Pat. No. Re. 21,699 of Jan. 21, 1941. However, the problem with a crossed pair of slits is that the canula, when being inserted, tends to widen the four arms of the slit adding to the possibility of contamination. Further, in such a situation, it is also possible that one of the quadrants of the cross may become detached and fall into the medication in the same manner as a core.

SUMMARY OF THE INVENTION

In order to overcome the shortcomings of the prior closures for containers or vials of medicaments, by the present invention it is proposed to use a three-part closure. Overlying the open top of the container or vial is a flat elastomeric member with a flexible, impermeable barrier layer placed thereon and, finally, a cap overlying both the barrier and the flat member to seal the combination to the container. The flat member is prepunctured with the single slit which is arcuate in shape and preferably semi-circular. Because of the elastomeric properties of the flat member, the slit substantially reseals itself after it has been punctured. To obtain a dosage from the container, a plastic canula is inserted through the preformed slit. The slit advantageously reforms around the canula and insures that there will be substantially no contamination of the contents of the container due to unwanted openings in the flat member. Also, because of the arcuate shape of the slit it is possible to use a dull pointed canula and, yet,

effectively make an insertion in order to withdraw a predetermined dosage.

Accordingly, it is an object of the present invention to produce a closure for medicament containers which facilitates the dispensing of multi-dosages of the medicament.

Another object is to produce a closure which does not require the use of a sharp pointed canula for use in obtaining a dosage. Still a further object of the present invention is to provide a closure which permits the use of a plastic canula which may be disposed of after a single dosage. A still further object is to produce a closure having a flat member which is sufficiently elastomeric to reseal the prepunctured slit after the canula is withdrawn.

These and other objects and advantages of the present invention may be noted from the following specification and description as well as the illustrated embodiment of the drawings, which description and illustration is intended for use by those skilled in the art, and not for the purpose of limitation.

IN THE DRAWINGS

FIG. 1 is an exploded view of the three-piece closure of the present invention for use in connection with a container holding multiple dosages of a medicament;

FIG. 2 is an enlarged fragmentary view showing the usage of a hollowed out needle for providing the arcuate slit to the seal member;

FIG. 3 is a sectional view along lines 3—3 of FIG. 2;

FIG. 4 is a sectional top view along lines 4—4 of FIG. 2;

FIG. 5 is a sectional side view showing the closure in place about a container;

FIG. 6 is a view similar to FIG. 5 with the tear tab of the closure cap removed;

FIG. 7 is a view similar to FIG. 6 with a portion of the barrier layer of the closure combination removed; and

FIG. 8 is a fragmentary enlarged view showing the usage of a canula and syringe to withdraw a dosage from the container sealed by the closure of the present invention.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENT:

Referring to the drawings and to FIG. 1 in particular, a container 10 containing a medicament 12 is shown. The container 10 includes a side wall 14, a bottom wall 16 and a reduced neck portion 18. The neck portion has a top opening 20 and a bead 22 is provided around the opening 20.

As also shown in FIG. 5 in particular, a flat member 24 overlies the opening 20. The member 24 is preferably made of an elastomeric material such as rubber. The member 24 extends sufficiently beyond the opening 20 so as to be seated firmly on the bead 22. In actual use, a suitable member was made from synthetic rubber, had a diameter of about 0.80 inches and a thickness of about one-eighth of an inch, and a durometer of about 50. It was used to seal off a 100 ml. container in which the outside diameter of the bead was about 0.785 inches. Overlying the member 24 is a barrier layer 26 which is advantageously made of a flexible, impermeable and tearable material such as aluminum foil. A cap 28 is positioned over the barrier and the member and fixed in place about the open top of the container by being crimped about the bead 22.

3

When the cap 28 is fixed in place and crimped about the bead, the member 24 and barrier 26 cooperate to make a tight seal protecting the contents of the container. Heretofore, the barrier layers have been aluminum discs and did not act as tearable seals.

The cap 28 has a top wall 30 and a depending skirt 32. The top wall 30 has a tear tab 34 which may be removed as shown in FIG. 6 to obtain access to the contents of the container 10. However, since the barrier layer 26 is sealed over the member 24, it is necessary that a portion 36 of the barrier layer 26 also be removed, the member 24 is then exposed to the atmosphere for the first time. Previously thereto, the member 24 would have been protected by the barrier layer 26 which is sealed with the member 24 over the opening 20. When the section 36 is removed, it provides access to a prepunctured slit 38, the slit having an arcuate shape approaching that of a semi-circle as shown in FIG. 4, in particular. The slit 38 is preferably of a very narrow extent and due to the elastomeric properties of the member 24, it readily reseals itself insuring that the contents of the container are not contaminated by the outer atmosphere about it.

The slit 38 may be formed by the use of a hollow needle 40 with a sharp tip 42 and a beveled edge 44. In addition, the needle 40 has a ground out portion 46 which results in the needle having a cross sectional shape similar to a semi-circle as shown in FIG. 3.

In many operations, it is desired to use a plastic or molded canula which would be available for only a single dosage and then disposed of. Such an application would be made by veterinarians in the treatment of cows for mastitis wherein the medicament is inserted into the udder through the canal opening in the cow's teat. In such cases it is not desirable to use a sharp needle because the possibility of injury or puncture exists. Instead, a tapered plastic canula with a dull or blunt tip is preferred. In this way after treatment of each cow the canula may be disposed of and a fresh canula attached to a syringe in order to extract another dose from the container.

Referring to FIG. 8, a hollow canula 48 made of a suitable molded plastic material such as polyethylene or polystyrene or any suitable polymer or copolymer is shown. The canula 48 is attached to a syringe 50 which includes a stub portion 52, a barrel 54 and a plunger 56. In the illustration of FIG. 8 the canula is shown depressed through the exposed member 24 by being inserted through the prepunctured slit 38. It is to be understood that in many operations the container 10 would be inverted in order to have the medicament 12 readily accessible to the tip of the canula 48.

As also shown in FIG. 8, the insertion of the canula through the prepunctured slit 38 causes the member 24 to be slightly depressed but yet there is a close fit about the canula to prevent any contamination from entering the container. When the canula is withdrawn from the container 10 the slit 38 quickly recloses itself to a sealing position due to the elastomeric qualities of member 24. In this way it is possible to have a container containing multiple dosages of a specific medicament and yet

4

have freedom from contamination. The protection which must be afforded to the medicament 12 before the removal of the tear tab 34 is very important. It is desirable that the barrier layer 26 be a composite part of the seal arrangement with the member 24. It is also desirable in actual use that the barrier layer 26 be flexible and tearable so that ready access may be had to the prepunctured slit 38. This is accomplished by using a flexible material rather than a rigid or semi-rigid material such as an aluminum disc.

The arcuate shape of the slit 38 insures that there is a substantial holding area for the tab 58 formed by the slit 38. This holding area would be generally along the line 60 as shown in FIG. 4. This arrangement permits the line 60 to function as a hinge for the tab 58 when the canula is pressed against the slit. It also is possible to avoid the problem of coring which would occur if a complete rounded opening were made. The problems resulting from such coring have been discussed hereinbefore.

From the foregoing discussion and description of the illustrated embodiment, the objects and advantages of the present invention may be understood by those skilled in the art.

What Is claimed:

1. A closure adapted to be used in combination with a container holding a medicament, said container including bottom and side walls and an open top, said closure comprising:
 - a. an elastomeric member closing off the open top of the container;
 - a. a flexible, impermeable and tearable barrier layer overlying the member;
 - a. a cap positioned over said barrier layer and the member and fixed in place about the open top of the container whereby said member and layer act as a seal over the open top;
 - a. a preformed opening extending through the member and resealed by the elastomeric properties of the member;
 - a. a removeable tear tab in said cap adapted to be removed to expose the barrier layer, whereby at least a portion of the layer may be removed and the preformed opening exposed, so that a canula may be inserted therethrough to remove a dose of the medicament held in the container without substantial exposure of the contents of the container to contamination.
2. A closure as defined in claim 1 wherein the opening is a slit and has an arcuate shape.
3. A closure as defined in claim 1 wherein the opening is a slit and has a semi-circular extent.
4. A closure as defined in claim 1 wherein the barrier layer has at least the extent of the seal member.
5. A closure as defined in claim 1 wherein the container has a bead ring about its open top and the cap is crimped about the bead ring.

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