

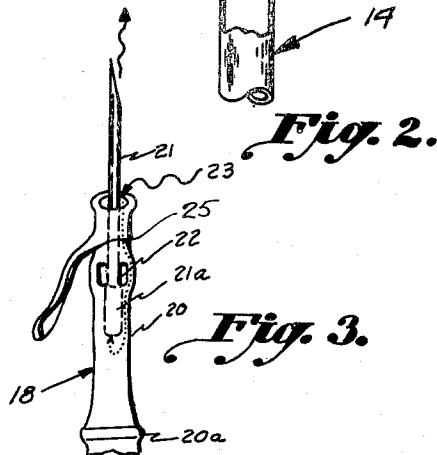
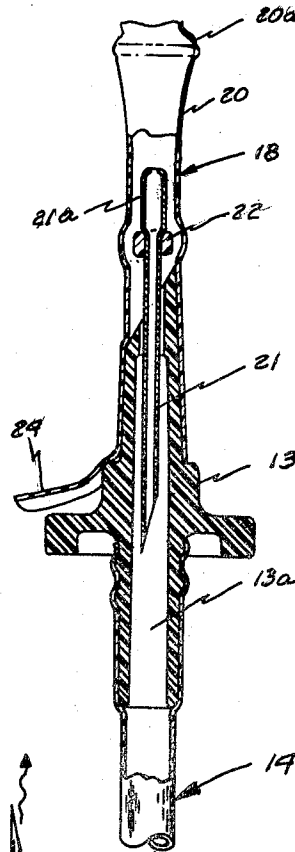
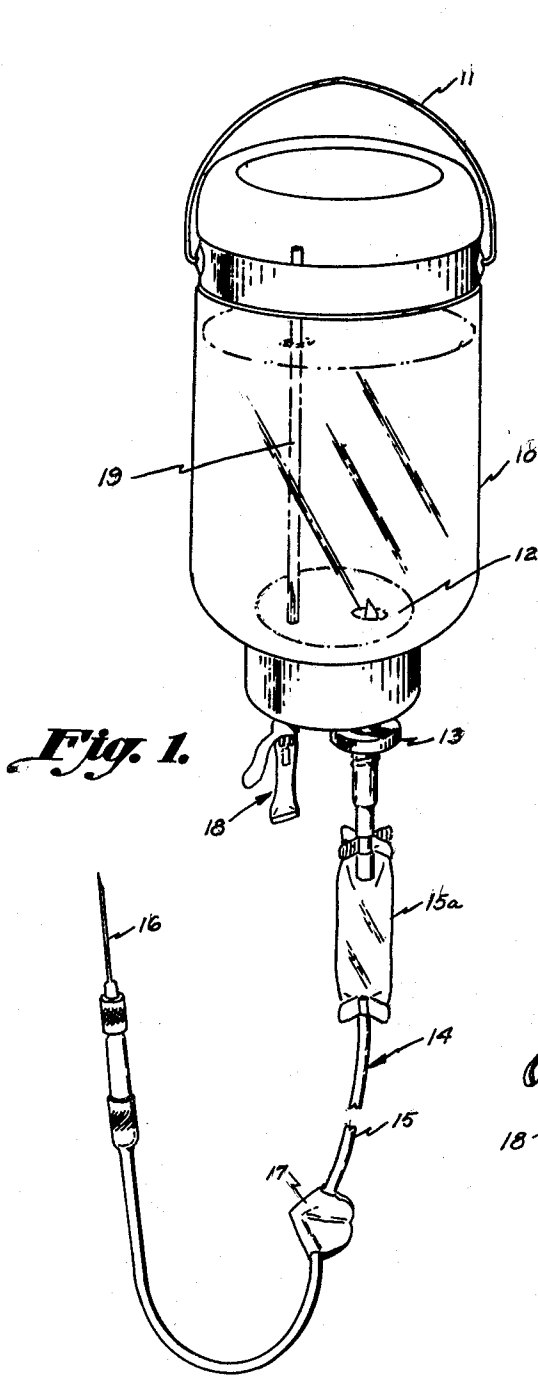
Jan. 15, 1957

J. G. THOMAS ET AL

2,777,443

AIR-WAY PUNCTURE DEVICE

Filed March 29, 1955



James L. Thomas
Cyrus R. Broman
INVENTORS.

BY Jerome F. Fallon

1

2,777,443

AIR-WAY PUNCTURE DEVICE

James G. Thomas, Skokie, and Cyrus R. Broman, Evanston, Ill., assignors to Baxter Laboratories, Inc.

Application March 29, 1955, Serial No. 497,574

6 Claims. (Cl. 128—214)

This invention relates to an air-way puncture device for use in conjunction with a parenteral solution container and, more particularly, to a device supplied as part of a parenteral administration set.

In the medical field of parenteral therapy, solutions are generally provided in closed glass containers with the contents under a pressure less than atmospheric. To preserve this vacuum condition it is necessary that the glass containers be securely capped, and it has been the uniform practice to provide a rubber stopper mounted in the container mouth and secured against inward or outward movement. The stopper, being of considerable thickness, is provided with passageways extending therethrough to permit the discharge of the contents of the container and to permit entry of replacement air for the discharged contents. These passageways are closed prior to actual administration by means of thin, puncturable diaphragms which are provided as integral parts of the stopper.

Our invention relates to a device for puncturing the diaphragm extending across one of the passages in the stopper mounted in a parenteral solution container. The passage to which the puncture device of our invention is to be applied is known as the air-way passage since it permits air to enter the container, normally through an inwardly-extending glass air tube, to replace the liquid as it is being discharged through another passageway. The liquid being discharged through the second-mentioned passageway is conducted to the site of administration, generally by means of an administration set which includes connectors attached to the ends of a length of flexible tubing. One of these connectors is inserted into the discharge passage of the stopper and the other connector, generally in the form of a hypodermic needle, is inserted into the vein of an intended recipient of the solution.

Puncture devices for the diaphragm extending across an air-way passage have been known to the art, but heretofore none has been able to achieve the advantages present in our device; namely, inexpensiveness of manufacture, foolproof usage, and the important function of serving as an integral part of a parenteral administration set up to the time it is used.

Since the keynote in parenteral therapy is maintenance of sterility of all parts of the system, the parenteral administration set itself is maintained in a sterile condition by insulating from contact with the atmosphere all surfaces that might contaminate the parenteral solution. In the case of the connectors, this is achieved by incasing them in plastic sleeves which are removed just prior to connection of the set with the parenteral solution container and the patient.

Essentially, our air-way puncture device includes a plastic sleeve having a needle mounted axially therein, the sleeve being mounted over the stopper plug-in portion of a parenteral administration set until it is to be used in its diaphragm-puncturing operation.

Our invention will be explained in conjunction with

2

the accompanying drawing in which Fig. 1 is a perspective view of a conventional parenteral administration system and which is equipped with the puncture device of our invention; Fig. 2 is an enlarged cross-sectional view of the device of our invention in the form in which it is used as a protector for the plug-in portion of a parenteral administration set; and Fig. 3 is a perspective view of the device of our invention in the form in which it is used as a puncturing device.

Referring now to the drawing and, in particular, Fig. 1, the numeral 10 indicates a parenteral solution bottle which is suspended in a mouth-downward condition by means of bail 11 from suitable support means (not shown). Mounted in the downwardly facing mouth of container 10 is stopper 12.

Inserted into one of the passageways that extend through stopper 12 is the plug-in portion 13 of parenteral administration set generally designated 14. Parenteral administration set 14 includes a length of flexible tubing 15. Affixed to one end of tubing 15 is the previously mentioned plug-in 13, and affixed to the other end is hypodermic needle 16. In the usual administration set, means for determining the rate of flow is generally employed in the form of a drip tube 15a, which permits the nurse or doctor supervising the administration to count the number of drops falling therethrough. The rate of flow is generally regulated by some form of clamping means, such as the clamp designated 17.

Inserted into the other passageway of stopper 12 is the air-way puncture device of our invention, generally designated 18. Inserted into the other end of the stopper passageway connected to the puncture device of our invention is air tube 19, which extends inwardly into solution container 10.

Air-way puncture device 18 in the form in which it is seen in Fig. 1 can be better appreciated by examination of Fig. 3, wherein an enlarged perspective view is shown. In Fig. 3 the device is seen to include a thermoplastic sleeve 20, and mounted axially in sleeve 20 is needle 21. We prefer that the mounting of needle 21 in sleeve 20 be achieved by fusing, as by heat sealing, opposing wall portions of sleeve 20 as designated at 22 to anchor needle 21 therein. Enlarged needle shank portion 21a also cooperates in this anchoring, especially during the puncturing operation. It is to be noted that the fused portions 22 do not completely block off the axial opening in sleeve 20, so that it is possible for air to enter the end of sleeve 20 adjacent the sharpened end of needle 21 in order to ultimately enter container 10. The air flow is indicated by a wavy arrow, and designated 23. The tortuous passage through which air flows and which is achieved by the cooperation of fused portions 22 and needle 21, serves as a filter. The end 20a of sleeve 20 opposite the sharpened end of needle 21 is closed, as by fusing through heat-sealing.

The puncture device of our invention is intended to be provided as part of a parenteral administration set, wherein it performs a second function as a protector. This can be appreciated from a consideration of Fig. 2, wherein sleeve 20 is mounted over plug-in 13 of parenteral administration set 14. In order to facilitate removal of sleeve 20 from plug-in 13, integral tab 24 is provided. Tab 24 may also be secured separately to sleeve 20, in which case it should also be provided adjacent the open end of sleeve 20. When sleeve 20 is mounted on plug-in 13, as shown in Fig. 2, the sharpened end of needle 21 extends into plug-in 13, which is provided with a longitudinal passage 13a for the conduction of parenteral solutions.

Thus, it is to be noted that there is no danger of accidental injury by providing a puncture device having an exposed, sharp needle. Further, all the elements

3

which are to be in contact with the parenteral solution during administration are insulated from contact with the air up to the time that they are to be used. From Fig. 2 it can be appreciated that the sharpened point of needle 21 is kept sharp until use, since plug-in 13 acts as a protector.

Operation

When a parenteral solution is about to be administered through an administration set provided with the air-way puncture device of our invention, the set is removed from its shipping container and tab 24 is grasped between the thumb and forefinger. When plug-in 13 is held in the other hand and tab 24 moved away from the hand grasping plug-in 13, sleeve 20 rolls back on itself substantially as shown at 25 in Fig. 3. The double thickness of sleeve provided thereby serves as a convenient finger grasp for inserting needle 21 through stopper 12, as shown in Fig. 1.

Although the pictured embodiment of our invention shows the end 20a of sleeve 20 opposite the sharpened end of needle 21 to be closed, whereby a tortuous air passage is achieved through the cooperation of fusing sleeve 20 as at 22, it is to be noted that the air-way puncture device 18 of our invention can have the above-mentioned end 20a provided in an open condition either during its use as a puncture device or as a protector, or both. Should it be desired to be used with an open end as a puncture device, it is only necessary for the nurse or doctor supervising the administration to snip off the sealed end portion 20a. Should sleeve 20 be desired to be used in the form having an open end 20a when in use as a protector, as shown in Fig. 2, it is only necessary to insert a plug of cotton into the open end 20a of sleeve 20. The cotton closing off the end 20a of sleeve 20 during storage will then serve as a filter when device 18 is used as an air-way puncture device.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be inferred therefrom.

We claim:

1. A puncture device for the air passage diaphragm in a stopper closing the mouth of a parenteral administration container comprising a thermoplastic sleeve having a needle permanently anchored axially therein and means closing the end of said sleeve opposite the sharpened end of said needle, said sleeve being adapted to be removably

4

mounted on the plug-in portion of a parenteral administration set to protect said plug-in portion against contamination during storage.

2. In combination, an air-way puncture device comprising a thermoplastic sleeve having a needle mounted axially therein; and a parenteral administration set comprising a length of flexible tubing provided at one end with discharge means and at the other end with a stopper plug-in, said sleeve being removably mounted on said plug-in with the sharpened end of said needle extending inwardly of said plug-in.

3. The combination of claim 2 wherein the said thermoplastic sleeve is provided with an integral finger tab extending from the end adjacent the sharpened end of said axially mounted needle.

4. In combination, an air-way puncture device comprising a thermoplastic sleeve having a needle mounted axially therein by fusing together opposite wall portions of said sleeve; and a parenteral administration set comprising a length of flexible tubing provided at one end with discharge means and at the other end with a stopper plug-in, said sleeve being removably mounted on said plug-in.

5. The combination of claim 4, wherein the said fused portions are so arranged as to provide spaced, longitudinal air passages in said sleeve and the end of said sleeve opposite the sharpened end of said needle is closed, whereby a tortuous air passage is provided.

6. In combination, an air-way puncture device comprising a thermoplastic sleeve having a needle mounted axially therein by spaced fusing of opposite wall portions of said sleeve whereby a longitudinal passage is provided in said sleeve external to said needle, said sleeve being closed at the end opposite the sharpened end of said needle; and a parenteral administration set comprising a length of flexible tubing provided at one end with discharge means and at the other end with a stopper plug-in provided with a longitudinal liquid-conducting passage extending therethrough, said sleeve being removably mounted on said plug-in with the sharpened end of said needle extending into the longitudinal passage of said plug-in.

References Cited in the file of this patent

UNITED STATES PATENTS

2,725,055 Gewecke Nov. 29, 1955