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2,568,108

DISPENSING CLOSURE FOR STERILE LIQUID CONTAINERS

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2 Sheets-Sheet 1

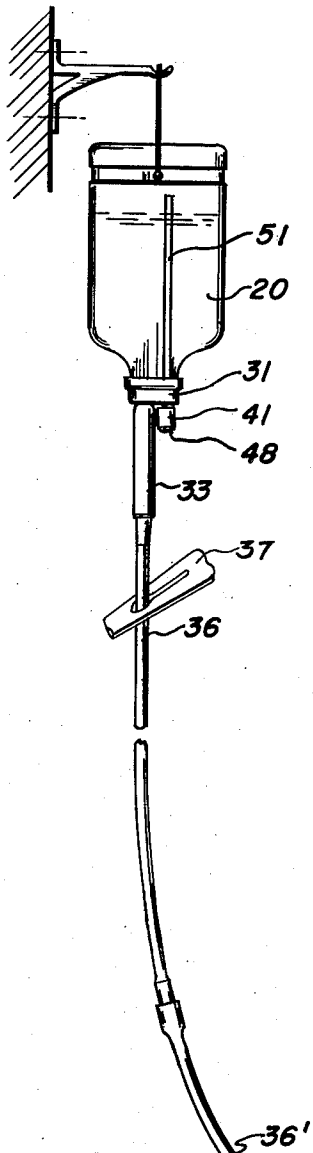


Fig. 1

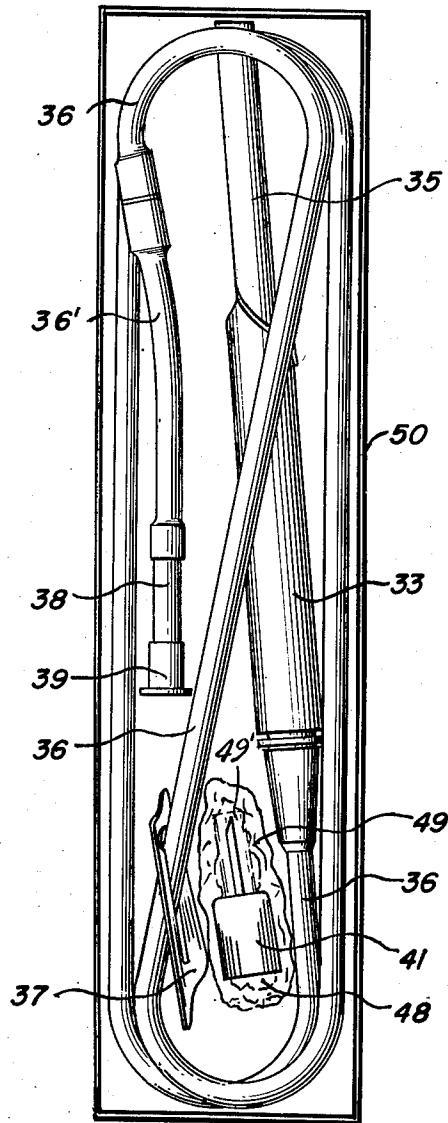


Fig. 2

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2 Sheets-Sheet 2

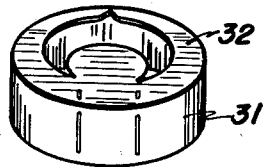


Fig. 6



Fig. 7



Fig. 8

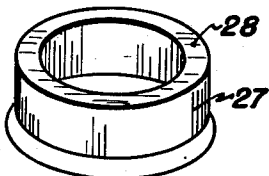


Fig. 9

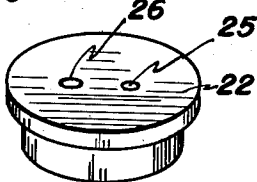


Fig. 10

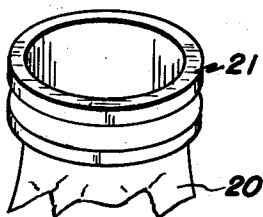


Fig. 11

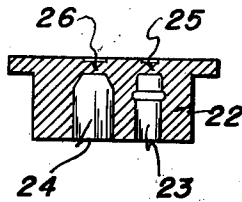


Fig. 3

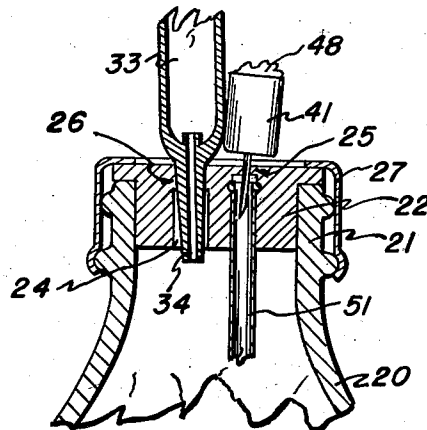


Fig. 4

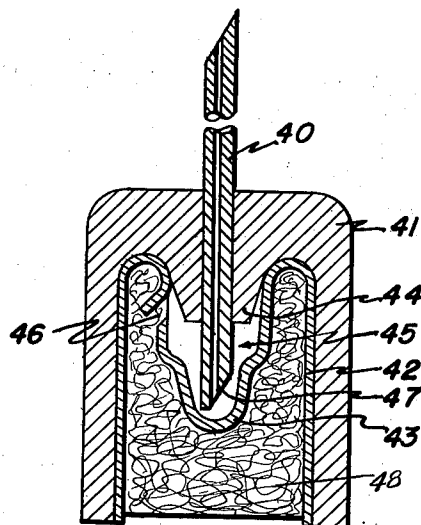


Fig. 5

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DISPENSING CLOSURE FOR STERILE LIQUID CONTAINERS

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This invention relates to apparatus for intravenous administration of liquids, and particularly to apparatus which is packaged in sterile condition and which can be put into use for its intended purposes in sterile condition without resterilization.

An important object of the invention is to provide apparatus of the character described of such construction and material that it can be produced economically and disposed of after a single use.

Another important object is to provide sterile apparatus which can be made ready for use without contamination of the parts of the apparatus or contents of the container holding the liquid to be administered intravenously to a patient.

Another object is to provide a closure plug for a sterile liquid container having air and fluid passages closed by diaphragms which are integral portions of the plug, constituting an air-tight closure for the container until the contents are to be used, and adapted to be opened to provide an air inlet and a fluid outlet without contamination of the container contents.

A special feature of construction of my apparatus is a portable, combined hollow needle and air filter unit which serves as a means for puncturing flexible sealing means constituting part of the container closure and also as a means for admitting filtered air into the sterile fluid container. By using the needle and filter unit for the purpose of puncturing the flexible sealing means, no unfiltered air is permitted to enter the container, as is the case when the puncturing is done by the use of a sharp instrument or a hollow needle not equipped with an air filter, or when a separate seal is removed and existing passageways in the closure plug are opened and air is admitted to the container. The apparatus herein shown and described thus provides a "closed" system of administering fluids intravenously, by which I mean that no unfiltered air can enter the sterile liquid container when the apparatus is used as intended.

The combined hollow needle and air filter of my invention is light in weight and compact in form, and therefore is self-supporting when it has been inserted into the container closure to provide an air inlet therefor, regardless of whether the container is in upright or inverted position.

Although the closure plug and combined hollow needle and air filter unit of my apparatus have been mentioned specifically as possessing novel advantages, it is to be understood that the sev-

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eral parts of the apparatus hereinafter described cooperate to provide an exceptionally efficient and economically practical construction for its intended purposes.

In the drawings:

Fig. 1 is an elevational view of a sterile liquid container provided with apparatus for intravenous administration of the container contents, embodying my invention, the container being shown in the inverted position designed for dispensing the contents.

Fig. 2 is an elevational view of that part of the apparatus which is packaged separately from the container and its closure, showing said apparatus as it appears when packaged in a box-like inner holder.

Fig. 3 is a vertical sectional view of the closure plug of my apparatus, removed from the fluid container, showing the plug before it has been prepared for dispensing the container contents.

Fig. 4 is a vertical sectional view of the closure plug in position in the neck of the container, with the drip meter (partly broken away) and my combined hollow needle and air filter unit positioned in the plug, as they appear when prepared for dispensing the container contents.

Fig. 5 is a vertical sectional view, enlarged, of the hollow needle and air filter unit of my apparatus.

Figs. 6 to 9, inclusive, are perspective views of detached parts constituting a portion of the closure means.

Fig. 10 is a perspective view of the closure plug.

Fig. 11 is a perspective view of the upper portion of the container in which the plug is to be seated.

In the preferred embodiment of the invention shown in the drawings, a conventional container for sterile liquid is indicated at 20. The neck 21 of the container is closed by a rubber stopper plug 22 provided with two passageways, 23 and 24, which do not extend entirely through the plug 22. These passageways are closed by thin flexible diaphragms 25, 26, respectively, which are integral with and form part of the outer face of the plug 22.

A metal retainer ring 27 provided with a flange 28 surrounds the neck of the container, the flange 28 overlying the circumferential portion of plug 22. A rubber liner 29 rests on top of the plug 22 and flange 28 of the ring 27. An aluminum disk 30 overlies the liner 29. Finally a tear off metal seal 31 with flange 32 provides an outer seal for the entire closure.

The separately packaged part of the sterile

apparatus for intravenous administration comprises a plastic dripmeter 33 in the form of a sight tube, provided with an adapter or reduced end 34 protected by a flexible cover 35 which contains sterile filter material. The opposite end of the dripmeter is connected to plastic tubing 36 provided with a rubber portion 36' near the end removed from the dripmeter 33. A compressor 37 is provided for regulating the flow of liquid through the tubing 36. Beyond the rubber portion 36' said tubing is provided with a needle adapter 38 protected by a sterile rubber cap 39.

A separate air filter comprises a hollow needle 40, cup shaped filter holder 41 preferably made of rubber, and a lining cup 42 in the holder 41, formed with a cup shaped central portion 43 which is inverted with respect to the cup 42. The cup portion 43 is spaced from a thickened portion 44 of the holder 41 to provide a chamber 45 which communicates with the atmosphere through the opening 46. The needle 40 extends through said holder 41 and thickened body portion 44, its inner end being beveled at 47, the arrangement being such that a passageway for air is insured through the hollow needle. Filter material 48 is held in the inner lining member 42 of the holder 41 as shown in Figs. 2, 4 and 5. The sterile hollow needle 40 is embedded in a compact roll of sterile filter material 49' to maintain sterility of the hollow needle after removal from the sterile transparent wrapper 49. In addition, this filter material prevents the needle 40 from tearing the wrapper 49. The entire air filter unit is enclosed in the sterile transparent wrapper or envelope 49.

In Fig. 2, the separately packaged parts of the apparatus are arranged in an open top box 50 which is completely enclosed in an outer receptacle (not shown) which seals said box 50 and contents.

When the plug 22 is in container closing position in the neck 21 of the container 20, the air passage 23 closes by diaphragm 25 registers with an air tube 51 in the container.

In assembling the sterile liquid container 20 and closure plug 22 and other parts of the closure assembly, a saline solution is applied to the exposed surface of the plug 22. This serves as a lubricant to facilitate the puncturing of the diaphragms 25, 26, and the lubricating property is preserved by the liner disk 29 which overlies the plug 22.

Operation.—To put the sterile intravenous administration apparatus into use, the tear off seal 31 is removed from the container closure, followed by removal of the aluminum disk 30 and rubber liner 29. This leaves exposed the outer face of the plug 22 and retainer ring 27.

Next the separately packaged parts of the apparatus in their container 50 are taken out of their outer receptacle. The envelope 49 is opened and the air filter unit is removed. The user employs the hollow needle 40 to puncture the diaphragm 26 which seals the passage 24 through which the solution in the container is intended to be dispensed. This puncturing of the diaphragm 26 by the combined needle and air filter unit prepares the plug 22 for the reception of the adapter end 34 of the dripmeter 33 without admitting unfiltered air to the container. Removal of the needle 40 after the puncturing has been done is followed by immediate self sealing of the diaphragm 26 over the liquid passage 24 due to the nature of the resilient material of the plug 22. After puncturing the diaphragm 26 the

operator immediately inserts the hollow needle 40 with air filter thereon into the diaphragm 25 and air passage 23 and leaves it in communication with the air tube 51 in the container. Next, the adapter end 34 of the dripmeter is forced through the punctured diaphragm 26 and into the liquid passage 24, as shown in Fig. 4.

The compressor 37 is adjusted to control the flow of fluid. The container 20 is then inverted and suspended as shown in Fig. 1, with the dripmeter 33, tubing 36 and needle adapter 38 depending from the plug 22. After the protector cap 39 has been removed and a conventional hypodermic needle has been attached, the apparatus is ready for the intravenous injection of the container contents.

From the foregoing it will be seen that the apparatus provides a "closed" system of administration, by which is meant a system in which no unfiltered air is allowed to enter the container or to otherwise contaminate the fluid to be administered intravenously.

Changes may be made in details of construction and the form of the parts without departing from the scope of the invention as defined by the following claims.

I claim:

1. In apparatus for the intravenous administration of liquids, means for admitting air to a container provided with a sealed closure, said means comprising a hollow needle adapted to be passed through the closure, a filter holder including an outer cup shaped member of flexible material, an inner member having an inverted cup shaped bottom mounted in the outer member and providing an air chamber between the bottoms of said members, filter material in the inner member, said needle extending through the flexible outer member into said air chamber, the inner end of said needle being beveled and spaced from the filter holder, said inner holder member being apertured between said filter material and air chamber to admit filtered air into said chamber and needle.
2. Apparatus for intravenous administration of liquids, comprising a resilient stopper adapted to seal the mouth of a container, said stopper being provided with a liquid passage and an air passage closed by diaphragms which constitute parts of the stopper, liquid dispensing means provided with an adapter extending into the liquid passage through the diaphragm initially closing the passage, a hollow needle extending through the diaphragm initially closing the air passage in the stopper, and an air filter comprising two members spaced apart to provide an air chamber between them, the air intake end of the needle being located in said air chamber of the filter holder.
3. Apparatus for intravenous administration of liquids, comprising a resilient stopper adapted to seal the mouth of a container, said stopper being provided with a liquid passage and an air passage closed by diaphragms which constitute part of the outer face of the stopper, liquid dispensing means provided with an adapter extending into the liquid passage through the diaphragm initially closing the passage, a hollow needle extending through the diaphragm initially closing the air passage in the stopper, a filter holder consisting of two members forming an air chamber between them, filter material in the holder, said needle extending through one of the holder members into said air chamber, the other of said holder members being apertured between

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the filter material and air chamber to admit filtered air into said chamber and needle.

4. Apparatus for intravenous administration of liquids from a sterile liquid container, comprising a sterile package containing liquid dispensing means and air admission means adapted to be mounted on a resilient closure plug for said sterile liquid container, said air admission means comprising a hollow needle, a filter holder mounted directly on the air intake end of the hollow needle, filter material in the holder excluding unfiltered air from the needle, a sterile protector on the opposite end of the needle, and a removable wrapper enclosing the air admission means.

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