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 [21] Appl. No. **794,635**  
 [22] Filed **Jan. 28, 1969**  
 [45] Patented **June 15, 1971**

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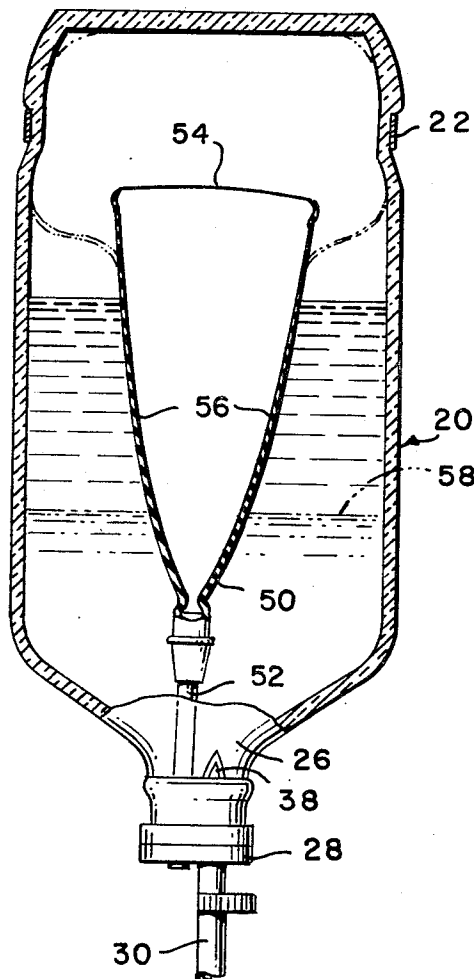
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[54] **INTRAVENOUS BOTTLE HAVING EXPANDABLE  
 INNER RECEPTACLE**  
 6 Claims, 5 Drawing Figs.

[52] U.S. Cl..... 222/479,  
 128/214  
 [51] Int. Cl..... B67d 3/00  
 [50] Field of Search.....  
 128/DIG.12, 214; 222/386.5, 479

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**ABSTRACT:** An intravenous bottle which dispenses intravenous fluids by gravity feed. The bottle includes a sterile expandable receptacle which is connected to the atmosphere via an inlet port. As the fluid for intravenous injection is dispensed from the bottle, air is drawn into the expandable receptacle. The expandable receptacle acts to prevent the contact of the air from the atmosphere with the fluid to prevent spoilage thereof.



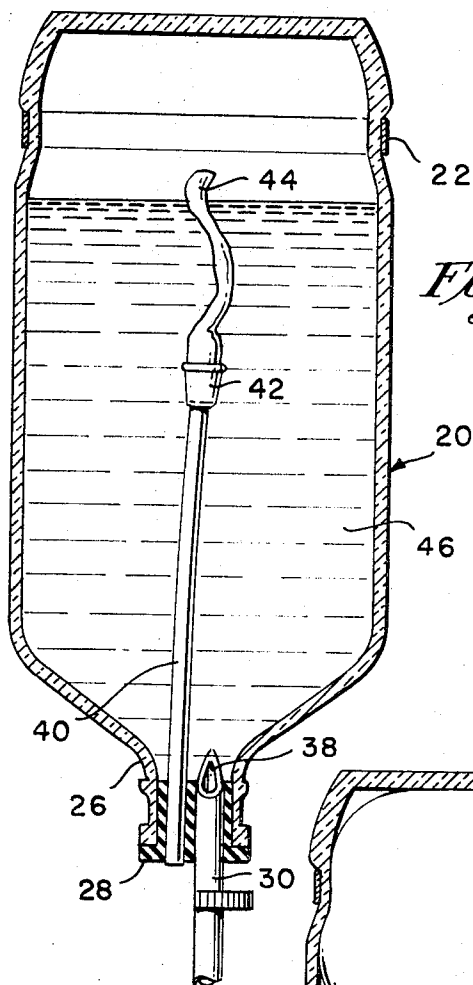


*Fig. 2.*

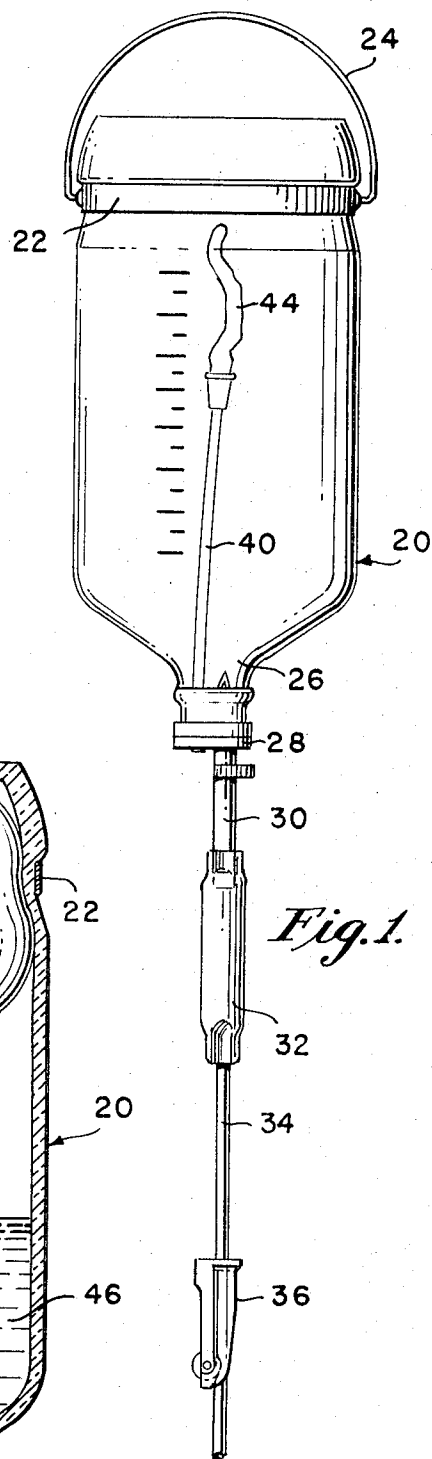
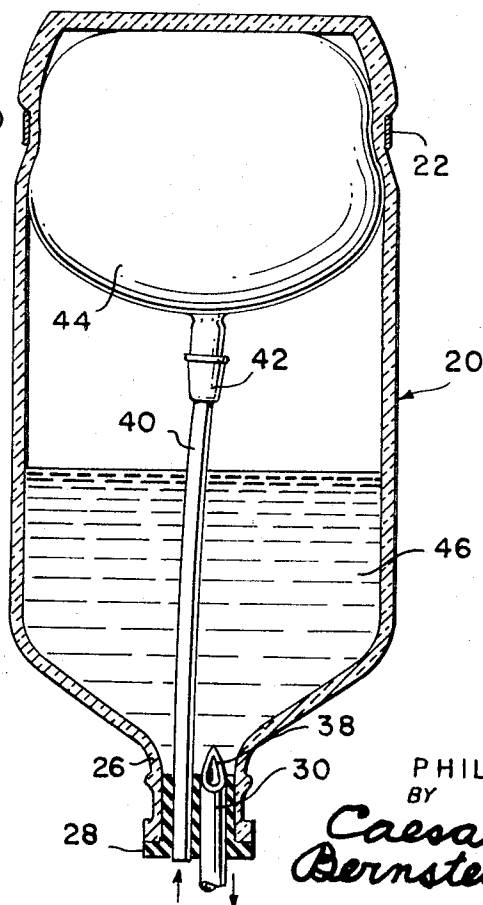


*Fig. 1.*

*Fig. 3.*



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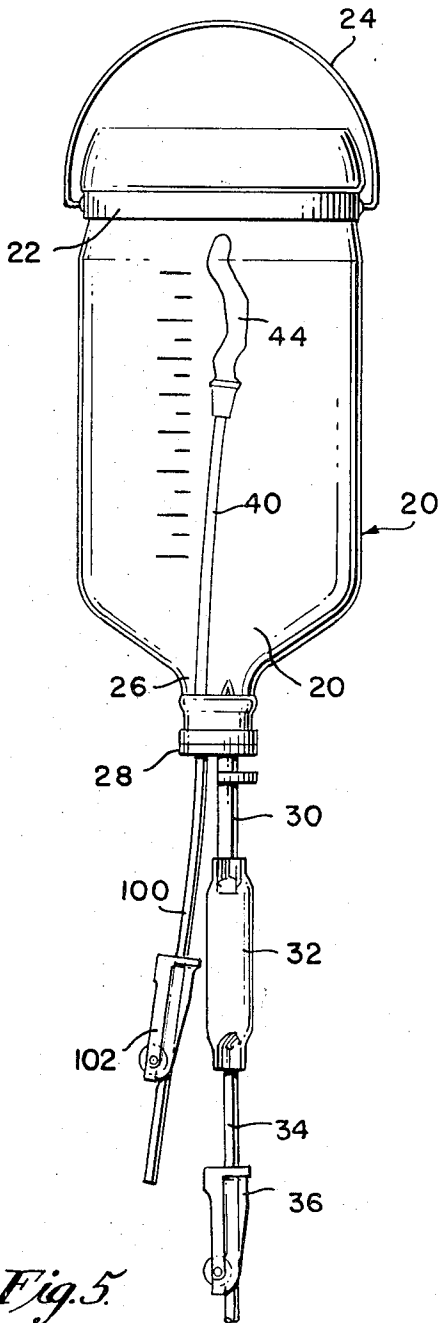


*Fig. 5.*

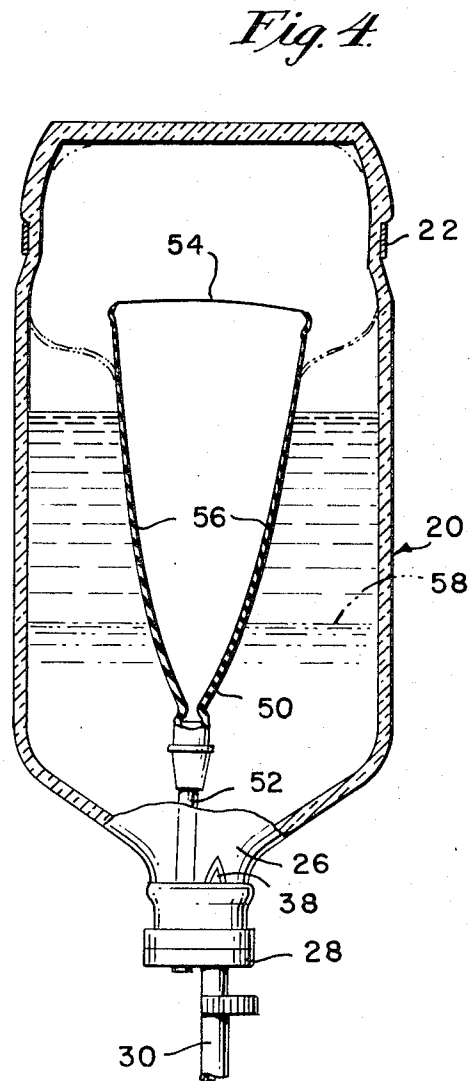


*Fig. 4.*

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## INTRAVENOUS BOTTLE HAVING EXPANDABLE INNER RECEPTACLE

This invention relates generally to intravenous injections and more particularly to an intravenous bottle which prevents contamination of the fluid therein during an intravenous injection.

When making injections of a dextrous solution or other fluids for insertion into the bloodstream of a patient, an intravenous bottle containing the fluid is conventionally suspended above and adjacent to the patient. The intravenous bottle normally includes a stopper at the neck of the bottle having an inlet and an outlet port. When used in intravenous injection, the bottle is inverted so that the outlet port is connected directly to the patient via an elongated tube and the inlet port is connected to the atmosphere. Consequently, as the fluid is dispensed through the outlet port, air from the atmosphere is drawn into the inlet port in order to take up the volume of liquid that has been removed from the bottle.

In many intravenous injections, the fluid in the bottle is dispensed over a relatively long period of time. During this period, bacteria in the air can contaminate the fluid within the bottle. In the case of dextrous solutions as well as fluids such as blood, a host environment is provided which is extremely susceptible to infection from the bacteria in the air. Even in the most sterile environments, such as hospitals, when patients are visited by friends, there is nothing to prevent the bacteria from a harmless sneeze or cough of one of the visitors from ultimately contaminating the fluid in the bottle.

One means that has been provided in order to reduce the contamination of the fluid in the bottle is a cotton insert provided at the inlet port of the intravenous bottle. There are, however, disadvantages in using a medicated cotton. The first of the disadvantages is that many forms of bacteria in the air are not filterable. A second disadvantage is that where the cotton is packed tightly, the flow of fluid can be completely inhibited because the flow of air into the bottle is impeded which is necessary to take up the volume of liquid which has been removed. Another important disadvantage is that the use of cotton can prevent higher flow rates of the liquid into the bloodstream where it is desired or required.

It is therefore an object of the invention to overcome the aforementioned disadvantages.

Another object of the invention is to provide a new and improved intravenous bottle having a sterile expandable receptacle connected to the inlet port thereof to prevent the contact of air from the atmosphere with the fluid contained in the bottle.

Another object of the invention is to provide a new and improved intravenous bottle which maintains the sterility of the fluid therein during the dispensing thereof.

Another object of the invention is to provide a new and improved intravenous bottle which can maintain sterility of the fluid therein while dispensing the fluid quickly by gravity feed.

Still another object of the invention is to provide a new and improved intravenous bottle having a safety means for preventing too fast a flow of fluid into the blood system of a patient.

Still another object of the invention is to provide a new and improved intravenous bottle having a sterile expandable insert to prevent contamination of the fluid therein, said receptacle acting to identify the fluid being dispensed.

These and other objects of the invention are achieved by providing a vessel for dispensing fluids which easily spoil during exposure to the atmosphere. The vessel is atmospherically sealed and includes a pair of ports. One of the ports is adapted for the removal of the liquid therein. An expandable receptacle is provided which is connected to the atmosphere via the other of the ports so that as the fluid is dispensed, air is drawn into the expandable receptacle. The receptacle prevents direct contact between the atmosphere and the fluid.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes

better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a side elevational view of an intravenous bottle embodying the invention;

FIG. 2 is an enlarged vertical sectional view of the intravenous bottle;

FIG. 3 is a view similar to FIG. 2 wherein a portion of the fluid in the intravenous bottle has been dispensed;

FIG. 4 is a side elevational view of an alternate intravenous bottle embodying the invention with portions thereof shown in section for purposes of clarity; and

FIG. 5 is a side elevational view of a second alternate intravenous bottle embodying the invention.

Referring now in greater detail to the various figures of the drawing wherein similar reference characters refer to similar parts, a liquid dispenser embodying the invention is shown generally at 20 in FIG. 1.

The intravenous bottle 20 is a conventional glass vessel having a bracket 22 connected about the periphery adjacent the bottom thereof which is connected to a wire 24 for suspension of the intravenous bottle in an inverted position.

As best seen in FIG. 2, at the opposite end of the intravenous bottle 20, a neck 26 of the bottle is provided with a rubber stopper 28 therein. Stopper 28 preferably includes a pair of ports which extend vertically through the stopper. A first port is utilized to receive a substantially rigid tube 30, which is connected via conventional intravenous tubing to the bloodstream of a patient. The stopper 28 may also comprise a stopper of the self-sealing type with the ports developed by use of an entry spike.

As best seen in FIG. 1, tube 30 is connected via a bulb 32 to flexible tubing 34 which extends to the patient. The flow through the tubing 34 is regulated by a suitable plastic pinch valve 36 which varies the opening in the tubing 34 to regulate flow. The bulb 32 enables the user to visually determine the rate of flow of fluid out of the bottle into the bloodstream.

As best seen in FIG. 3, the tube 30 is terminated at 38 so that the edge thereof is inclined. The inclination of edge 38 produces a sharp edge which is utilized in insertion of the tube 30 to penetrate the seal in the port of the stopper of the bottle which is provided for sealing the contents thereof. In the second of the ports, a tube 40 is provided which extends substantially centrally of the bottle. The tube 40 includes a nipple 42 at the end thereof to which an expandable receptacle 44 is attached.

The expandable receptacle 44 is basically comprised of a sterilized flexible elastomeric material and suitably comprises a balloon. The tube 40 is preferably permanently secured in the stopper 28 and terminates at the outer surface of the stopper. The port in the stopper connected to tube 40 may include a breakable seal. The seal is optional, however, since the expandable receptacle 44 is provided at the opposite end of the tube 40 and therefore seals the contents of the bottle 20 from the atmosphere.

The stopper 28 is placed into the bottle 20 after a predetermined amount of liquid is placed into the bottle. The stopper 28 normally includes a seal over the first port which is penetrable by the end 38 of the outlet tube 30.

The expandable receptacle 44 may also take the form of a collapsible or folded bag which has flexible but inelastic walls. As the air enters the bag, the bag unfolds and expands to accommodate the intake of air. Moreover, the receptacle 44 is suitably colored to identify the solution in the bottle that is being dispensed. Not only are different colored receptacles contemplated, but also different patterns (i.e. stripes, dots, etc.).

As best seen in FIG. 3, during the use of the bottle, the tube 30 is inserted in the first port of stopper 28. After the intravenous fluid is emitted via tube 30, air from the atmosphere enters tube 40 via the second port and is drawn into the expandable receptacle 44. The air which is drawn into the balloon is equal in volume to the volume of liquid 46 that has been dispensed through the tube 30.

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The receptacle 44 is expanded automatically as the fluid is dispensed by gravity feed because the removal of the fluid causes the air in the vessel to occupy a larger space and thereby cause a reduced pressure therein. The atmospheric pressure in tube 40 is then larger and causes the receptacle to increase until the pressure in the bottle and the atmospheric pressure are substantially equal.

It can therefore be seen that a new and improved intravenous bottle has been provided. The inlet portion to the bottle is connected to an expandable receptacle which is expanded as the fluid is dispensed from the intravenous bottle. Since the receptacle 44 is air tight, the air cannot make contact with the fluid 46. Thus, no matter how contaminated the air about the intravenous bottle 20, the fluid 46 remains sterile throughout thereby preventing any bacterial or other infections from entering the bloodstream of the patient. Moreover, the use of colored patterns on the receptacles 44 enables quick identification of the fluid dispensed.

FIG. 4 shows an alternate embodiment of the invention. The intravenous bottle 20 shown therein includes an alternate form of expandable receptacle 50. The intravenous bottle 20 is otherwise similar to bottle 20 shown in FIG. 1. The expandable receptacle 50 is connected to the second port of the stopper 28 via a shorter tube 52 than tube 40 in FIG. 1 so that the expandable receptacle is located closer to the stopper of the bottle. The receptacle 50 basically differs from receptacle 44 in that the receptacle includes a wall of varying thickness. That is, the uppermost portion 54 of the wall of the receptacle 50 comprises a very thin and elastic membrane which is more easily expandable than the remaining portion 56 of the wall of the receptacle. In this manner, it assures the receptacle of expanding at the top thereof so that the expansion of the receptacle cannot preclude fluid from reaching the port of the stopper 28.

In FIG. 4, the receptacle 50 is shown in full line in an immediately expanded condition. The portion shown in phantom shows the receptacle expanded when the fluid has reached the level of dotted line 58 shown therein. The receptacle 40 facilitates the complete removal of fluid from the intravenous bottle. That is, where the intravenous bottle 20 is completely filled, there is the chance that as the fluid is completely removed in the embodiment shown in FIG. 1, the receptacle 44 may be broken because of its deformation about a rigid tube 40. In the embodiment shown in FIG. 4, the receptacle 50 more easily conforms to the shape of the bottle 20 as the fluid is dispensed.

Referring now to FIG. 5, an intravenous bottle 20 is shown utilizing an alternate inlet tube 100. The inlet tube 100 is flexible so that a pinch valve 102 may be utilized to regulate the

flow of air to the receptacle 44. The valve 102 supplements valve 36 so that if either valve 36 or 102 should be inadvertently removed, the flow of fluid out of the bottle cannot be greatly increased and thereby provide a hazard to the patient. The provision of the flexible tube 100 having a pinch valve 102 is enabled by the provision of having an expandable receptacle 44 provided within the intravenous bottle 20.

That is, where the expandable insert is not provided, it is necessary to filter the incoming air by means of cotton or other purifying filters. Thus, the flow of air therethrough is not regulatable except by compacting or loosening the cotton.

It should also be understood that the size of the port in the stopper 28 may be increased to increase the flow of fluid out of the intravenous bottle. In such a case, there is still no problem of contaminating the fluid within the bottle in that the receptacle 44 maintains a barrier between the air from the atmosphere and the fluid.

Without further elaboration, the foregoing will so fully illustrate my invention that others may, by applying current or future knowledge, readily adapt the same for use under various conditions of service.

What I claim as invention is:

1. In an intravenous bottle for dispensing fluids by gravity feed in an intravenous injection and which fluids should not be exposed to the atmosphere, said bottle having inflexible walls and being atmospherically sealed, said bottle having a pair of ports, one of said ports adapted for the removal of said liquid, an expandable receptacle within said bottle, said expandable receptacle being connected to the atmosphere via the other of said ports so that as said fluid is dispensed, air is drawn into said expandable receptacle; said receptacle is conformable to the shape of the inner surface of said bottle as it expands and contacts the same and prevents direct contact between the atmosphere and said fluid, said receptacle adapted to expand to substantially replace the dispensed fluid contents of said bottle.

2. The invention of claim 1 wherein said receptacle is color coded in accordance with the fluid dispensed.

3. The invention of claim 1 wherein said ports are provided in a stopper at the neck of said bottle.

4. The invention of claim 1 wherein said receptacle comprises a balloon.

5. The invention of claim 1 wherein said receptacle includes an elastomeric wall which is of varying thickness to predetermine the shape as said receptacle expands.

6. The invention of claim 1 wherein a regulating valve is connected to said port adapted for the removal of said liquid and a regulating valve is also connected to said port connected to the atmosphere.

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