Nov. 19, 1940. M. C. SCHWAB 2,222,123

FILTERING DEVICE FOR STERILIZED LIQUIDS

Filed Jan. 9, 1937

Fig. 1.

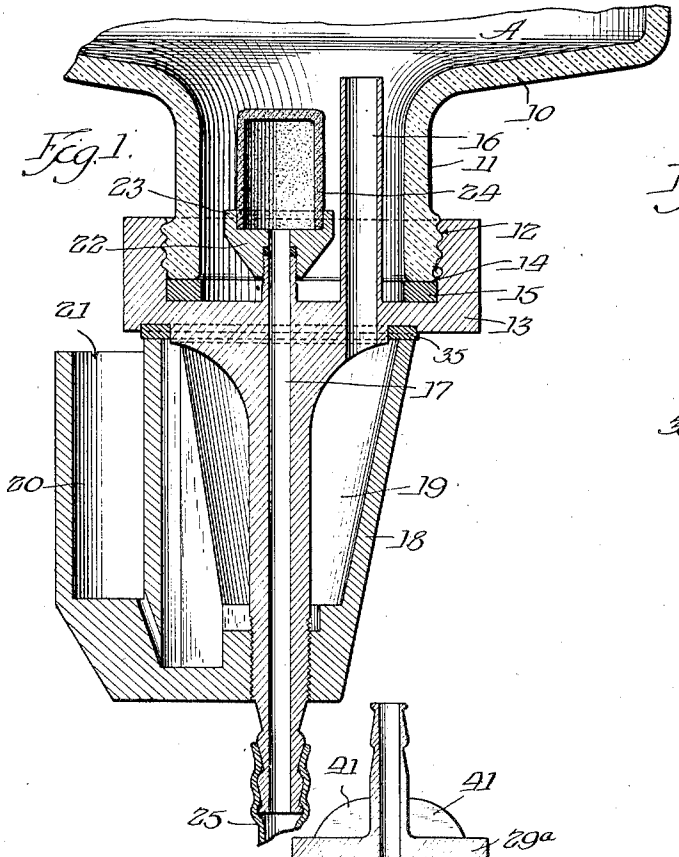


Fig. 2.

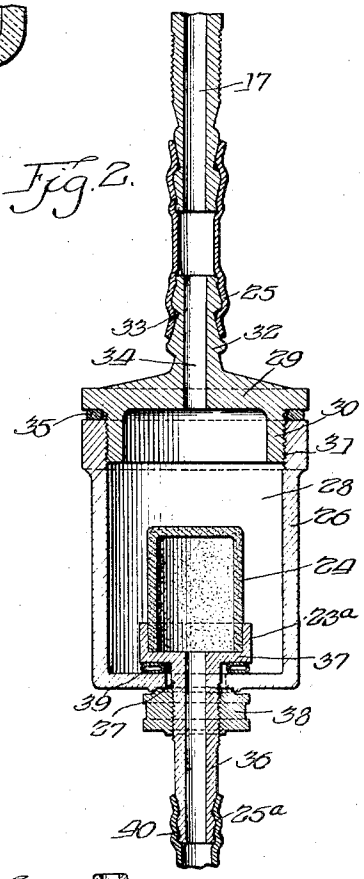


Fig. 4.

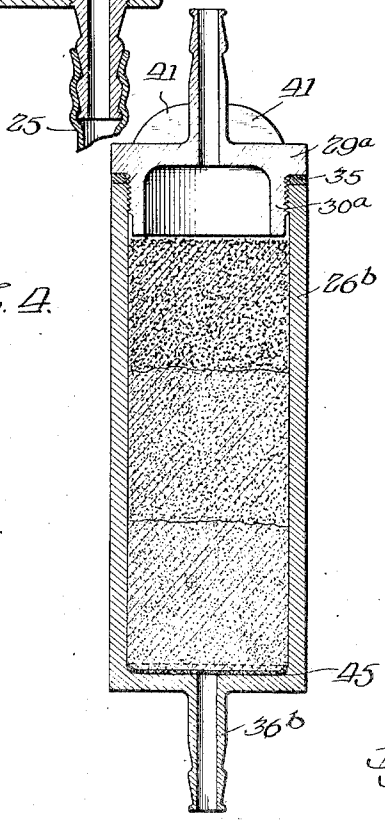
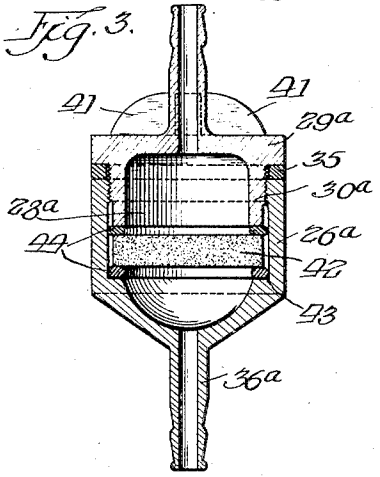


Fig. 3.



Inventor:
Martin C. Schwab:
By: Paul Carpenter Atty.

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FILTERING DEVICE FOR STERILIZED LIQUIDS

Martin C. Schwab, Chicago, Ill.

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5 Claims. (Cl. 210—99)

This invention relates to a filtering device for attachment to liquid dispensing apparatus of sterilized liquids of the general character referred to in my application serially numbered 750,392, filed October 27, 1934, and now Patent No. 2,065,829, granted December 29, 1936; that of my application serially numbered 698,544, filed November 17, 1933, now Patent No. 2,010,417, granted August 6, 1935; that of my application serially numbered 58,649, filed January 11, 1936, now Patent No. 2,156,313, granted May 2, 1939; and that of my application serially numbered 69,323, filed March 17, 1936, now Patent No. 2,156,314, granted May 2, 1939, although not limited thereto.

This invention is particularly designed to supplement and aid in the many features and advantages of the dispensing devices of sterilized liquids mentioned above. These devices are in general directed to the dispensing of sterilized liquids and to safeguarding the liquid of the container from contamination by outside sources by or during dispensing.

Since the sterile liquids for dispensing are largely used for intravenous hypodermic and intermuscular injections and for the feeding and reviving of feeble human beings, every possible precaution must be taken to see that no contamination of any kind is carried to the already weakened individual. While the dispensing devices protect the liquid from becoming contaminated, the present invention is an added precaution to protect the patient from any possible contamination remaining in the liquid. Although the liquid to be dispensed may be sterile, it may sometimes contain very small and minute particles of material in suspension, which should not, of course, be carried to the patient. These particles, while not being septic, may be a source of irritation, and so this invention finds immediate need in the saving of human lives.

Another feature which this device has is that it is readily sterilized and cleaned, a very important consideration where human health is involved. Also, it has the benefit of being readily replaced in the event of damage or clogging or when worn out. This assembly also has the same portability as the dispensing assemblies as well as the similar features of being detached and separately dealt with apart from both the liquid container and the dispensing device. Further objects are to provide a construction of maximum simplicity, economy and ease of assembly and such further objects, advantages and capabilities as will later more fully appear and as are inherently possessed thereby.

My invention further resides in the combination, construction and arrangement of parts illustrated in the accompanying single sheet of drawings, and, while I have shown therein a preferred embodiment, together with other embodiments, it is to be understood that the same are capable of further modification and changes and are comprehensive to the details and constructions without departing from the spirit of my invention.

Referring to the drawing:

Figure 1 is a fragmentary vertical sectional view of a preferred embodiment of my assembly in dispensing positions with the dispensing device attached to a portion of a bottle.

Figure 2 is a vertical section of another embodiment of my assembly interposed in the dispensing line.

Figure 3 is a vertical section of a modification of the device of Figure 2.

Figure 4 is a vertical section of another modification of the device of Figure 2.

Like reference characters are used to designate similar parts in the drawing and in the description of the invention which follows.

Referring now more particularly to the drawing, wherein, as illustrated in Figure 1, is shown a portion of the container of sterilized liquid to be dispensed as represented by the letter A. This container has the usual bottle-like body **10** and neck **11** which is provided with the conventional external screw threads **12**. Container A is shown inverted in dispensing position. The dispensing device consists of a base portion **13** preferably formed of a moldable material which can be readily sterilized, such as metal, glass, hard rubber or the like, provided with internal screw threads **14** adapted to engage those on the neck of the bottle in order to provide ready and easy attachment. A gasket or washer **15** is generally provided to secure a water and air-tight sealing, although any equivalent means may be used. The base portion of the dispensing device has attached thereto an air inlet tube **16** and a sterilized liquid dispensing tube **17**. The cap portion of the dispensing device **18** is provided with a washing chamber **19** and an overflow chamber **20** which washes and purifies the incoming air arriving at **21**, which washed air is delivered by tube **16** to replace the liquid being dispensed.

Threadably attached to the intake end of the dispensing tube **17** is a collar **22** having an upstanding annular rim **23**. On the inside of this annular rim is fitted a hollow cylindrical member **24** closed at the top and formed with walls of porous material suitable for fine filtering purposes.

In operation the complete assembly is placed in its inverted position as shown in Figure 1, and the liquid in container A is held against a flow by any suitable flow control means (not shown) such as a thumb clamp, for example, attached conveniently on conveyor tube **25**. A small portion of the liquid from the container will be trapped in the air washing chamber **19** and provide the means

for washing the incoming air upon release of the flow. As soon as the flow is released, atmospheric pressure forces air into the open chamber **20** at **21** and by intercommunicating means up through the liquid in air washing chamber **19**, and the washed air is then delivered through air inlet tube **16** to replace the liquid being dispensed. As the liquid runs out of container A it first must pass through the filter chamber **24**, thence through dispensing tube **17** and thence by conveyor tube **25** to the injection needle (not shown). Thus it will be seen that not only is the air washed and purified before delivery to the interior of the container with the sterilized liquid but the liquid itself is further purified and filtered at the time of actual dispensing. The inequality of the pressures comes about by the fact that, as the liquid is dispensed, there is a partial vacuum left at the top of the container and, since the chamber **20** is open to the atmosphere through the air inlet tube **16** and the chambers in the cap, atmospheric pressure will force air through the dispensing cap and the air inlet tube **16** to occupy the space vacated by the liquid.

Referring now to Figure 2, I have shown a modified form of my filtering device which, instead of being located within the container of liquid to be dispensed, is positioned in the dispensing line of the conveyor tube **25** and its extension **25***a* between the injection needle and the dispensing cap and dispensing device. This device, generally referred to as **26**, is preferably of cylindrical shape with a restricted opening **27** in the bottom thereof forming a hollow chamber **28**. At the top of the device **26** there is provided a removable cap **29** provided with an annular rim **30** with screw threads **31** for easy attachment and removal from the cylinder **26**. This cap **29** has a nozzle **32** provided with inlets **33** which facilitate air and liquid tight attachment of the conveyor tube **25**, and through this nozzle passes a channel **34** providing an inlet into the hollow chamber **28**. To further facilitate air and water tight juncture between the cap and the rest of the assembly **26**, a washer or gasket **35** or any other suitable means may be added. Passing through the aperture **27** in the bottom of the device **26** is a short stub tube **36** provided with an enlarged portion **37** at the interior end forming annular flanges **23***a* for holding a filtering device **24**. The tube **36** is held in place by the thumb screw **38**, and the juncture is made air and water tight by the washer or gasket **39**. At the outlet end of the stub tube **36** there is likewise provided notches **40** for facilitating the attachment of the conveyor tube **25***a*.

It will be seen in Figure 2 that the liquid as it is dispensed passes through the channel **34** into the hollow chamber **28** and thence through the filter chamber **24** before passing out to the patient through the stub tube **36** and the conveyor tube **25***a*.

In Figure 3 there is provided a modified and simplified form of the device of Figure 2. The cylindrical device **26***a* has the stub tube **36***a* merged at the restricted outlet in the bottom thereof. The removable cap **29***a* is provided with wings **41** which facilitate the manual removal of the cap. Also, the annular flanges **30***a* are extended to form pressure holding means for the filtering media **42** which is placed transverse of the flow of liquid through the chamber **28***a* which is seated in the side walls of the chamber **26***a* as shown at **43**. Washers or gaskets **44** provide an air and water tight jointure. The device or modification shown in Figure 4 is similar in operation and construction to that shown in Figure 3, only here adaptation has been made for the use of granular filtering media rather than porous solid forms. The cylinder **26***b* has been elongated to accommodate the granular filtering media, and a screen **45** has been placed over the bottom of the chamber and over the intake end of the tube **36***b* to prevent any of the filtering media being carried to the patient.

I claim:

1. Dispensing apparatus for sterile liquid, comprising a container of sterile liquid to be dispensed, a cap removably disposed on the neck of said container, an air inlet extending through said cap into said container, means connected to said air inlet for washing incoming air, a liquid dispensing tube extending through said cap into said container and having a portion depending from said cap outside of said container, and a filter removably carried on said dispensing tube and adapted to filter said sterile liquid.

2. Dispensing apparatus for sterile liquids comprising a container of sterile liquid to be dispensed, an air inlet to said container, an air washing chamber connected to said air inlet and adapted to wash said air prior to its discharge into said container, a dispensing tube carried in said container, and a hollow chamber detachably mounted at the intake end of said dispensing tube, said chamber having walls of porous filtering material.

3. Dispensing apparatus for sterile liquids comprising a container of sterile liquid to be dispensed, an air inlet to said container, means within said air inlet for washing incoming air, a dispensing tube carried in the neck of said container and having a portion depending from said container, and a filter chamber mounted on the inlet end of said dispensing tube within said container adapted to filter sterile liquids.

4. Dispensing apparatus for sterile liquids comprising a container of sterile liquid, a liquid dispensing tube carried in the neck of said container having a portion extending into said container and a portion depending outside of said container, an air inlet duct in the neck of said container and extending further into said container than said liquid dispensing tube, means within said duct for washing incoming air, and a chamber adapted to filter said sterile liquids carried on the inlet end of said liquid dispensing tube within said container.

5. Dispensing apparatus for sterile liquids, comprising a container of sterile liquid to be dispensed, a closure for said container, an air inlet extending through said closure into said container, means connected to said air inlet for washing incoming air, a liquid dispensing tube extending through said closure into said container and having a portion depending from said closure outside of said container, and a filter adapted to filter sterile liquid as it is dispensed, removably carried on said dispensing tube outside of said liquid container.

MARTIN C. SCHWAB.