Aug. 6, 1940. E. A. RAVENSCROFT 2,210,098

APPARATUS FOR VENOCLYSIS

Filed April 11, 1936

Fig. 1

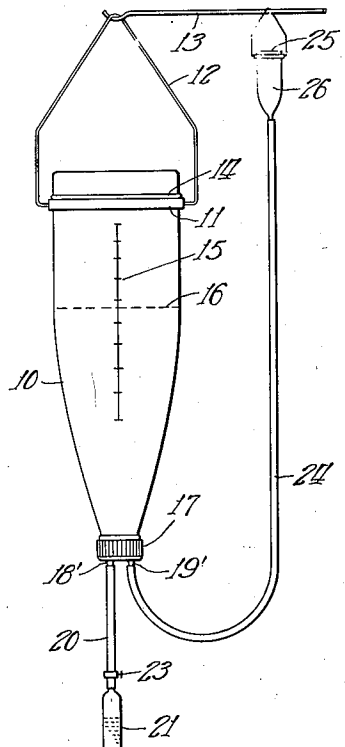


Fig. 2

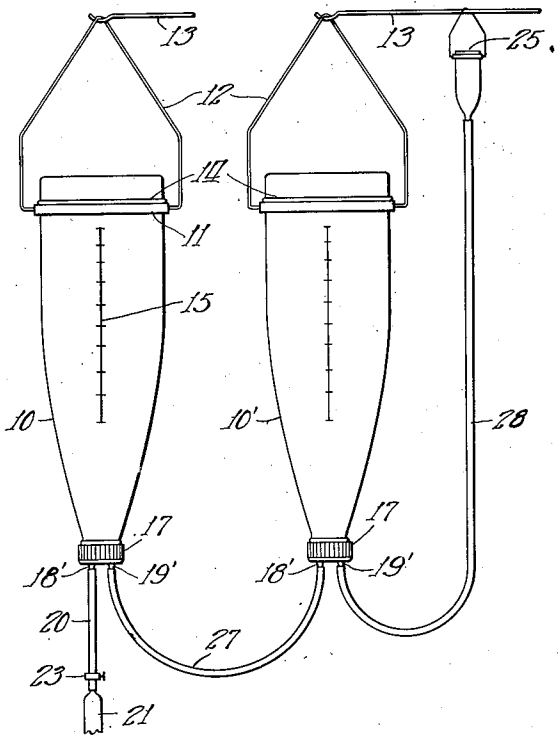


Fig. 3

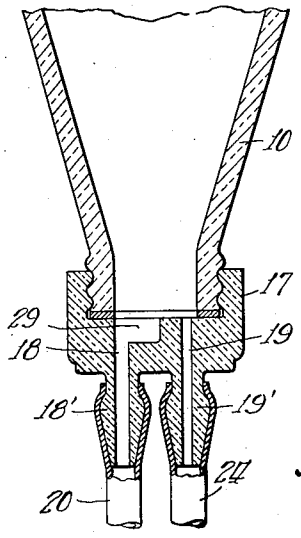
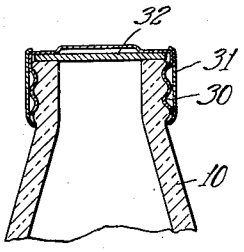


Fig. 4



Inventor:
Edward A. Ravenscroft
By:
Fisher, Clapp, Soans & Pond
Attys

Patented Aug. 6, 1940 2,210,098

UNITED STATES PATENT OFFICE

2,210,098

APPARATUS FOR VENOCLYSIS

Edward A. Ravenscroft, Glencoe, Ill., assignor to Abbott Laboratories, North Chicago, Ill., a corporation of Illinois

Application April 11, 1936, Serial No. 73,862

1 Claim. (Cl. 128—214)

The present invention relates to apparatus for the intravenous injection of sterile liquids. More particularly the present invention relates to bulk containers for sterile intravenous liquids and includes an improved dispensing cap for withdrawing liquids and admitting sterile air when the container is in an inverted position.

The apparatus for venoclysis heretofore available has been found unsatisfactory. For example, one disadvantage found to be prevalent was that the customary air-inlet tube, which extends from the cap or stopper to the bottom of the container is filled with liquid. When the container is inverted the liquid in the air-inlet tube runs out and must be absorbed with towels or caught in a basin in order to prevent the soiling of the floor or the patient's bed. Another disadvantage was found in that the wetted glass delivery tubes were easily pulled from the rubber stoppers by the weight of the rubber tube extending to the patient. Accidents of this type are far more serious than the mere leaking or spilling of the solution. For example, apparatus for venoclysis may be connected with the vein in the patient's arm for hours at a time and if the glass delivery tube is pulled from the rubber stopper, the flow of the solution into the vein stops immediately. While I do not know that patients have been bled by such accidents, it is quite possible that the rubber tube extending from the needle in the vein of the patient to the glass tube in the stopper would fall to a level lower than the patient's bed and cause a serious loss of blood before the accident would be discovered. An additional disadvantage of the containers in common use is the closure with a rubber stopper which on sterilization imparts to the enclosed solution the taste and odor of some constituents of the rubber.

It is the object of my invention to provide an apparatus for venoclysis free from the disadvantages enumerated above.

Further objects of my invention will be apparent from the following description.

In the accompanying drawing forming a part of this specification:

Fig. 1 is a side elevation for a single bulk container arranged for intermittent venoclysis.

Fig. 2 is a side elevation of two of my improved bulk containers arranged in series for continuous venoclysis.

Fig. 3 is an enlarged longitudinal section through my improved dispensing cap and a portion of the container.

Fig. 4 is an enlarged side elevation, partly in section, of the upper portion of my container provided with a metal cap and tamper-proof seal.

Referring with more particularity to the drawing, a glass bottle or flask 10 such as is suitable for containing sterile liquids used for intravenous injections, is supported in an inverted position by means of a circular metal band 11 provided with an adjustable bail or handle 12, hung on any suitable support such as represented at 13. The band bears against a circumferential bead 14 on the container which bead holds the container in place. The container may also be provided with graduated markings 15 for measuring the liquid 16.

The dispensing cap 17, preferably made of molded material, is threaded on the neck of the container as shown in Fig. 3. This dispensing cap is provided with an outlet aperture 18 and a separate inlet aperture 19, and integral external nipples 18' and 19' communicating respectively with the apertures. Attached to nipple 18' communicating with outlet aperture 18, is a conduit 20 leading to a flow indicator 21 and needle 22. The conduit, which may be made of rubber, is provided with a conventional adjustable pinch clamp 23 which is used to regulate the flow of liquid from the container.

In the intermittent venoclysis apparatus shown in Fig. 1, the nipple 19' is connected by conduit 24 to an external air inlet 25. The air inlet should be elevated above the level of the liquid in container 10 to insure against leakage of liquid. A cotton filter such as indicated at 26 may be used to maintain the sterility of the air entering the container 10. The filter may be any open container suitable for holding cotton or like porous material and may be supported in a manner similar to that of the liquid container previously described.

In the continuous venoclysis apparatus shown in Fig. 2, the arrangement is similar to that shown in Fig. 1 except that a conduit 27 connects (outlet) nipple 18' of container 10' with (inlet) nipple 19' of container 10, the (inlet) nipple 19' of container 10' being connected by means of conduit 28 to the external air inlet 25 which is elevated above the level of liquid in containers 10 and 10'.

When employing my bulk containers in series for continuous venoclysis, the liquid in the container to which the air-vent is attached will empty itself completely before the air can get into the other container and allow it to empty. By replacing the former container for a fresh full one, it will be unnecessary to refill or change the

container to which the needle is connected and the flow of solution through the needle will be uninterrupted over long periods of time.

The outlet aperture of my preferred dispensing cap (Fig. 3) is provided with an enlargement or counter bore 29, the bottom of which is positioned so that it will be lower than the inlet aperture when the container is inverted. This arrangement prevents the air, which enters the inlet aperture, from passing with the liquid through the outlet aperture to the injection needle.

In order to keep the solutions sterile before use, the container is provided with (Fig. 4) a metal cap 30 and a tamper-proof seal 31. The metal cap is provided with a liner 32 which will not contaminate the sterile liquid.

In the operation of the container for venoclysis, the tamper-proof seal and the metal cap are removed and the dispensing cap fitted on the container in the conventional manner. The external air inlet is supported above the liquid in the container at all times not only during the venoclysis itself, but also during the attachment of the cap to the container and the inversion of the container. For an intermittent injection, the apparatus is arranged as shown in Fig. 1, and for a continuous injection the apparatus is arranged as shown in Fig. 2. Upon opening the pinch clamp the sterile solution flows out of outlet aperture 18, nipple 18', through conduit 20, flow indicator 21 to the needle 22. Connecting conduit 27 of the continuous venoclysis apparatus (Fig. 2) carries liquid from container 10' to container 10. It will be understood that while I have shown my continuous venoclysis apparatus employing only two of my containers, any multiple thereof arranged in series may be used. The adjustable pinch clamp 23 used on the outlet line 20 to control the flow of liquid from the container, may be placed, if desired, on the inlet lines 24 or 28 and used to control the flow of air into the container, which automatically controls the flow of liquid from the container.

Air which may or may not be filtered is emitted at 25. The elevation of the external air inlet prevents leakage of the liquid, the passage of the liquid from the container being at all times restricted to the outlet aperture.

As shown in the drawing, conduit 24 in Figure 1 and conduit 28 in Figure 2 connecting inlet nipple 19' with air filters 25, are each provided with a loop which extends downwardly below the level of the outlet nipple 18'. This arrangement prevents the liquid from flowing out of the outlet nipple 18' when the delivery tube 20 becomes accidentally detached therefrom. This action may be explained by the fact that the column of liquid in the loop of the tube conduit creates a slight vacuum which holds the liquid in the container when the outlet conduit becomes detached from the outlet nipple. As shown in the drawing, the nipples extend downwardly when the apparatus is inverted. This arrangement in which the axis of the inlet nipple is substantially perpendicular to the plane of the cap necessitates the downwardly extending loop in the inlet tubes.

As shown in the drawing nipples 18' and 19' should be of equal length, i. e., the ends of the nipples should extend downwardly to substantially the same level when the container is inverted. This arrangement not only necessitates a loop in the inlet conduit as indicated in the paragraph above, but in addition insures that the loop will be below the end of the outlet nipple.

While I have described only the preferred embodiments of my invention, it will be understood by those skilled in the art that the claim appended hereto is intended to cover all modifications coming within the true spirit and scope of my invention.

I claim:

An apparatus of the character described, comprising a container having an opening therein, a dispensing cap positioned over said opening, said dispensing cap having an outlet aperture and a separate inlet aperture therein, the outlet aperture being enlarged at its inner end to form an enlargement and the bottom of said enlargement being so positioned that when the container is inverted the said bottom is lower than the inner end of said inlet aperture, external outlet and inlet nipples of equal length communicating respectively with said outlet and inlet apertures and extending downwardly to the same level when the container is inverted, a conduit for connecting said outlet nipple to an injection needle, a second conduit for connecting said inlet nipple to an external air filter elevated above liquid in the container, said second conduit being formed to provide a loop extending below said outlet nipple when the container is in operating position and means for regulating and observing the flow of liquid from the container.

EDWARD A. RAVENSCROFT.