

Feb. 21, 1939.

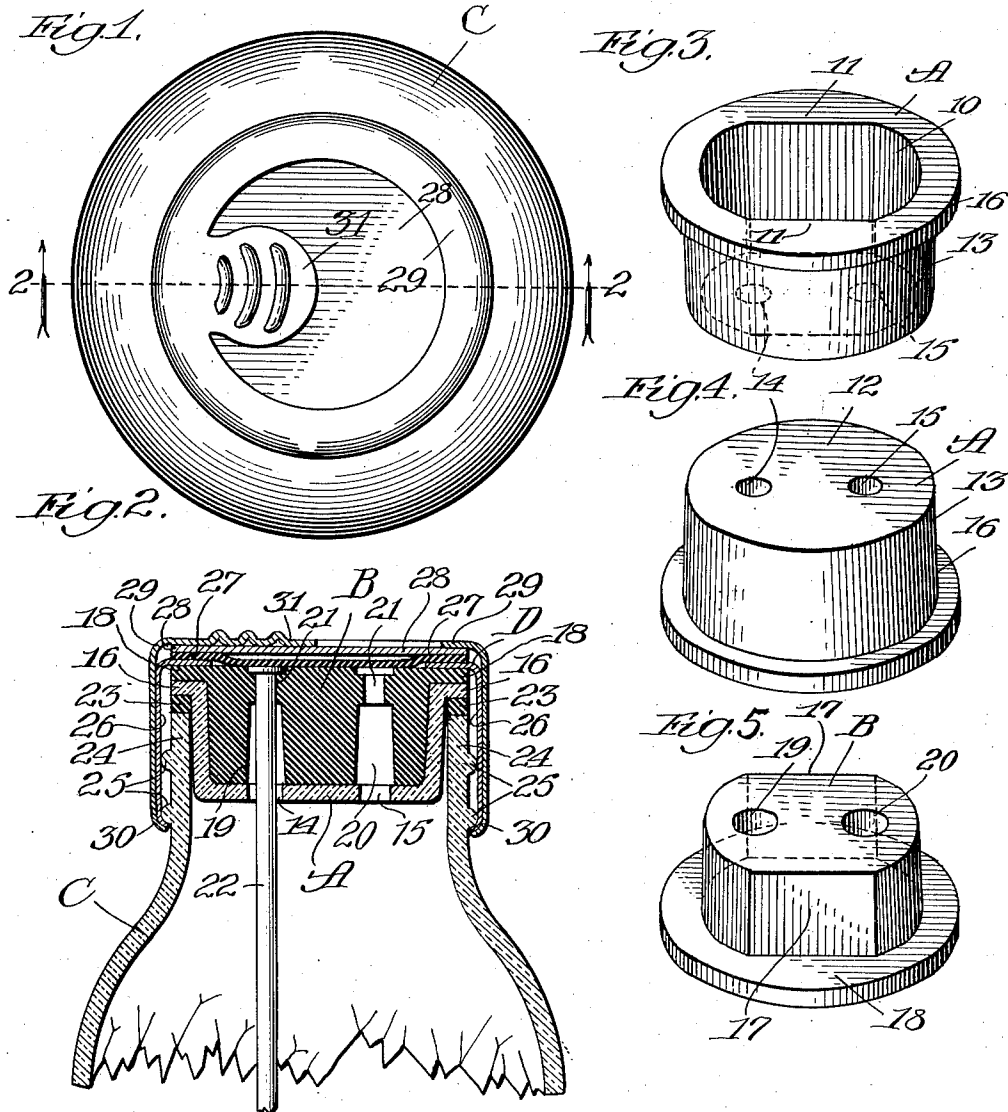
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2,148,196

CLOSURE FOR CONTAINERS

Filed Jan. 21, 1937

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 6.

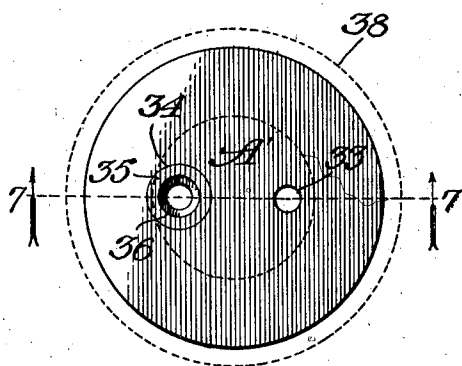


Fig. 7.

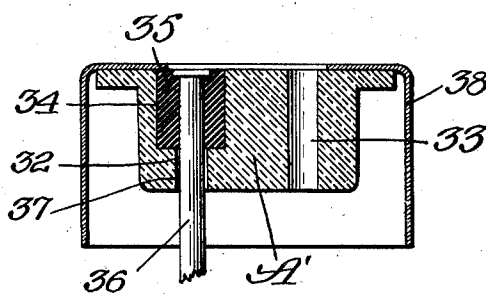


Fig. 8.

Fig. 9.

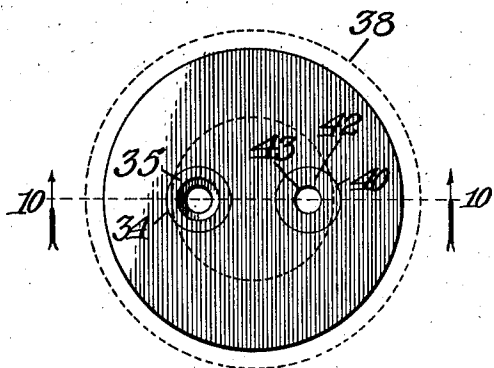


Fig. 10.

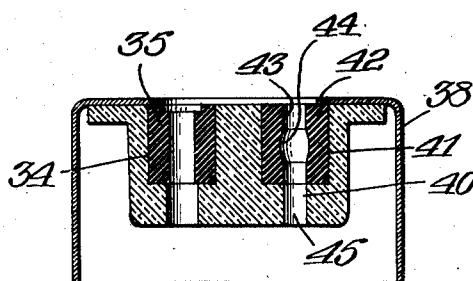


Fig. 11.

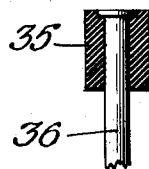
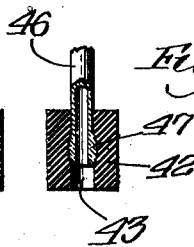


Fig. 12.



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UNITED STATES PATENT OFFICE

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CLOSURE FOR CONTAINERS

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Application January 21, 1937, Serial No. 121,707

5 Claims. (Cl. 215—48)

This invention relates to closures for containers and more particularly to closures for containers in which sterile fluids, such as intravenous solutions, are carried.

5 An important object of the invention is to provide a closure which provides an effective seal but which is insoluble in the solution carried in the container.

Another object is to provide a closure through 10 which a tube may be inserted for the withdrawal of liquid, but which is not soluble in the solution carried in the container.

A further object is to provide a closure which is resiliently secured to the container but which 15 presents a rigid insoluble surface to the interior of the container.

In the past resilient rubber closures provided with openings have been used on containers carrying intravenous solutions. This type of 20 closure is described in a prior Patent No. 2,004,027, dated June 4, 1935. Such a plug was satisfactory so far as sealing the container was concerned, and it was satisfactory so far as allowing tubes to be admitted for drawing off the 25 liquid, but it was subject to the objection that the rubber of the closure was somewhat soluble in the intravenous solutions used.

Since the solution carried is injected into a patient's body to be carried away through the 30 veins, it is very essential that a very high degree of purity be maintained, and only a very slight amount of impurities or sediment in the solution is known to have bad effects. Commercial rubber contains certain ingredients which are 35 somewhat affected by the intravenous solution and upon prolonged exposure to the liquid produces a kind of sediment which forms on the bottom of the container. Glass is very slightly affected by the solutions used, but the use of glass 40 has not been available heretofore because of the need for a proper seal about the neck of the container and about the tubes for dispensing the liquid.

I have produced a closure structure which does 45 employ glass, and which also forms a proper seal about the container opening and with the dispensing tubes. The particular structure of my new closure is more clearly understood with reference to the accompanying drawings in 50 which—

Fig. 1 is a plan view of my improved closure when completely assembled on a container; Fig. 2, a sectional view, the section being taken as 55 indicated at line 2—2 of Fig. 1, the lower portion of the container and tube being broken away;

Fig. 3, a perspective view of the plug, the plug being in upright position as in Fig. 2; Fig. 4, a perspective view of the plug as in Fig. 3 except that the plug is shown in inverted position; Fig. 5, a perspective view of the sealing member, the 5 sealing member being shown in inverted position; Fig. 6, a plan-view of a modified form of the invention, the cap being shown in dotted lines; Fig. 7, a sectional view of the form shown in Fig. 6, the section being taken as indicated at line 7—7 10 of Fig. 6; Fig. 8, a view of a tube which may be inserted into the form of closure shown in Figs. 6 and 7 to withdraw liquid; Fig. 9, a plan view of a second modified form, the cap being shown in dotted lines; Fig. 10, a sectional view of the second 15 modification, the section being taken as indicated at line 10—10 of Fig. 9; Fig. 11, a detail view showing a glass tube inserted into one of the sealing plugs; and Fig. 12 a detail view showing a type of sealing plug and tube illustrated 20 in Figs. 9 and 10.

In the embodiment shown in Figs. 1 to 5, A designates a plug; B, a sealing member; C, a 25 container; and D, clamping means for holding the plug in sealing engagement with the container.

The plug A is made of glass which material is substantially insoluble in the liquids used in intravenous solutions. However, this plug may be 30 made of other materials provided the material used is not soluble in or affected by the liquids to be used in the container. For example, metals, many rosins, synthetic compounds of various kinds which do not form a precipitate or sediment when contacted with saline, dextrose or 35 other intravenous solutions, may be used. As clearly shown in Figs. 3 and 4 of the drawings, plug A is hollow and cup shaped. The hollow interior or recess 10 is provided with flat side portions 11 which serve to prevent the member B 40 from turning within the plug as will appear more clearly later in the specification. The bottom of recess 10 is formed by a wall 12 having a thickness comparing with the substantially cylindrical side walls 13 of the plug. Walls 13, however, 45 are preferably slightly tapered so that the plug has a slightly smaller diameter at its bottom end. Bottom wall 12 is provided with two openings 14 and 15 extending therethrough and which may 50 be moulded in the plug as it is formed or may be drilled if so desired. Though in this embodiment two such openings are shown, only one may be provided, or more than two may be provided, as may be desired. At the top of the plug is an edge 55

flange 16 which is annular in form and extends outwardly from the top portion of walls 13.

The sealing member B is preferably of some resilient material such as soft rubber, and has a central portion 17 of such size and shape as to fit snugly within the recess 10 of plug A. At the top of central portion 17 is an outwardly extending annular flange 18 which is coextensive with the outer edge of flange 16 of the plug. Extending vertically through member B are two openings 19 and 20 which, when the sealing member is in place within the plug, are aligned with openings 14 and 15 respectively of the plug. Each of openings 19 and 20 are provided with narrow constrictions 21, which aid in holding and clamping tubes inserted through the openings. It is essential, however, that the sealing member be in close engagement with the glass plug adjacent the openings in the wall 12 of the plug. In the embodiment shown a glass tube 22 of a length suitable to extend to the bottom portion of the container is placed through opening 19, but tubes may be inserted in either or both of openings 19 and 20 of any desired lengths.

When the plug is to be placed upon the container, a resilient washer 23 which may be of rubber or other resilient material is placed about plug A and under the edge flange 16. The container C may be of any suitable size or type. As illustrated, the container is of glass having a neck portion 24 with an opening therethrough and having beads 25 on the outside thereof. The plug A with the sealing member and washer attached is placed into the neck of the container. The edge flange 16 of the plug is supported by the edge of the container neck, with the resilient washer 23 interposed.

The clamping means D for holding the plug in sealing engagement with the container, includes a metal cap 26 which is cut away at its top so that it engages only the flange portion of the sealing member. At its lower edge cap 26 is adapted to engage bead 25 on the exterior of the container neck, and is adapted to be turned to bring the flange of the sealing member tightly against the edge flange 16 of the plug. This action also presses flange 16 tightly against washer 23 to bring the plug into sealing engagement with the container.

With the parts assembled as above described, the container is closed except for the passages provided by openings 19 and 20 in the sealing member and openings 14 and 15 in the plug. For closing these passages I place a thin flexible sealing disk 27 upon the top of the sealing member so that the edges of the disk rest upon the top portion of cap 26. Over the flexible disk 27 I place a metal disk 28 which clamps the peripheral edge of the flexible disk firmly against the top of cap 26. The outer cap 29 is then placed over the metal disk 28 and its lower edge portions 30 spun under the lower shoulder of cap 26. The central portion of outer cap 29 is cut away and tab 31 is provided for tearing the outer cap down to gain access to the container through the openings in the sealing member.

In the use of my improved closure, the container may be filled with the intravenous solution and the closure assembled and mounted as just described with both cap 26 and outer cap 29 firmly in place. The container may be transported in this condition, and when the injection of the solution is to be made, the outer cap 29 may be torn off by the use of thumb tab 3. This frees metal disk 28 and flexible disk 27 which are

then removed. The tube (not shown) through which the solution is drawn off from the container, may then be inserted into opening 20 of the sealing member, so that the tube is held by constriction 21. Then the container is inverted and held in inverted position while the desired amount of solution is drawn off. The liquid withdrawn from the container is replaced by air entering through tube 22 extending through opening 19 in the sealing member.

Figs. 6, 7 and 8 illustrate a modification of the invention in which the glass member A' is solid except for openings 32 and 33 which are of a special character. Opening 32 is provided with an enlarged portion 34 which may be cylindrical in form and which is adapted to receive the rubber plug 35. A glass tube 36 is received through a central opening in plug 35 and extends downwardly through the lower portion 37 of the opening 32.

The opening 33 in member A' may be simply cylindrical in form and adapted to receive a resilient tube such as illustrated in Fig. 8. The sealing cap 38 preferably has its edge extending over a portion of rubber plug 35 so as to bind it in place. In other respects the structure and operation of this modified form is identical with that of the form first described.

Figs. 9 to 12 illustrate another form of the invention which is similar to that shown in Figs. 6 and 7 except that the liquid outlet opening 40 is also provided with an enlarged portion 41 which is adapted to receive the rubber plug 42. Plug 42 has a central opening 43 having an expanded portion 44 and communicating with the lower portion 45 of opening 40. In this modification a glass tube 46 having an enlargement 47 may be inserted into plug 42 until the enlargement 47 engages portion 44 of the plug opening. When desired, rubber plug 42 may be replaced by another plug having an opening of different size or shape to accommodate tubes of different sizes and shapes.

In all of the embodiments illustrated the liquid in the container is restrained from contact with the rubber to any appreciable extent. The only points at which the liquid may have any contact with the rubber or resilient material is at the immediate points of sealing adjacent the tubes or openings and at the mouth of the container, and the surface of the rubber exposed to the liquid at these points may be reduced to a negligible area. In keeping the liquid from appreciable contact with any soluble material, the intravenous solution or other sterile liquid used in the container is kept free from the harmful impurities which are so likely to make trouble.

By using a hard shell, a softer and substantially pure rubber insert can be used to replace the relatively hard and impure rubber plug heretofore used.

Since the hollow interior of the plug is formed with flattened sides, the sealing member which fits within this plug is not free to turn, and the openings in the plug and sealing member are always maintained in alignment. This feature is important in keeping the sealing member from turning with respect to the plug.

With this construction, there is very little tendency for the liquid to find its way into the openings in the closure, the lower glass wall of the closure serving to throw back the liquid when it splashes during transit.

While in the above description I have set forth a specific structure for purposes of illustration,

it will be understood that this structure may be modified greatly without departing from the spirit of my invention. The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible in view of the prior art.

What I regard as new and desire to secure by Letters Patent is:

1. In combination with a container having a neck portion and an opening therethrough, said neck portion having a bead on its exterior, a glass plug extending into said opening in said neck portion and having an opening there-
through, a resilient washer between the edge of said neck and said glass plug, means engaging said bead for clamping said glass plug against said resilient washer, a sealing member above the opening in said glass plug, and in engagement with said plug adjacent its opening.

2. In combination with a container having a neck portion and an opening therethrough, said neck portion having a bead on its exterior, a glass plug extending into said opening in said neck portion and having an opening there-
through, a resilient piece between said plug and said neck portion, a sealing member over said glass plug and having an opening therethrough which is in communication with the opening in said glass plug, and a cap engaging the edges of said sealing member and said bead, said cap being drawn tight to bring said glass plug into sealing engagement with said container.

3. A closure for a container comprising a hollow glass plug having an opening in its bottom

wall, said plug having an annular edge flange, a resilient sealing member extending within the hollow of said plug and having an opening there-
through in communication with the opening in said plug, a resilient washer extending about said plug and under said edge flange, and means engaging the top of said sealing member for bringing said washer into sealing engagement with said edge flange and said container.

4. A closure for a container comprising a hollow glass plug having a pair of openings in its bottom wall, said plug being equipped with an edge flange, a resilient sealing member extending within the hollow of said plug and coextensive with the outer edge of said flange, said member being provided with a pair of openings there-
through which communicate respectively with the openings in said plug, said resilient member being in sealing engagement with said plug adjacent the openings in said plug, and means for sealing the edge flange of said plug adjacent an opening in said container.

5. In combination with a container having a neck portion and an opening therethrough, a glass plug extending into said opening and having a passage therethrough, a resilient piece between said plug and said neck portion, a sealing member over said glass plug and having an opening therethrough which is in communication with the opening in said glass plug, and a cap engaging the edges of said sealing member and said neck, said cap being drawn tight to bring said glass plug into sealing engagement with said container.

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