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ELASTOMER STOPPER

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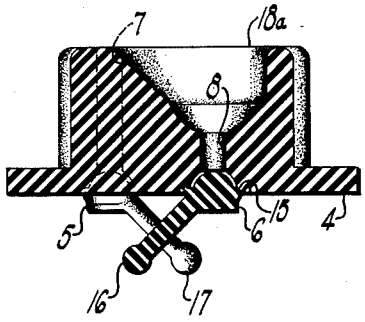


FIG. 2

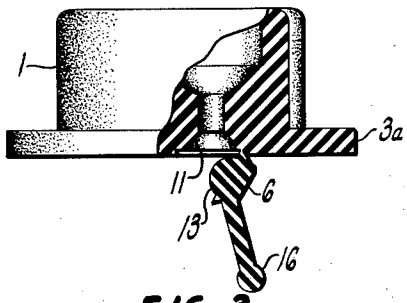


FIG. 3

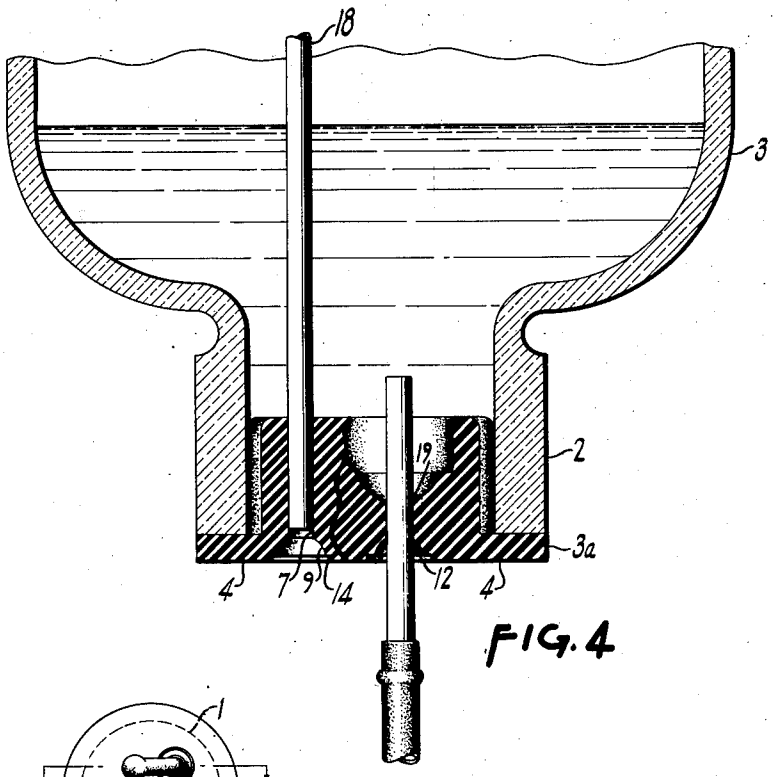


FIG. 4

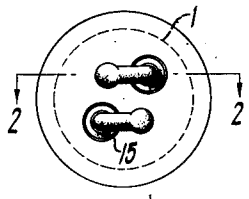


FIG. 1

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ELASTOMER STOPPER

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4 Claims. (Cl. 128—272)

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This invention relates to and in general has for its object the provision of an elastomer stopper particularly suitable for sealing intravenous injection flasks and for making the required connections therewith when it is desired to dispense its contents.

Intravenous injection flasks are customarily sealed with a rubber stopper formed with a pair of bores, one in which an air eduction tube is mounted for relieving the partial vacuum within the flask, and the other for receiving a service connection such as a hypodermic needle. Provided on the upper end of the stopper is some means for hermetically sealing the upper ends of both of these bores.

More particularly, the object of this invention is the provision of an elastomer stopper for stoppering an intravenous solution flask wherein a pair of bores extend upwardly from the lower face of the stopper and terminate at their upper end in downwardly dished check valve seats adjacent the upper face of the stopper, wherein check valve closure members formed integral with the upper end of the stopper serve to seal off the upper ends of said bores under the influence of a differential air pressure; and wherein said closure members can be readily torn from the stopper to expose the upper ends of said bores when it is desired to dispense solutions from said flask.

The invention possesses other advantageous features, some of which, with the foregoing, will be set forth at length in the following description where that form of the invention which has been selected for illustration in the drawings accompanying and forming a part of the present specification is outlined in full. In said drawings, one form of the invention is shown, but it is to be understood that it is not limited to such form, since the invention as set forth in the claims may be embodied in a plurality of forms.

Referring to the drawings,

Fig. 1 is a top plan view of a stopper embodying the objects of our invention;

Fig. 2 is a vertical section taken on the section line 2—2 of Fig. 1, showing the stopper of our invention in inverted position, with both of its bores sealed by the upper portion of the stopper.

Fig. 3 is a figure similar to Fig. 2 but showing the stopper with one of its bore closure members completely removed and the other partially removed.

Fig. 4 is a partial vertical mid-section of an intravenous injection flask provided with a stopper such as shown in Figs. 1, 2 and 3, and in its operative dispensing position.

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As shown in these figures, the objects of our invention have been embodied in an elastomer stopper of more or less conventional form, and including a cylindrical body portion 1 arranged to be inserted in the neck 2 of an intravenous solution containing flask 3 and an outwardly extending flange 3a arranged to seat over the upper face of the neck 2. Extending outwardly from the upper face 4 of the stopper and formed integral therewith are a pair of spaced circular bosses 5 and 6. Formed in the stopper in vertical alignment, respectively, with the bosses 5 and 6 are bores or holes 7 and 8 the outer or upper ends of which terminate in hemispherical cuts 9 and 11. The lower wall 12 of each of these hemispherical cuts serves to define a corresponding hemispherical valve seat whereas their upper walls define hemispherical check valve closure members 13. Formed on the outer face 4 of the stopper and circumscribing each of the bosses 5 and 6 is a channel 14 which, with the peripheral circular ends of the cuts 11 and 12, serves to define relatively thin annular walls 15. These walls constitute the only connection between the bosses 5 and 6 and the body of the stopper 1. Formed integral with each of the bosses 5 and 6, and extending outwardly therefrom at an angle, are finger grips 16 and 17 for tearing the bosses away from the stopper about thin annular walls 15. As shown in Fig. 4, the bore 7 is arranged to receive an air eduction tube 18, the upper or outer end of this tube terminating somewhat short of the hemispherical check valve member 13. Circumscribing the lower or inner end of the bore 8 is a sump 18a into which blood clots or other solid matter can settle when the flask 3 is in its inverted and operative position as shown in Fig. 4.

In the use of a stopper of the character above described, the eduction tube 18 is seated and sealed within the bore 7. The flask 3, while in its upright position, is partially filled with whole blood, plasma, or any desired intravenous solution, and is then sealed by the stopper while under the influence of a partial vacuum. Due to the differential pressure existing between the interior and exterior of the flask, the respective bosses 5 and 6 are forced downwardly until their underlying check valve portions 13 are in sealing engagement with their respective hemispherical valve seats 9 and 11. This check valve action is important for the reason that although the bosses 5 and 6 have an unbroken connection with the stopper proper through the thin annular walls 15, the rubber or other elastomer of which the stopper is formed is sufficiently porous to admit of the passage of some air through a rela-

tively thin section thereof such as the walls. By seating the check valve portions 13 against the valve seats 9 and 11, the effective thickness through which any such air must pass is of course increased by the length of the engaging surfaces of the check valve portions 13 and their respective seats 9 and 11.

When it is desired to make an intravenous injection, the flask 3 is first placed in its upright position and then the bosses 5 and 6 are torn away from the stopper by pulling on the finger grips 16 and 17. A connecting tube or a hypodermic needle is then inserted in the open bore 8 with its shank 19 sealed within the walls of the bore 8.

This having been done the flask is inverted to the position shown in Fig. 4, whereupon air is free to pass from the exterior of the flask upwardly through the air eduction tube 18 to that portion within the flask above the liquid level, thereby permitting the liquid contents of the flask to flow through the hypodermic needle to be dispensed as desired.

From the above description it will be seen that we have provided a flask devoid of apertures extending therethrough but which is formed with portions in alignment with the stopper bores which can be readily removed but which until removed form an effective barrier to the ingress of air through the adjoining portions of the stopper.

We claim:

1. An elastomer stopper having opposed end faces, said stopper being formed with a valve seat recess in one of its ends and with a hole extending from its other end to said valve seat recess; a valve closure member suspended within said valve seat recess by a thin continuous tear wall circumscribing said closure member and formed continuously integral therewith and with said stopper; and a finger grip formed integral with and extending outwardly from said closure member.

2. An elastomer stopper having opposed end faces, said stopper being formed with a valve seat recess in one of its ends and with a hole extending from its other end to said valve seat recess; a valve closure member suspended within said valve seat recess by a thin continuous tear wall circumscribing said closure member and formed continuously integral therewith and with said stopper; and a finger grip formed integral with and extending outwardly from a peripheral edge of said closure member thereby to leave the upper face of said closure member unobstructed and available for the reception of a hypodermic needle.

3. An elastomer stopper having opposed upper and lower faces, said stopper being formed with a valve seat recess in its upper face and with a hole extending from its lower face to said valve seat recess; a valve closure member suspended within said valve seat recess by a thin continuous tear wall circumscribing said closure member and formed continuously integral therewith and with said stopper, the upper end of said closure member being disposed above the upper face of said stopper; and a finger grip formed integral with and extending outwardly from said closure member.

4. An elastomer stopper having opposed upper and lower faces, said stopper being formed with a downwardly converging valve seat recess in its upper face and with a hole extending from its lower face to said valve seat recess; a downwardly converging valve closure member suspended within said valve seat recess by a thin continuous tear wall circumscribing said closure member and formed continuously integral therewith and with said stopper, the upper end of said closure member being disposed above the upper face of said stopper; and a finger grip formed integral with and extending outwardly from said closure member.

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