

April 29, 1952

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2,594,639

Y RUBBER STOPPER

Filed May 22, 1950

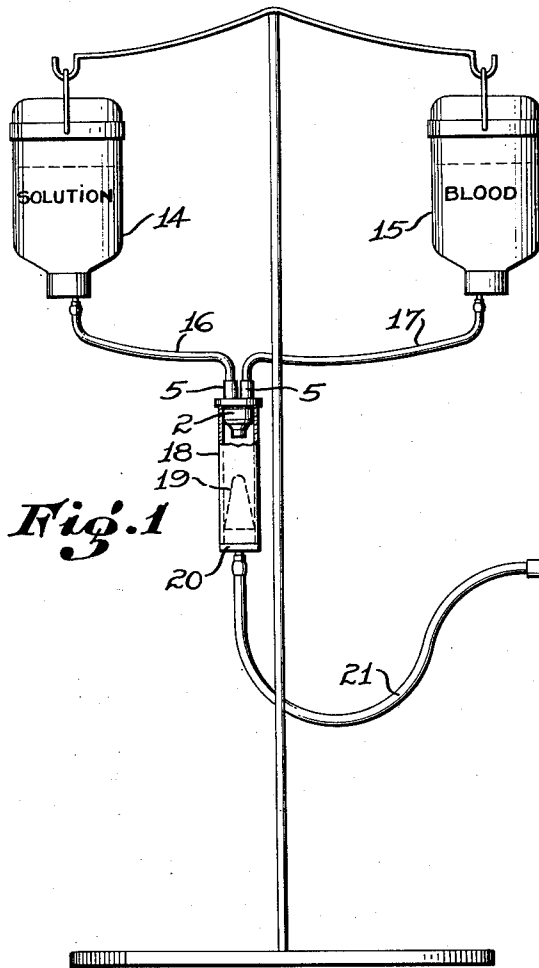


Fig. 1

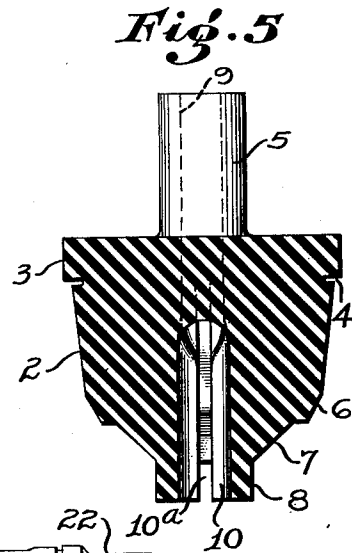


Fig. 5

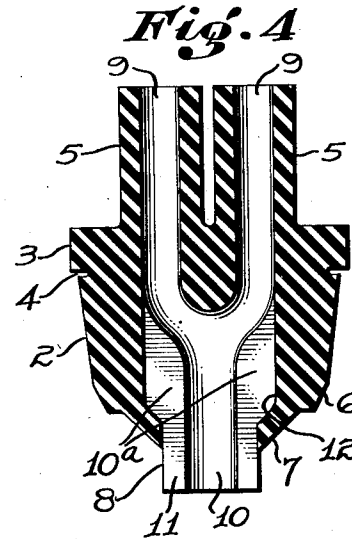


Fig. 4

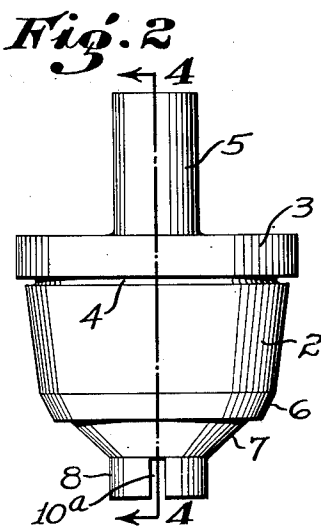


Fig. 2

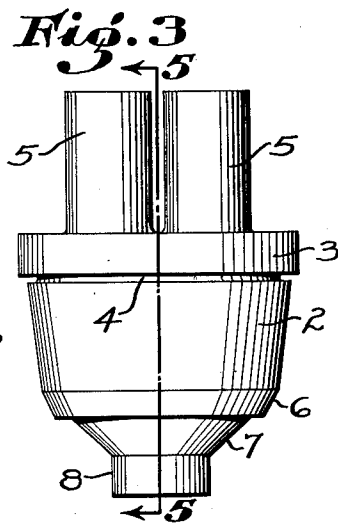


Fig. 3

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2,594,639

Y RUBBER STOPPER

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Application May 22, 1950, Serial No. 163,461

5 Claims. (Cl. 285—210)

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This invention relates to a Y rubber stopper and the process of producing the same and the invention is particularly directed to a rubber stopper intended for use as part of an administration set useful in giving a blood transfusion.

In giving a blood transfusion it is common practice to start the transfusion with a suitable sterile solution, such as a normal saline or a 5% dextrose solution, in order to be sure that the needle is properly situated within the patient's vein and the procedure is going smoothly. After such smooth flow is established the blood is allowed to run in. Finally, the solution is again run to wash the blood out of the tubing into the patient's vein. This practice creates a need for an administration assembly which permits either blood or solution at will to flow through the same needle. For this purpose a variety of assemblies have been used, ordinarily referred to as Y administration sets. In such administration sets one leg of the Y is connected to a solution bottle; another leg is connected to the blood bottle, and the third leg connects to the tube leading to the needle.

In recent years there has been a trend toward the use of disposable administration sets, that is, sets which are intended, after use for one administration, to be discarded. This imposes the necessity for having the administration sets and units of which they are composed of the lowest possible cost and the Y assemblies previously employed have been too costly for use as disposable sets.

It is a general object of the present invention to provide a special molded rubber device or stopper which can be employed in the construction of such a Y administration assembly and through its use permit the production of a sufficiently low cost Y disposable administration set. The molded rubber device or stopper of the present invention is so constructed as to serve the purposes of a Y connection, a stopper, and a drip indicator.

The rubber stopper of the present invention has molded within the stopper a Y connection, and a further object of the present invention is to provide both a form of stopper having such a Y connection which is capable of being molded, and also to provide a novel process for so molding a Y connection within the stopper.

Various further objects and advantages of both the stopper of the present invention and the process of producing the same will be more fully understood from the following description of a preferred example of the invention, the

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description being given in connection with the accompanying drawings in which:

Figure 1 illustrates an administration assembly utilizing the stopper of the present invention;

Figure 2 is a plan view of the stopper;

Figure 3 is a plan view at right angles to Figure 2;

Figure 4 is a section on the line 4—4 of Figure 2;

Figure 5 is a section on the line 5—5 of Figure 3.

Referring to the drawings, the stopper of the present invention comprises a body portion 2 which is intended to act as a plug or stopper for one end of a transparent tube, the portion 2 being tapered to slightly contract in a downwardly direction. The portion 2 includes an upper flange 3 intended to set on the rim of the transparent tube to limit the insertion of the plug or stopper into the tube. Adjacent the lower edge of the rim, the body 2 is provided with a small groove, such as indicated at 4, for forming a semi-locking fit with the rim of the transparent tube used in connection with the stopper. Above the flange 3 the stopper is provided with two tubular extensions 5 to provide additional gripping surfaces for making connections to the tubing. At the lower end of the body 2 the stopper is tapered as indicated at 6 and 7 and terminates in a tubular outlet portion 8.

Internally the stopper plug is provided with passages which form a typical Y connection. Such passages comprise the two upwardly directed passages 9 which, within the body portion 2, join to a single downwardly extending axial passage 10. The upwardly extending passages 9 are continued through the upward tubular extensions 5 and the downward passage continues through the outlet 8.

To render it possible that such a Y-shaped passage can be formed inside a plug during the operations of molding the plug, it is necessary to provide special means by which a Y-shaped molding pin can be removed from the molded plug. I have found that this can be effected by providing diametrically aligned narrow slots 10a or vein-like recesses along the single downwardly extending passage of the stopper. Within the body of the stopper the maximum distance between the slots is substantially equal to the maximum distance between the upper passages 9. Near the lower end of the body 2 these slots are decreased in thickness as indicated at 12 until the maximum distance be-

tween the slots corresponds to the diameter of the outlet 8. There is thus left along the tapered lower end of the body a thin wall. This design permits a molding of the desired Y connection in a stopper. To form such a Y connection it is necessary to employ a mold pin, which mold pin is of a Y-shape corresponding to the passages 9, 9', 10. Heretofore, there has been no way by which such a Y-shaped molding pin could be used during the molding of a rubber stopper and then removed from the molded stopper without rupturing the body of the stopper. By the provision of the slot 10a, which is considerably narrower than the thickness of the Y pin used in molding the stopper, it is possible to withdraw that molding pin downwardly. In this operation since the width of the slots is less than that of the molding pin it is necessary to expand somewhat the stopper, and also when the branch of the molding pin reaches the portion 12 of the stopper a narrow tapered wall must there be stretched to allow the molding pin to be removed. This can be accomplished without rupturing the plug. It is understood that this slot 10a, 11 is, in the molding operation, formed by two diametrically aligned vanes on the Y-shaped molding pin. The portion of the slit which is positioned in the outlet 8 may not, in all cases, be essential but greatly facilitates removal of the molding pin without danger of rupturing the plug. I have found that this slit in the outlet in no way interferes with the intended function of the outlet, which is to form droplets of blood or saline solution.

In use the stopper of the present invention is connected in the type of assembly illustrated in Figure 1. In Figure 1, 14 indicates a bottle containing a solution, such as a normal saline or 5% dextrose solution, while 15 indicates a bottle containing blood to be administered. From the bottles 14 and 15 are respectively connected tubes 16 and 17, which tubes in turn are connected with the tubular extensions 5 of the stopper of the present invention. The stopper of the present invention is indicated as set in the upper end of a transparent tube 18, which is intended to form a part of a drip indicator. The lower end of said tube may be provided with a filter 19 and a plug 20 which connects with the tubing 21 leading to an administration needle 22. The stopper of the present invention thus permits a two-way connection to the bottles 14 and 15 connecting these to a single outlet, which outlet is adapted to act as a drip outlet. The stopper of the present invention may be sufficiently economically formed as to permit the assembly to be constructed at sufficiently low cost as to be disposable after a single use.

While the particular form of the stopper of the present invention herein illustrated is well adapted to carry out the objects of the invention, this invention is of the scope set forth in the appended claims.

I claim:

1. A stopper for an administration assembly comprising, a body adapted to be set in a cylindrical neck, a Y-shaped passage within said body, including two upwardly extending passages joining an axial downwardly extending passage, slots in said body extending from diametrically opposite sides of the downwardly extending passage a distance substantially equal that of the spacing between the two upwardly extending passages thereby to facilitate the re-

moval of a Y-shaped molding pin from the stopper.

2. A stopper for an administration assembly comprising, a body adapted to be set in a cylindrical neck, said body having two upwardly extending passages joined to a single downwardly extending passage, extensions on the upper end of the body aligned with and continuing the upwardly extending passages, the body being provided with narrow diametrically aligned slots extending from the downwardly directed passage to a width substantially corresponding to the separation of the upwardly extending passages.

3. A stopper for an administration assembly comprising a body adapted to be set in a cylindrical neck, said body having two upwardly extending passages joined to a single downwardly extending passage, extensions on the upper end of the body aligned with and continuing the upwardly extending passages, the body being provided with narrow diametrically aligned slots extending from the downwardly directed passage to a width substantially corresponding to the separation of the upwardly extending passages, the lower end of the body being reduced in diameter and terminating in an outlet through which the downward passage extends, the width of the slot being reduced to the diameter of the outlet at a point on the body spaced above the outlet.

4. A stopper for an administration assembly comprising, a molded body adapted to be set in a cylindrical neck, two upwardly extending passages in said body joined to a single downwardly extending passage, the body having extensions aligned with the upwardly extending passages and the passages continuing through said extensions, the lower end of the body having an outlet extension through which the downward passages continue, and diametrically aligned vein-like slots extending from the downward passage the width of the outlet extension and above said outlet extension, extending to substantially the distance between the upwardly extending passages.

5. A stopper for an administration assembly comprising, a molded body having a slightly tapered outer surface so that said body may act as a stopper in a cylindrical neck, the body having molded passages within the body, including two upwardly extending passages joined within the body to a single axial downward passage, the body having extensions from its upper end continuing the upwardly extending passages, and having an outlet extension from its lower end and continuing the downwardly extending passages, and vein-shaped slots in the body extending from diametric sides of the downward passage to facilitate removal of a Y-shaped molding pin employed in forming said passages.

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