

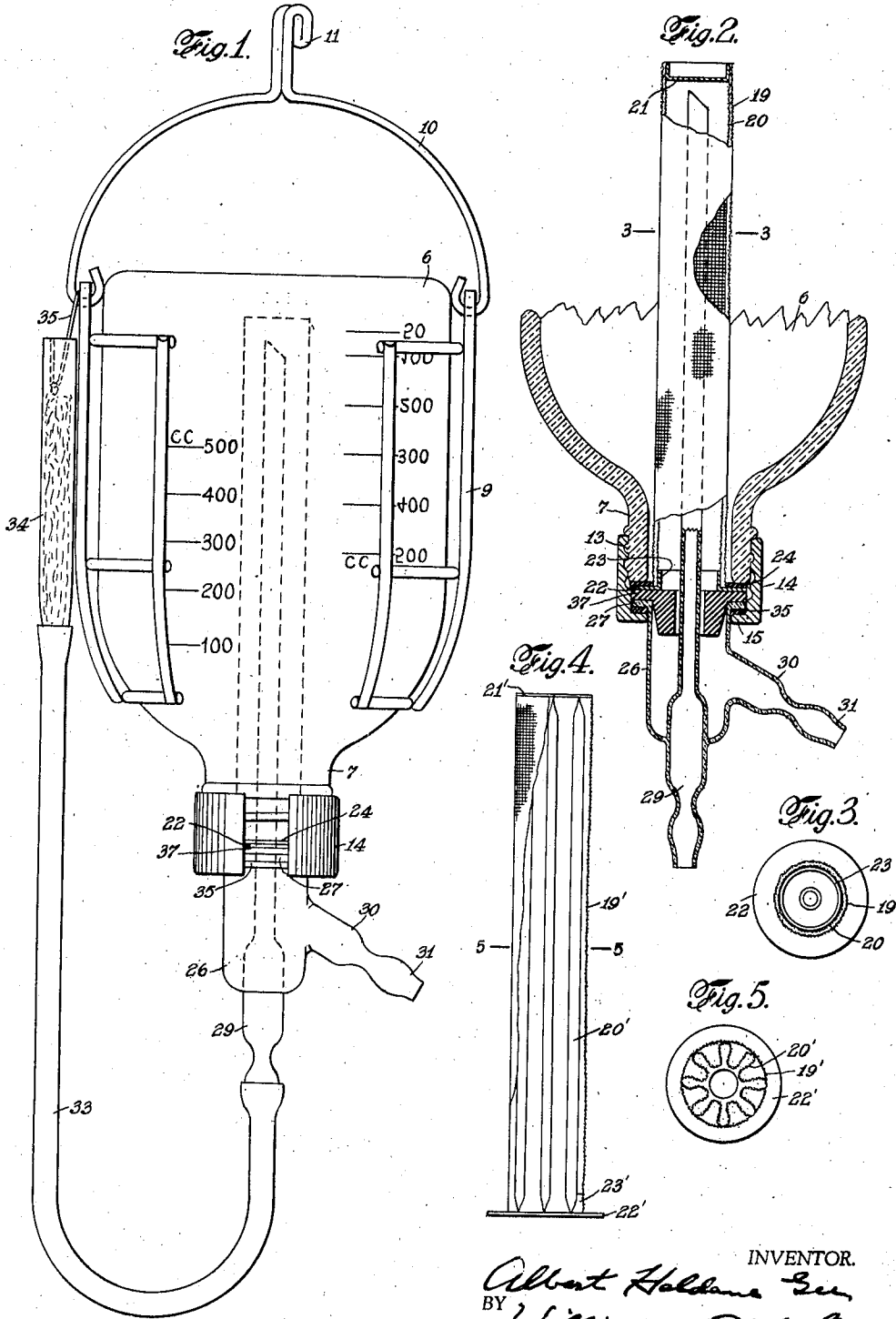
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BLOOD TRANSFUSION APPARATUS

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BLOOD TRANSFUSION APPARATUS

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This invention relates to blood transfusion apparatus, the general object of the invention being to provide a new and improved form of apparatus, adapted both for taking blood from a donor, and for delivering it to a recipient, either with or without storage of the blood for a period of time between the two operations.

One of the advantages of the present invention results from the fact that the principal parts of the apparatus, with the exception of the blood-filtering element, are adapted for use both when the apparatus is utilized for the collection of blood from a donor, and also when the apparatus is being used for the injection of blood into a recipient. This helps to reduce to a minimum the number of different kinds of parts which must be cleaned and which the operator is required to have on hand in a sterilized condition; all of which contributes to smooth operating technique. Another advantage of the invention is due to the fact that it provides a new and improved filter means, which may be used if filtering of the blood is deemed necessary or desirable by the operator. Other advantages of the invention will be obvious to those skilled in the use of blood transfusion apparatus.

Referring to the drawing, Fig. 1 is an elevation of an apparatus embodying the invention, in the position in which it is supported when blood is being given to the recipient; Fig. 2 is a fragmentary elevation, partly in section, showing the construction of the apparatus; Fig. 3 is a plan view in section on the line 3—3 of Fig. 2; Fig. 4 is an elevation, partly in section, of a modified form of filtering element; and Fig. 5 is a plan view in section on the line 5—5 of Fig. 4. Like parts are referred to throughout the several views by the same reference characters.

Referring to Fig. 1, the blood container 6, preferably of glass, is provided with a neck 7 having an opening therethrough. The means for supporting the container 6 in an inverted position is shown as consisting of a metal cage 9 having a bail 10 provided with a supporting hook 11. As shown in the drawing, the outside of the neck 7 is provided with molded screw threads 13 adapted to be engaged by an internally threaded collar 14 of any suitable material, having therein a slot or opening (shown in Fig. 1) the purpose of which is to facilitate assembly, as will be hereinafter mentioned. The collar 14, which is provided with a flange 15 at one end, serves to clamp to the neck 7 of the container 6 certain parts which will now be described.

One of those parts is the blood-filtering screening element, which is best shown in Figs. 2 and 3 and in a modified form in Figs. 4 and 5. In Figs. 2 and 3 the filter member is shown as comprising two co-axial tubular screens 19 and 20 having a diameter slightly less than the diameter

of the opening through the container neck; the inner end of the inner screen being closed by a cup-shaped disc 21 to which one or both screens are secured, and the other end being provided with a flange 22 having a collar 23 to which the inner or both of the screens are secured. The inner tubular screen 20 is of very fine mesh, for example what is known as 200-mesh screening; while the outer tubular screen 19 is of coarser mesh, for example what is known as 60-mesh screening. Preferably, there is a slight space between the co-axial tubular screens, as shown in Figs. 2 and 3. It will be noted that the length of the filter element is such that it extends nearly to the end wall of the container when inserted therein as far as the flange 22 permits. In inserting the filter member in the container, a gasket 24 is preferably interposed between the flange 22 and the end of the neck 7 of the container.

As shown in Figs. 1 and 2, the apparatus includes a drainage chamber 26, preferably of glass, which is closed at one end and is provided at its other end with an outwardly extending flange 27. A tube 29, also preferably of glass, is welded or otherwise secured in the closed end of the drainage chamber 26 and extends axially, as shown in Figs. 1 and 2, beyond the flanged end 27, of the drainage chamber 26 for a distance which is only slightly less than the internal length of the blood-filtering element. As shown in the drawing, the outer end of the tube 29 is adapted to receive the end of a rubber tube 33 leading to a glass tube 34 which may be suspended from one end of the bail 10 by a wire hook 35, the tube 34 being partly filled with sterile gauze and cotton which filter out dust or other impurities that might otherwise pass through the tubes 33 and 29 into the space within the blood-filtering element and through the blood-filtering element into the container 6, during the draining of blood from the latter. Communicating with the drainage chamber 26 and extending at an angle downwardly from its side, at a point a considerable distance from its closed end, is a drainage tube 36 having an end 31 adapted to receive the end of a rubber tube (not shown) leading to the needle which is inserted in the recipient of the blood.

As best shown in Fig. 2, there is preferably interposed between the flange 22 of the blood-filtering element and the flanged end of the drainage chamber 26 a washer 37 of comparatively soft rubber, which is preferably made in the form shown in the drawing to facilitate easy assembly of the various parts of the apparatus. Also, a gasket 35, also preferably of soft rubber, is interposed between the flanged end of the drainage chamber and the flange 15 of the threaded collar 14.

Figs. 4 and 5 show a modified form of blood-

filtering element characterized by the fact that the fine mesh inner screen 20' is of the form best shown in Fig. 5, which gives that screen a greatly increased area. Surrounding the fine mesh screen 20' is the coarser screen 19'. At both ends the ribbed portions of the inner screen member 20' are pressed together as shown in the drawing, and at one end both of the screen members are welded to a disc 21', while at the other end the screen members are welded to a disc 22' having a flange 23' extending within the inner screen member 20'. It will of course be understood that the blood-filtering screen-element shown in Figs. 4 and 5 may be used in the same way as the filter member shown in Figs. 1, 2 and 3.

When the apparatus is to be used for taking blood from a donor, the container 6 is not suspended with its neck 7 extending downwardly as shown in Fig. 1, but instead is supported in any suitable way with the neck 7 extending upwardly; and if desired the cage 9 carrying the bail 10 may be removed as unnecessary during this operation. All of the parts having been sterilized, the chamber 26 with the tube 29, the washer 37, and the clamping ring 14 with the washer 35, are assembled and attached to the container neck 7, preferably without the blood-filtering element. The flexible tube leading to the needle which is to be inserted in the donor is attached to the tube 29; and the usual suction pump (not shown) is attached to the tube 31. The blood from the donor enters the container 6 through the tube 29 and, by reason of the fact that the end of that tube extends nearly to the bottom of the container, the blood cannot drain down the wall of the container but flows directly into and is immediately mixed with the citrate which is usually inserted in the container before the collecting operation begins. As the collecting operation proceeds, the operator can easily ascertain the quantity of blood collected by consulting the graduations engraved upon the container, as shown at the right side of Fig. 1. When the blood collecting operation is completed, if the operator desires to send the blood to storage, the collar 14 and the parts which are secured to the container by it may be removed and a screw cap may be substituted.

When it is desired to use the blood so gathered for injection into a recipient, it is merely necessary to attach to the container 6 the various parts, including the blood-filtering element, which are shown in Figs. 1 and 2, to apply the suspending cage to the container, and to attach to the end 31 of the tube 30 a tube leading to the needle which is to be inserted in the recipient. When the container is inverted and suspended in the position shown in Fig. 1, of course the blood within the container flows through the blood-filtering element and down through the annular space between the washer 37 and the tube 29 and into the drainage chamber 26, out of which it flows through the tube 30, while air enters the container 6 through the tubes 34, 33 and 29. During the operation, the quantity of blood passing to the recipient is measured by the fall of level within the container 6 as measured by the graduations shown at the left side of Fig. 1.

It will be obvious that, after being used, the entire apparatus may be easily disassembled and

all of the parts thereof washed and sterilized. The purpose of the opening in the collar 14 is to permit the drainage tube 30 to pass through that opening when the collar 14 is removed from the drainage chamber 26. The apparatus above described is particularly efficacious in the matter of preventing any coagulated blood from retarding the flow of blood to the recipient. The co-axial coarse and fine mesh screens are ordinarily used for this purpose; but if they are not used, the drainage chamber 26 acts as a trap for catching any small clots, by reason of the fact that the drainage tube 30 extends from the drainage chamber at a point considerably above its bottom. Thus the apparatus is reliable and effective for the purposes for which it is intended.

What is claimed is:

1. A blood transfusion apparatus comprising a blood container having a neck with an opening therethrough, a tubular blood-filtering screen-element having a diameter slightly less than the diameter of said opening and closed at one end and at the other end open and provided with an outwardly extending flange adapted to cooperate with the end of the container neck, the length of said blood-filtering element being such that it extends nearly to the bottom (top when inverted) of said container when inserted therein as far as the flange permits, a drainage chamber closed at one end and having at its other open end an outwardly extending flange, a tube passing through the closed end of said drainage chamber and of such a length that it extends beyond the flanged end of said drainage chamber for a distance only slightly less than the internal length of said blood-filtering element, a drainage tube communicating with said drainage chamber and extending at an angle from its side at a point distant from its closed end, means for clamping the flanges of the blood-filtering element and of the drainage chamber to the neck of said container with the blood-filtering element and said tube extending into said container, and means for supporting said container with the neck and drainage chamber extending downwardly.

2. A blood transfusion apparatus comprising a blood container having a neck with an opening therethrough, a tubular blood-filtering screen-element having a diameter slightly less than the diameter of said container opening and provided with an outwardly extending flange adapted to cooperate with the end of the container neck, a drainage chamber closed at one end and having at its other open end an outwardly extending flange, a tube passing through the closed end of said drainage chamber of such a length that it extends beyond the flanged end of said drainage chamber for a distance only slightly less than the depth of said blood container, a drainage tube communicating with said drainage chamber and extending at an angle from its side at a point distant from its closed end, means for clamping the flanges of the blood-filtering screen-element and of the drainage chamber to the neck of said container with the blood-filtering screen-element and said tube extending into said container, and means for supporting said container with the neck and drainage chamber extending downwardly.

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