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[54] **MEANS FOR STERILELY TRANSFERRING BLOOD PLASMA, SERUM, BIOLOGICAL OR PHARMACEUTICAL FLUIDS, AND THE LIKE**
 2 Claims, 8 Drawing Figs.

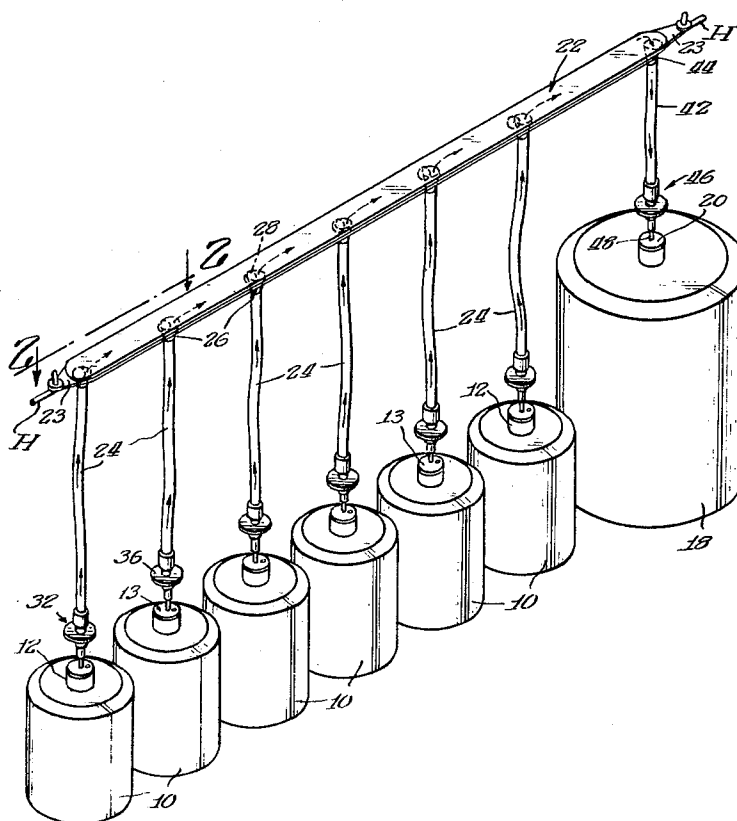
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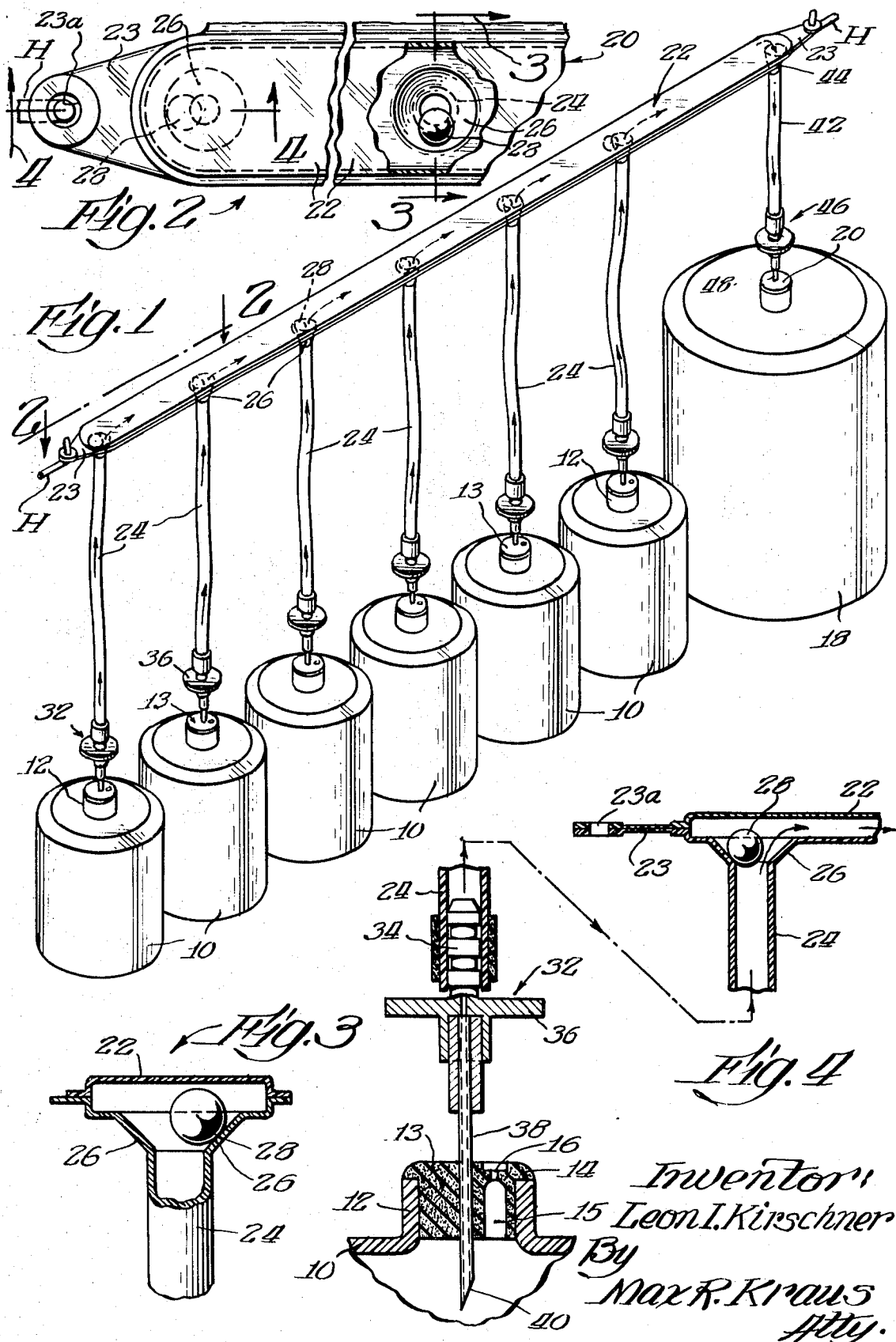
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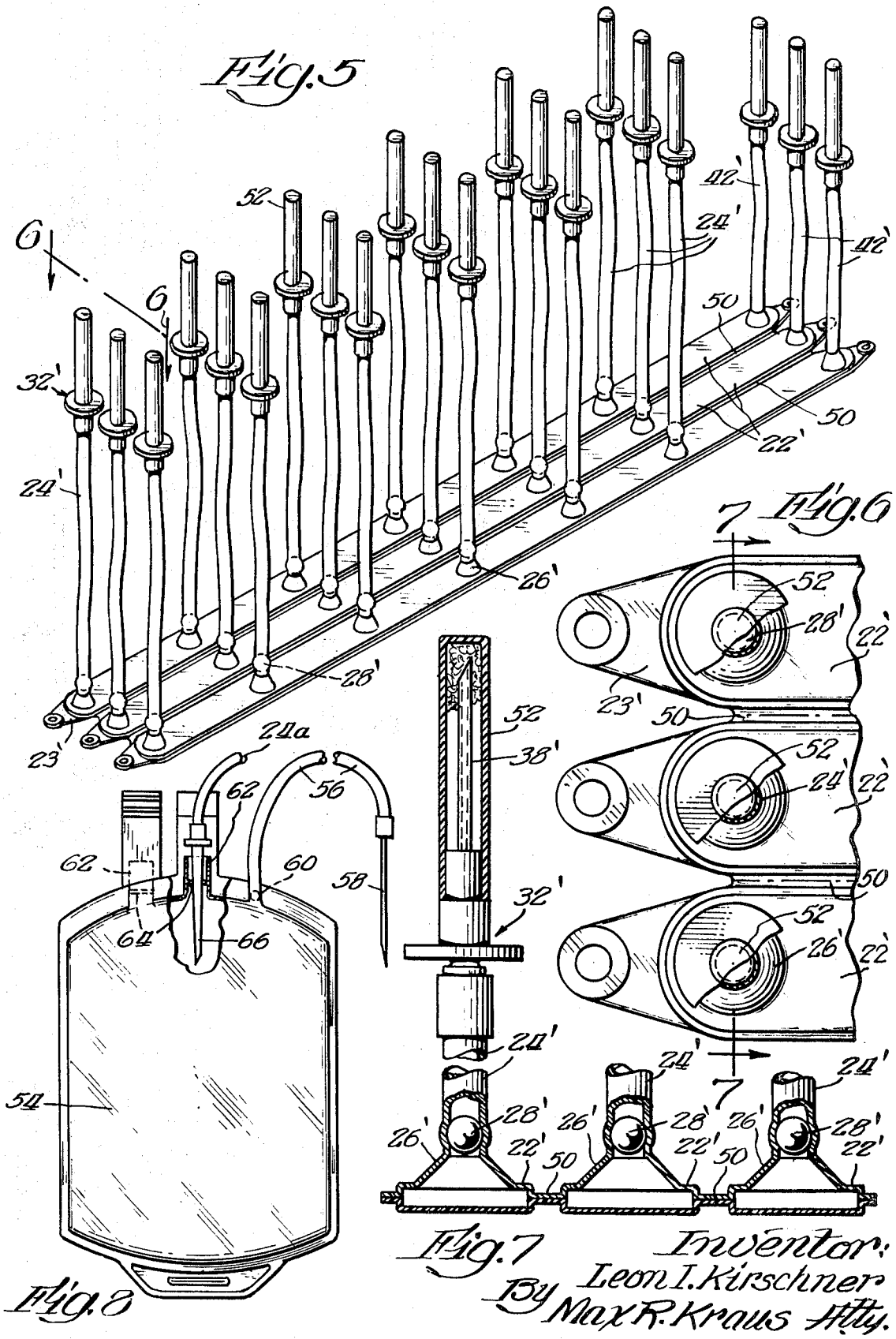
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ABSTRACT: Means for sterilely transferring blood plasma, serum, biological or pharmaceutical fluids and the like from a plurality of containers containing said plasma or fluids to a single collecting or pooling container, or conversely transferring same from a single container to a plurality of containers, said means comprising a manifold provided with a plurality of conduits or tubes, each of which is connected to a separate container of a plurality of containers, and a conduit or tube which is connected to the pooling or larger container.







MEANS FOR STERILELY TRANSFERRING BLOOD PLASMA, SERUM, BIOLOGICAL OR PHARMACEUTICAL FLUIDS, AND THE LIKE

The invention herein while described specifically in connection with the transfer of blood plasma is equally applicable to the transfer of serum, biological or pharmaceutical fluids and the like under sterile conditions.

In the conventional practice well known in the art for transferring blood plasma or serum, the blood is placed into an individual container which contains the anticoagulents. The blood is then centrifuged so that the blood plasma or serum separates from the whole blood in said container. The container is then connected by an individual conduit or tube to a pooling container and the blood plasma or serum is passed from the individual container into the pooling container. This practice is repeated with each individual container until a sufficient amount of blood plasma or serum is collected in the pooling container. Each of the individual conduits or tubes has at its outer end a terminal coupler which is inserted into the rubber plug or stopper used to close the pooling container. Thus, every time a conduit is connected to the plug, the plug is punctured, which means that the plug or stopper of the pooling container is repeatedly punctured. All of this must be performed under sterile conditions. The foregoing procedures require considerable handling and increases the danger of contamination.

The present invention eliminates the foregoing objectionable features in that there is provided a manifold having a plurality of conduits, each of which is connectable to an individual container. The manifold has a single outlet which is connectable to a pooling container. Thus, the outlet terminal coupler is inserted into a plug or stopper of the pooling container only once and the plasma or serum from the individual containers pass through their respective individual conduits or tubes to the manifold and from the manifold through the outlet conduit or tube to the pooling container. The apparatus has a one-time use and is discarded after such use. It is relatively inexpensive to produce. It is made of principally of a flexible collapsible material such as plastic which is inert, non toxic, and hemorepellant.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a perspective view of one embodiment of this invention in which the individual containers in which the blood is stored are in the form of bottles, and showing the manifold with the individual conduits or tubes each connected to a respective container, and with the outlet conduit or tube connected to a pooling container.

FIG. 2 is an enlarged plan view taken on line 2-2 of FIG. 1.

FIG. 3 is a sectional view taken on line 3-3 of FIG. 2.

FIG. 4 is a sectional view taken on line 4-4 of FIG. 2.

FIG. 5 is a view of a modification in inverted position from that of FIG. 1, showing a plurality of manifolds each with a plurality of conduits and in which the manifolds may be separated from each other.

FIG. 6 is an enlarged view taken on line 6-6 of FIG. 5.

FIG. 7 is enlarged sectional view taken on line 7-7 of FIG. 6; and

FIG. 8 shows a conventional individual flexible blood bag or container for containing the individual stored blood which may be used in lieu of the rigid container or bottle shown in FIG. 1.

DESCRIPTION OF THE EMBODIMENTS

The sterile conditions under which the apparatus is used makes it necessary that the apparatus used in the transfer of the plasma or serum as herein described, is of a disposable nature. In other words, once the apparatus has been used for the transfer of the blood plasma or serum it is not used again and is disposed of therefore, it is made at a cost which is not prohibitive to preclude its being disposed of after each use.

In the embodiment shown in FIG. 1, six bottles or rigid containers, each identified by the numeral 10, are of conventional construction and are each provided with a neck 12 which is closed by a rubber plug or stopper 13 at the top thereof. Each of these containers is used to separately contain the blood from an individual donor, as is well understood. As best seen in FIG. 4, the rubber plug or stopper 13 seals and closes said mouth opening of the neck of the container has an annular flange 14 which seats against the top of the bottle. The plug 13 has a recessed or hollow portion 15 which communicates with a rupturable portion which when manually ruptured or pierced will provide an air opening or vent 16.

The pooling or collecting container which is indicated by the numeral 18 is a larger container in contrast to the individual smaller containers 10 and is likewise closed with a rubber plug or stopper 20, similar to that described in connection with the individual containers. Before the plasma is passed from the individual container 10 to the pooling container 18 the blood in the container 10 is centrifuged by the conventional method to cause the blood plasma or serum to separate from the blood. The blood plasma will comprise the upper liquid in each container 10. The pooling container 18 has a vacuum so that the blood plasma from the individual container 10 will pass through the individual conduit or tube to the pooling container.

The invention herein comprises a manifold generally designated by the numeral 22 to which are connected a plurality of spaced conduits or tubes 24 along substantially the length of said manifold. The manifold 22 and the conduits or tubes 24 are made preferably of a flexible plastic material, similar to the material which is now used in the art and identified as a blood bag. The material forming the manifold and the conduits is of a flexible collapsible material, which is insert, non toxic, hemorepellant plastic, such as polyvinyl chloride of medical grade quality. Extending from the opposite ends of the manifold are extensions 23 which are provided with openings 23a. This permits the manifold to be supported or hung on hooks H which engage the openings 23a. As best shown in the cross-sectional view of FIG. 3, the manifold 22 is integrally formed with the flexible conduits 24.

As best seen in FIG. 3, the conduit 24 is enlarged at its upper end and inclines outwardly to form a truncated cone-shaped junction 26 with the bottom of the manifold. A ball-type check valve 28 is lodged in the junction 26 and is adapted to seat in the upper end of the conduit 24 adjacent the junction 26 to block the flow or passage of the blood plasma or serum from the conduit 24 to the manifold 22. To unblock the conduit 24 manual finger pressure is applied on the conduit below the ball valve 28 to force it to unseat and move upwardly to the junction and/or the manifold as shown in FIG. 3, to permit the passage of the blood plasma or serum therethrough into the manifold.

As shown in FIG. 4, a terminal coupler generally designated by the numeral 32 is connected to the lower end of each of the conduits or tubes 24. Said terminal coupler includes a hollow stem 34 which is integrally formed with a flange 36. A cannula 38 is formed integral with the stem and communicates with the interior of the hollow stem 34. The outer end of the cannula has a tapered or pointed end 40. The stem 34 is connected to the conduit 24.

The outlet end of the manifold 22 has a flexible conduit or tube 42 which is integrally formed with the manifold and is provided with a truncated-shaped junction 44 therebetween, identical to the junction 26 previously described. A terminal coupler generally indicated at 46, identical to the coupler 32 is secured to the outlet end of conduit 42. The cannula 48 of said coupler is inserted into the plug or stopper 20 of the pooling container 18, similar to the insertion of the cannula 38 in the stopper 13.

In transferring the plasma or serum, the individual containers 10 are lined up and connected the apparatus forming this invention, in the manner shown in FIG. 1. The outlet conduit 42 is connected to the pooling container 18. The vacuum

in the pooling container 18 will cause the plasma in the individual containers to be drawn up through their respective conduits 24 into the manifold 22 and from the manifold discharged through the outlet conduit 42 into the pooling container 18. It is preferably advisable to have the plasma from each of the individual containers pass into the manifold separately. Thus, for example, if the plasma is being withdrawn and transferred into the manifold from the first container the ball valve in the first container conduit 24 is manipulated out of the junction 26 to permit the flow of the plasma from the first container through the conduit 24 to the manifold until the plasma is withdrawn from the first container. During this procedure the ball valves in the remaining conduits will remain in their seated position to block passage of the plasma from the remaining containers 10. This procedure is repeated with respect to each container until such time that enough plasma has been transferred to the pooling container 18.

FIGS. 5, 6 and 7 show the modified construction in which a plurality of manifolds 22' are connected together, each manifold being identical to that previously described. Each manifold is a separate entity and is sealed from the other connected manifolds, as best shown in FIG. 7 by joined connecting strips 50 which may have a centered weakened line. Thus, if it is desired to remove one of the manifolds from the others, the strip 50 is torn along the weakened line thereof and this will separate the manifold from the other manifolds. Each manifold is integrally formed with a plurality of conduits or tubes 24' with junctions 26' and with ball valves 28' positioned therein.

FIG. 7 shows the seating of the ball valve in the conduit 24' to block the flow of the plasma. The ball valve 28 previously described would be similarly seated in the conduits 24. Each conduit 24' has a terminal coupler 32', as previously described. The cap 52 shown in FIG. 7 is detachably secured to the terminal coupler for protecting the cannula 38'. In the FIG. 5 embodiment the cannulae 38' would be connected to the individual containers 10 and the outlet conduit 42' would be connected to the pooling container 18, as previously described.

In lieu of the rigid blood containers 10 described, a flexible collapsible storage container or blood bag, such as shown in FIG. 8 may be used. It is of conventional construction and is identified by the numeral 54. It has a tube 56 terminating with a phlebotomy needle 58. A ball valve 60 is positioned between the tube 60 and bag 54. The bag is made of the same material as previously described in connection with the manifolds 22 and conduits 24. The blood bag 54 has a pair of outlet ports 62, each closed by a diaphragm 64. The conduit 24a here shown, which is joined to the manifold as previously described, has a terminal coupler 66 in the form of a hollow spear which when pressed against the diaphragm 64 punctures

the diaphragm to permit insertion of the spear into the bag 54. By manually squeezing the bag 54 the blood plasma in the bag will pass through the spear 66, through conduit 24a into the manifold and then out of the outlet conduit into the pooling container 18.

A further modification may be used of a single manifold connected with a plurality of rows of conduits, similar to that shown in FIG. 5, with a plurality of outlet conduits. This last-mentioned modification would be like that shown in FIG. 5, except that instead of the three manifolds, all the conduits would be connected to a single manifold having substantially the width of the three manifolds shown.

With the arrangement of the invention shown herein the plasma from a plurality of individual bottles or bags is passed into a single manifold and from that manifold is passed into a pooling container.

The invention herein shown may be used conversely if so desired; that is, the flow of a fluid may be from a single container or reservoir, similar to the pooling container 18, through the conduit 42, through the manifold 22, to and through the individual conduits 24, to the individual containers 10 or bags 54.

While the invention is shown and described specifically in connection with the transfer of blood plasma or serum, it could be used to transfer any biological or pharmaceutical fluid sterilely. The term "fluid" or "fluids" in the claims is intended to embrace all of the foregoing since they are all sterilely transferred.

It will be understood that various changes and modifications may be made from the foregoing without departing from the spirit and scope of the appended claims.

I claim:

1. A disposable single use apparatus for sterilely transferring blood plasma, serum, biological or pharmaceutical fluids and the like from a plurality of separate individual containers to a pooling container, said apparatus comprising a manifold formed of a generally flat elongated member sealed along its length and sealed at each end, a plurality of branch conduits formed integrally with said manifold and each connected at one end to said manifold at longitudinally spaced points on said manifold, each of said conduits having connected at its opposite end a coupler adapted for connection to a respective container, an end branch conduit on said manifold being connected to the pooling container, and the remainder of said conduits being connected to respective individual containers, valve means connected to each branch conduit for controlling the flow through said branch conduit, said manifold and said conduits being formed of flexible, inert, nontoxic and hemorepellant material.

2. The invention as defined in claim 1, including means at each end of said manifold for connection to support means for said manifold.

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