

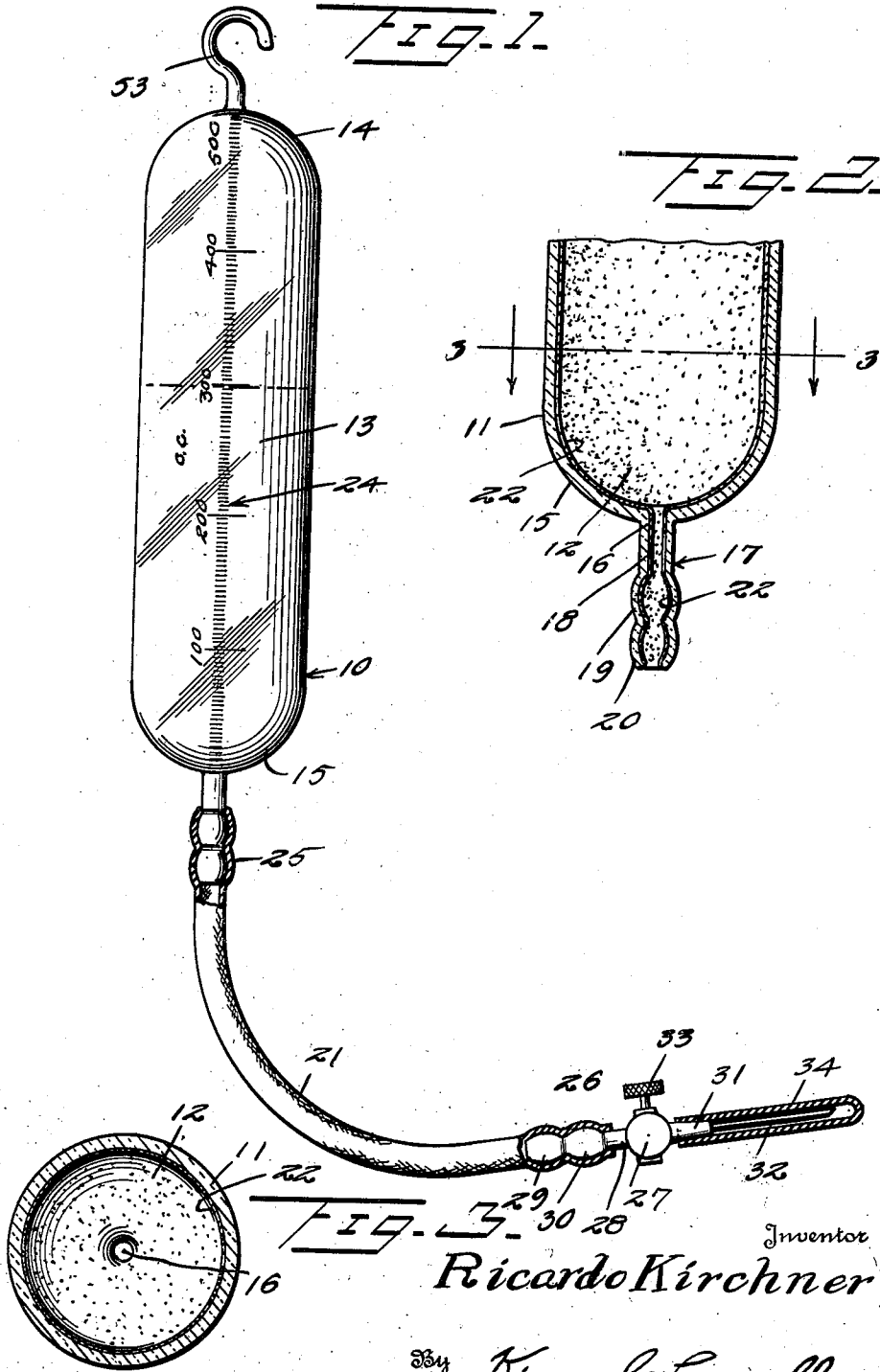
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R. KIRCHNER

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APPARATUS FOR AND METHOD OF BLOOD INFUSION

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Ricardo Kirchner

By *Kimmel & Crowell*
Attorneys

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APPARATUS FOR AND METHOD OF BLOOD INFUSION

Ricardo Kirchner, Mexico City, Mexico

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2 Claims. (Cl. 128—214)

This invention relates to an apparatus for and a method of blood infusion.

The invention aims to provide, in a manner as hereinafter set forth, for enriching the blood to be infused in the patient.

The invention further aims to provide, in a manner as hereinafter set forth, for utilizing the pressure of the enriching medium for the blood for infusing the latter into the patient.

The invention further aims to provide, in a manner as hereinafter set forth, whereby a small sized needle may be employed for the infusion operation, this being particularly advantageous when dealing with children or patients in whom access to a vein is difficult.

The invention further aims to provide, in a manner as hereinafter set forth, whereby an infusion operation may be expeditiously carried out by the utilization of enriched blood under gaseous pressure and with the pressure being provided by the enriching medium for the blood.

The invention further aims to provide, in a manner as hereinafter set forth, whereby the blood prior to its infusion is combined with an enriching medium in the proportions of three-fifths blood and two-fifths of such medium.

Embodying the aims aforesaid, and others which may hereinafter appear, the invention relates to an apparatus and a method to be hereinafter more specifically referred to, but it is to be understood that changes, variations and modifications may be resorted to in the apparatus and in the method which falls within the scope of the invention or claims.

In the drawing:—

Figure 1 is a side elevation, partly in section of an ampoule forming an element of the apparatus.

Figure 2 is a fragmentary view in vertical section of the ampoule, and

Figure 3 is a section on line 3—3, Figure 2.

With reference to the drawing, an ampoule is generally indicated at 10 and it includes a transparent hollow receiver 11 formed of any suitable material (preferably glass) and providing a blood receiving chamber 12. The chamber 12 is shown as for a content of 500 c. c. but can be of any desired size or dimensions. The receiver 11 includes a cylindrical intermediate portion 13 and a pair of oppositely disposed rounded end portions 14, 15. The end portion 14 is closed. The end portion 15 centrally thereof is formed with an opening 16 and a combined intake and outlet glass nipple 17. The latter is integral with and depends from end portion 15 and has its inner face registering with the wall of opening 16. The

nipple 17 is formed of a part 18 of uniform diameter and a pair of parts 19, 20 each decreasing in diameter from the transverse median to its ends. The part 18 at one end merges into the end portion 15 and at its outer end merges into the inner end of part 19. The outer end of part 19 merges into the inner end of part 20.

The parts 19, 20 are shown as of greater diameter than part 18, and they constitute couplers for a flexible conducting tube 21 to be more fully referred to, but obviously these parts may vary in specific size or dimensions. The inner face of the receiver, wall of opening 16 and the nipple 17 are coated throughout with chemically pure paraffine 22 preferably with what is termed "German" paraffine. Formed integral with and centrally of the outer face of the end portion 14 is a hook 23 for suspending the receiver 11 when desired. This hook is of the same material as the receiver. The receiver 11 is formed lengthwise of the outer face and aligned with its longitudinal axis with a cubic centimeter scale 24, as shown by way of example graduated in hundredths from one hundred to five hundred. It is to be understood that the scale 24 will vary depending on the length and dimensions of the chamber 12. The end terminal portion 25 of the tube 21 is coupled to the nipple 17 by overlapping the parts 19, 20 of the latter. The other end terminal portion 26 of tube 21 is coupled to a valve casing 27. The latter at one side is formed with a lateral tubular extension 28 formed with a pair of parts 29, 30 corresponding in form to that of the parts 19, 20 of nipple 17. The parts 29, 30 constitute couplers for the tube 21. The end terminal portion 26 of tube 21 overlaps the parts 29, 30 of extension 28. The other side of the casing 27 is formed with a tapered tubular nipple 31 which constitutes a combined intake and outlet for casing 27 and also a coupler for connecting a small needle 32 to said casing. The latter has mounted therein a shiftable normally closed valve 33 which is common to and provides for simultaneously opening and closing the extension 28 and nipple 31 to and from the interior of the casing 26. A removable glass or hard rubber cap 34 detachably engages with the nipple 31 to protect the needle 32 when the latter is not in use.

The tubing 21 heretofore mentioned is preferably of rubber or the like flexible material and such flexibility serves the purpose not only of permitting the apparatus to be readily compacted for storage, etc., but in the case of a transfusion to a patient who moves about during the trans-

fusion, the flexibility of the tube will prevent harm to the patient and eliminate such danger as bending and breaking of the needle of the reservoir for the blood.

After having been coated with the paraffine, as before described, the blood receiving chamber and conducting tube are first evacuated to create a vacuum in the ampoule. The valve is then closed, after which the needle is inserted in the vein of the person from whom the blood is to be extracted and the valve is carefully gradually opened. The suction effect of the vacuum will cause the blood to enter the receiving chamber of the ampoule. After the said chamber has been filled with blood to the desired extent, the valve is again closed and the needle extracted from the patient or donor. The needle is then detached from the valve, the needle side of the valve is attached to a suitable pumping means and an enriching medium such as pure air or oxygen or carboxide (which is a mixture of oxygen and carbon dioxide), under pressure, is directed or pumped into the ampoule. During the mixing of the enriching medium with the blood, the blood while in the ampoule is gently agitated to provide for a thorough admixing of the enriching medium (gas) with the blood. The admixing of the enriching medium with the blood is had under a pressure of preferably thirty pounds per square inch when the ampoule has a receiving chamber of about five hundred cubic centimeters capacity, but the pressure will vary proportionately depending upon the size of the receiving chamber. The ampoule, whatever its capacity may be, is never filled to more than 60% with blood so that the mixture of pure air or oxygen or carboxide and blood will be in the proportion of three-fifths of blood and two-fifths gas. The enriching medium thus admixed with the blood will not only provide an infusion having no deleterious effect on the patient but in addition it will be unusually beneficial to the patient. With the proportions of ingredients set forth, and the pressure described, the gas bubbles will be very tiny.

After the admixing step the valve is closed, the pumping means detached and the ampoule with the enriched infusion is stored in the member 10 to be suitably refrigerated. The member 10 with the ampoule therein is transported to the place where the infusion operation is to be carried on. When ready to be used, the ampoule is removed from member 10, and the cap 34 is then removed from the needle, the latter inserted in the patient and the pressure from the enriching medium will act to force the mixture from the ampoule through the needle into the patient. Prior to the storing of the ampoule in the member 10, the needle is attached to the valve casing and the cap 34 mounted in protecting relation with respect to the needle.

The enriching medium is preferably carboxide or pure air or oxygen, as stated, but it is con-

templated that other suitable gases or mixtures thereof may be used which will have the effect, and properties described.

The use and purpose of the paraffine is to prevent coagulation of the blood from what would otherwise be contact directly with the glass. It is the practice in some instances to add suitable agents to the blood to prevent coagulation, so that possibly the use of the paraffine could be eliminated, but it has been found that even in such cases, it is still preferable to use the paraffine coating and that better results are had from such use than otherwise. Coagulation of the blood, even to a small extent, will result not only in possible danger to the patient, but in addition will clog the needle.

The descriptive word "infusion" as used in this case is intended to include transfusions or transfusing of the blood.

What I claim is:

1. A method of enriching blood for infusion and for infusing the enriched blood into a patient, said method consisting in creating a vacuum in an ampoule, communicating the evacuated ampoule for a predetermined period with a source of blood supply to thereby cause a flow of blood into the ampoule, closing the ampoule, pumping under pressure for a predetermined period a gaseous enriching medium for the blood into the ampoule while the blood within the ampoule is under a state of agitation and in the presence of a preventative for blood coagulation to thereby intimately mix the blood and said medium to thereby provide an enriched mixture, closing the ampoule, and then utilizing, after opening the ampoule, the pressure within the ampoule of the residual enriching medium for the infusing of the enriched mixture from within the ampoule into the patient.

2. A method of enriching blood for infusing and for infusing the enriched blood into a patient, said method consisting in creating a vacuum in an ampoule, communicating the evacuated ampoule for a predetermined period with a source of blood supply to thereby cause a flow of blood into the ampoule to an extent of about sixty percent of the capacity of the ampoule, closing the ampoule, then pumping under pressure for a predetermined period, into the ampoule a gaseous enriching medium for the blood while the blood in the ampoule is under a state of agitation and is in the presence of a preventative for blood coagulation to thereby intimately mix the blood and said medium to provide an enriched mixture within the ampoule of about three-fifths blood and about two-fifths of said enriching medium, closing the ampoule, and then utilizing after opening the ampoule the pressure within the ampoule of the residual enriching medium for infusing from within the ampoule of the enriched mixture into the patient.

RICARDO KIRCHNER.