

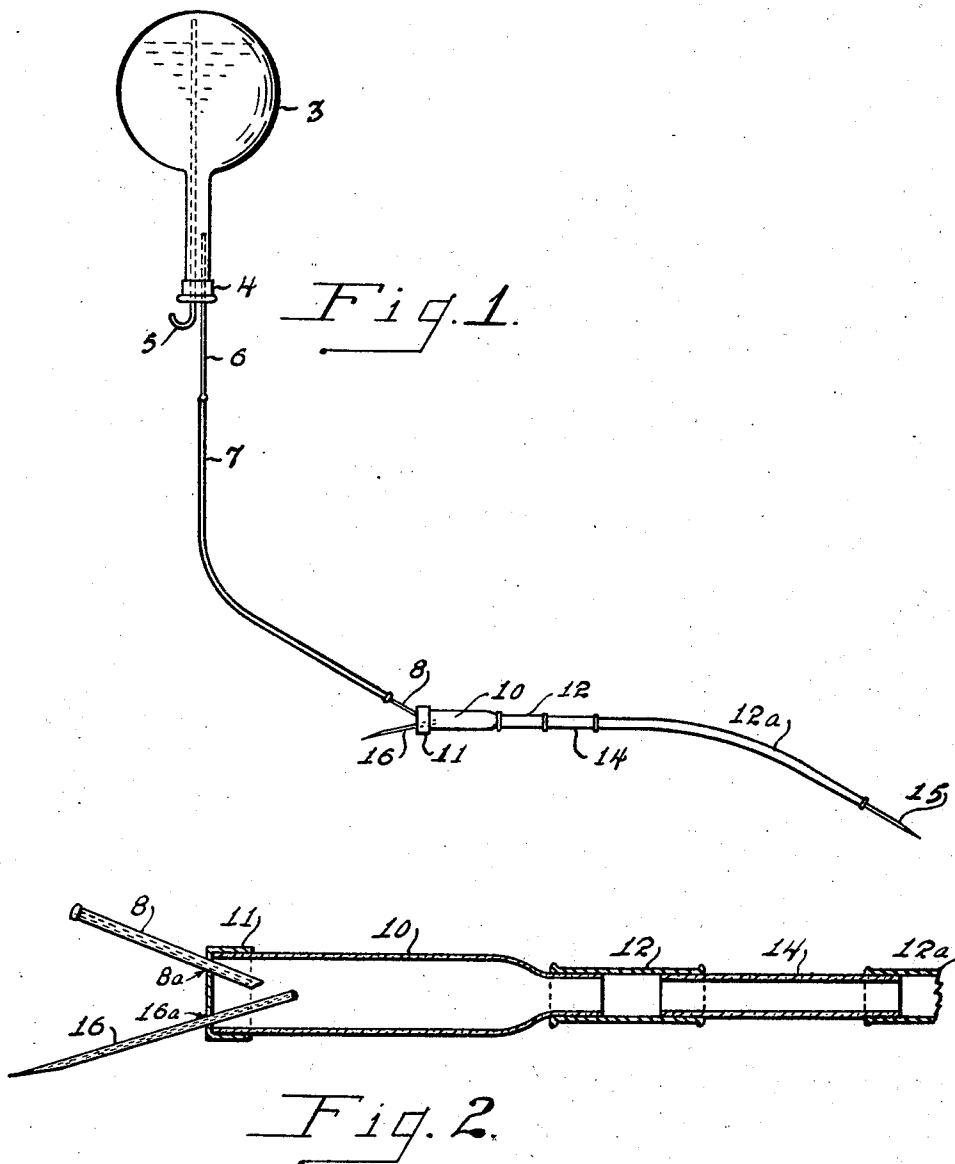
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N. C. AGUILAR

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METHOD AND MEANS FOR BLOOD TRANSFUSION

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N. C. Aguilar,
INVENTOR.

BY

J. W. Sheeley
ATTORNEY.

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NARCISO COSIO AGUILAR, OF MEXICO CITY, MEXICO.

METHOD AND MEANS FOR BLOOD TRANSFUSION.

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The present invention relates to apparatus and methods for the transfusion of blood, and pertains more particularly to the surgical art in which blood is transfused from a healthy subject to one less healthy, either in the case of human beings or animals.

It will be understood in the consideration of this invention that the transfusion should be directly and without delay, and it is one of the objects of the invention to provide an apparatus which will permit of direct, expeditious and sanitary transfusion of the blood, either in quantities subject to close regulation, or at a rate subject to close regulation.

Another and important object of the invention is to provide for improving or increasing the potentiality of the blood, as it passes from the giver to the recipient, in such manner that the previous dormant state of the blood is diminished.

Still another object of the invention is to provide an apparatus of the class described which permits the physician to know at all times the rate at which the blood is flowing from the giver to the recipient.

In carrying out one of the salient features of my invention, I provide a suitable volume of fluid of such nature that it is readily assimilated directly by the blood; certain glucose fluids being known to have such characteristics. I cause the blood, which is to be transfused, to flow from the giver to the patient through a mixer, in which the glucose fluid is mixed with the blood at a regulated rate, and I permit the resultant mixture to flow into the vein of the patient at a rate which I can regulate as I desire.

In view of the foregoing, it is another object of the invention to provide a device which will permit of the mixture of a glucose fluid and blood, while the said blood is flowing directly from the giver to the recipient, and which device will provide for readily or constantly regulating the rate at which the mixture flows on into the vein of the patient.

Still other objects and advantages of my invention will appear hereinafter.

I have illustrated my invention by the accompanying drawings in which:—

Figure 1 is a view in elevation of the complete apparatus.

Figure 2 is an enlarged detail view of a lower part of the apparatus.

More specifically, the numeral 3 indicates a glass globe or receptacle, arranged to be held in inverted position and closed at the lower end by a cork 4. Said receptacle may have a capacity of 1000 cubic centimeters. Through the cork 4 there extends two glass tubes, 5 and 6, respectively. Tube 5 is used to allow air to enter so that the fluid may gravitate from the receptacle into a flexible rubber tube 7, which is connected to the receptacle by the glass tube 6.

The rubber tube 7 continues to a mixer tube 8, to which it is connected. The mixer tube 8 is preferably of glass and is extended into the hollow interior of a larger glass tube 10, usually about two centimeters in diameter and about five centimeters in length. The tube 10 is provided at one end with a metal cork 11, and the other end is diminished in diameter to fit into a flexible rubber tube or nipple 12, of suitable length and flexibility. The rubber tube continues again, as at 12^a, but intermediate of the sections 12 and 12^a there is interposed a suitable length of glass tube 14, which is hereinafter known as the sight tube. Said sight tube permits of viewing the fluid and blood mixture as it flows by, so that the quantity of flow may be known at all times.

The tube section 12 leads to a usual needle 15, which is adapted to be employed to make connection with the artery of the recipient.

The metal cork is provided with two perforations, 8^a and 16^a, respectively. The mixer tube 8 is extended through the perforation 8^a and is a close fit therein, while the perforation 16^a serves to receive another needle 16, which is used to make a puncture in the artery of the giver. Both needles 15 and 16 are of the hollow type commonly employed by physicians for removing or injecting blood and other fluids. The needles are opposed or oppositely directed so that the flow of blood is directly from the donor to the recipient, and the tube 8 is directed into the tube 10 in the direction of such flow.

In employing the described apparatus in the transfusion of blood, the needle 16 is inserted in the artery of a giver so that the point of the hollow needle is directed against, or contrary to, the direction of flow of blood in the artery. Thus the systolic action of the heart of the donor will force the blood into the needle and through the device in the direction of the recipient. Usual-

ally, the donor is placed in a slightly higher elevation than the recipient, as is indicated by the respective positions of the two needles. The needle 15 is inserted in the recipient so that the needle is directed with the flow of blood, so that such flow of blood in the recipient has an inductive action and tends to draw the mixture into the blood vessel of the recipient. Such tendency is added to by the difference in elevation of the subjects and the fact that the heart action or systole of the donor results in blood actually being pumped, by the healthy giver's heart, into the body of the recipient at a point where the effective blood pressure is minimum. Thus I have provided for dispensing with pumps, syringes or the like. When, by observing the sight tube 12, it is seen that the blood is flowing as required, the reservoir 3 is elevated enough to cause fluid therefrom to flow into the large glass tube 10. Owing to the direction of the tube 8, such flow actually aids in forcing the mixture forwardly into the tubes 12, 14 and 12^a. The physician at all times keeps close watch upon the sight tube 12, noting carefully the color and viscosity of the resultant mixture and making sure that no coagulation, clotting, or uneven mixture is flowing. If at any time during such observation it is seen that the mixture is not as desired, the reservoir is instantly lowered to diminish or discontinue flow of glucose fluid into the tube 10. The fluid may be caused to flow from the reservoir into the blood stream in the tube 10 in even pulsations between the heart pulsations of the donor, so that full advantage of the systolic action of the donor may be had. The closed type of receptacle 3, which I employ, is particularly suited for this work as it enables the physician to move the receptacle without spilling or unduly agitating the contained fluid. By using my improved device, a physician may make a blood transfusion unaided and subject to very close observation and regulation, and without having to depend upon the human element of a less skilled assistant. My improved device and method forces the blood into the recipient in rhythmic pulsations of the correct nature and gives regular and normal pulse to the blood vessel receiving the fluid. The transfusion can thus be made with extreme care and with a well regulated mixture in a manner and state to which a weakened system will tend to respond, rather than being shocked thereby; previous methods being rather sudden and forceful. The tube 12, of my improved device, being smaller in diameter than the tube 10, provides higher fluid velocity at that point, and any slight change in viscosity of the mixture is instantly recognized.

It will be apparent now that I have provided for adding a suitable food-value fluid,

or other suitable blood agent, to a stream of blood flowing from a giver to a recipient, and it will also be apparent that I have provided a simple, dependable and sanitary device for carrying out the method, which device is subject to close observation and regulation, and while I have shown and described specific constructions, arrangements of parts and specific method with a specific order of steps in the method, I do not limit myself thereto, and I may employ any construction, arrangement of parts, method, or steps in a method, coming within the scope of the appended claims, without departing from the spirit of my invention.

What I claim as new and patentable is:—

1. In an apparatus of the class described, a portable fluid receptacle subject to change in elevation, a flexible tube leading from said receptacle, an elongated hollow member providing a mixture chamber, a second tube leading from said flexible tube into said hollow member in a direction approximately parallel to the longitudinal axis of said elongated hollow member, a hollow donor needle extending into said chamber in the same general direction in which the second tube enters said chamber, a mixture conveying tube leading from the elongated hollow member at the end opposed to that at which said second tube and needle enter, and a recipient needle continuing from said mixture conveying tube.

2. In an apparatus of the class described, a portable fluid receptacle subject to change in elevation, a flexible tube leading from said receptacle, an elongated hollow member providing a mixture chamber, a second tube leading from said flexible tube into said hollow chamber in a direction approximately parallel to the longitudinal axis of said elongated hollow member, a hollow donor needle extending into said chamber in the same general direction in which the second tube enters said chamber, a mixture conveying tube leading from the elongated hollow member at the end opposed to that at which said second tube and needle enter, a recipient needle continuing from said mixture conveying tube, and a translucent sight tube interposed in said fluid conveying tube; said sight tube being of appreciably smaller diameter than said elongated hollow member.

3. In an apparatus of the class described, a portable fluid receptacle having a reduced neck provided with an opening; said receptacle being otherwise entirely closed, a cork closing said neck, an open end air admission tube leading through said cork well into the interior of said receptacle, a conduit leading from the interior of said neck outwardly through said cork, a flexible tube attached to said conduit leading from said receptacle, an elongated hollow member pro-

viding a mixture chamber, a second tube leading from said flexible tube into said hollow member in a direction normal to the longitudinal axis of said elongated hollow member, a donor needle continuing into said chamber in the same general direction in which the second tube enters said chamber, a mixture conveying tube leading from the elongated hollow member at the end opposed to that at which said second tube and needle enter, a recipient needle extending from said mixture conveying tube, and a translucent sight tube interposed in said fluid conveying tube; said sight tube being of appreciably smaller diameter than said elongated hollow member.

NARCISO COSIO AGUILAR.