

April 20, 1937.

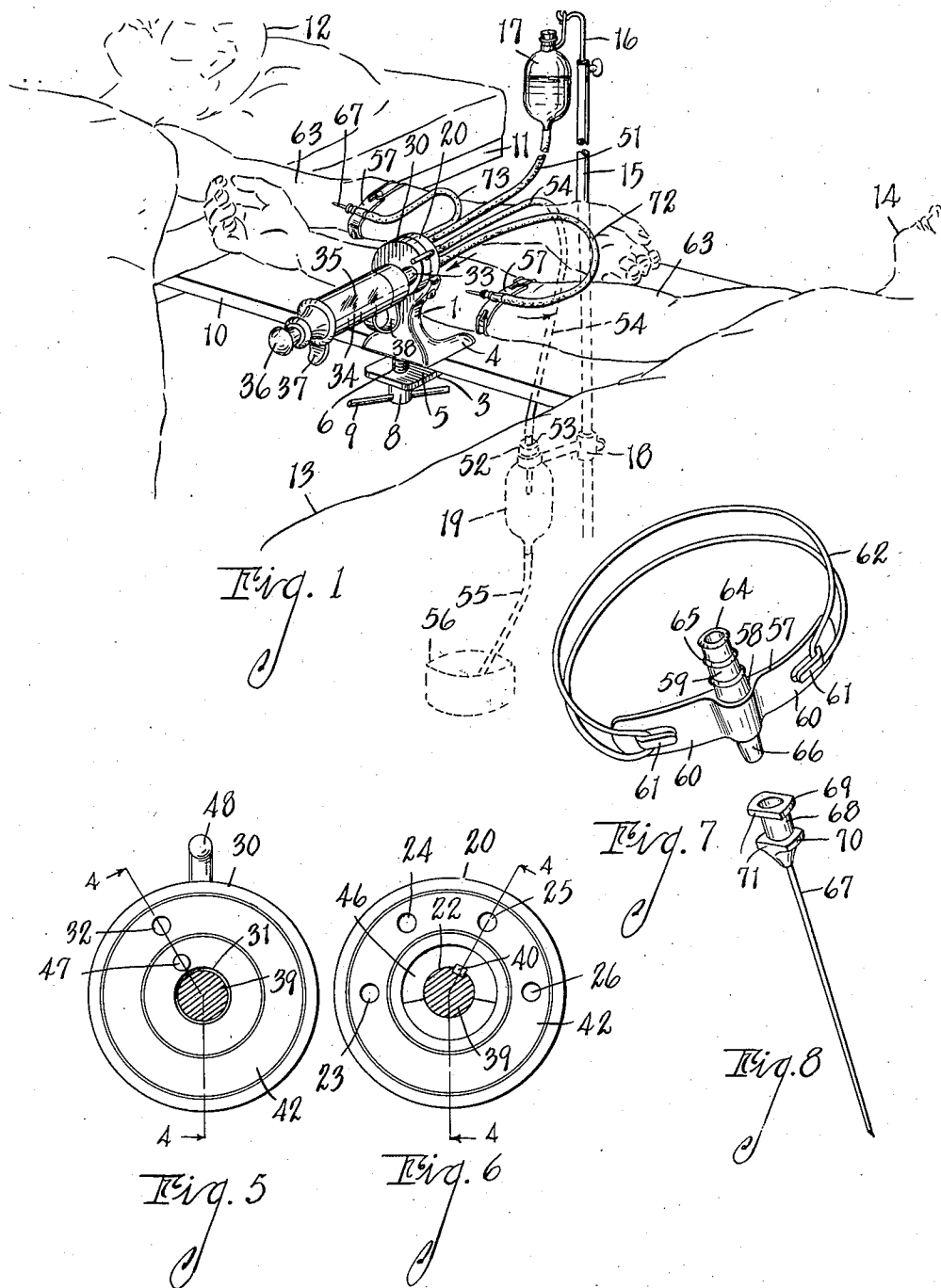
F. F. RUDDER

2,077,774

TRANSFUSION APPARATUS

Filed Feb. 19, 1934

2 Sheets-Sheet 1



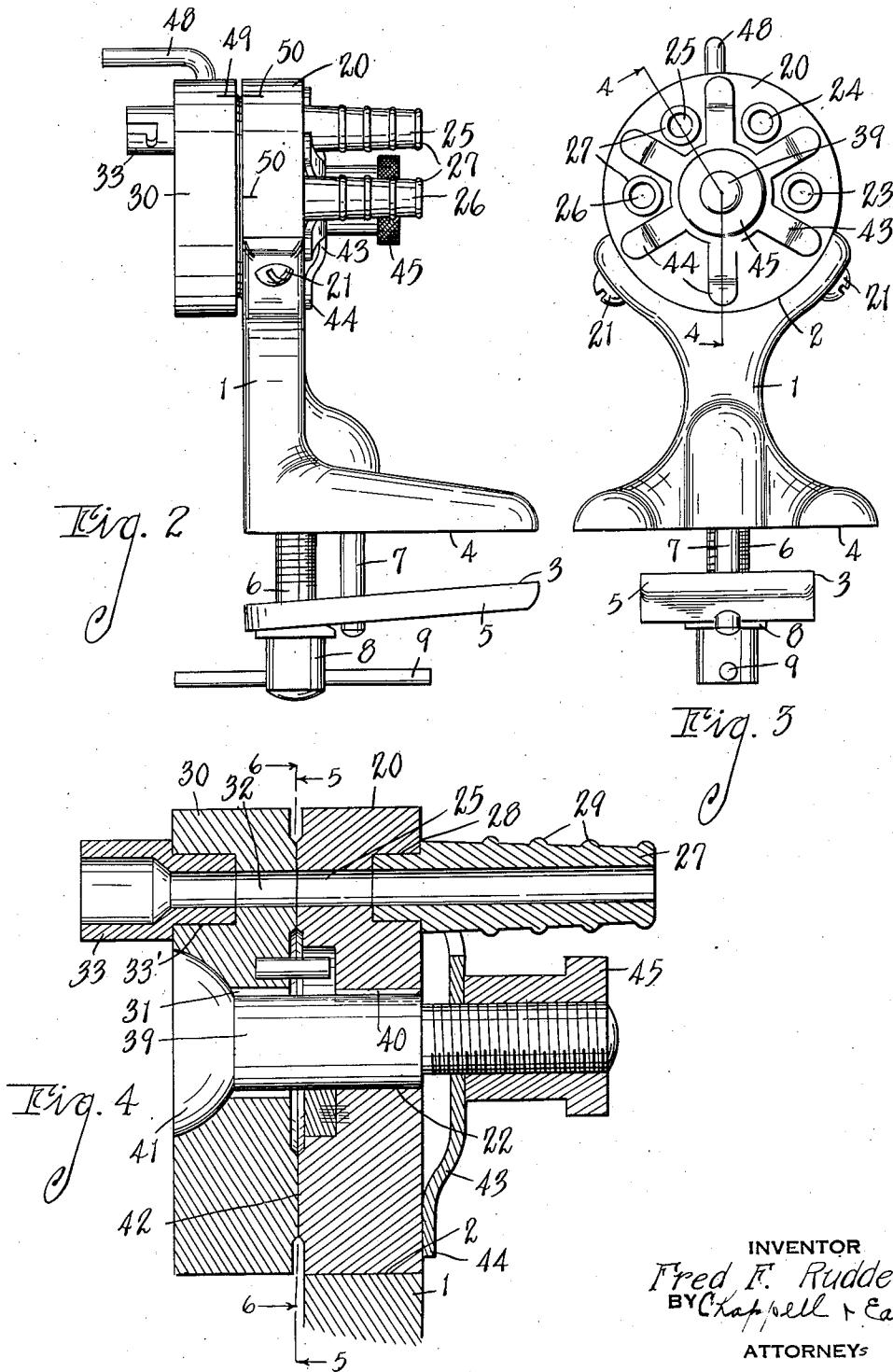
INVENTOR
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 BY Chappell & Carl
 ATTORNEYS

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UNITED STATES PATENT OFFICE

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TRANSFUSION APPARATUS

Fred F. Rudder, Jacksonville, Fla.

Application February 19, 1934, Serial No. 711,946

6 Claims. (Cl. 128—214)

The main objects of this invention are:

First, to provide improved apparatus which is well adapted for the successful transfusion of blood.

Second, to provide apparatus of this character having a valve provided with straight passages to eliminate blood clotting and to facilitate cleaning.

Third, to provide a special outlet in the valve for ejecting saline waste.

Fourth, to provide an adapter which is capable of receiving any standard make of needle.

Fifth, to provide improved means for supporting such adapter in position on the arm of the donor or recipient.

Sixth, to provide transfusion apparatus having the above desirable features and characteristics and which is simple and economical in its parts and very efficient and effective in operation and which can be readily taken apart for cleaning and sterilizing.

Objects relating to details and economies of my invention will appear from the description to follow. A structure which is a preferred embodiment of my invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a fragmentary perspective view of transfusion apparatus embodying the features of my invention in use.

Fig. 2 is a view in side elevation of my improved valve.

Fig. 3 is a rear elevation.

Fig. 4 is an enlarged fragmentary section on a line corresponding to line 4—4 of Figs. 3, 5, and 6.

Fig. 5 is a section on a line corresponding to line 5—5 of Fig. 4.

Fig. 6 is a section on a line corresponding to line 6—6 of Fig. 4.

Fig. 7 is a perspective view of my improved adapter and holder therefor.

Fig. 8 is a perspective view of a needle.

The parts are identified by their numerals of reference which are the same throughout the several views.

In the embodiment of my invention illustrated in the drawings, numeral 1 indicates a pedestal having a curved seat 2 at its top and a clamp at its bottom indicated generally by the numeral 3. The clamp comprises an upper member 4 formed integral with the pedestal and a lower member 5 which is provided with an opening for the passage of the screw 6 and the depending guide 7. The lower end of the screw has an enlarged head 8 coacting with the lower clamping member 5 and having a cross pin 9 by means of which the

screw 6 can be readily manipulated. By means of the clamp 3, the pedestal 1 may be secured to the cross support 10 in any desired position, the cross support 10 being arranged in the usual manner between the bed 11 of the recipient 12 and the bed 13 of the donor 14.

The stand 15 is arranged between the beds on the opposite side of the support and is provided with an upper bracket 16 for the saline vessel 17 and a lower bracket 18 for the saline waste bottle 19, the brackets being disposed above and below the support as indicated.

A stationary valve member 20 is secured to the curved seat 2 in the pedestal 1 by means of the screws 21, 21. The stationary valve member has a central bore 22 and a blood outlet 23, a saline inlet 24, a saline outlet 25, and a blood inlet 26, the blood and saline inlets and outlets being axially arranged in parallel and equi-spaced relation to the central bore 22. The blood and saline inlets and outlets are provided with nipples 27 which are frictionally fitted within sockets 28 provided therefor in the stationary valve member, the nipples being tapered and provided with spaced annular beads 29 for holding the rubber tubing thereon.

A rocking valve member 30 is arranged for coaction with the stationary valve member and has a central bore 31 and a syringe hole 32 extending parallel to the axis of said rocking valve member for selective registry with the blood and saline inlets and outlets in the stationary valve member. A syringe adapter 33 is frictionally mounted in the socket 33' in the rocking valve member. The syringe 34 is connected to the adapter 33 by means of a connection of the "bayonet-lock" type. The syringe 34 comprises a glass cylinder 35 and a plunger having an operating handle 36, the end members of the syringe being provided with finger grips 37 and 38.

A shaft 39 is keyed at 40 to the central bore 22 of the stationary valve member and has a connection 41 with the central bore 31 of the rocking valve member of the "ball and socket" type so that the contacting faces of the valve members at 42 are self seating, the faces being accurately machined so that an air-tight joint is provided. A spider-like spring 43 is disposed on the shaft 39 for longitudinal movement and has radial arms 44 for engaging the stationary valve member 20. A thumb nut 45 is threaded to the shaft and coacts with the hub of the spring for holding the arms thereof in engagement with the stationary valve member. The spring acts to hold the coacting faces of the stationary and rocking

valve members in air-tight contact at 42 which can be varied by adjusting the thumb nut. By removing the thumb nut, the parts of the valve may be readily disassembled for cleaning and sterilizing.

The rocking movement of the rocking valve member 30 relative to the stationary valve member 20 is limited by means of an annular recess 46 in the stationary valve member and a pin 47 on the rocking valve member projecting into said recess and adapted to engage the ends thereof.

The rocking valve member 30 is adapted to be manipulated by the handle 48 to bring the syringe hole 32 into selective registration with the blood and saline inlets and outlets, the proper position of the rocking valve member being indicated by the registration of the mark 49 thereon with one of the marks 50 on the stationary valve member. If desired, spring actuated detents can be provided for locating the rocking valve member in proper position.

The saline inlet 24 is connected to the saline vessel 17 by means of the rubber tubing 51. The waste bottle 19 is provided with a stopper 52 having a central bore 53 through which is fitted the rubber tubing 54, the upper end of the latter being connected to the saline outlet 25 of the stationary valve member. The tubing 54 extends through the bore in the stopper and terminates within the waste bottle 19 as indicated. A discharge pipe 55 is connected to the bottom of the waste bottle and delivers to the waste basin 56. With this arrangement, it is impossible to withdraw waste saline from the bottle 19.

To clean the syringe, the rocking valve member is adjusted so that the syringe hole registers with the saline inlet. The syringe is then manipulated to withdraw salt solution from the saline vessel until the syringe is filled therewith whereupon the rocking valve is adjusted to register the syringe hole with the saline outlet and the syringe is manipulated to discharge the waste saline through the tubing 54 into the waste bottle 19 and finally through the pipe 55 into the basin 56. Thus, the contents of the saline vessel 17 is kept clean for future use.

The holder 57 has a central bore 58 for the adapter 59. The holder is also provided with resilient lateral arms 60 having integral upset portions 61, 61 constituting inwardly facing hooks. The rubber band 62 is looped to engage the hooks 61 at its ends to hold the holder 57 in place on the limb 63 of the wearer. The adapter 59 is frictionally fitted within the bore 58 and has its tubing end 64 tapered and provided with spaced annular beads 65 and its needle end 66 tapered for receiving any standard needle. The needle 67 has an enlarged tubular base 68 provided with spaced annular flanges 69 and 70 flattened at 71 on opposed sides thereof.

The adapter associated with the limb of the donor is connected to the blood inlet 26 of the stationary valve member by means of the rubber tubing 72 while the adapter associated with the limb of the recipient is connected to the blood outlet 23 of the stationary valve member by means of the rubber tubing 73. The tubing is preferably rigid catheter No. 22 having a smooth inner bore throughout.

The transfusion is started by drawing normal saline through tubing 51, then displacing all air in tubing 72 and tubing 73 to donor and recipient, respectively, and enough saline is run into the tubing 54 to create a suction. Blood is then drawn from donor 14 and given to recipient 12 by manip-

ulating the syringe 34 and manually adjusting the rocking valve member 30. The syringe can be washed as often as necessary with saline from vessel 17, the waste saline being discharged into the bottle 19. As best illustrated by Fig. 4, the passage through the valve is absolutely straight, thereby preventing the formation of blood clots and facilitating cleaning with the salt solution.

The apparatus can be operated readily by one person without the aid of a nurse or assistant. The system is entirely air-tight, thereby eliminating the possibility of air embolism. The device is easily cleaned and sterilized and can be readily taken apart and assembled without the aid of tools. The metal parts are preferably of stainless steel or rustless metal.

It is obvious that various changes and modifications may be made in the details of construction, and design of the above specifically described embodiment of my invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. Transfusion apparatus comprising a first valve member and a second valve member, one of said valve members being stationary and the other a rocking one, said first valve member having a central bore and a plurality of bores parallel with the axis thereof to serve as straight blood and saline passages, said second valve member coacting with said first valve member and having a central bore, and a straight syringe hole parallel to the axis thereof for selective registry with said passages to provide a straight passage, a shaft keyed to the central bore of one of said valve members and having a connection with the central bore of the other of said valve members of the "ball and socket" type so that the contacting faces of the valve-members are self-seating, a spring disposed on said shaft for longitudinal movement and having radial arms for engaging the valve member which is opposed to the one having the "ball and socket" connection to said shaft to hold said valve members in cooperative relationship, a nut threaded to said shaft and coacting with the hub of said spring for holding said arms in engagement with said valve member, and means for limiting the rocking movement of the rocking valve member relative to the stationary valve member, comprising an annular recess in one valve member, and a pin on the other valve member projecting into said recess and adapted to engage the ends thereof to limit the movement of the rocking valve member.

2. Transfusion apparatus comprising a first valve member and a second valve member, one of said valve members being stationary and the other a rocking one, said first valve member having a central bore and a plurality of bores parallel with the axis thereof to serve as straight blood and saline passages, said second valve member coacting with said first valve member and having a central bore, and a straight syringe hole parallel to the axis thereof for selective registry with said passages to provide a straight passage, a shaft keyed to the central bore of one of said valve members and having a connection with the central bore of the other of said valve members of the "ball and socket" type so that the contacting faces of the valve members are self-seating, a spring disposed on said shaft for longitudinal movement and having radial arms

for engaging the valve member which is opposed to the one having the "ball and socket" connection to said shaft to hold said valve members in cooperative relationship, a nut threaded to said shaft and coacting with the hub of said spring for holding said arms in engagement with said valve member, and means for limiting the rocking movement of the rocking valve member relative to the stationary valve member.

10 3. Transfusion apparatus comprising a first valve member and a second valve member, one of said valve members being stationary and the other a rocking one, said first valve member having a central bore and a plurality of bores parallel
15 with the axis thereof to serve as straight blood and saline passages, said second valve member coacting with said first valve member and having a central bore, and a straight syringe hole parallel to the axis thereof for selective registration with said passages to provide a straight passage, a shaft in the central bore of one of said valve members and having a connection with the central bore of the other of said valve members of the "ball and socket" type so that the contacting faces of the valve members are self-seating, a spring disposed on said shaft for longitudinal movement and for engaging the valve member which is opposed to the one having the "ball and socket" connection to said shaft to hold
20 said valve members in cooperative relationship, and means on said shaft coacting with said spring for holding it in engagement with said valve member.

4. Transfusion apparatus comprising a first
35 valve member and a second valve member, one of said valve members being stationary and the other a rocking one, said first valve member having a central bore and a plurality of bores parallel with the axis thereof to serve as straight
40 blood and saline passages, said second valve

member coacting with said first valve member and having a central bore and a straight syringe hole parallel to the axis thereof for selective registration with said passages to provide a straight passage, a shaft in the central bore of one of said valve members and having a connection with the central bore of the other of said valve members of such type that the contacting faces of the valve members are self-seating, a spring disposed on said shaft for longitudinal movement and for engaging the valve member which is opposed to the one having the connection to said shaft to hold said valve members in cooperative relationship, and means on said shaft coacting with said spring for holding it in engagement with said valve member.

5. Transfusion apparatus comprising an upper saline vessel, a lower waste bottle, a valve located at a level between said bottle and vessel and comprising a stationary member and a rocking member, one member having a saline inlet and a saline outlet and the other member having a syringe hole for selective registration with said inlet and outlet to provide a straight passage, means connecting said saline vessel to said saline inlet, tubing connected to said saline outlet and terminating within the waste bottle, and a discharge connected to the bottom of said waste bottle.

6. Transfusion apparatus comprising an upper saline vessel, a lower waste vessel a syringe valve located at a level between said vessels and having blood and saline inlets and outlets, means connecting said upper saline vessel to said saline inlet, tubing connected to said saline outlet and terminating within the waste vessel, and a discharge connected to the bottom of said waste vessel.

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