

Dec. 12, 1939.

A. F. BURTON

2,183,318

MEDICAL AND SURGICAL APPARATUS

Filed Jan. 26, 1937

2 Sheets-Sheet 1

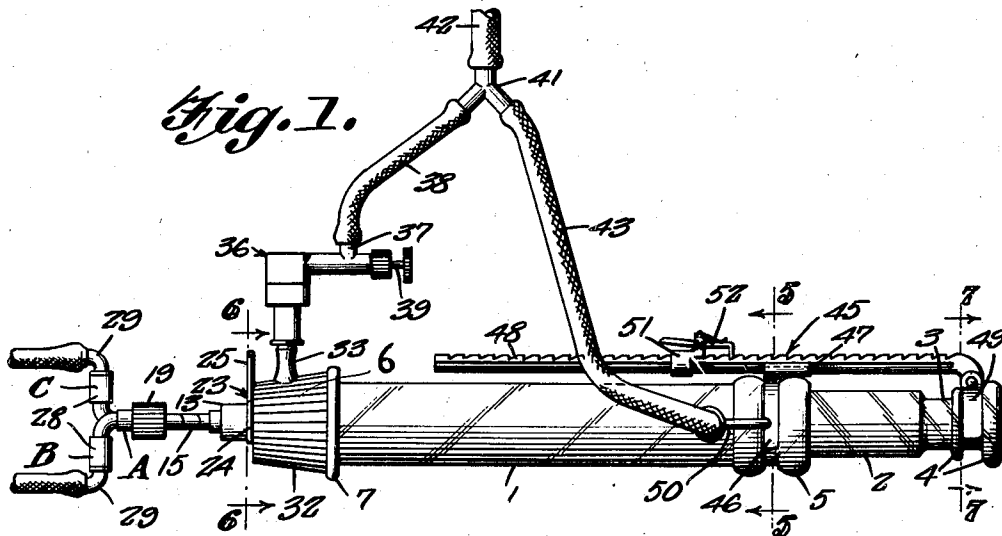


Fig. 2.

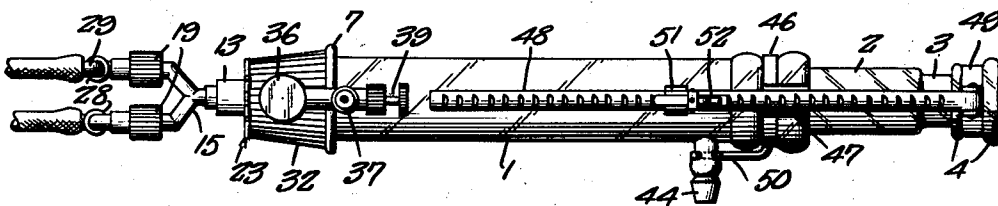


Fig. 6.

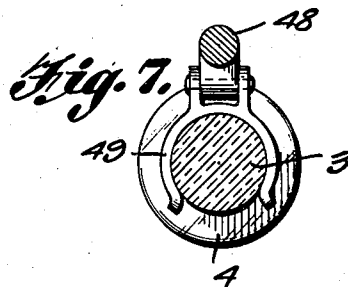
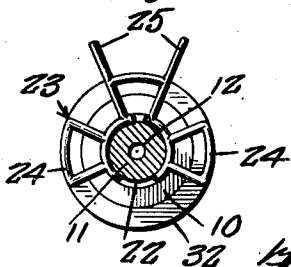
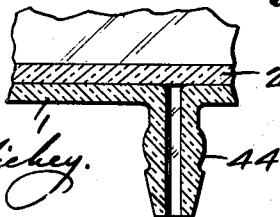


Fig. 8.



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WITNESS

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Fig. 3.

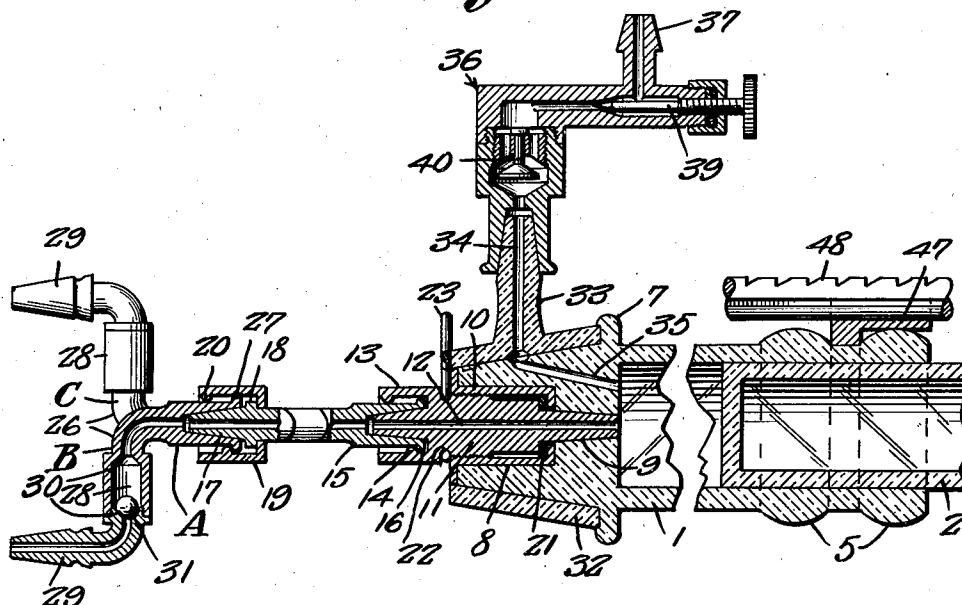


Fig. 4.

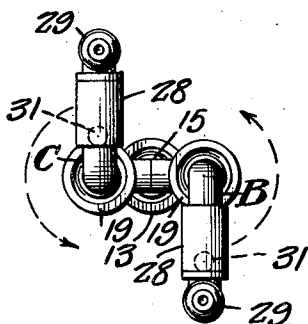
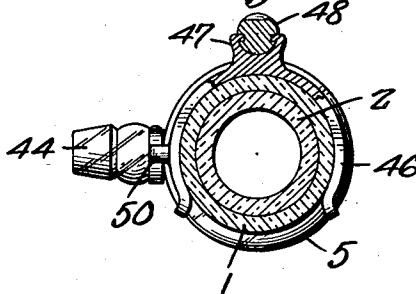


Fig. 5.



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UNITED STATES PATENT OFFICE

2,183,318

MEDICAL AND SURGICAL APPARATUS

Andrew F. Burton, Washington, D. C.

Application January 26, 1937, Serial No. 122,443

1 Claim. (Cl. 128—214)

This invention relates to surgical apparatus and more particularly to a blood transfusion device and has for the primary object the provision of an efficient and durable device of this character which will permit a blood transfusion to be quickly and accurately carried out by transferring blood from one person and injecting said blood into another person without disconnecting the device from either person.

Another object of this invention is the provision of means for accurately introducing into the blood being transferred anti-coagulants or other medicaments and which also may be employed as a lubricant to assure free operation of the device.

With these and other objects in view, this invention consists in certain novel features of construction, combination and arrangement of parts to be hereinafter more fully described and claimed.

For a complete understanding of my invention, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a side elevation illustrating a surgical apparatus constructed in accordance with my invention.

Figure 2 is a top plan view illustrating the same.

Figure 3 is a fragmentary vertical sectional view illustrating the adapters of the device and the means of admitting the anti-coagulant to said device.

Figure 4 is an end view illustrating the adapters.

Figure 5 is a transverse sectional view taken on the line 5—5 of Figure 1.

Figure 6 is a transverse sectional view taken on the line 6—6 of Figure 1.

Figure 7 is a transverse sectional view taken on the line 7—7 of Figure 1.

Figure 8 is a fragmentary sectional view showing the means of admitting the anti-coagulant into the cylinder of the device and in engagement with the piston to act as a lubricant for the latter.

Referring in detail to the drawings, the numeral 1 indicates a cylinder in which is reciprocally mounted a piston 2 and the latter extends outwardly of one end of the cylinder in the form of a finger grip 3 including spaced flanges 4. Said end of the cylinder has formed thereon spaced flanges 5. The other end of the cylinder is closed by a head 6 of substantially conical shape and is provided with a flange 7 at its point of formation on the cylinder. A recess 8 is formed in the head 6 and opens outwardly through the reduced end of said head and communicates with

a tapering bore 9 leading to the interior of the cylinder. A flanged bushing 10 is located in the recess 8 and the inner wall of said bushing has an opening aligning with the bore 9. The bushing 10 is internally screw threaded and has threaded therein a plug or fitting 11 provided with a passage 12 extending therethrough. The fitting 11 has a portion reduced and tapered to fit the bore 9 placing the passage 12 in communication with the interior of the cylinder and in alignment with the longitudinal axis of the cylinder. The fitting 11 also includes a tapered portion surrounded by a cup or flange 13 in which is formed a spiral rib 14. A fitting 15 of Y shape has a bore opening outwardly through the ends thereof and one end is provided with a tapered recess to fit the last-named tapered portion of the fitting or plug 11 within the cup-shaped portion 13. A flange 16 is formed on said end of the fitting 15 to engage with the rib 14 for aiding in retaining the fitting 15 within the cup-shaped portion 13 and with a tight fit with the plug or fitting 11. The other end of the fitting 15 is tapered, as shown at 17, and also flanged, as shown at 18. Cups 19 are applied to the fitting 15 in engagement with the flanges 18 and have formed therein spiral ribs 20. A gasket 21 is positioned in the bushing 10 between the latter and the fitting 11 to prevent leakage about said fitting 11, bushing 10 and head 6. The fitting 11 has a groove 22 arranged exteriorly of the head 6 and in close proximity thereto to receive a spring clip 23 which contacts the outer end of the bushing. The spring clip 23 includes a split annular portion fitting within the groove 22, on which portion are formed finger pieces 24. The annular portions of the split clip are joined by connected arms 25. The connected arms permit the annular portions of the clip to be flexed away from each other when desiring to remove the clip from the fitting 11.

Adapters 26 include portions A, B and C having formed therein passages. The portions A have tapered recesses to fit the tapered portions 17 of the fitting 15 within the cups 19 and are flanged, as shown at 27, to engage the ribs 20 placing the passages in communication with the bore of the fitting 15. The portions C and B have chambers 28 formed therein communicating with said passages of the adapters 26. The portions C and B extend in opposite directions to each other and during the use of the device said portions are arranged vertically, one or the other adjusted to be disposed in a plane above the other. Fittings 29 are secured to the portions C and B and extend at right angles thereto and form closures

for the chambers 28. Said chambers at the opposite ends thereof have valve seats 30 and operating within said chambers are ball valves 31. The fittings 29 are tapered to permit the application of rubber tubes or hose thereto and to which are applied the usual surgical needles (not shown) for insertion into the tissues or veins of a donor and a recipient. In use, the ball check valves 31 are arranged so that one is disposed vertically of the other so that blood of the donor may be drawn into the cylinder by the movement of the piston in one direction and the blood of the recipient prevented from entering the cylinder and on movement of the piston 2 in the opposite direction, the blood taken into the cylinder from the donor is injected into the recipient, said blood being prevented from returning to the donor.

A substantially conical-shaped sleeve 32 is journaled on the head 6 and retained thereon by the flange 7 and the spring clip 23. A nipple or fitting 33 is formed on the sleeve and the passage 34 thereof extends through the sleeve so as to be brought into communication with a passage 35 formed in the head 6 and which has communication with the cylinder 1. By adjusting the sleeve 32 on the head, the passage 34 of the nipple 33 may be moved into and out of communication with the passage 35. A valve housing 36 is shaped to receive the fitting 33 and has a nipple or fitting 37 formed thereon to which a flexible tube 38 is adapted. A needle valve 39 is arranged between the fitting 37 and the fitting 33 within the valve housing for controlling the flow of fluid through the housing from the fitting 37 to the fitting 33. A check valve 40 is also located in the valve housing between the needle valve 39 and the fitting 33 and which will permit fluid to pass from the housing 36 to the fitting 33 but which will prevent fluid from returning from the fitting 33 to the valve housing. The tube 38 has a Y fitting 41 connected thereto and to which is connected a supply tube 42 and also a tube 43 connected with a fitting 44 formed on the cylinder 1 and in communication with the interior of the latter for the purpose of admitting fluid onto the piston 2 to lubricate said piston and thereby prevent sticking of the piston. The supply tube 42 is connected to an anti-coagulant supply (not shown) or the supply may contain some other medicaments for the treatment of blood. Whatever fluid is in the supply acts as a lubricant for the piston 2 and may be permitted to enter the cylinder 1 in selected or controlled amounts for mixture with the blood taken in the cylinder from the donor and forced to the recipient by the reciprocation of the piston.

A control of an easily adjusted type is connected to the cylinder 1 and with the piston 2 for the purpose of permitting the operator of the device to vary the distance of travel of the piston on its suction stroke so that the amount of blood taken from the donor or transferred to the recipient can be controlled. A spring clip 46 fits the cylinder 1 between the flanges 5 and has integral therewith a guide 47 which slidably supports a toothed bar 48, one end of which is pivoted to a clip 49. The clip 49 fits the piston or finger piece 3 thereof between the flanges 4. The clip 46 has integral therewith a clip 50 engageable with the fitting 44 to prevent rotation of the clip 46 about the cylinder 1. A stop 51 is slidably mounted on the toothed bar and carries a spring pressed catch 52 to engage with the teeth of the bar 48. The stop 51 cooperates

with the guide in limiting the movement of the piston 2 on its suction stroke and the stop 51 may be adjusted along the bar 48 and held in any of its adjusted positions by means of the spring catch 52 engaging with the teeth. The adjustment of the stop 51 permits the operator to readily regulate the distance of travel of the piston 2 on its suction stroke.

In operation, the parts being in the position illustrated in Figure 1, tubes having suitable needles are connected to each of the fittings 29, said needles being inserted into the blood streams of the donor and recipient respectively. In this position of the parts, the piston is moved outwardly towards the end of the cylinder on the suction stroke thereby causing blood to be sucked through the intake passages into the cylinder, the ball check valve in the outlet passage of the adapter A serving to prevent blood from the recipient being withdrawn. A reverse movement of the piston serves to force the blood out of the cylinder through the outlet passage of the adapter A, the ball check valve in the inlet passage serving to prevent the blood being forced into the veins of the donor. During the suction stroke of the piston an anti-coagulant fluid is drawn into the cylinder through the passages 35, 34 and valve housing 36 from a suitable source of supply connected with said housing. A needle valve 39 serves to control the amount of anti-coagulant fluid sucked into the cylinder to be mixed with the blood and the check valve 40 serves to prevent the anti-coagulant fluid and blood from being expelled through the passages 35 and 34. Also, during the suction stroke of the piston an amount of anti-coagulant fluid is sucked through the tube 43 to lubricate the piston. The adjustable stop 51 carried by the rack bar detachably connected to the head of the piston serves to limit the suction stroke of the piston within the cylinder by engaging the guide 47. From the foregoing it will be apparent that the amount of blood sucked into the cylinder may be governed by adjustment of the stop on the rack bar 45, and likewise the amount of anti-coagulant fluid to be mixed with the blood may be governed by adjustment of the needle valve 39.

From the foregoing description taken in connection with the accompanying drawings it will be seen that a durable and efficient surgical device has been provided whereby an operator can accurately remove a desired amount of blood from a donor and transfer said blood directly to a recipient mixed with a desired amount of anti-coagulant fluid or some other blood treating fluid and that the last-named fluid will act as a lubricant for the piston and thereby prevent sticking of the piston in the cylinder.

Having described the invention, I claim:

A surgical device for blood transfusions comprising a cylinder, a piston reciprocally mounted in the cylinder for manual operation and having suction and expelling strokes, an adapter connected with the cylinder and including means whereby surgical needles may be connected thereto and which needles are to be inserted in a donor and a recipient and also having means whereby the blood taken from the donor on the suction stroke into the cylinder may be forced into the recipient on the expelling stroke of the piston and be prevented from reentering the donor and acting to prevent the blood of the recipient from entering the cylinder on the suction stroke of the piston, means for admitting

and regulating the amount of a fluid medicament to the cylinder for mixing with the blood being transferred from the donor to the recipient, and including means whereby certain of
5 said fluid may be applied to the piston as a lubricant therefor, a detachable rack bar carried by said piston, a guide detachably mounted on said cylinder and slidably engaging said rack bar, and a stop on said rack bar for engagement with said
guide to limit the suction stroke of said piston, said stop having a spring pressed catch for selective engagement with a tooth of said rack bar for effecting adjustment of said stop on said
bar whereby a predetermined amount of blood
5 may be transfused by complete suction and expelling strokes of said piston.

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