

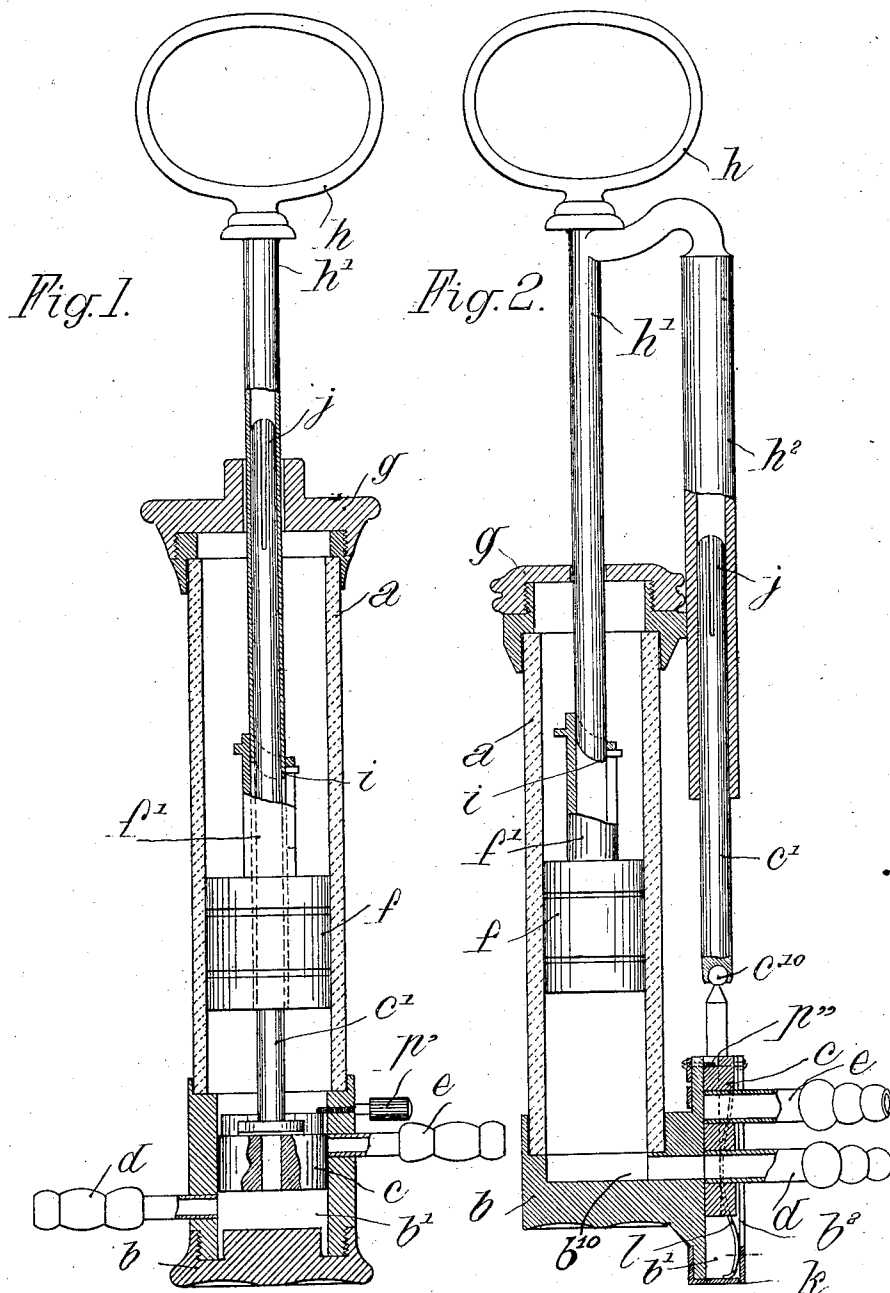
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SYRINGE

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by his attorneys *Wick & Hays*

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UNITED STATES PATENT OFFICE.

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SYRINGE.

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This invention relates to improvements in syringes, and in particular, to syringes used for the transfusion of blood.

The invention has for its chief object to so construct such syringes so that they function better.

In order that the invention may be more clearly understood, it will now be described with reference to the accompanying drawing, which is given merely by way of example.

Fig. 1 shows an axial section of a syringe for the transfusion of blood constructed according to one method of carrying out the invention.

Fig. 2 is a similar view of a modified construction of a syringe for the same purpose.

Referring to the drawings:—

a is a cylinder, preferably of glass, closed at one end by a base b , in or near which is provided a chamber b^1 adapted to receive a distributor element. This may consist of a small cylindrical or plain sliding sleeve c , adapted to be displaced or reciprocated in the said chamber b^1 , so that it puts the interior of the cylinder a in communication, when said sleeve c is moved to the end of its upstroke, with an admission passage d . When said sleeve c is moved to the end of the downstroke, it puts the interior of the cylinder a in communication with the delivery pipe e .

In the construction shown in Fig. 1, the chamber b^1 is so arranged that its axis is in alignment with the axis of the cylinder a ; and the cylindrical sliding sleeve c is so formed that the liquid can at required times pass longitudinally through it. Two radial passages are provided in the base b into which the tubes d and e are screwed or otherwise inserted. In this way, as previously stated, when the sliding member c is at the end of the upstroke, it uncovers the admission passage of base b , which passage is then in communication with the chamber b^1 , and through the passage in the slide c with the interior of the cylinder a . When the slide c is at the end of the downstroke, it uncovers the delivery pipe e , which pipe is then in communication with the chamber b^1 and is directly in communication with the interior of the cylinder.

Alternatively, as shown in Fig. 2, the chamber b^1 may be formed in a laterally extending portion of the base b , with its axis parallel to the axis of the cylinder a . k is

the removable cover of this chamber and it is provided with springs l to press down the sleeve during its sliding movement. The chamber b^1 is connected to the interior of the cylinder a by means of a single passage b^{10} passing through the base b . The sliding element c is provided with two diametric holes into which are fixed respectively the nozzles d and e . These nozzles project through a slot b^2 , in the wall of the chamber, this enabling the element c to reciprocate. When the sliding member c is at the end of the upstroke, the tube d registers with the conduit b^{10} , whilst, when it is at the end of the downstroke, the tube e registers with the conduit b^{10} .

f is a piston adapted to reciprocate in the cylinder a and provided with a rod f^1 .

In the construction shown in Fig. 1, the rod f^1 is tubular and adapted to receive an inner rod h^1 which is also tubular and is attached to or formed with the handle h . i is a suitable pin fixed to the rod h^1 and movable in a slot in the rod f^1 , the length of this slot being equal to the stroke of the slide c . The rod h^1 and the piston f are provided with a bore, the inner wall of which is adapted to frictionally grip the rod c^1 of the sliding element c . This rod c^1 has a split end j to engage the bore of the rod h^1 . In this way the rod c^1 and consequently the sliding element c tend to be drawn along when the rod h^1 is displaced in either direction. If for example, the piston f is at the bottom of its stroke and hence the sleeve valve c is in its bottom position, an upward pull upon this handle h causes the sleeve valve c to be moved to its upper position before the pin i of the rod h^1 contacts with the upper end of the slot in the piston rod f^1 . Hence, the position of the sleeve valve c is reversed at the end of each stroke, before the movement of the piston f is reversed. Likewise, if the direction of movement of the piston f is reversed before it has reached the end of its stroke and while said piston f is in what may be termed an intermediate position, the movement of the handle h causes the position of the sleeve valve c to be reversed before the movement of the piston f is reversed.

In the modified construction shown in Fig. 2, the rod f^1 has an axial opening or depression in which the rod h^1 fits. The rod f^1 and the tube h^1 are interconnected by a suitable pin i fixed to the rod f^1 and working in a slot of a length equal to the stroke of the

slide c and provided in the tube h^1 , h^2 is another rod parallel to the tube h^1 and so connected thereto that the distance between the axes of the two rods is equal to the distance
5 between the axis of the slide c and that of the piston f .

The rod h^2 is formed tubular and is adapted to receive the rod c^1 in connection with the sliding element c . The rod c^1 is provided with an articulation for the purpose
10 of preventing lateral pressures.

In the particular construction shown the rod c^1 is provided with a split end or the like j adapted to frictionally engage with rod
15 h^2 so as to move the rod c^1 and consequently the slide c in one direction or the other, when the tube h^2 is displaced in the direction of its axis.

The mode of operation of the devices shown in Figs. 1 and 2 is as follows: When the handle h is pulled upwards in order to raise the piston f towards the end g , rod c^1 which is in frictional contact with tube h^1 or h^2 , exerts a pull on sliding element c the
25 end of its upstroke and establishing communication between the lower portion of the cylinder a and admission pipe d ; on continuing the pull upon the handle in the same direction, the piston f is raised through the intervention of the pin i , and liquid is
30 drawn into the interior of the cylinder of the syringe.

p' and p'' are two simple self stopping devices for the sleeve.

When it is desired to deliver the liquid, the handle h is pushed down. This first of all causes the slide c to move downwards, closing the admission tube d and opening the delivery passage e . The pin i then
40 comes into action to push the piston f downwards, and the liquid contained in the lower portion of the cylinder a is delivered from this cylinder through the tube e .

It is to be pointed out that the reversing movement can be carried out in any intermediate position of the piston f . The operation always starts with a change of position of the sliding member c .

As has already been stated the invention
50 is not limited to the particular application

or to the constructional embodiments of its various features which have been more particularly described, but all modification falling within a fair interpretation of the claims are included.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A device for the transfusion of blood comprising in combination a cylinder, a piston slidably mounted therein, said piston having a piston rod connected thereto, an inlet and an outlet tube mounted on the same end of the cylinder, valve means interposed
65 between the cylinder and the inlet and outlet tubes and operable to establish communication between the cylinder and either the inlet tube or the outlet tube, and frictionally operated means for shifting the position of
70 said valve means prior to each reversal of the piston.

2. A device for the transfusion of blood comprising in combination a cylinder, a piston slidably mounted therein, said piston
75 having a piston rod connected thereto, an inlet and an outlet tube mounted on the same end of the cylinder, valve means interposed between the cylinder and the inlet and outlet tubes and operable to connect either the
80 inlet tube or the outlet tube to the cylinder, and means operable on each reversal of movement of the piston rod to first move said valve means and to then move said piston.

3. A device of the class described comprising in combination a cylinder, an inlet and an outlet tube connected to the same end of said cylinder, a piston slidably mounted in said cylinder, valve means controlling communication between the cylinder and said inlet and outlet tubes, and means operable to reverse the position of said valve means in position of the piston intermediate the ends of the piston stroke, and independent of the reversal of movement of the piston at the ends of its stroke.

In testimony whereof I affix my signature.

HENRY LOWENFELD.