

Oct. 29, 1935.

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2,018,998

SURGICAL PUMP

Filed May 11, 1934

2 Sheets-Sheet 1

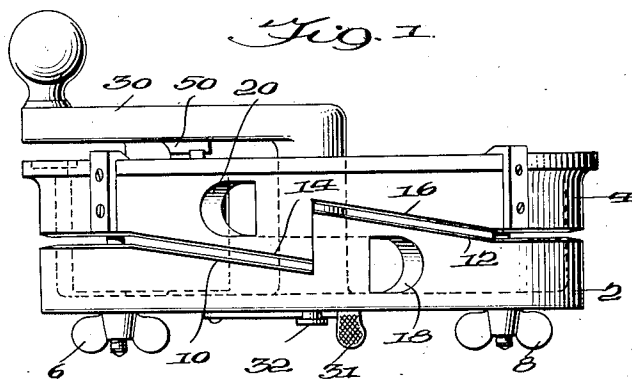


*Fig. 2.*

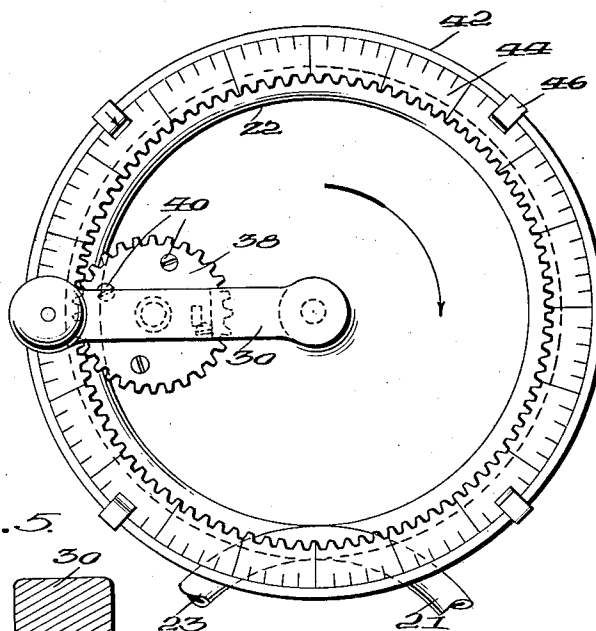


*Fig. 5.*

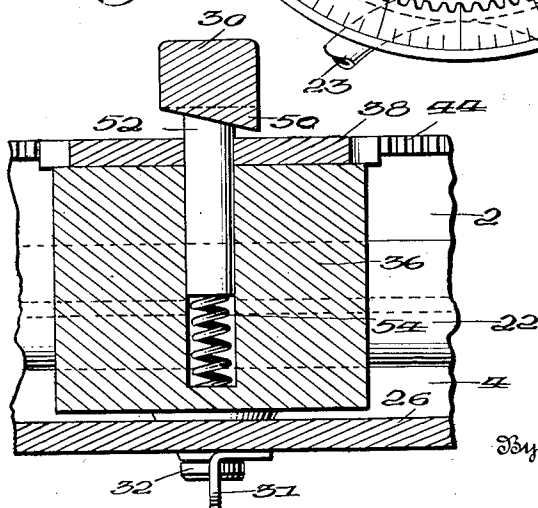
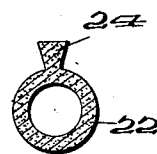


*Fig. 6.*



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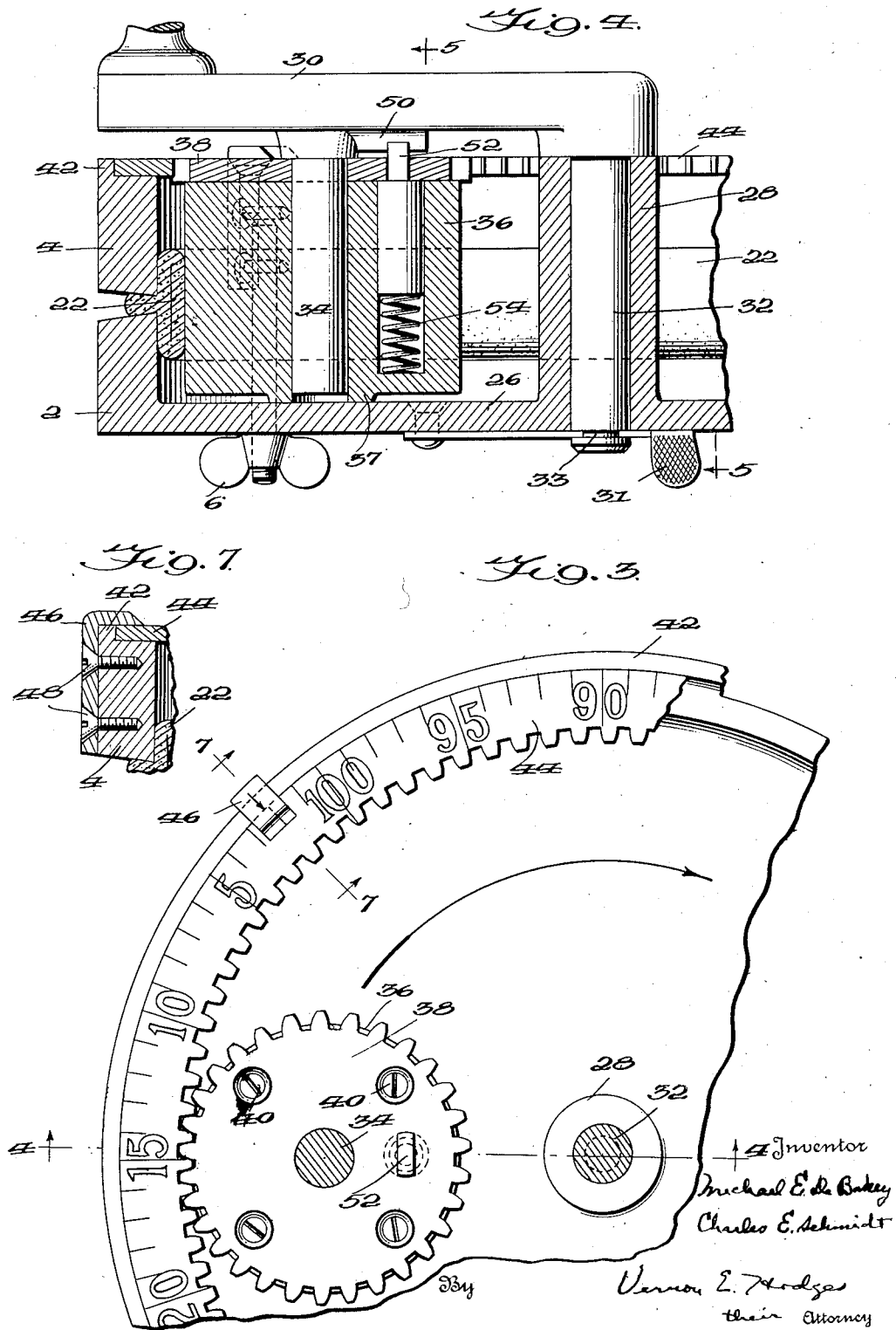
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## SURGICAL PUMP

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2 Sheets-Sheet 2



## UNITED STATES PATENT OFFICE

2,018,998

## SURGICAL PUMP

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Application May 11, 1934, Serial No. 725,162

11 Claims. (Cl. 103—149)

Our invention relates to an improvement in a surgical pump.

The object of our invention is to provide a simple and efficient surgical pump designed primarily for use in blood transfusions and infusions of other fluids.

Another object of our invention is to provide a surgical pump which is positive in its action and which may be operated in the one direction only.

Another object of our invention is to provide a surgical pump having a device for counting the number of revolutions of the pump or the amount of fluid transferred by the pump.

In making blood transfusions, one of the most essential features of a pump is that the pump should not be operated in a reverse direction, thus allowing a possibility of the blood to flow from the patient being treated to the donor. If this should happen, it is very dangerous to the life of the donor as well as the patient.

In making transfusions of blood, it is necessary to know how much blood is being transferred, which may be counted either by the revolutions of the pump or in the amount which will be calculated by the number of revolutions of the pump.

In making blood transfusions, there is necessarily a certain amount of confusion, and it becomes practically impossible for the surgeon performing the operation to bear in mind the number of revolutions which have been made by the pump he is using; and it is therefore very desirable that a counting device be fixed to the pump that is being used.

In the drawings:

Fig. 1 is a side elevation of the surgical pump with the tube removed;

Fig. 2 is a plan view;

Fig. 3 is an enlarged partial plan view with the crank-handle removed;

Fig. 4 is an enlarged section on the line 4—4 of Fig. 3;

Fig. 5 is an enlarged irregular cross-section on the line 5—5 of Fig. 4;

Fig. 6 is a cross-section of the tube;

Fig. 7 is an enlarged cross-section on the line 7—7 of Fig. 3.

The pump is made in two sections 2 and 4 which are designed to fit together as shown in Fig. 1 to be held in their assembled position by the wing-nuts 6 and 8.

The lower section 2 is provided with a downwardly slanting surface 10 on the left side of the section (as viewed in Fig. 1) and with an upwardly slanting surface 12 on the right side (as shown in Fig. 1). The upper section 4 is provided

with downwardly and upwardly slanting edges 14 and 16 to correspond with the downwardly and upwardly slanting edges of the lower section 2. The lower section 2 is provided with an opening 18, and the upper section 4 is provided with an opening 20, which openings are located in the enlarged portions of the respective sections. These openings are provided so that the tube 22 may enter the lower section 2 through the opening 18 and pass around the inner side of the two sections and be held therebetween as shown in Fig. 4.

The tube 22 is provided with a flange 24 which is cut with its sides converging toward the point where it is affixed to the tube 22. The edges of the sections 2 and 4 are beveled as shown in Fig. 4, so that they will conform to the edges of the flange 24 of the tube 22 to hold it securely in place on the inner side of the sections 2 and 4.

We provide a solid base 26 on the lower section 2, in the center of which is an upstanding bearing 28.

After the tube 22 has been placed in position between the sections 2 and 4, the crank 30 is placed in the center of the assembled sections 25 with the crank-pin 32 in position within the bearing 28 to be held in position by the catch 31, which engages within the channel 33 in the end of the crank-pin 32.

The crank 30 is provided with a stub-shaft 34, at a predetermined distance away from the crank-pin 32. This shaft is placed within a roller 36 and holds said roller against the tube 22 holding it in the compressed position as shown in Fig. 4 when the crank is in position for operation. The roller 36 is provided on its under side with a boss 37 which holds the roller 36 out of contact with the base 26, thus reducing friction. The roller 36 is provided with a pinion-gear 38 which is attached to the upper side of the roller by means of the countersunk screws 40.

The upper edge of the upper section 4 is provided with a flange 42 to hold a scale 44 in position to be operated by the pinion-gear 38. The scale 44 is loosely held on the upper section 4 by the flange 42 and the removable clips 46 which are secured to the upper section 4 by means of suitable countersunk screws 48.

One of these clips 46 is provided with an engraved arrow to point to the scale 44.

The pinion-gear 38 is slightly smaller in diameter than the roller 36, so that as the roller rotates when the crank is turned, the scale 44 will move a predetermined amount with each revolution of the crank.

The under side of the crank 30 is provided with a boss 50 to engage the spring-pressed lug 52 which is mounted within the roller 36 and pressed upwardly by the spring 54 as shown in Figs. 4 and 5. The boss 50 is beveled on one side (the side shown in Fig. 4) so that as the crank 30 is revolved in a clockwise direction, the roller 36 revolves in a counter-clockwise direction, and the spring-pressed lug 52 will be depressed by the boss 50 and allowed to pass. If the crank 30 revolves in a counter-clockwise direction, the roller 36 would rotate in a clockwise direction, and the spring-pressed lug 52 would come into contact with the other edge of the boss 50 after the roller 36 had made less than one revolution, thereby stopping the rotation of the crank in a counter-clockwise direction.

To summarize, the pump is assembled by placing the upper and lower sections together, and clamping them in position around the tube which has been inserted through the opening in the lower section extending around the inner side between the upper and lower sections, and emerging through the opening 20 in the upper section.

With the tube properly placed and secured in position, the roller 36 is placed within the assembled sections and is held compressing the tube 22 (as shown in Fig. 4), after which time the crank 30 is placed into position by placing the stub-shaft 34 within the center of the roller 36, and the crank-pin 32 within the bearing 28 in the center of the lower section 2. When the crank is in its assembled position, the latch 31 is moved so that it is in position within the flange 33 of the crank-pin 32 to hold the crank in proper position.

By rotating the crank in a clockwise direction, the roller 36 is moved around the inner circumference of the sections 2 and 4, thus compressing the tube 22 progressively to draw fluid in through the end 21 and force it out through the end 23 of the tube 22.

As the roller 36 is rotated, the pinion-gear 38 mounted thereon moves the scale 44 relative to the casing to indicate the number of revolutions made by the crank 30. With each revolution in a counter-clockwise direction, the spring-pressed stud 52 passes the boss on the under side of the crank 30, which boss permits the spring-pressed stud 52 to pass only when the roller 36 is rotating in a counter-clockwise direction.

We claim:

1. In a surgical pump, a casing, a tube held by said casing, a roller to compress said tube against said casing, means for rotating said roller, and means carried by the said rotating means and the roller for preventing the rotation of said roller for more than one revolution in one direction.

2. In a surgical pump, a divided cylindrical casing, a tube held between the sections of the casing, a roller for compressing the tube against the casing, means for moving the roller in one direction, and means carried by the roller and said moving means for preventing the roller from rotating for more than one revolution in the opposite direction.

3. A surgical pump comprising a lower section, an upper section, a tube secured therebetween, a crank pivotally mounted in one section, a roller pivotally mounted on the crank to compress said tube, and means carried by the roller and said crank for arresting the movement of the crank in one direction.

4. A surgical pump comprising a cylindrical casing, a tube secured to the inner side of said casing, a crank pivotally secured to the center of said casing, a roller secured to said crank for compressing said tube against said casing, and means including a scale and pinion for counting the revolutions of the crank, said scale being mounted on said casing and said pinion being secured to said roller and adapted to move the scale as the roller is rotated.

5. A surgical pump comprising a cylindrical casing, a tube secured to the inner side of said casing, a crank pivotally secured to the center of said casing, a roller secured to said crank for compressing said tube, a scale mounted on one edge of said casing, and a pinion secured to said roller for moving the scale as the roller is rotated.

6. In a surgical pump, a cylindrical casing, a tube secured to the casing, a roller for compressing said tube at progressive points, means for moving the roller lengthwise of the tube, and means carried by the roller and said moving means for arresting the rotation thereof in one direction.

7. In a surgical pump, a cylindrical casing, a tube secured to said casing, roller means for compressing said tube against said casing at one point at a time, said means being movable lengthwise of said tube, and means carried by the roller and said movable means for arresting the rotation of the roller in one direction.

8. A surgical pump comprising a divided cylindrical casing, the adjacent edges of which converge, a tube having a flange outstanding therefrom, the sides of said flange converging and held between the said converging edges of the casing, a crank rotatably connected with said casing, and a roller carried by said crank and adapted to compress the tube against the casing as the crank is rotated.

9. A surgical pump comprising a divided cylindrical casing, the adjacent edges of which converge, a tube having a flange outstanding therefrom, the sides of said flange being beveled to approximately fit between the converging edges on said casing divisions, a crank rotatably connected with said casing, and a roller carried by said crank and adapted to progressively compress said tube against the casing as the crank is rotated.

10. In a surgical pump, a cylindrical casing, a tube secured to said casing, a roller for compressing said tube at progressive points, means for rotating said roller, a spring urged lug mounted on said roller, and a boss on said means for rotating the roller, said boss positioned to engage the spring urged lug with every rotation of the roller and to stop the rotation of the roller in one direction.

11. In a surgical pump, a cylindrical casing, a tube secured to said casing, a roller for progressively compressing said tube, a crank for rotating the roller, a spring-urged lug mounted on the roller, and a boss on said crank in position to engage the spring urged lug, said spring urged lug adapted to pass the said boss when the roller is rotated in one direction and to be stopped by the boss when the roller is rotated in the opposite direction.

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