

March 26, 1946.

P. P. GOLAND ET AL

2,397,257

SURGICAL SUCTION APPARATUS

Filed Feb. 4, 1943

2 Sheets-Sheet 1

Fig 1

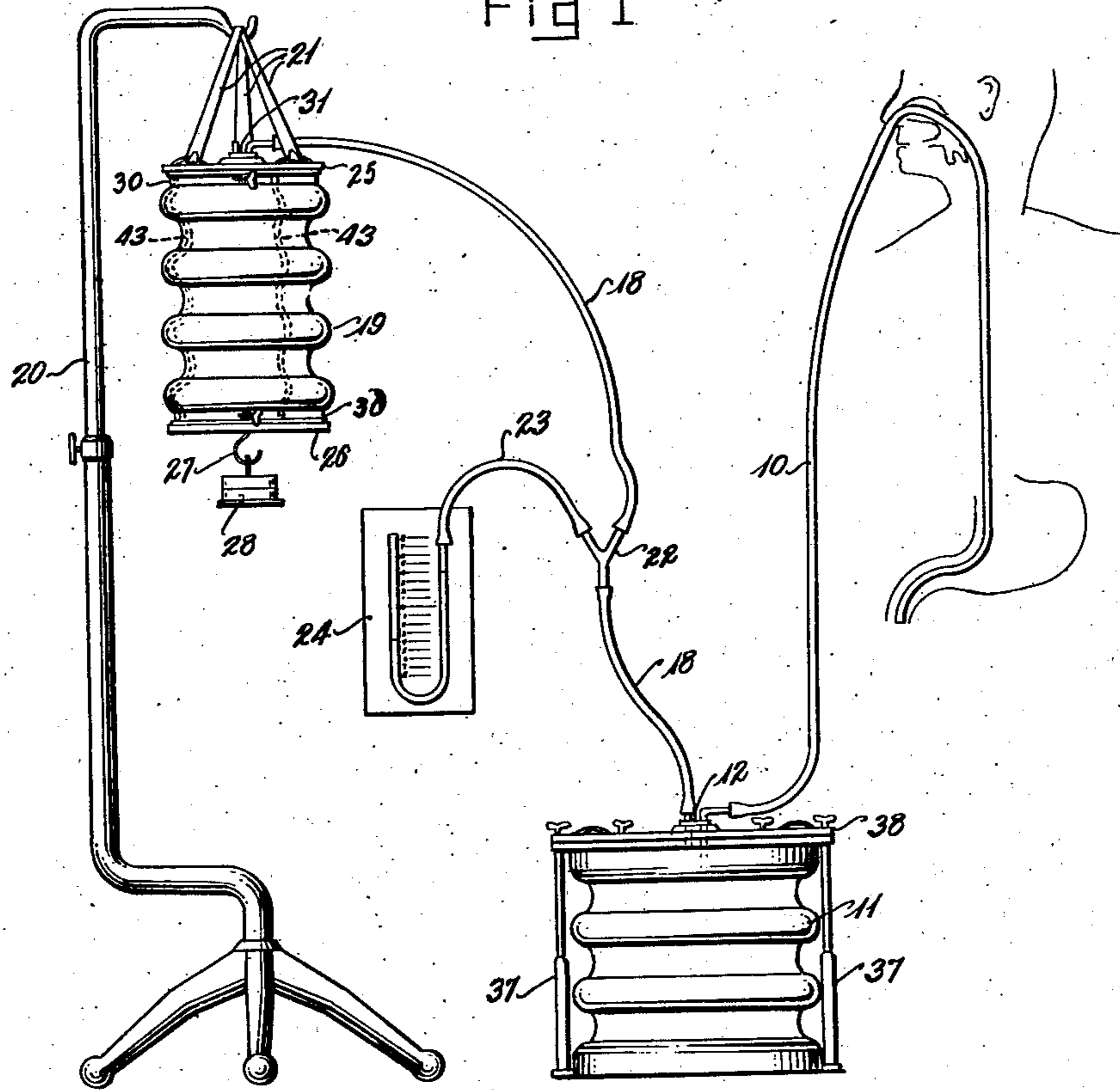


Fig 2

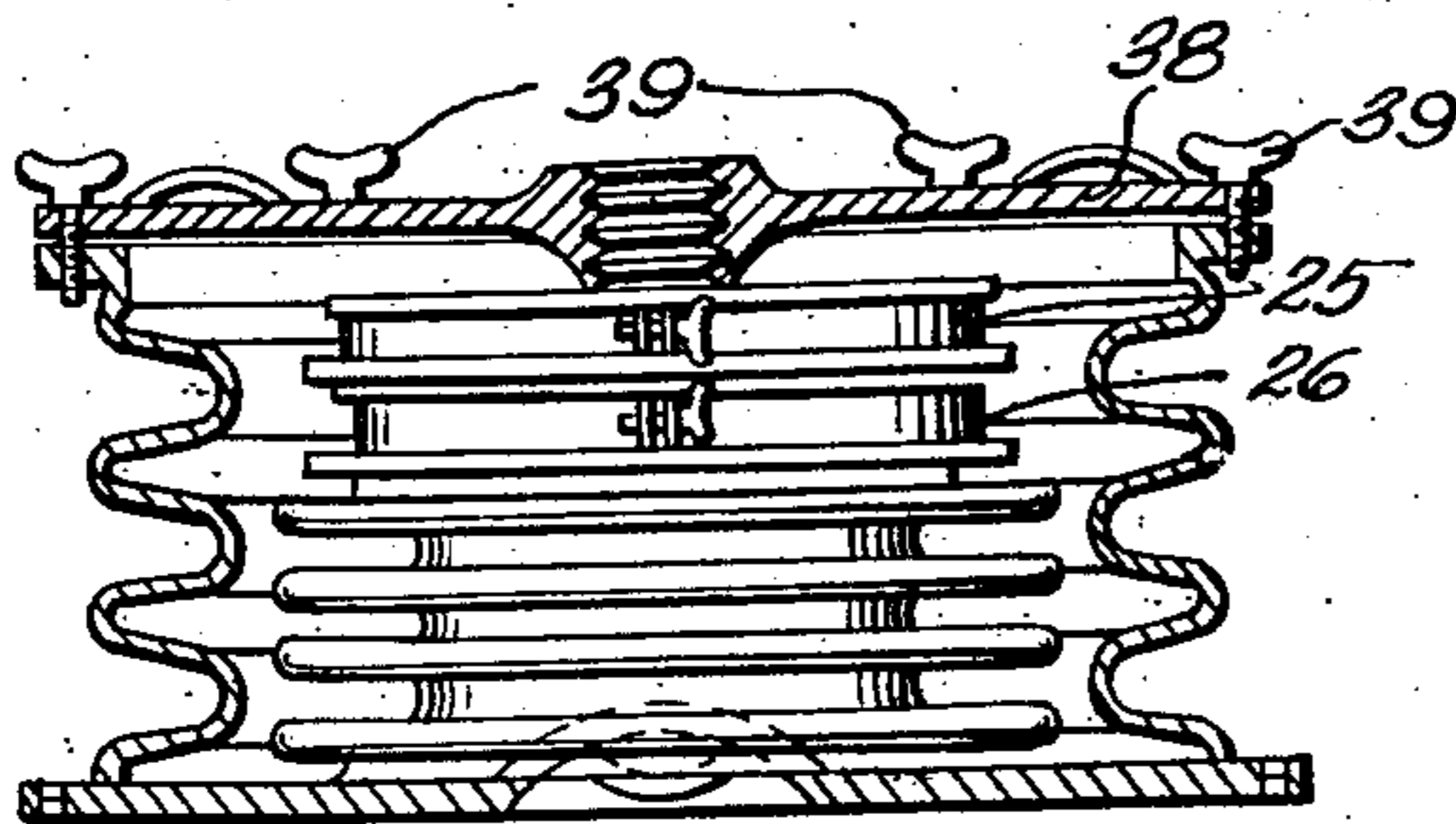
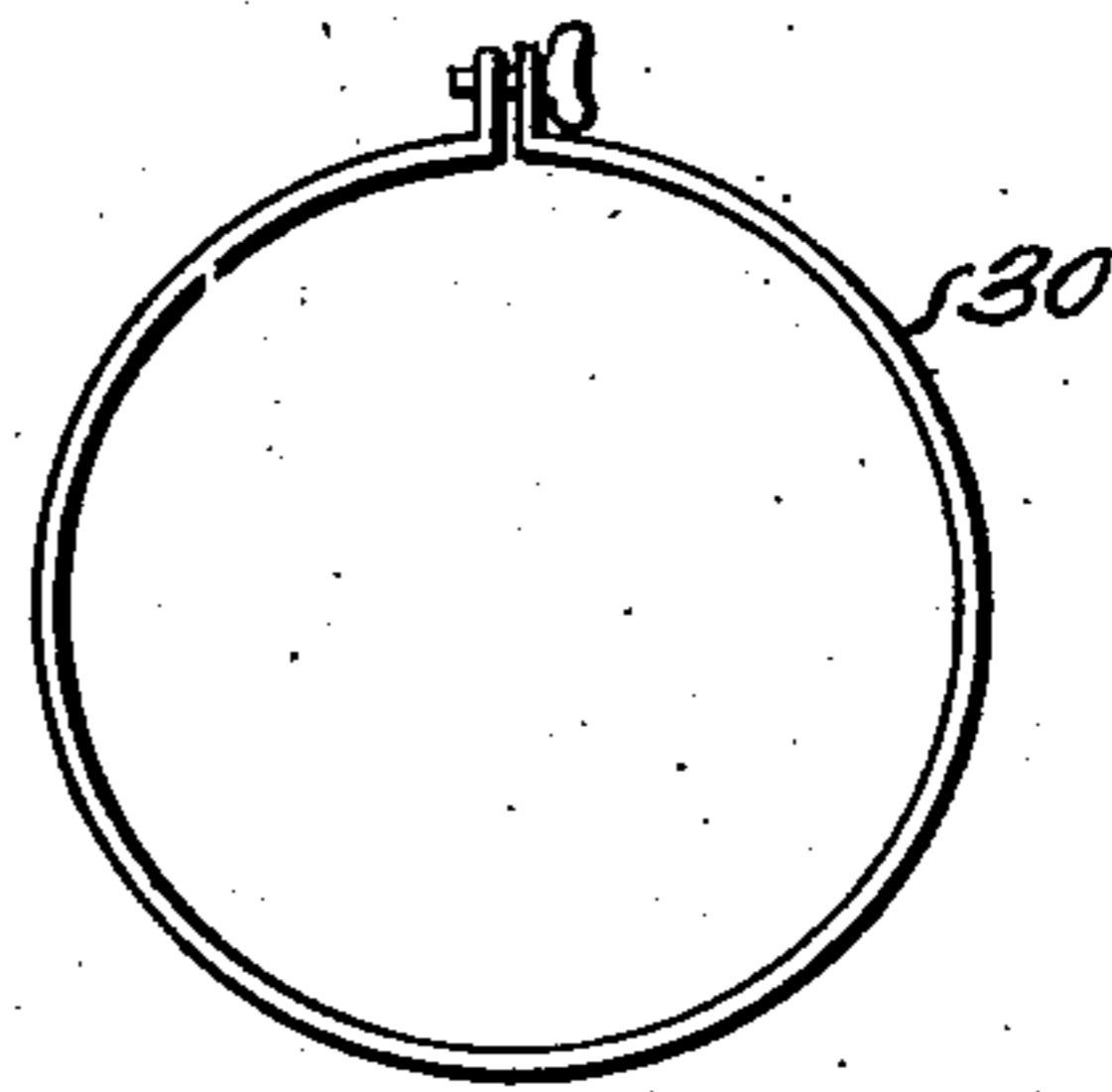


Fig 3



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Fig 4

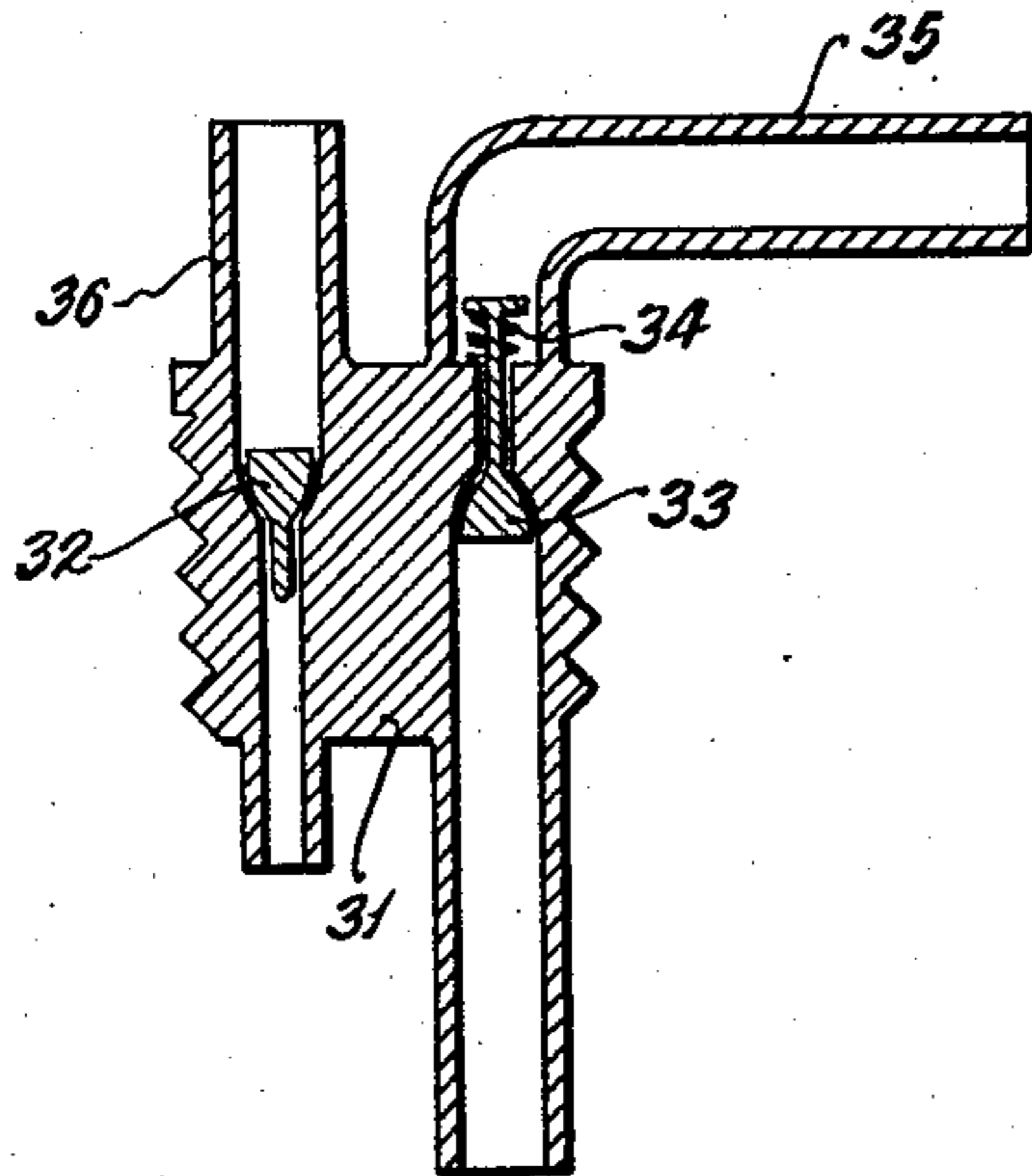


Fig 5

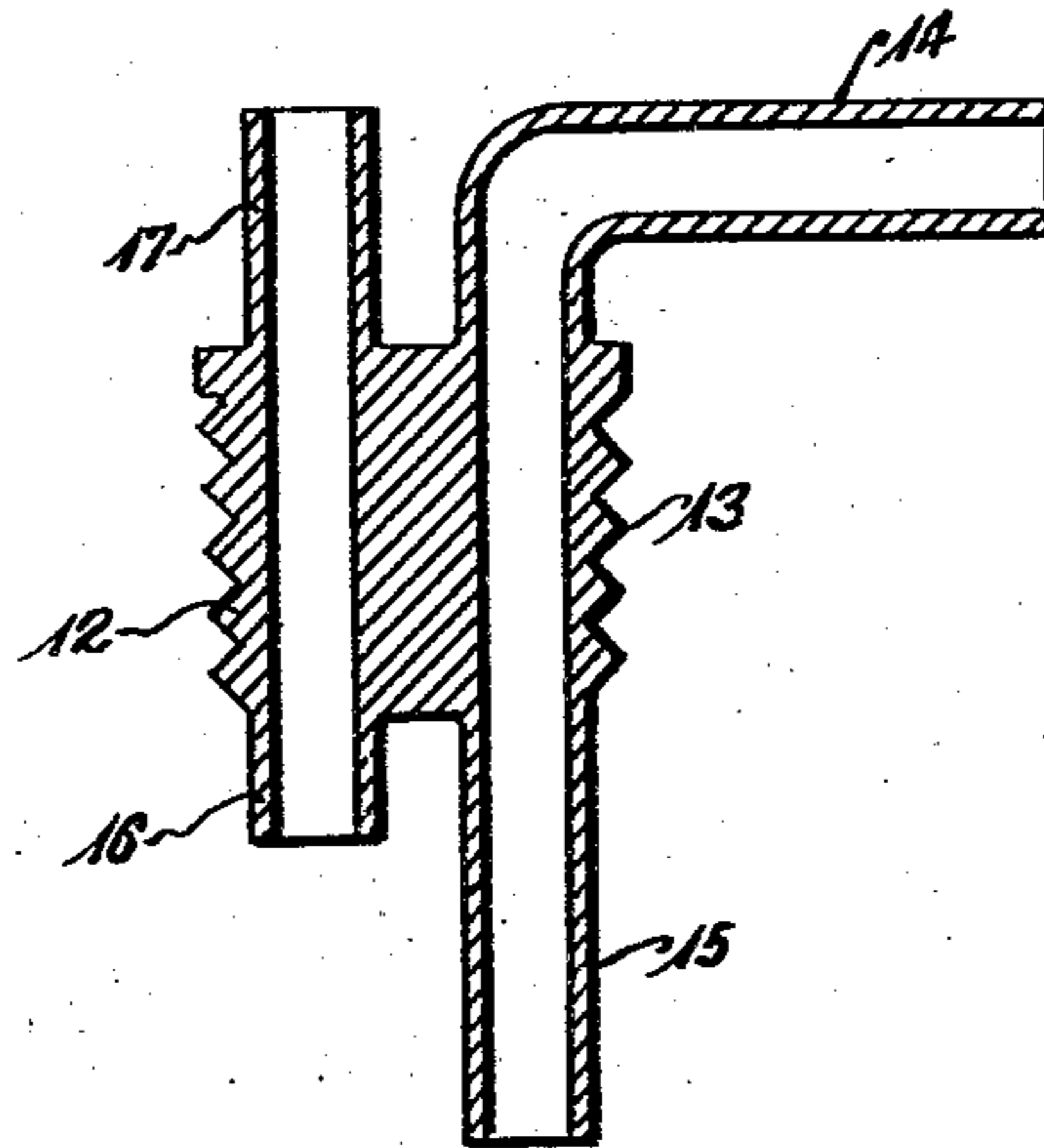


Fig 6

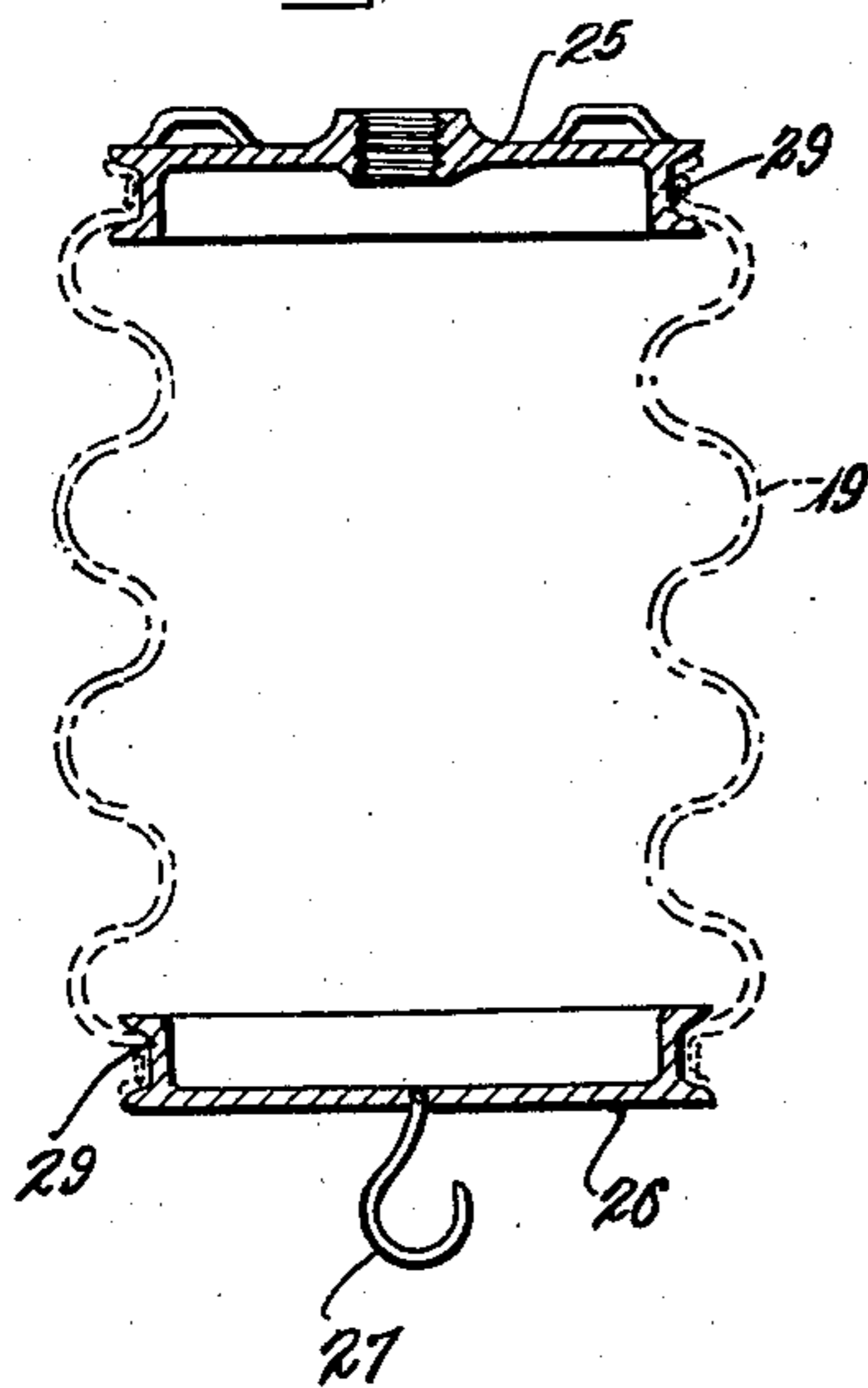


Fig 7



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## UNITED STATES PATENT OFFICE

2,397,257

## SURGICAL SUCTION APPARATUS

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Application February 4, 1943, Serial No. 474,744

2 Claims. (Cl. 128—276)

The invention relates to surgical suction apparatus and has as an object the provision of a device of this character that may be produced at a very much lower cost than devices now on the market for the purpose.

It is a further object of the invention to provide apparatus of this character that shall have substantially no frangible parts; one which may be packed in a very compact package, and which because of these qualities will be especially useful in army, navy, or wilderness use generally.

Further objects of the invention will appear from the following description when read in connection with the accompanying drawings showing illustrative embodiments of the invention, and wherein:

Figure 1 is a side elevation of the apparatus as it will appear in use;

Fig. 2 is a vertical section showing one portion of the apparatus packed in another portion for carrying;

Fig. 3 is a plan view showing a form of clamp band;

Figs. 4 and 5 are vertical transverse sections drawn to an enlarged scale showing a valved connector and a plain connector respectively;

Fig. 6 is a detail vertical section of an end closure for one of the parts; and

Fig. 7 is a like view of an end closure of another part.

After surgical operations it is frequent for a patient to become distended with gas, to his great discomfort, and it is the practice to insert a tube, usually through the nostril, into the stomach, and even into the small intestine. Such a tube is shown at 10 with the parts of the body through which it is inserted shown diagrammatically. The tube 10 leads to a chamber 11 for reception of gas or any liquids that may be drawn off, entering the chamber by means of a connector 12 shown enlarged in Figure 5, as comprising a screw-threaded exterior 13, a connector for the tubing 14, a tubular portion 15 projecting into the chamber and an outlet 16 having a portion 17 to which a suction tube 18 may be attached.

The suction tube 18 leads to suction device 19 shown as suspended from the bracket 20 by means of flexible members 21. To measure the amount of reduced pressure produced by the device 19, the tube 18 is shown as equipped with a Y 22 one branch of which is connected to tube 23 which in turn connects to a manometer 24.

The suction device 19 is shown as provided in the form of a collapsible bellows-like chamber having upper and lower closure plates 25, 26,

shown in detail in Figure 6. The lower of these plates is shown as provided with a hook 27 upon which weights 28 may be hung to increase the suction and by varying the number of weights 5 suspended may determine the amount of suction, as indicated on the manometer 24.

For convenience, but not essentially, the closures 25, 26 are formed with a circumferential groove 29 and the upper and lower ends of the collapsible member 19 are shown as clamped in these grooves by means of a screw clamp member 30, as indicated in Figure 3. If desired, reinforcing strips 43 may be provided in the bellows 19 to take the weight of the plate 26 or of weights 15 suspended therefrom when the bellows is fully extended.

The form of clamp band shown is only for purposes of illustration as some other form of connection, quick detachable, cam, or toggle-operated clamp, may desirably be substituted therefor. Also if it is desired the closure plates 25, 26 may be made permanently attached to the member 19.

A plug 31 for the top of member 19 is shown in Figure 4 as provided with inwardly and outwardly closing valves 32, 33. The valve 32 will close by gravity. Valve 33 is shown as provided with a light spring 34 to ensure its closure.

The tube 18 is to be attached to the member 35 and the member 36 when used as shown is merely a vent. It will be seen that when the member 19 has yielded to the suction so as to become fully extended, it is only necessary to push upwardly on the bottom of the closure 26 whereupon the valve 33 will close and valve 32 will open to expel air from the chamber, and release of this upward pressure will instantly place the device into operation.

For compactness when prepared for transportation, the member 11 is also shown as collapsible and in use it is supported by struts 37 which are desirably telescopic so that they may be folded into a small space and placed inside of the chamber 11. This chamber is shown as having a closure 38 secured with a suitable gasket to make the same air-tight, by means of wing screws 39, or in any other desirable manner to provide an airtight joint.

Should the chamber 19 become damaged or lost, it is possible to place the plug 31 in the place of the plug 12 and either dispense entirely with a chamber for 11 or improvise a chamber for this purpose out of a five-gallon can or a jug with a cork receiving the tubes 10 and 18.

The bracket 20 is of course no necessary por-

tion of the apparatus as the member 19, or 11 if substituted therefor, can be hung upon a limb of a tree or a tent pole or any other convenient object.

The expense of usual devices for the purposes of the present invention is such as to make it prohibitive for small hospitals to supply as many as they should have. Since the present device can be constructed at a fraction of such cost, every hospital can have a liberal number. In use the device has been found to be very flexible, convenient, and efficient.

In the operation of the device, with the tube 10 in place and the apparatus arranged as illustrated, the attendant will merely lift the plate 26 and weight 28, and release the same. Air compressed in the space within the chamber 19 will force valve 33 closed aided by spring 34 and open valve 32. When the plate is released suction will begin at once with reversal of the valves 32, 33 and the vacuum created will be determined by the amount of weight 28 and indicated on the device 24.

The time during which the device will operate without attention will be determined, other things being equal, by the volume of the chamber 19. It can be increased in either diameter or length to increase the period of operation.

The chamber 19 may be suspended as shown, or from the limb of a tree, or from a tent pole, or a hook can be applied to an upright of a bedstead for its support. Because of its adaptability and compact packing possibilities it is capable of a wide range of service in war or in peace.

Minor changes may be made in the physical embodiments of the invention within the scope

of the appended claims without departing from the spirit of the invention.

We claim:

1. Surgical suction apparatus comprising, in combination: a collapsible suction device; a collapsible receptor chamber; said device and chamber of airtight construction; a vent from said device to atmosphere; conduit means connecting said device and chamber, conduit means connecting said chamber and a stomach tube; means to control inflow and outflow from said device; means whereby said device is expanded by force of gravity; and strut means to prevent collapse of said chamber; said device being enclosable in said chamber with both in at least partly collapsed condition.

2. A readily portable surgical suction device comprising, in combination: a plate manually restrainable to remain stationary against movement in one direction and normally restrained against movement in the opposite direction; a movable plate; collapsible, hermetically impervious wall means joining said plates to enclose a space of variable cubic capacity; valve means controlling at least one gas passage through said stationary plate acting automatically to deliver outgoing gases to the atmosphere and ingoing gases into said space and to prevent a reverse delivery; conduit means to place said space in communication with the interior of a patient's body; means to adjust the pull of gravity on said movable plate; and means to suspend said first named plate from a support.

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