

May 25, 1948.

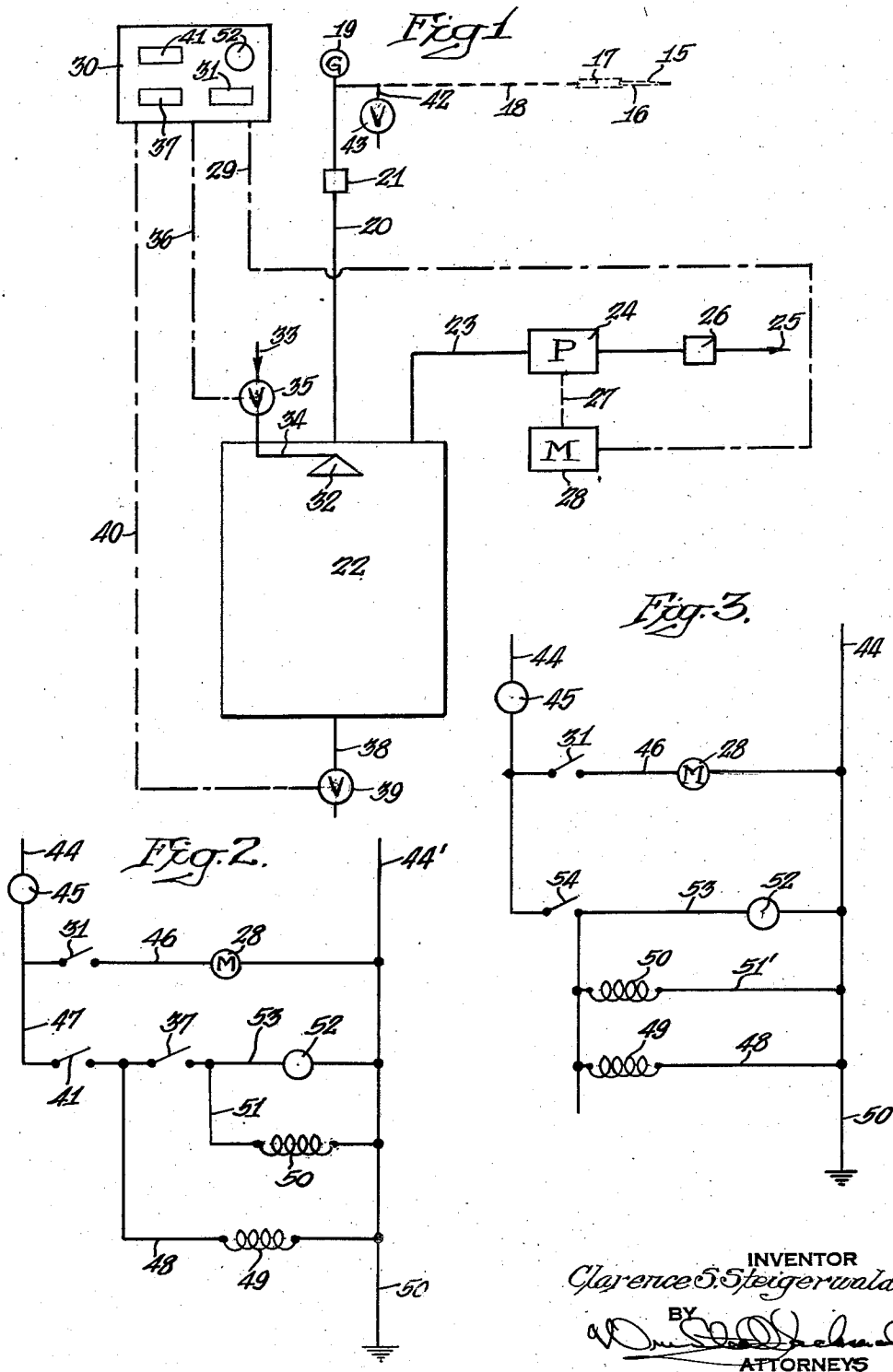
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2,441,980

ASPIRATOR

Filed Jan. 8, 1947

2 Sheets-Sheet 1



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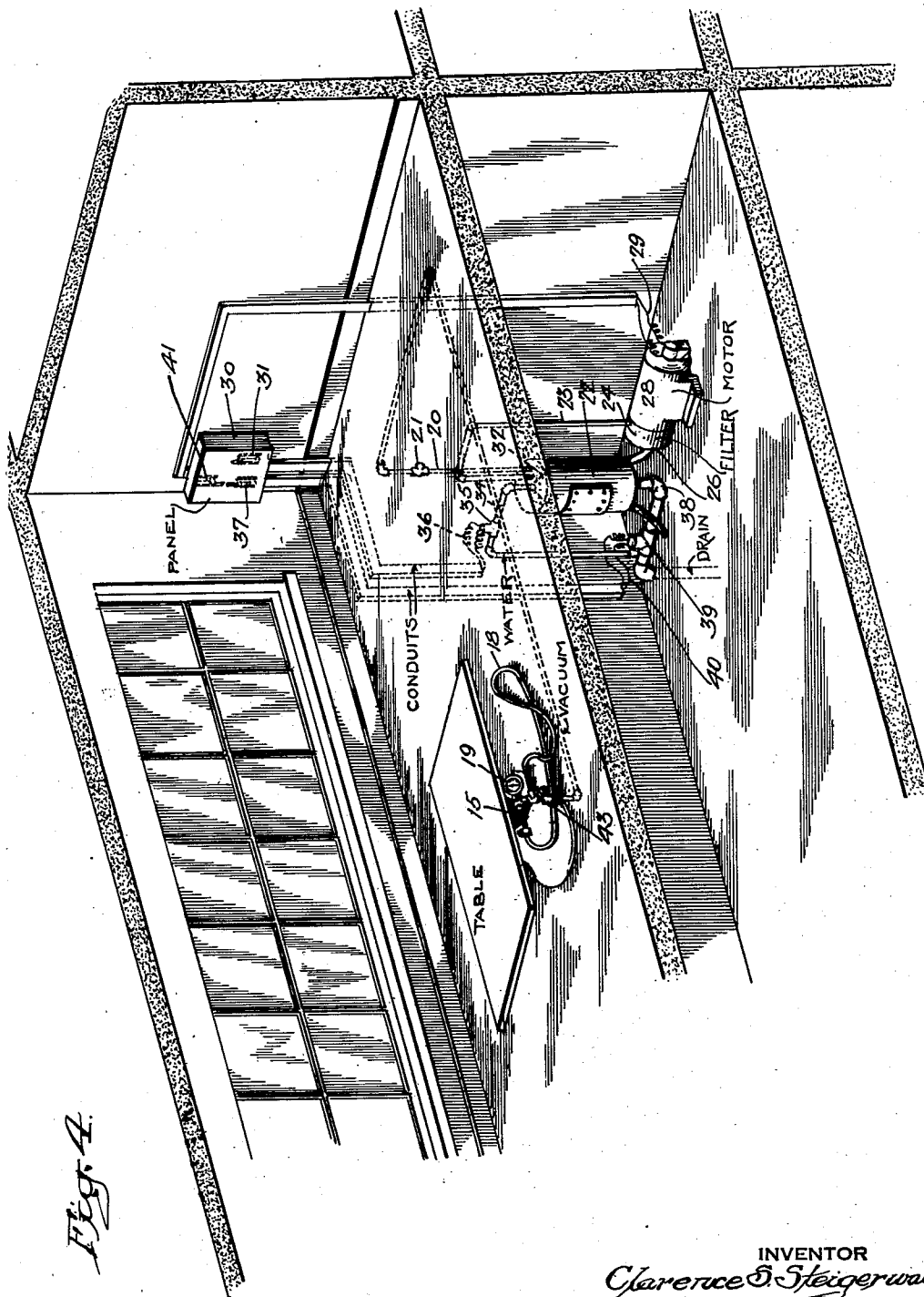
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ASPIRATOR

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5 Claims. (Cl. 128—276)

1

My invention relates to aspirator systems for all types of surgical use.

A purpose of my invention is to free the operator and his assistants from the objectionable odors, emanating from the contents of the jar and the unsanitary manual care and the considerable loss of time and inconvenience incident to the use of glass-jar type aspirators in the operating room.

A further purpose is to provide an aspirator operable by remote control, and permissibly to have it serve several locations.

A further purpose is to prevent the necessity for skilled operation of an aspirator, and to render the operation fool-proof, so that difficulty will not be encountered through the uninformed or careless filling, clogging or other misuse of the aspirator system.

A further purpose is to provide remote control valves for flushing and draining an aspirator tank and to interlock the valves so that flushing cannot be started before the drain is open, preferably by making the switch controlling the remote control system for the drain valve operate in series with the switch controlling the remote control system for the flushing valve, or by using a single switch for both functions.

A further purpose is to provide controllable suction by controllable by-pass on the suction line from a remote control suction tank.

Further purposes appear in the specification and in the claims.

In the drawings I have chosen to illustrate a few only of the embodiments of my invention, choosing the forms shown from the standpoints of convenience in illustration, satisfactory operation, and clear demonstration of the principles involved.

Figure 1 is a schematic view of my aspirator system.

Figure 2 is an electrical circuit diagram for operating the mechanism of Figure 1.

Figure 3 is a variant circuit diagram.

Figure 4 is a perspective showing the general lay-out of the mechanism.

In the drawings like numerals refer to like parts throughout.

Describing in illustration but not in limitation and referring to the drawings:

In the office and operating room of the modern general surgeon or specialist, including nose and throat, oral surgery and exodontia, it is frequently necessary to remove accumulations or progressive accretions of body fluids or substances such as blood, mucus, pus, tissue, saliva, or the like. For-

2

eign bodies, small slivers of bone fragments, gangrenous tissues, pus or the like can be carried away. For these and related reasons, aspirators have become widely used and accepted in the operating rooms and hospitals throughout the country.

Prior art aspirators have commonly been of glass bottle type, and are subject to clogging, and represent a very troublesome and inconvenient piece of equipment, from the standpoint of cleaning and sterilizing, and breakage. The aspirator of this type is also psychologically bad from the standpoint of the patient, for the reason that the vacuum glass jar must be within the sight of the operator in order to determine the amount of aspirating material flowing into the limited capacity of the glass vacuum jar, to avoid overflowing and to be in easy access for disconnecting rubber tubing from the vacuum pump to the vacuum glass jar when emptying the contents of the jar.

I have discovered that a very convenient aspirator construction can be employed, with remote control operation, the essential operating parts, except for the control mechanism and the aspirator applicator, being placed at some distant point, frequently in the basement of the hospital, or the building housing the physician, or in a special equipment room or closet.

In accordance with my invention I employ the usual aspirator applicator 15, suitably merely a tube 16 having a handle 17 and connected to a flexible tube 18 of rubber or the like. A pressure gauge 19 is conveniently connected in the aspirator line and a pipe or tube 20 is carried from the flexible tube 18, conveniently through a trap 21 (to eliminate possible return flow of liquid or the like during flushing) to a vacuum tank 22 conveniently at some remote point, as in the basement, closet or enclosed cabinet convenient to water supply and sewerage connections. The tank 22 will suitably be of steel welded construction and adequate size to hold all material removed during the full length of any given operation. At the conclusion of the operation the contents may then be removed and the system flushed.

The tank 22 is connected suitably at the top by a pipe 23 to a suction pump 24 which receives inlet air at 25 through a conventional air filter 26. The pump is conveniently mechanically driven at 27 from an electric motor 28, operating and controlled by connections 29 from a control panel 30. As later explained, the motor may be controlled by a suitable switch as shown at 31.

At a suitable point in the tank, conveniently

3

near the top, I locate a spray head 32 connected to a source of water 33 by a pipe 34 through a valve 35. The valve is conveniently of remote control type, and is controlled by connections 36 from a switch 37 on the control panel. Any convenient type of remote control valve may be used, but I find it very satisfactory to employ a valve of the character shown in Boyle U. S. Patent 1,807,191, granted May 26, 1931.

At the bottom of the tank I provide a suitable drain 38 controlled by a valve 39 suitably of remote control type, and desirably of the character described in the Boyle patent. The control connections 40 extend to a switch 41 on the control panel.

In many medical and surgical operations, such as cleaning out slivers of bone and removing tissue from cysts, accurate control of the amount of suction is important. For this purpose I provide a by-pass 42 on the pipe 20 suitably adjacent the connection of the tube 18, with a valve 43, suitably of adjustable type connected to atmosphere. By this means it is possible through adjustment of the valve to increase or decrease the suction applied by the applicator.

In operation of the device of Figure 1, the flushing valve 35 and the drain valve 39 will normally remain closed. The pump will be put in operation, and the aspirator applicator can then be used in the normal way, opening the by-pass valve 43 slightly if it is desired to reduce the suction. To prevent clogging of the small rubber tube by blood coagulation, the aspirator applicator and tubing may be constantly cleared during use by antiseptic solution sucked in through the applicator.

When the aspirator has completed a campaign, suitably at the end of the operation, it will be flushed. To accomplish this, water will be brought into contact with the end of the aspirator applicator, and will be sucked through the applicator, through the tube 18 and the pipe 20 into the tank 22, thus washing out the applicator, the tube 18 and the pipe 20. The pump 24 should then be turned off, and the drain valve 38 opened by remote control operation from the switch 41. Then the flushing valve 35 is opened by remote control from the switch 37, thus causing water from the spray head 38 to wash out the tank and discharge through the drain. When there has been sufficient flushing, the flushing valve 35 is closed by operation of the switch 37, after which the drainage valve 39 is closed. The mechanism is then ready for further aspiration, upon merely starting the pump 24.

In order to make the mechanism fool-proof, I provide special interlocking switching arrangements to prevent opening of the flushing valve 35 until the drain 39 is opened, or about to be opened. I illustrate in Figure 2 a preferred circuit for this purpose.

Terminals 44 and 44', suitably at 110 volts and 60 cycles alternating current, supply electrical energy through a fuse 45 adjacent terminal 44 to a circuit branch 46 including the motor 28 in series with a motor switch 31. A separate circuit branch 47 in parallel with the branch 46 includes a switch 41 in series with a circuit branch 48 including an electromagnet 49 of the remote control drain valve 39. The other side of the electromagnet 49 is of course connected to the opposite terminal 44', which may be suitably grounded at 50. Also in series with the drain valve switch 41 I connect the switch 37 which controls the electromagnet 50 of remote control

4

flushing valve 35 in circuit branch 51 connected across to the opposite terminal 44' of the source, as well as tell-tale lamp 52 similarly connected in a parallel circuit branch 53.

Thus by reference to Figure 2, it will be evident that the pump motor may be connected on and off without reference to the other mechanism, by closing and opening switch 31. The energy required to open the remote control flushing valve 35, however, can only be supplied when switch 41 is closed, supplying the energy to open remote control drain valve 39. If switch 37 is closed at any other time, no current can flow through coil 50, and the flushing valve will not open. Thus there is an effective interlocking which prevents the opening of the flushing valve when the drain valve is closed.

Figure 3 shows an alternate circuit diagram accomplishing this purpose. The motor circuit is the same as in Figure 2. The flushing and drain valve control circuits are however different in that a single control switch 54 energizes the coil 49 to open the drain valve 39 in circuit branch 48 and also energizes the coil 50 in circuit branch 51' in parallel with circuit branch 48 to open the flushing valve 35. In this way the necessity for the extra switch 37 is eliminated.

By my invention it is possible at all times to control the aspirator operating mechanism remotely from a point adjacent the aspirator applicator, and without any difficulty, or danger of improper operation by inexperienced assistants.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claims.

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

1. In an aspirator for surgical use, an aspirator applicator, a tank at a remote position from the applicator, means connecting the applicator to the tank, a pump connected to the tank for applying suction thereto, flushing means for flushing the tank with a liquid, remote control valve means for operating the flushing means, a drain for the tank and remote control valve means for the drain.

2. In an aspirator for surgical use, an aspirator applicator, a suction tank remote from the applicator, means connecting the applicator and the tank including a by-pass, a controllable by-pass valve for regulating the suction on the applicator, pump means applying suction to the tank, flushing means for introducing liquid into the tank, a valve controlling the flushing means, remote control mechanism operable from adjacent the applicator for controlling the flushing valve, a drain for the tank, a drain valve for the drain and remote control valve means controllable from adjacent the applicator for operating the drain valve.

3. In an aspirator for surgical use, an aspirator applicator, a tank remote from the applicator, means for connecting the applicator and the tank, flushing means for introducing liquid to wash the interior of the tank, a valve controlling the flushing means, remote control means operable from adjacent the applicator or for controlling the flushing valve, a drain for the tank, a valve controlling the drain, remote control

5

means operable from adjacent the applicator for operating the drain valve, a pump applying suction to the tank, and means for preventing opening of the flushing valve unless the drain valve is likewise opened.

4. In an aspirator for surgical use, an aspirator applicator, a tank remote from the applicator, means for connecting the applicator and the tank, a pump applying suction to the tank, flushing means for introducing liquid to wash the interior of the tank, a valve controlling the flushing means, remote control means operable from adjacent the applicator for controlling the flushing valve, a drain for the tank, a valve controlling the drain, remote control means operable from adjacent the applicator for operating the drain valve, a switch controlling the drain valve remote control means, and a second switch in series with the first controlling the flushing valve remote control means so that the flushing valve cannot open except when the drain valve opens.

5. In an aspirator for surgical use, an aspirator applicator, a tank remote from the applicator,

6

means for connecting the applicator and the tank, a pump applying suction to the tank, flushing means for introducing liquid to wash the interior of the tank, a valve controlling the flushing means, remote control means operable from adjacent the applicator for controlling the flushing valve, a drain for the tank, a valve controlling the drain, remote control means operable from adjacent the applicator for operating the drain valve, and a single switch controlling the drain valve and flushing valve remote control mechanism to provide interlocking between the same.

CLARENCE S. STEIGERWALD.

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