

Aug. 6, 1968

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3,395,705

MEDICAL SUCTION APPARATUS

Filed Oct. 18, 1965

2 Sheets-Sheet 1

FIG. 1.

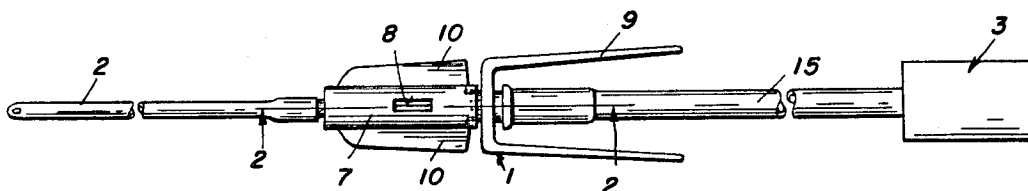


FIG. 2.

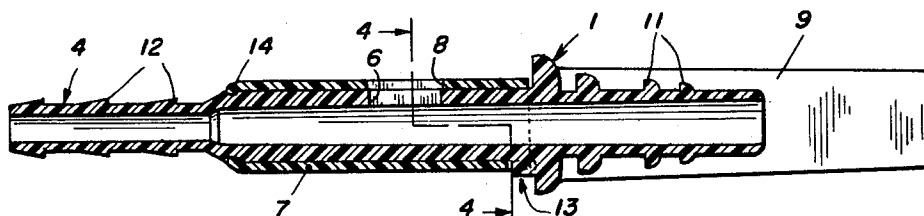


FIG. 3.

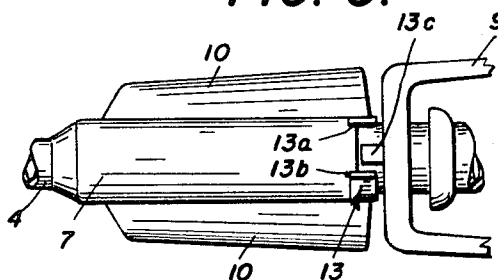
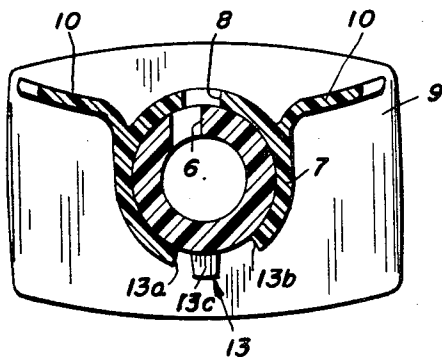


FIG. 4.



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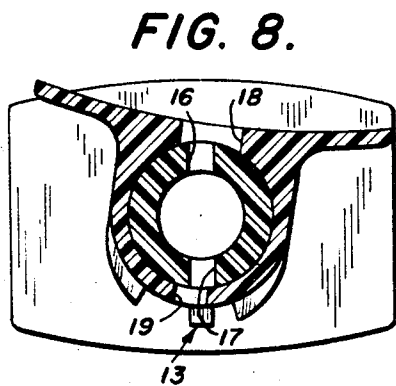
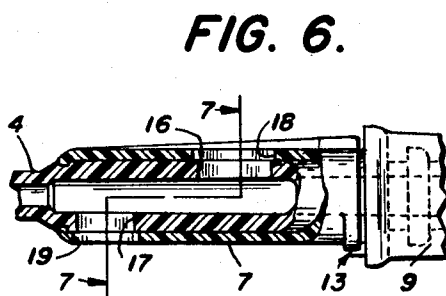
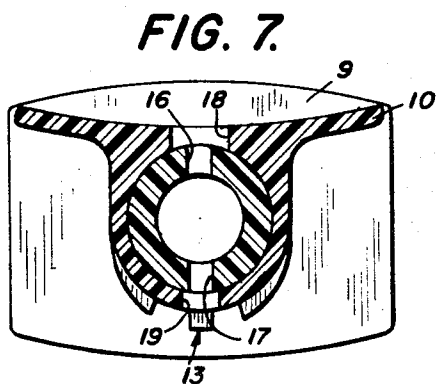
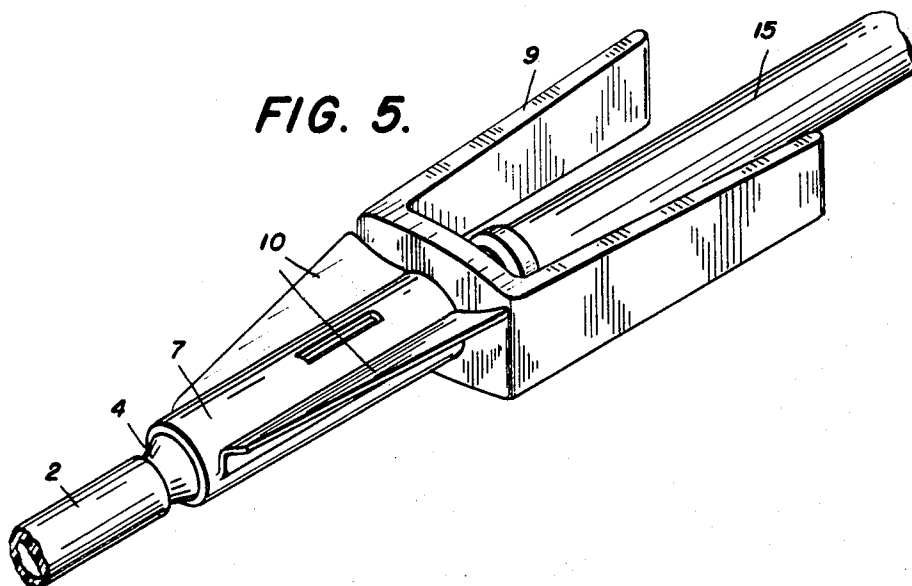
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2 Sheets-Sheet 2



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3,395,705

MEDICAL SUCTION APPARATUS

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6 Claims. (Cl. 128-276)

ABSTRACT OF THE DISCLOSURE

A regulator that fits in a suction line between a medical catheter and a suction pump. The regulator has an inner tubular member and an outer sleeve telescoped together with superimposed side vents that are progressively opened and closed by rotation of the sleeve relative to the tubular member. The sleeve has a laterally enlarged thumb pad surrounding the sleeve's side vent, whereby an operator can with his thumb either close off the vent or change the regulator setting by pushing on the thumb pad adjacent one edge.

This invention relates to medical suction apparatus with a suction regulator for controlling the amount of suction applied to a catheter.

Suction catheters are used in many medical and surgical procedures to remove blood, mucus, or other material from a patient. The catheters usually include a plastic or metal tube with an opening at a forward end. A rear end of the catheter is connected by means of a flexible connecting tube to a suction machine. Blood, mucus, and other material sucked in through the catheter is deposited in a trap or container located between the catheter and the suction machine.

When probing about in the human body to remove blood and mucus, the amount of suction applied is very important. The suction must be strong enough to remove the blood and mucus and still not damage tissue or delicate membranes, or otherwise cause injury to the patient.

Suction control presented a major problem with previous suction catheters. There was usually a valve on the suction machine but this is some distance removed from the patient. To control the suction from the machine would require the physician to run back and forth between the patient and the suction machine or to rely on verbal instructions to a nurse at the suction machine.

To give the physician some degree of immediate control over the amount of suction applied, a vent hole has been provided in the suction line at the rear of the catheter. When open, the suction is dissipated through this vent hole and hence very little suction reaches the open end of the catheter. By placing his thumb over the hole, the physician can shut off this vent hole and thereby provide a direct line of suction between the suction machine and end of the catheter. This vent hole is either in a wall of the catheter itself or in a plastic or metal connection between the catheter and a flexible tube leading to the suction machine.

The physician, however, has no intermediate control of the suction. For instance, sometimes in delicate tissue areas where full suction might damage the tissue, a weaker suction such as one half or one fourth full suction is needed. A simple thumb hole cannot give this control.

It is an object of my invention to provide a medical suction apparatus with a suction regulator whereby a physician can control the amount of suction applied as he manipulates the catheter.

Another object of this invention is to provide a regulator for medical suction apparatus that can be set for inter-

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mediate amounts of suction between full suction and no suction.

These and other objects of my invention can be better understood with reference to the accompanying drawings, in which:

FIGURE 1 is a top plan view of the suction regulator connected between a suction catheter and a suction source;
FIGURE 2 is a sectional view of the regulator taken along line 2-2 of FIGURE 1;

FIGURE 3 is a fragmentary bottom plan view of the regulator;

FIGURE 4 is a sectional view taken along line 4-4 of FIGURE 2;

FIGURE 5 is a perspective view of the regulator;

FIGURE 6 is a modified version of the suction regulator shown in a fragmentary side elevational view partially in section;

FIGURE 7 is a sectional view taken along line 7-7 of FIGURE 6 showing the modified suction regulator in its fully open position; and

FIGURE 8 is a sectional view similar to FIGURE 7 but showing the modified suction regulator partially closed.

Referring now to the drawings, one embodiment of my invention is shown in FIGURES 1 to 5. This suction regulator 1 has a tubular member 4 which connects at one end to a catheter 2 and at an opposite end to a connecting tube 15 leading to a suction source 3. Retaining means 12 and 11 on the tubular member help hold the tubular member 4 to catheter 2 and connecting tube 15. Within a wall of tubular member 4 is a vent port 6 shown in FIGURES 2 and 4. Mounted on an outside surface of tubular member 4 is a sleeve 7 with a passage 8 in its wall. Sleeve 7 rotates about tubular member 4 to progressively open and close vent port 6 to apply varying amounts of suction to catheter 2. When vent port 6 is fully open, essentially no suction reaches catheter 2; when it is fully closed, catheter 2 is under full suction.

To facilitate relative rotation between tubular member 4 and sleeve 7, a U-shaped handle means 9 extends outwardly and rearwardly from the tubular member 4, and a handle 10 extends outwardly from sleeve 7. Thus, when the physician grasps the suction regulator with handle 9 in his palm, he can rotate sleeve 7 relative to tubular member 4 by pressing on laterally extending wings of handle 10. In this embodiment of my invention the physician can set the regulator at a constant suction less than full suction as shown in FIGURE 4. The physician can apply full suction immediately to catheter 2 simply by placing his thumb on a thumb pad provided by handle 10 adjacent passage 8 thus closing off the vent port 6.

For minimum friction during rotation, the rotational engagement between sleeve 7 and tubular member 4 need be only at the ends of sleeve 7 with a slight clearance between the sleeve and tubular member intermittent the ends of sleeve 7.

To assure that passage 8 and port 6 are properly aligned, an axial stop means 14 and a rotational stop means 13 are provided between tubular member 4 and sleeve 7. The axial stop means 14 is shown in the form of an inwardly projecting flange on sleeve 7 that rotatably snaps into an annular groove on tubular member 4. Rotational stop means 13 is shown as a pair of spaced ears 13a and 13b on a bottom of sleeve 7 which abut a stop tab 13c on tubular member 4 at rotational extremes between open and closed positions.

One embodiment of this invention shown in FIGURES 1 to 5 has a single vent port and intermittent surges of suction can be applied by closing off vent port 6 with

the thumb. These surges are always at full suction because there is no other vent port.

In a second embodiment of this invention, shown in FIGURES 6 to 8, there are two vent ports 16 and 17 in tubular member 4 and two passages 18 and 19 in sleeve 7. In this latter embodiment, intermittent surges of suction can be at less than full suction. When the physician's thumb closes off first passage 18, the suction source 3 can draw air in through the partially closed vent 17 in FIGURE 8. The first passage 18 of this regulator is much wider than first vent port 16. Thus first vent port 16 remains open to the regulator's exterior through first passage 18 even though second vent port 17 is partially or completely closed. With the double vent port version of this invention the physician can stop suction to catheter 2 by lifting his thumb off of first passage 18. By replacing his thumb across first passage 18 he can cause a surge of suction to the catheter 2. This surge is governed by the setting of second vent port 17. With the second vent port 17 partly open there is no danger of suddenly applying full suction by closing off first vent port 16.

The medical suction regulator of my invention can be made of a rigid thermoplastic material such as nylon, Delrin, polypropylene, polyethylene, or polyvinyl chloride.

Throughout the specification I have used specific examples to illustrate my invention. It is understood, however, that persons skilled in the art can make certain modifications to those specific examples without departing from the spirit and scope of this invention.

I claim:

1. A suction regulator adapted to be used in medical suction apparatus, said regulator comprising a tubular member having first and second vent ports in a wall thereof; a sleeve rotatably mounted on an external surface of the tubular member, which sleeve has first and second passages therethrough communicable respectively with the first and second vent ports of the tubular member, said vent ports and passages being so positioned that rotation of the sleeve in opposite rotational directions relative to the tubular member progressively closes and opens the second vent port while the first vent port remains open to an exterior of the regulator through the first passage in said sleeve, the first passage being substantially wider than said first vent port; and handle portions joined to each side of said sleeve and extending laterally therefrom to form a thumb pad with an approximately flat upper surface surrounding the passage in said sleeve, said thumb pad's upper surface having a greater lateral dimension than the tubular member's outer diameter, with the sleeve being twistable relative to the tubular member by a pushing force normal to and adjacent an outer edge of the upper surface of the thumb pad while said tubular member is held rotationally stationary.

2. A suction regulator as set forth in claim 1 wherein the tubular member has a U-shaped handle means extending outwardly therefrom for grasping during relative rotation of the tubular member and sleeve.

3. A suction regulator adapted to be used in medical suction apparatus, said regulator comprising a rigid tubular member having a vent port in a wall thereof and retaining means for flexible tubing adjacent each end of the tubular member, and a sleeve rotatably mounted upon an outer surface of the tubular member, said sleeve having a passage therein communicable with the vent port whereby the vent port is progressively opened and closed by rotation of the sleeve relative to the tubular member; axial stop means on the rigid tubular member limiting axial movement of the sleeve upon the rigid tubular member; and handle portions joined to each side of said sleeve and extending laterally therefrom to form a thumb pad with an approximately flat upper surface surrounding the passage in said sleeve, said thumb pad's upper surface having a greater lateral dimension than the tubular member's outer diameter, said sleeve being twistable relative to the tubular member by a pushing force normal to and adjacent an outer edge of the upper surface of the thumb pad while said tubular member is held rotationally stationary, said tubular member having a U-shaped handle means extending outwardly therefrom for grasping during relative rotation of the tubular member and sleeve, said regulator having rotational stop means oriented in relation to said vent port and passage for limiting the amount of rotation of the sleeve relative to the tubular member as it opens and closes the vent port in the tubular member, said rotational stop means comprising a tab integral with said tubular member and projecting outwardly therefrom, said sleeve including a notch forming abutment ears flanking said tab.

4. A suction regulator as set forth in claim 3 wherein the axial stop means includes a projection extending inwardly from the sleeve and engaging a groove in said tubular member.

5. A suction regulator as set forth in claim 4 wherein said projection is an annular flange.

6. A suction regulator as set forth in claim 3 in which said U-shaped handle means extends in a plane generally normal to the direction toward which said vent port opens whereby a user's thumb is oriented to the proper position to engage the sleeve passage when the handle lies in the palm of his hand.

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