

[54] **DEVICE FOR SUCTIONING**

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[51] Int. Cl. **A61m 4/00**

[58] Field of Search **128/276-278, 297-300**

[56] **References Cited**

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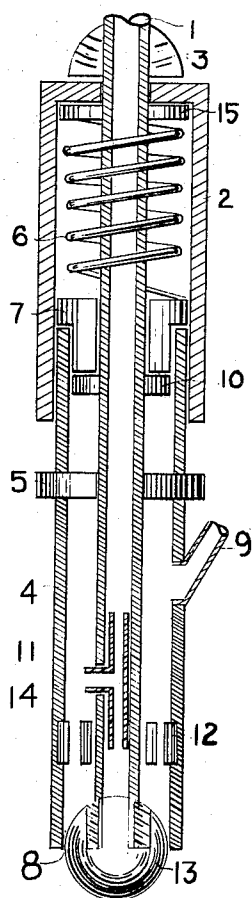
Primary Examiner—Charles F. Rosenbaum

[57] **ABSTRACT**

The suction device incorporating the present invention has a telescoping upper and lower casing and an interposed carrier-director with fixtures attached for the purpose of controlling suction and the amounts of fluid allowed into the instrument, and depending on the controlled amount of protrusion of the carrier-director, control of suctioning and the amounts of fluid to the parts suctioned is obtained. Means of releasing unwanted suctioned matter is provided for in the device. The carrier-director is hollow and carries fluid from a source into the distal end, the outlet is

guarded by a t-tube which is occluded when the outlet is brought in contact with a hollow ring fixed to the lower casing. At the end of the carrier-director is a ball which occludes the opening of the lower casing at the distal end. Depending on the position of the ball relative to the mouth of the lower casing and the opening in the carrier-director to the fixed ring, the fluid flows readily when the opening of the t-tube is not occluded. The constant suction applied to the outlet in the lower casing, is varied in effect by the relative position of the ball. When the ball occludes the mouth of the lower casing, the suction is applied only to the contents of the lower casing. When the ball is protruded a fixed distance when the upper casing meets a fixed obstacle on the lower casing, this distance is also the amount required to bring the t-tube into the ring thus shutting off inlet of fluid. The suction is now applied to the part to be suctioned. Further protrusion a fixed distance by pressure on a knob on the proximal part of the director-carrier allows both suction and fluid to be applied to the part to be suctioned. Thus unwanted intrusion of a part being suctioned is pushed further away and is washed away by a flush of fluid following the release which occurs when the t-tube is pushed away from the lumen of the ring. When suction is desired to be continued in the part to be suctioned the pressure on the knob is released and a spring-like fixture on the upper end of the carrier brings the carrier director back to the position of the upper casing being compressed against the lower casing. If suction to the part of the organ being suctioned is desired to be interrupted, release of the pressure on the upper casing allows the carrier-director to return the position of the uncompressed spring-like device now suction is applied only to the suctioned material by reason of the lower casing being closed off from the part to be suctioned by the ball on the end of the returned carrier-director, and fluid flows freely to dilute the suctioned material and to pressure the material out of the suction egress tube. This occurs because the t-tube on the carrier-director is carried away from the ring, so the outlet of fluid is free.

1 Claim, 3 Drawing Figures



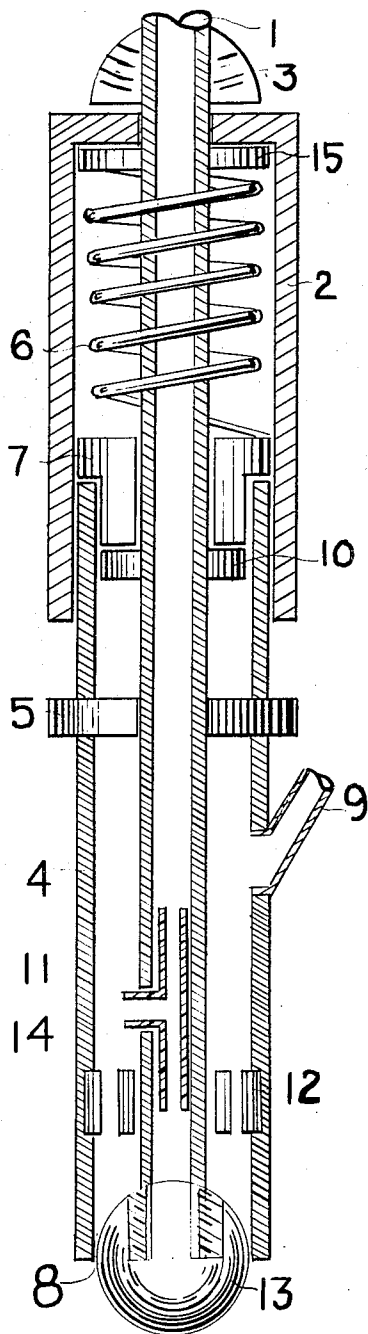


FIG. 1

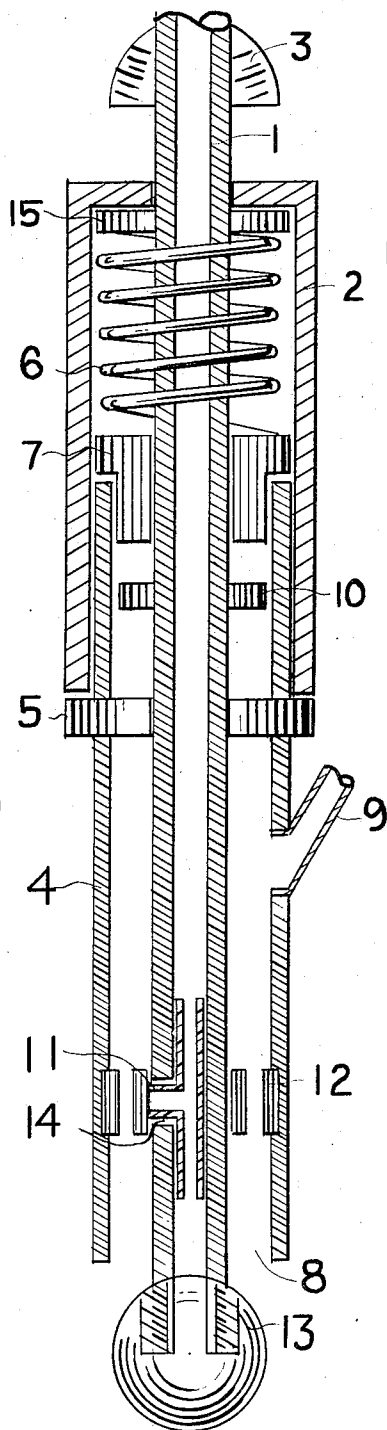


FIG. 2

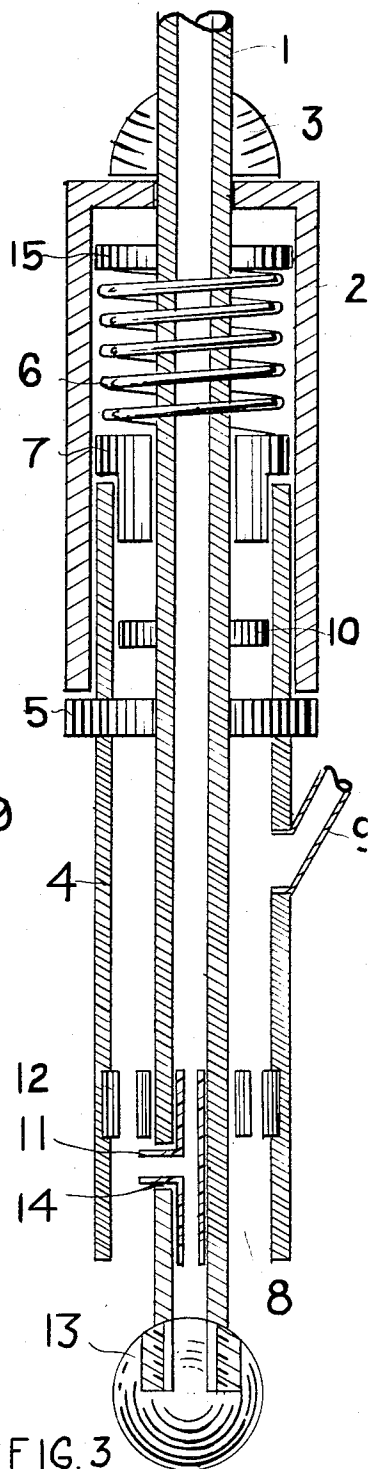


FIG. 3

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DEVICE FOR SUCTIONING

FIELD OF INVENTION

The invention relates to suction devices and particularly to suction devices used in surgery. Where it is of critical importance to have controlled suction which does not clog the device and cause delays and reinsertions exposing the patient to increased risks of contamination. A device with requirements such as this one fulfills is valuable. Conventional suction devices are notorious for their lack of dependability mainly because they clog or suction unwanted parts.

BRIEF SUMMARY OF THE INVENTION

The chief faults of clogging are taken care of by providing for titred amounts of suctioned material being allowed into the instrument. This is accomplished by the telescoping upper and lower casing with a carrier-director interposed, with a ball on the lower end of the carrier-director, a t-tube on the lower portion of this same carrier, a spring like device on the upper end and fixtures to contain it, as well as these fixtures being arranged so that when the carrier-director is to be moved a fixed distance, as to protrude the ball away from the mouth of the lower casing, the upper casing is arrested in its telescoping action by an obstacle on the lower casing. The fixture on the upper end of the carrier-director being immediately under the lower surface of the upper casing end which is perforated for passage of the carrier-director, pushes the carrier-director down the fixed distance which, the upper casing telescopes on the lower, the carrier-director in turn moves the t-tube to be occluded by a ring like fixture attached in the lower casing, thus occluding the fluid outlet and stopping the flow of fluid within the carrier-director into the lower casing. The ball on the lower end keeps the intestinal wall from being sucked into the lumen of the lower casing. Suction is applied to an outlet on the lower casing on its upper portion. If unwanted structures intrude into the lumen of the lower casing, they can be pushed away by pressing a knob on the carrier director which further compresses the spring-like device, until the knob meets the upper end of the perforated upper casing. The carrier-director being moved further moves the t-tube distal to the fixed hollow ring attached to the lower casing. The fluid then flushes away the unwanted part. Release of the knob allows the spring to return to strike the under surface of the upper end of the upper casing, bringing the t-tube on the carrier-director into the hollow ring and shutting off the slightly protruding vertical part of the t-tube against the wall of the ring. Release of the upper casing allows the spring to return to the uncompressed position by virtue now of the lower fixture attached to the carrier-director which strikes the under surface of the upper end of the lower casing. Now suction of the material in the casing continues because the ball-like attachment on the lower end of the carrier-director has been carried to occlude the lumen of the lower casing. The t-tube is also carried away from the ring so fluid can now enter the lower casing freely, thus diluting and pressuring suctioned material out of the outlet in the lower casing. In addition the length of the lower casing is sufficient to "thread" or pleat the entire lower intestine on it without removing the instrument, so that the entire lower intestine may be suctioned out if desired.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1, is a cross section drawing showing the spring uncompressed, and the ball at the end of the carrier-director occluding the lower casing.

FIG. 2 is in the position of the upper casing telescoped partly over the lower casing, the upper casing arrested by the fixture on the lower casing, the t-tube brought into contact with the walls of the ring, 12 shutting off fluid from entering into the lower casing, 4. The ball, 13 is protruded away from the lumen, 8, of the lower casing.

FIG. 3 is a cross section showing the carrier-director, 1, compressed further by pressure on the knob, 3, thus protruding the ball further and freeing the t-tube 11, and the outlet of the t-tube 14, from the ring, 12, thus allowing fluid to flow into lower end of lower casing, 4, and out of the lumen, 8, of the lower casing. Note the upper fixture just above the spring compresses the spring in FIGS. 2 and 3. Release of compression brings fixture 10 just under the end of the upper side of the lower casing.

DETAILED DESCRIPTION

The actual operation of the instrument sequentially is best described by starting with FIG. 2. This shows the position of suctioning the organ, the carrier-director, 1, being protruded by pressure over the upper casing, 2 which partially telescopes over the lower casing, 4, and by compressing the spring, 6, the carrier-director moves to the position where the t-tube, 11, in the carrier director, 1, at its lower end with the protruding bar of the T, is occluded against the inner wall of the hollow ring, 12, thus shutting off the flow of fluid through the lumen of the carrier-director, 1. The ball, 13, at the end of the carrier-director is away from the lumen of the lower casing, 8; in this position, suction is applied to the organ. The walls of the intestine are prevented from being suctioned into the lumen, 8 by the distracting force of the ball and the distance of the ball away from the lumen, 8.

If an unwanted structure should intrude into the lumen, FIG. 3 shows the maneuver to deal with this eventuality. Pressure on the knob, 3, protrudes the carrier-director, 1 still further, carrying the ball, 13, at its lower end still more distal from the lumen 8, and at the same time the t-tube, 11, is freed from the ring 12. Thus fluid flows into the distal end of the lower casing, 4, and out of the lumen 8, to help flush the intrusion away, the distal pressure of the ball helps move away the intrusion which usually insinuates itself around the ball, 13, in the small intestine. Of course the instrument can also be pulled proximally in toto. Release of the knob 3, allows the spring to return the carrier-director back to position shown in FIG. 2. The fixture, 15, on the upper part of the carrier-director, 1, strikes the under surface of the upper part of the upper casing, 2, and limits the return of the spring, 6 to that shown in FIG. 2., at the same time the t-tube, 11 has its mouth, 14, occluded by the inner walls of the hollow ring, 12, thus shutting off inflow of liquid through the lumen of the carrier-director, 1. In this position as shown in FIG. 2., suction is applied to the organ but fluid is not.

Release of the upper casing, 2, as in FIG. 1, fixture, 10, the spring to return to the uncompressed position, 6. The fixture, 10, on the carrier-director, 1, limits the

return excursion so that the exact position is attained on each release of the compressed spring 6, as in FIG. 2., then returning to position of FIG. 1. The fixture, 10 strikes the under-surface of fixture 7. Note that the fixture, 5, on the lower casing, 4, arrests the downward descent of the upper casing 2, as it partially telescopes over the lower casing, 4. It is this distance, between the lower end of the upper casing, 2 and the upper end of the ring like fixture 5 as depicted in FIG. 1, which has been determined by the distance which the protrusion of the ball-like fixture, 13, at the end of the carrier-director, 1, is optimal for suctioning as shown in FIG. 2, which at the same time distracts the walls of the intestine from being sucked into the sides of the lumen, 8, of the lower casing, 4, which distance determines the descent of the upper casing and in turn the carrier-director, via the movement of the fixture, 15 at the upper end of the carrier, since it is firmly attached to the carrier-director, 1, which determines the position of the mouth of the t-tube, 14, to be apposed to the inner walls of the hollow ring, 12 as seen in FIG. 1, and then FIG. 2.; on release of pressure over the upper casing, 2, the return distance is assured by contact of fixture 10, against the under surface of fixture 7., compare 10, in FIGS. 2, and 1.

The position shown in FIG. 1, shows the lower casing, 4, shut by fixture 13, thereby stopping transmission of suction to the organ. Now the previously suctioned matter can be disposed of by the free flow of fluid from the unoccluded t-tube 11, 14, into the lower casing, 4. The pressure of this fluid helps dilute and force the matter out of the outlet for suction, 9. Thus both suction and fluid help dispose of the suctioned matter in the lower casing, 4, out of the tube 9, to which suction is applied constantly or intermittently as desired by control of the suctioning source. The design of the ball 13 is adapted to tangential contact with the walls of the organs, and by reason of its smoothness, minimizes trauma to insignificance.

The various fixtures attached to the carrier-director also help to keep the carrier-director centered within

the upper and lower casings.

While the drawings show that the fluid is carried through the central lumen of the carrier-director it is not intended that this be taken as the only alternative since it is logical to allow fluid through the very wall of the lower casing, longitudinally, or via a conduit on the outside or within the lumen of the lower casing. It is not even necessary to have the carrier-director operate by being interposed between the upper and lower casings but it might be also considered as within the makeup of this device to have a carrier-director on the wall of the lower casing, within the lumen, or on the outside. For in making smaller versions of this device it is necessary not to compromise the internal diameter with structures and therefore they may be constructed as indicated on the outside, or within the very walls of the device.

What is claimed is:

1. In a device for suction comprising a telescoping upper and lower casings, and an interposed carrier-director having means for control of suction and of fluid passage and means for protecting vital structures from injury by the device, and means of retaining the interposed carrier-director between said telescoping casings, the improvement comprising a lumen in the carrier-director which permits the flow of liquid through it, and an outlet at the lower end of the lumen of the said carrier-director, said outlet containing a T-Tube, the projection of which serves as a valve to control the outflow of fluid from the said lumen of the carrier-director when the said projection is pressed against a hollow ring which closely encompasses the said projection, this said hollow ring being affixed to the wall of the lower casing by a strut, thus when the ring and the projection of the t-tube are approximated, the control of the output of fluid is attained, and when the director carrier is not in such position as to oppose the projection of the t-tube and the ring the fluid then has free egress from the outlet in the said lower end of the lumen.

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