

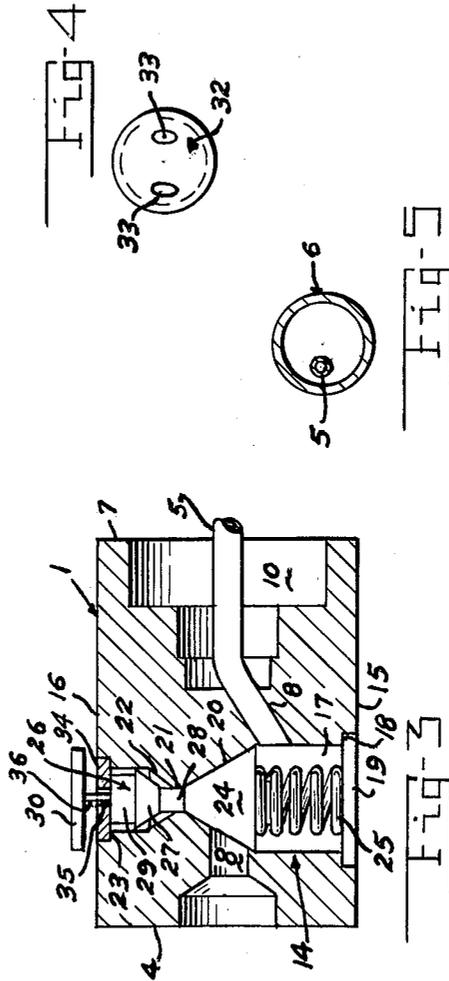
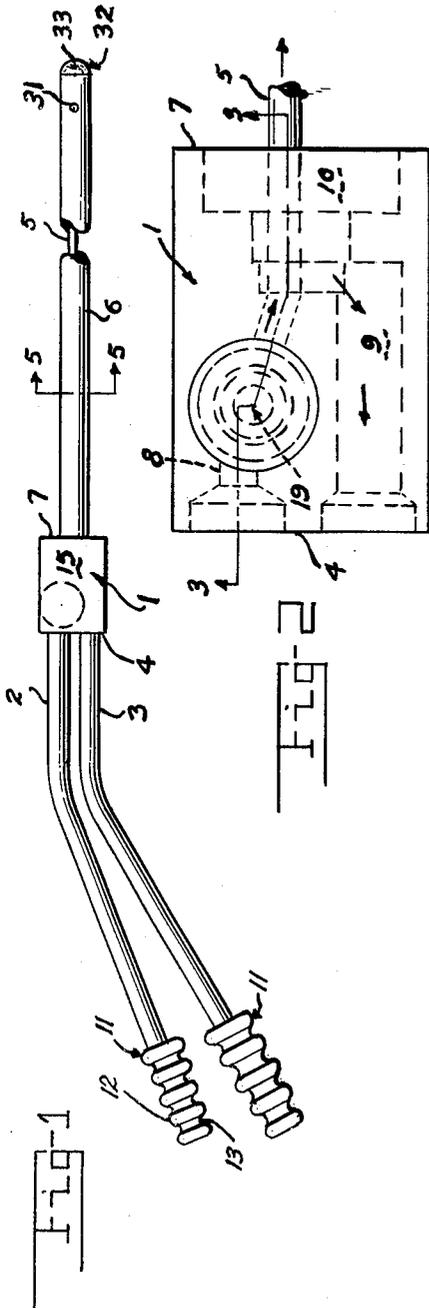
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CLEANSING APPARATUS

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CLEANSING APPARATUS

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This invention relates to cleansing apparatus particularly advantageous for use in surgical procedures.

In surgery it is highly important that the operating area be kept free of blood and the contaminating influence of bacteria or malignancy cells. Undue accumulation of blood and other fluids obstruct the surgeon's vision while bacteria can cause a patient to have serious after effects. It is also important that portions of a patient's body exposed in a surgical procedure be maintained in a moist or lubricated condition to avoid damage thereto or deterioration thereof as well as prevent loss of body fluid by evaporation during exposure.

Various implements have been designed to assist the surgeon in accomplishing the noted objectives. He normally must employ a plurality of such implements during an operation and generally requires assistance in doing so. Most of these implements are relatively awkward to manipulate and their use invariably interrupts surgery. It is obvious that delay in surgical procedures can produce complication. Moreover, in most instances gauze must still be used to sponge the operating area to help keep it free of blood. This produces trauma to the organs contacted by the gauze.

The present invention provides a simple implement particularly adapted for surgical procedures which can be used to more effectively and gently remove excess fluids, cleanse and/or lubricate the operating area, as required. In its preferred form it minimizes or obviates the need for sponging exposed organs to cut down trauma which is an incident thereof. The implement can be easily held and manipulated with one hand. A surgeon can employ it without assistance and without interrupting his surgical procedure. Its structure is such that it may be easily sterilized and maintained in a sterile condition.

A primary object of this invention is to provide improved cleansing apparatus particularly advantageous for use in surgical procedures which is simple and economical to fabricate, more efficient and satisfactory in use, adaptable to a wide variety of applications and unlikely to malfunction.

A further object is to provide improved apparatus for cleansing and flushing relatively inaccessible areas.

Another object of the invention is to provide novel apparatus which enables a surgeon to cleanse and lubricate an operating area without interrupting his surgery.

An additional object is to provide an implement for use in surgical procedures so fabricated as to eliminate the usual delays occasioned by the normal requirements for cleansing and lubricating an operating area during surgery.

A further object of the invention is to provide improved cleansing apparatus integrating means for flushing and drawing contaminating influences from an inaccessible area and applying a moist film over such an area.

Another object of the invention is to provide improved apparatus for applying suction and selectively delivering fluid to a limited area which is so formed to minimize its component structure and to eliminate need for lubrication thereof.

Another object is to provide cleansing apparatus, the use of which in surgery cuts down trauma to organs which is a normal incident thereof.

A further object of the invention is to provide improved means for assisting a surgeon in removing contaminating influences present in surgical procedures which may be

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readily sterilized and easily maintained in a sterile condition.

A further object of the invention is to provide cleansing apparatus possessing the advantageous structural features, the inherent meritorious characteristics, and the means and mode of operation herein described.

With these and other objects in view, as will more fully appear in the specification, the invention intended to be protected by Letters Patent consists of the features of construction, the parts and combinations thereof, and the mode of operation as hereinafter described or illustrated in the accompanying drawings, or their equivalents.

Referring to the drawings, wherein is disclosed a preferred but not necessarily the only form of embodiment of the invention,

FIG. 1 is an elevation view of apparatus in accordance with the invention;

FIG. 2 is an enlarged view of the valve housing portion of the apparatus of FIG. 1 indicating its internal structure in dotted lines;

FIG. 3 is a view taken on line 3-3 of FIG. 2;

FIG. 4 is an elevation of the head of the apparatus of FIG. 1; and

FIG. 5 is a cross sectional view taken on line 5-5 of FIG. 1.

This invention can be best described with particular reference to the accompanying drawings. As oriented in the drawings, the device illustrated includes a rectangular valve housing 1 having a pair of vertically aligned tubes 2 and 3 connected in and projected from one end 4 and a pair of nested tubes 5 and 6 projected from its opposite end 7.

A series of intercommunicating passages are defined in the housing 1. Passages 8 and 9, which are vertically spaced, open from the end 4 of the housing and extend inwardly thereof toward its opposite end 7. The inner ends of the passages 8 and 9 are oriented to mutually open into the inner end of a passage 10, the outer end of which opens centrally of the end 7 of housing 1.

The connected ends of tubes 2 and 3 respectively nest in the passages 8 and 9 to the end 4 of the housing 1. Thus, tubes 2 and 3 respectively provide small bore extensions of the passages 8 and 9. The portions of the tubes 2 and 3 immediately adjacent housing 1 are generally parallel, vertically spaced and at right angles to its end 4. The portions of tubes 2 and 3 remote from the housing 1 are relatively depressed in a vertical sense, at acute angles to their connected portions, and caused to slightly diverge. The tubes 2 and 3 thereby define a convenient natural grip for the invention apparatus which may be observed in FIG. 1 of the drawings.

Tubular adapters 11 are fixed about the ends of tubes 2 and 3 remote from the housing 1. The adapters 11 are externally convergent to their projected extremities and formed to have annular projections 12 spaced by annular depressions 13. The irregular exterior of adapters 11 thus formed facilitate sealed coupling of hose units thereto.

In employing this invention embodiment for surgical procedures, the adapters 11 on tube 2 serve as a coupling for a hose unit connected to a supply of appropriate fluid under pressure. The adapter 11 on tube 3 serves as a coupling for a hose unit connected with suction apparatus. Details of the pressure and suction apparatus are conventional and therefore not essential to the disclosure of the present invention.

The passage 8 is intersected by a passage 14. The passage 14 extends transversely of the housing 1 from one side 15 to an opposite side 16. The portion 17 of the passage 14 adjacent the side 15 is cylindrical in configuration and expanded at the side 15 to form a shoulder 18 facing outwardly thereof. A disc 19 is fixed

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to the shoulder 18 to seal this end of the passage 14. Spaced inwardly of the side 15 the passage 14 is conically reduced in cross section to provide a conically convergent surface 20. The conical reduced portion of the passage 14 is followed by a relatively narrowed cylindrical section 21 beyond which passage 14 is slightly expanded once more to define a short generally conical surface 22. The balance of the passage 14 is uniformly cylindrical to a point adjacent the side 16 of housing 1 where it is slightly expanded to define a shoulder 23 facing outwardly thereof. A disc 34 having a small central aperture 35 seats in fixed relation to shoulder 23 to bridge passage 14 at the side 16 of the housing 1.

The cross section of passage 14 is a maximum in its portion 17 and a minimum in section 21.

The path of the passage 8 through housing 1 is such that its upstream portion adjacent the end 4 opens into the conically reduced portion 20 of passage 14. The downstream portion of the passage 8 opens into portion 17 of passage 14 immediately adjacent its conically reduced portion 20.

A conical valve element 24 positioned in the conically reduced portion of passage 14 has an external configuration to precisely seat to the conical surface 20. A cylindrical projection from the base of valve 24 nests within a coil spring 25 interposed between disc 19 and the base of valve 24. The spring 25 applies a bias to seat valve 24 in sealing relation to conical surface 20 and completely intercept the passage 8 thereby. Axially aligned with and opposed to the valve 24 is a second valve 26 having a conical surface portion 27 adapted to precisely seat to surface 22 in passage 14. A cylindrical axial projection 28 from the apex of the conical section of valve 26 projects to bear on the wall defining section 21 of passage 14. The length of projection 28 is such to normally displace the conical surface portion of the valve 26 from the surface 22. A reduced cylindrical projection 29 from the base of the conical section of valve 26 terminates in a stem 36 which projects outward of the side 16 of the housing 1 through the aperture 35 in the disc 34. An operator disc 30 is fixed to the projected extremity of stem 36 and normally spaced outwardly of the housing 1 thereby. As may be seen from FIG. 3 of the drawings, disc 34 serves to contain valve 26 and defines the limits of movement thereof.

Pressure must be applied to the operator disc 30 of the valve member 26 to displace valve 24 from the conical surface 20 in passage 14 through the medium of valve projection 28. This enables fluid under pressure to pass from the upstream section of passage 8 to the downstream section. Passage 8 is otherwise normally sealed by valve 24. When valve 24 is displaced, the conical section 27 of valve 26 precisely seats to surface 22 to seal the passage 14 at that point and thereby prevent leakage in transmission of fluid under pressure through the valve housing.

The innermost end of tube 5 which projects from and perpendicular to the end 7 of housing 1 is positioned inwardly of the passage 10 and is angled to fixedly nest in the downstream portion of the passage 8 to form an extension thereof. Tube 5 is thus in direct communication with the section 17 of the passage 14. The inner end of tube 6 is fixed to housing 1 in the passage 10 to form an extension thereof. The tube 6 projects coextensively with and about the tube 5 which is eccentrically disposed relative thereto. The tube 6 is provided with vent holes 31 adjacent its projecting extremity which is closed by a hemispherical cap 32. The cap 32 is provided with a pair of apertures 33 arranged in diametrically opposite positions. The projected extremity of the inner tube 5 is connected to cap 32 to define one of the apertures 33 which provides an exit therefor. The other aperture 33 communicates with the interior of the tube 6.

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The embodiment of the invention thus described provides unique cleansing apparatus particularly adaptable for use in surgical procedures in the following manner. As mentioned previously, the tube 2 is connected to a source of appropriate cleansing fluid under pressure while the tube 3 is connected to suction apparatus. As may be seen with reference to the drawings, the tube 2 communicates with the tube 5 through the devious passage 8 in the housing 1 which is normally sealed by the valve element 24. The tube 3 directly communicates with tube 6 through the passages 9 and 10 in the housing 1 providing for a direct, continuous application of suction through one aperture 33 in the cap 32.

In using such apparatus, the surgeon may easily and naturally grip the divergent portions of the tubes 2 and 3 in one hand so as to leave one finger directed forwardly thereof to a position to one side of housing 1 adjacent the outwardly biased disc extremity of the valve 26. Where incisions have been previously made and the lips thereof spread to expose the area of the operation, the surgeon with one hand can manipulate the invention apparatus and apply cap portion 32 adjacent to the operating area while he continues to cut with his other hand. Blood and other fluids that accumulate as he continues with the cutting operation are immediately drawn through one aperture 33 to tube 6, passages 9 and 10 in housing 1 and the tube 3. In the process, as required, by moving the finger adjacent the disc 30 and applying pressure thereto, the surgeon can axially project valve element 26 inwardly of the housing 1 to seat to the conical surface 22 and thereby displace the valve 24 through the medium of projection 28. This provides an opening from the entrance end to the exit end of the passage 8 through the passage 14 so that fluid under pressure is released to flow into the inner end of the tube 5 and out through the projected end of tube 5 at the cap 32 on the tube 6. As may be readily seen, the surgeon may selectively flush and wash or cleanse the operating area and continuously and immediately suck away fluids and contaminating mediums embodied therein so as to keep his vision unobstructed at all times. All this may be accomplished without the surgeon having any need to interrupt his cutting procedure to any degree. It should be noted that maximum sterility is maintained by this simple apparatus since there is no delay in flushing and removing dangerous bacteria and cells. The flow through the tube 5 provides a self cleansing thereof and causes movement of fluids away from the operating area to be continuously and immediately sucked up through the adjacent opening 33 to the suction tube 6 thereabout. It should be particularly noted the use of the invention device substantially eliminates conventional sponging procedures and the trauma incident thereto.

A further feature of the invention is that in employing such apparatus for brain surgery, for example, a constant selective fluid flow may be maintained to continuously lubricate and maintain tissues in a moist condition in a manner to enable the undesirable fluids to be drawn away by suction without danger of damage to or deterioration of the exposed tissues. The invention apparatus is therefore extremely flexible and efficient to use. It obviates the need for interference and delay occasioned by the many hands normally employed to maintain an operating area in a safe condition during surgery. It also provides means ideally suited for safely applying drugs within a body cavity.

Thus an extremely simple and effective structure is provided which may be applied to many other cleansing or lubricating applications as well. Such other applications are clearly contemplated and will be understood by those versed in the art as within the scope of the invention.

From the above description it will be apparent there is

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thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in form, proportion, detail construction and arrangement of parts without departing from the principles involved or sacrificing any of their advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown but the means and construction herein disclosed merely comprise modes by way of example of putting the invention into effect.

Having thus described our invention, we claim:

1. Cleansing apparatus particularly applicable for use in surgical procedures comprising a single housing unit, a pair of aligned tubes, a pair of nested tubes, said aligned tubes being connected to project in fixed relation to one end of said housing, said nested tubes being connected to freely project in a fixed rod-like formation from the opposite end of said housing, said housing unit having passages therethrough respectively connecting one of said aligned tubes with one of said nested tubes to respectively provide a suction line and a pressure line therethrough, valve means selectively adjustable in said housing unit to and from a blocking relation to the passage completing said pressure line for selectively interrupting delivery therethrough, and cap means for the projected extremity of the outer of said nested tubes including a pair of orifices, each operatively related to one of said nested tubes whereby to provide a directed flow from the pressure line and a directed inflow to said suction line.

2. Cleansing apparatus comprising a single housing element having passages formed therein, a pair of aligned tubes, a pair of nested tubes, said aligned tubes being connected to project in fixed relation to one end of said housing, said nested tubes being connected to provide a rod-like projection from the opposite end of said housing, the passages in said housing element respectively connecting one of said aligned tubes with one of said nested tubes to respectively provide a suction line and a pressure line extending therethrough, said aligned tubes being substantially parallel adjacent said housing element and then angularly diverted in the same sense but in divergent relation to provide a convenient hand grip adjacent said housing element, valve means in said housing element adjustable to and from a blocking relation to said pressure line and a plunger-type valve operator means operatively related to said valve means and accessible at the exterior of said housing element for convenient operation by a finger of the hand gripping said aligned tubes.

3. Cleansing apparatus comprising a single housing unit, a pair of aligned tubes, a pair of nested tubes, said aligned tubes being connected to project in fixed relation to one end of said housing, said nested tubes being connected to provide an elongated relatively fixed rod-like projection from the opposite end of said housing, said housing unit having passages therethrough respectively connecting one of said aligned tubes with one of said nested tubes to respectively provide a suction line and a pressure line therethrough, the suction line being uninterrupted and the pressure line having valve means connected to adjust to and from a blocking relation thereto for selectively interrupting delivery through the pressure line, said aligned tubes having a fixed disposition to provide a convenient hand grip adjacent said housing unit, a cap element over the projected extremity of the outer of said nested tubes having an aperture defining the outlet from the inner of said nested tubes and a second aperture in said element laterally spaced from said first aperture to

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to communicate with the interior of the outer of said nested tubes.

4. Cleansing apparatus comprising a single housing unit having a pair of passages therethrough, a pair of tubes connected to project from one end of said housing unit in fixed substantially co-planar relation to respectively form extensions of said passages to one end thereof, a pair of nested tubes providing a rod-like projection from the opposite end of said housing and respectively providing extensions of said pair of passages to the opposite ends thereof, means in said housing unit operable to selectively block one of said passages and an externally rounded cap element over the projected extremity of the outer of said nested tubes having an aperture therein defining the opening from the inner of said nested tubes, the inner of said nested tubes being eccentrically oriented with respect to the outer of said nested tubes and an additional aperture in said cap element communicating with the interior of the outer of said nested tubes.

5. Cleansing apparatus particularly applicable for use in surgical procedures comprising an elongated tubular rod-like member having means connected for applying continuous suction to draw blood and contaminating mediums therethrough from an area of an operation, a small bore tube eccentrically oriented in said member and extending coextensive therewith, said tube having means connected for independently delivering a flushing cleansing liquid under pressure to the operating area to be directly drawn away with materials flushed thereby through suction applied thereabout and means defining an opening at the delivery end of said small bore tube capping the adjacent end of said member, said capping means having an additional passage to one side of the opening from said small bore tube whereby to limit the application of suction to one side of said small bore tube.

6. Cleansing apparatus particularly applicable for use in surgical procedures including a tubular elongated rod-like member having a rounded cap closing one end thereof, said cap having an aperture therethrough offset from its center, the other end of said member having adapter means connected for application of a continuous suction therethrough to draw blood and contamination from the area of an operation through said cap, a second tubular elongated rod-like member housed in said first mentioned member extending substantially co-extensive therewith, said cap having a second aperture defining the outlet from the adjacent end of said second member, said second member having means connected through the medium of said adapter means to its end remote from said cap for applying a flushing, cleansing flow of fluid under pressure therethrough to the operating area to be directly drawn away with the materials flushed thereby by the suction applied about said inner tube and through the first mentioned aperture in said cap, said adapter means including a grip portion for the first mentioned member having a valve operator biased therefrom operable to control flow of fluid through said second member.

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