

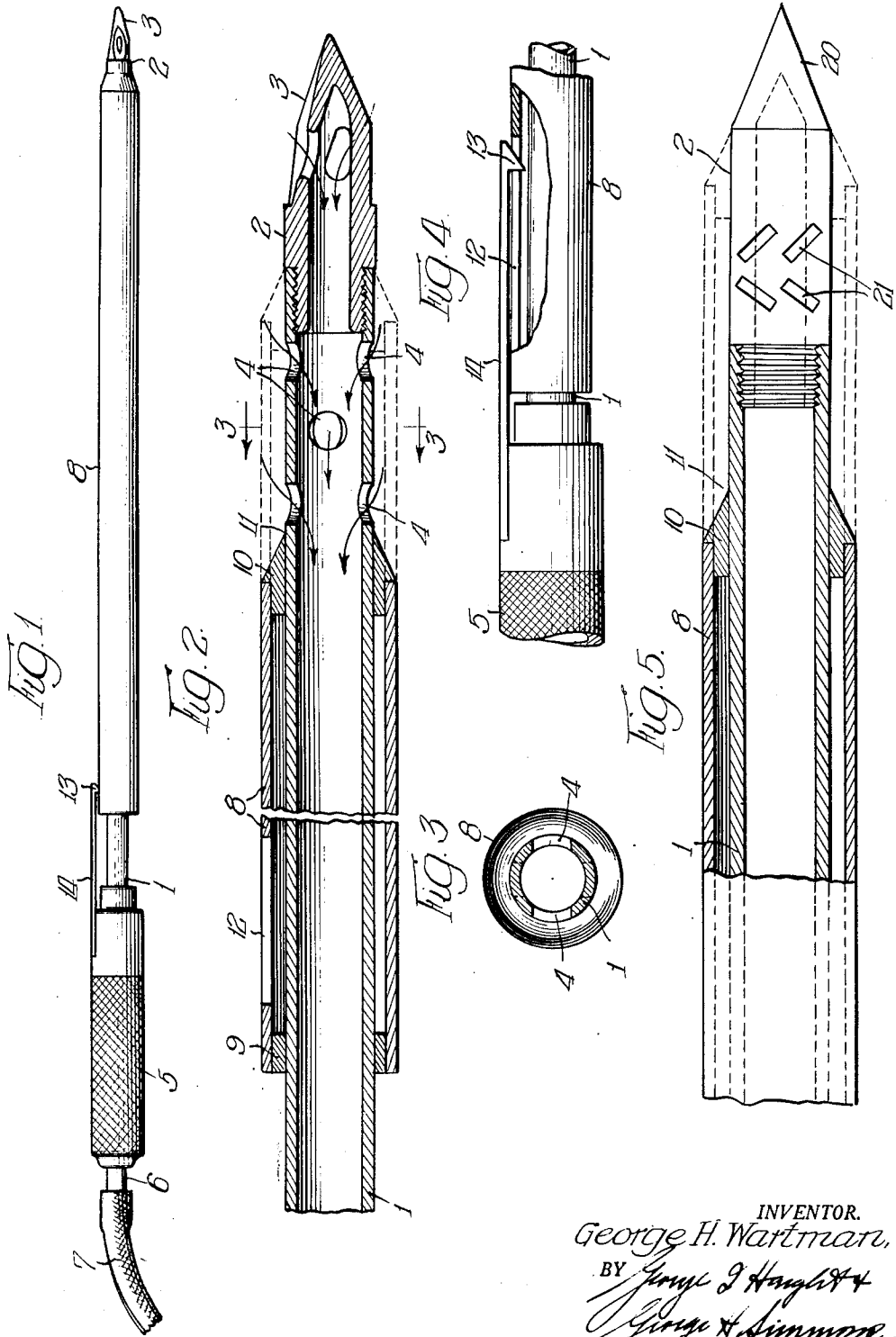
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G. H. WARTMAN
EMBALMING INSTRUMENT

2,639,484

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2 Sheets-Sheet 1



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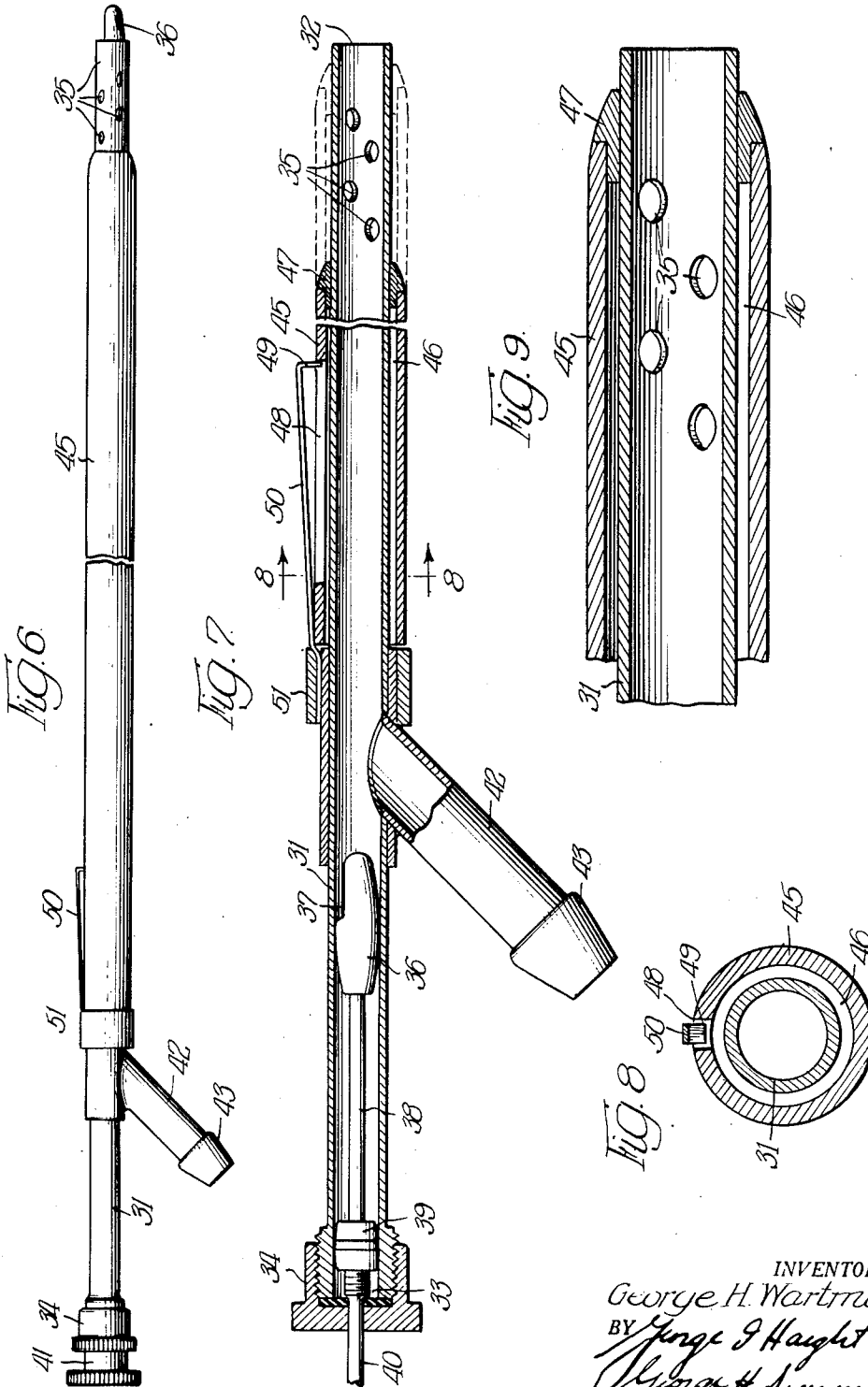
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EMBALMING INSTRUMENT

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2 Sheets-Sheet 2



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EMBALMING INSTRUMENT

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This invention relates to embalming instruments and has for its principal object the provision of new and improved instruments of this kind.

It is a main object of the invention to provide an embalming instrument which can be purged of blocking material without removing the instrument from a body.

Another object of the invention is to provide an embalming instrument having inner and outer concentric tubes adapted to be projected into a body and to provide a passageway through which air may be drawn through the inner tube to clear the same.

Another object of the invention is to provide improved embalming instruments which can be manufactured economically without sacrificing quality and can be maintained in proper operating condition at low cost.

Further objects of the invention not specifically mentioned here will be apparent from the description and claims which follow, reference being had to the accompanying drawings in which a preferred embodiment of the invention is shown by way of example and in which

Fig. 1 is an elevational view of an improved embalming instrument or trocar in purging position;

Fig. 2 is a fragmentary cross sectional view along the longitudinal axis of the trocar, drawn to an enlarged scale and showing the instrument in normal operating position;

Fig. 3 is a cross sectional view taken substantially along the line 3-3 of Fig. 2, looking in the direction of the arrows;

Fig. 4 is a fragmentary view, partly in section, showing the latch for limiting the relative movement between the inner and outer tubes;

Fig. 5 is a fragmentary view, partly in section, showing a modified form of trocar tip;

Fig. 6 is a plan view of a drainage tube in position for insertion in a blood vessel;

Fig. 7 is a cross sectional view through the longitudinal axis of the drainage tube, showing the parts in draining position;

Fig. 8 is a cross sectional view along the line 8-8 of Fig. 7, looking in the direction of the arrows; and

Fig. 9 is a fragmentary longitudinal cross sectional view showing the tubes in position for clearing the inner tube.

In the embalming of human bodies, it is common practice to insert a tubelike instrument into the chest and abdominal cavities and to apply suction to that instrument to withdraw from

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those cavities fluids and/or solids or semi-solids that may be therein contained. These instruments, commonly referred to as trocars, are usually equipped with a sharpened point which facilitates piercing the tissues as the instrument is inserted into the cavities. During the normal operation of such trocars in the withdrawing of fluids from these cavities, it is usually necessary to withdraw the trocar several times to permit the suction applied to it to draw air through the trocar and thereby remove from it solids or semi-solids which block or so nearly block the trocar tube as to interfere with the proper removal of fluids from the cavities. As will be apparent to one skilled in the art, it is extremely difficult to re-insert the trocar tube through the openings in the tissues made by a previous insertion and as a consequence further mutilation of these tissues results from each withdrawal and re-insertion of the trocar tube.

The present invention seeks to overcome the difficulties inherent in trocars now in common use by providing an outer tube of diameter slightly larger than the outside diameter of the trocar tube and spaced equidistant therefrom to provide an air chamber or passageway extending concentrically around the trocar tube. The inner end of this outer tube disposed adjacent to the tip of the trocar is of frusto-conical section to facilitate entry of the tube through the tissues of a body and to snugly but slidably engage the outer surface of the trocar thereby to form a substantially airtight seal with that surface.

The outer end of the outer tube is provided with a ring which engages the trocar tube and serves to space the tube uniformly therefrom. The outer tube contains one or more slots to permit air to enter the space between the tubes. As the trocar and tube are inserted into a cavity, the outermost ends of both extend outside of the body. The trocar is then pushed forward slightly to move the perforations in the trocar tube beyond the innermost end of the outer tube, thereby to permit suction applied to the trocar to withdraw fluids and other materials from the cavity. Should these perforations become blocked or partially blocked by solids or semi-solid materials to such an extent that proper removal of fluid is no longer possible, the trocar tube is withdrawn slightly to move the innermost end of the outer tube to a point between the tip of the trocar and the perforations. Air entering into the space between the outer and trocar tubes is thus permitted to flow through these perforations, thereby to permit the suction applied to the trocar to withdraw

from it the obstructing materials, clearing the instrument so that it may again be pushed forward and fluids removed from the cavity.

Referring now to the drawings in more detail, Figs. 1 and 2, it will be seen that the trocar comprises a tube 1 into one end of which a tip 2 is secured preferably by threading. The tip has sharpened portions 3 which facilitate piercing through body tissues as the instrument is being inserted into a cavity. The tube 1 is provided with perforations 4 through which fluids may pass.

The outer end of the trocar is provided with a handle 5 and a nipple 6 to which a tube or hose 7 may be attached to apply suction to the instrument. Suction generated by an aspirator or pump is thus applied to the instrument to draw fluids from the cavities.

Mounted concentrically upon the tube 1 is an outer tube 8, somewhat shorter than the tube 1 and adapted to slide therealong, as will presently appear. At the outer end of the tube 8 is a ring or collar 9 which engages the tube 1 to space the tube 8 concentrically therewith.

The inner end of the tube 8 is provided with a frusto-conical collar 10 which tightly but slidably embraces the outer surface of the tube 1 to support the inner end of the tube 8 concentrically therewith. The edge of the collar 10 is preferably sharpened, as indicated at 11, so that as relative movement between the tubes 1 and 8 is established this edge 11 will shear off and push away solid materials that may be projecting through the perforations 4 in the tube 1.

The tubes 1 and 8 and ring 9 are preferably made of brass and the tip 2 and collar 10 are preferably made of steel, although the use of other materials is contemplated. Handle 5 may also be composed of brass, although in certain instances clear plastic may be advantageous. The metallic parts of the instrument are plated preferably with chrome and polished to give the instrument a neat appearance and to aid in keeping it clean and sanitary.

In the operation of the device, the tube 1 is inserted into a cavity, the inner tube 1 is pushed forward into the position shown in full lines in Fig. 2 thereby to permit suction applied to the tube 1 to draw materials through the openings 4. When these openings for the tube 1 become clogged, tube 1 is withdrawn slightly to move the outer tube 8 into the position shown in dotted lines in Fig. 2, thereby to close off the openings 4 from the cavity and to open them into the air space between the tubes. Air thus drawn into the tube 1 by the suction applied thereto enables that suction to withdraw blocking material from the tube, thereby to clear it for further withdrawal of fluids from the cavity.

As will be seen best in Fig. 4, the outer tube 8 contains a slot 12 into which is projected a detent 13 that is carried on a spring member 14. Member 14 is fixed on the handle 5 of the instrument. As the handle and tube 1 are moved to the left, detent 13 will engage the end of the slot 12 thereby to limit the movement. With the detent so engaged, the collar 10 will be positioned between the perforations 4 and tip 2, as shown in dotted lines in Fig. 2. When it is desired to separate the tubes 1 and 8, as for cleaning, detent 13 can be lifted out of the slot 12 to permit the tubes to be separated.

In the embodiment of the invention shown in Figs. 1 and 2, the perforations 4 are located in the tube 1 adjacent the tip 2. In the embodi-

ment shown in Fig. 5, the tip 2 is relatively longer and is threaded into the end of the tube 1 as before. The tip in this embodiment contains not only the pointed cutting edge 20, but also a plurality of perforations 21 through which fluids are drawn into the tube 1. As shown, these perforations are set at an angle to the axis of tube 1, this particular arrangement being advantageous in that as the cutting edge 11 of the outer tube 8 is moved relatively to the tip and over the perforations, better shearing action is obtained than would be possible with circular perforations such as are shown in Fig. 2; otherwise the embodiment of the invention and its manner of operation are identical with that of Figs. 1 and 2. The particular shape of slots 21 can be varied within the teachings of the invention; in fact, the use of various styles of tips is contemplated.

Referring now particularly to Figs. 6 to 9 of the drawings, it will be observed that a somewhat different embodiment of the invention is there shown. The embalming instrument shown here includes an inner tube or trocar 31 which generally corresponds to the tube 1, described hereinbefore. The end 32, which is open, is adapted to be inserted into the body cavity, such as blood vessel, while its other end 33 is closed by a threaded fitting 34. Openings 35 are provided near the end 32 through which the body fluids can be drawn, in addition to their being drawn through the open end 32.

It is sometimes the case that materials, such as blood, may coagulate near the open end 32 and close the openings 35. In order to remove such material, a plunger 36 is provided. As shown, it is generally elliptical in cross section and has a portion 37 removed providing a step which facilitates the operation of the plunger 36. The plunger 36 has a rod 38 extending therefrom and it has a plunger or guide member 39 at its other end. It will be understood that the plungers 36 and 39 are movable longitudinally through the inner tube 31 from the position shown in Fig. 6, where a portion of the plunger 36 projects from the open end 32 to the position shown in Fig. 7. The flexible rod 40 is threaded into the plunger 39 and it extends through a suitable aperture in the fitting 34, as shown. It has a button head 41 at its outer end to facilitate its external manipulation.

Near the end of the inner tube 31, which is closed, there is a branch tube 42 which opens into it and which has a head 43 over which a flexible hose may be passed for connection to a source of suction or to a source of embalming fluid, as may be desired. It will be observed that the branch tube 42 extends angularly with respect to the inner tube 31.

Surrounding the inner tube 31 is an outer tube 45 which corresponds to the outer tube 8, referred to hereinbefore. The outer tube 45 is spaced from the inner tube 31 so as to provide an annular space 46 through which atmospheric air may flow. A collar 47 at the forward end of the outer tube 45 fits closely around the inner tube 31 and its forward edge serves to shear off any materials which may plug up the openings or perforations 35 when the outer tube 45 is moved relative to the inner tube 31. The collar 47 also serves to space the forward end of the outer tube 45 from the inner tube 31.

With a view to limiting the relative movement between the tubes 31 and 45, a longitudinal slot 48 is provided in the latter for receiving a de-

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tent 49 which is carried at one end of a spring member 50, the other end of which is secured to the outer tube 45 by a sleeve 51.

In operation, the embalming instrument as shown in Fig. 6 is inserted into a body cavity, such as an artery. Thereafter the button head 41 is withdrawn to move the plungers 36 and 39 to the positions shown in Fig. 7. Here the relative positions of the tubes 31 and 45 are shown by the full lines. Suction may be applied to the branch tube 42 for withdrawing the body fluids through the openings or perforations 35 into the inner tube 31.

In the event that these openings become plugged up, the outer tube 45 can be moved relative to the inner tube 31 to the position shown by broken lines in Fig. 7, and full lines in Fig. 9. In addition, the flexible rod 40 can be moved through the inner tube 31 so that the plunger 36 moves past the openings or perforations 35 and partially through the opening 32. On retraction of the flexible rod 40 and plungers 36 and 39 to the positions shown in Fig. 7, and the application of suction to the branch tube 42 with the outer tube 45 positioned relative to the inner tube 31, as shown in Fig. 9, atmospheric air is drawn through the annular space 46 and any material clogging the openings or perforations 35 is removed therefrom. Thereafter the outer tube 45 is retracted to the position shown by full lines in Fig. 7.

When formed of suitable materials, such as steel or brass, and properly plated, the instrument of the present invention can be manufactured at low cost and maintained in proper operating condition economically. Through its use, cavities can be completely drained on one insertion of the instrument therein; and blockings that may occur can be cleared without removing the instrument from the cavity. If desired, embalming fluid, such as may be employed to fill the cavities after drainage, may be inserted through the trocar tube the same as before. Through the use of the instrument of the present invention, proper drainage of the cavities is insured quickly and with a minimum of mutilation of body tissues.

While I have chosen to show my invention by illustrating and describing a preferred embodiment of it, I have done so by way of example only, as there are many modifications and adaptations which can be made by one skilled in the art within the teachings of the invention.

Having thus complied with the statutes and shown and described a preferred embodiment of my invention, what I consider new and desire to have protected by Letters Patent is pointed out in the appended claims.

What is claimed is:

1. The combination with a trocar having perforations through which suction applied to the trocar draws fluids from a body, of an outer tube encircling the trocar, means on the outer end of said tube engaging the trocar to support the tube concentrically of the trocar, means on the other end of the tube engaging the trocar and closing the end of the tube thereagainst, said means together supporting the tube on the trocar, spacing it therefrom, and enabling it to move relatively to the trocar to position the perforations therein within the tube so that said suction will draw air through the tube, perforations and trocar to clear the trocar of obstructing material while maintaining the trocar in the body.

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2. In combination with a trocar having a sharpened tip and a plurality of openings through which suction applied to the trocar draws fluids from a body; a tube of diameter larger than the trocar encircling the trocar and spaced uniformly therefrom; a frusto-conical tip portion on the end of said tube adjacent the tip of the trocar, slidably engaging the trocar and forming a seal therewith, said frusto-conical portion shearing off solids lodged in the openings of the trocar as the trocar is withdrawn slightly to move the edge of said section towards said tip and permitting the suction on the trocar to draw air through said tube and openings thereby to enable said suction to draw said solids out of the trocar.

3. A trocar comprising a tube having a suction connected at one end and a pointed tip at the other end, which tip facilitates inserting the trocar into a body cavity, there being perforations in the trocar through which fluids in the cavity are drawn by suction through the trocar and out of the body, an outer tube slightly shorter and of larger diameter than the trocar tube, means for supporting the outer tube concentrically on the trocar with a space therebetween, said outer tube extending outside the body when the trocar is in operating position in a cavity therein, the inner end of said outer tube falling short of the perforations in said trocar when the trocar is in said operative position, said outer tube permitting said suction to draw air through the space between the outer tube and trocar and through said perforations into the trocar when the trocar is withdrawn slightly to bring said perforations within said outer tube, said means on the inner end of said outer tube engaging said trocar to seal off the space between said tube and trocar while perforations are disposed within said tube, and a cutting edge on said means adapted to shear off solids projecting into said perforations as the trocar is being moved with respect to the tube to bring said perforations within the tube.

4. A trocar comprising: a tube, a tip threaded into one end of said tube, a sharpened point on said tip enabling the tube to be inserted into a body, there being a plurality of perforations in said tip adjacent the point thereof, an outer tube of diameter larger than said first tube disposed concentrically of said first tube and forming an air chamber therearound, a frusto-conical end section on said outer tube the free end of which engages said first tube and forms a seal therewith, the free end of said conical section serving to shear material blocking said openings as the first tube and tip are backed up slightly to move said perforations into said outer tube, thereby to permit suction applied to the first tube to draw air from said chamber through said openings into the inner tube to enable said suction to clear said first tube.

5. An embalming instrument comprising: a tube perforated adjacent one of its ends, through which perforations suction applied to the other end of the tube draws fluids from a body cavity; an outer tube shorter than the first tube, disposed concentrically therewith and spaced therefrom, said tubes being movable relative to each other; a collar in one end of said outer tube and carried thereby, having sliding fit with said perforated tube and adapted to move across said perforations to shear off solids blocking the perforations so that air drawn through the space between the tubes by suction applied to the per-

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forated tube can pass through the perforations to clear the solids therefrom; and a pointed member projecting beyond the perforated end of said first tube to aid in inserting said tubes into a body.

6. An embalming instrument comprising: a tube perforated adjacent one of its ends, through which perforations suction applied to the other end of the tube draws fluids from a body cavity; an outer tube of diameter greater and length less than that of the perforated tube; a collar in one end of said outer tube slidably supporting the outer tube concentrically of the perforated tube and spaced therefrom, said collar being adapted to be moved across said perforations and to shear off solids blocking the perforations and adapted, when positioned between the perforations and the end of the tube, to

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seal the end of the outer tube so that suction applied to the perforated tube will draw air through the outer tube and perforations to clear obstructing solids from the instrument; and a pointed member projecting beyond the end of the perforated tube to facilitate inserting the tube into a body cavity.

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