June 28, 1938. J. E. TILLOTSON 2,122,121

SURGICAL ASPIRATED DRAINAGE CUP

Filed Feb. 2, 1937 2 Sheets-Sheet 1

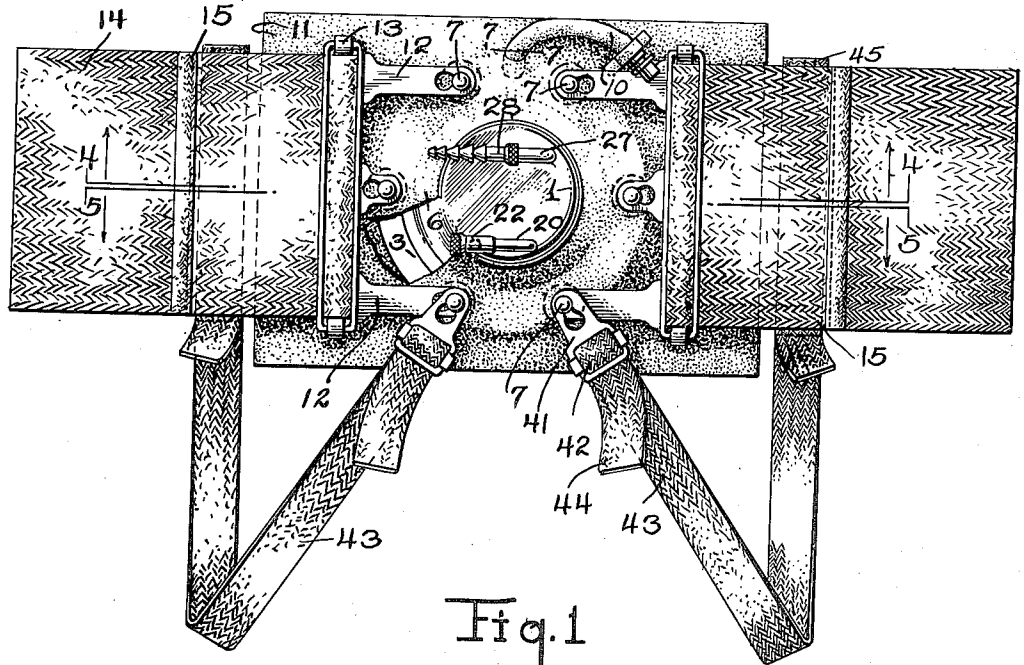


Fig. 1

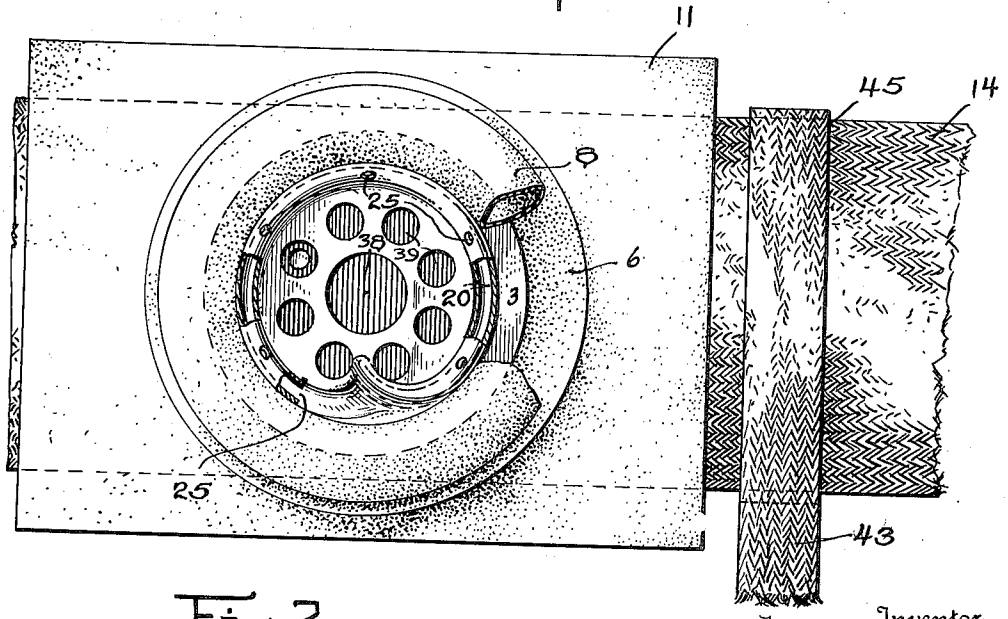


Fig. 2

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Filed Feb. 2, 1937 2 Sheets-Sheet 2

Fig. 3

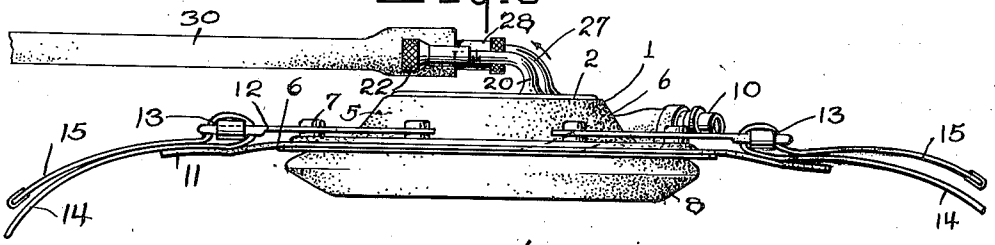


Fig. 4

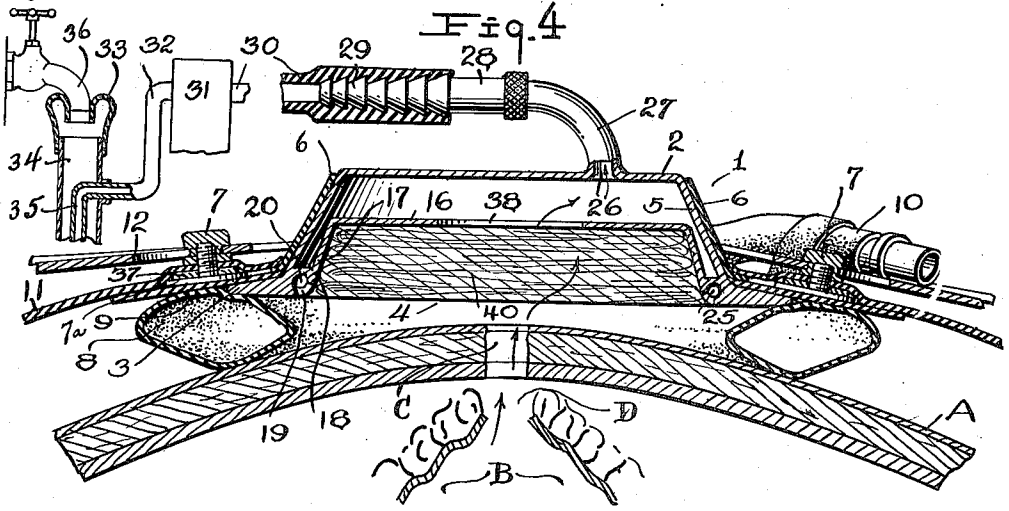
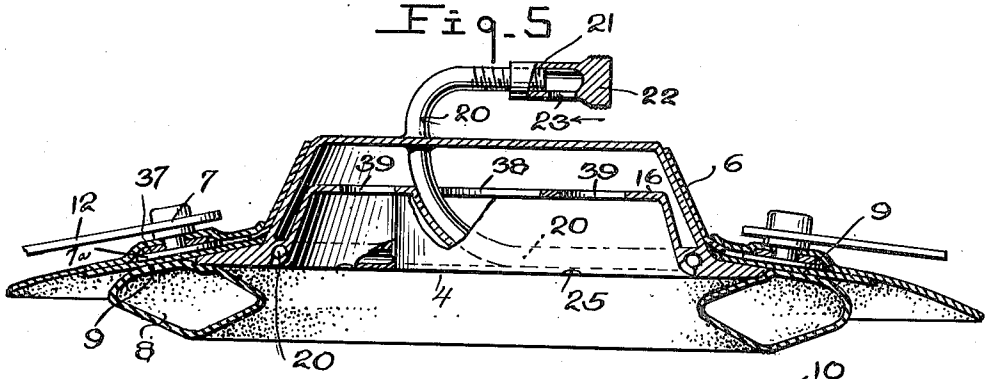


Fig. 5



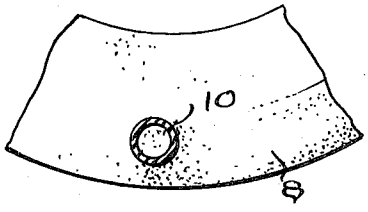


Fig. 6

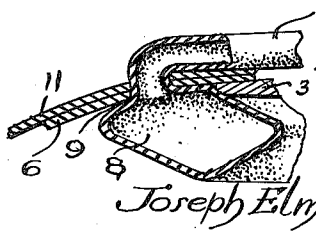


Fig. 7

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UNITED STATES PATENT OFFICE

2,122,121

SURGICAL ASPIRATED DRAINAGE CUP

Joseph Elmer Tillotson, Colusa, Calif.

Application February 2, 1937, Serial No. 123,665

12 Claims. (Cl. 128—350)

In urologic surgery, drainage apparatus employing suction is frequently used, as following cystotomy and prostatectomy. It is important that such drainage apparatus be applied in such a way as to avoid injury to the bladder mucosa, as by pressure necrosis due to the mucosa pressing against an indwelling bladder tube.

It is an object of my invention to provide an aspirated drainage cup which may be applied externally to the body over a wound, and will gently but effectively and continuously remove all waste products which accumulate at such wound.

It is another object of my invention to provide a drainage cup which will perform drainage effectively without damage to any tissues.

It is a further object of my invention to provide a drainage cup wherein a current of air blows continuously over the surface of the wound and carries away the discharge present.

In suprapubic cystotomy, the incision may be 6 to 8 centimeters in length, ordinarily parallel to the length of the body. Primary closure of the wound following the operation is not usual, and some kind of drainage must be applied. A cystotomy tube which may be as large as 2.5 centimeters caliber is often inserted after the operation, at least at first. A siphon drainage tube has been frequently applied, but the comparatively large value of vacuum required to get effective drainage through such a tube is likely to cause the bladder mucosa to press against the tube, resulting in necrosis.

I provide a drainage cup which is held tightly sealed against the abdomen over the wound, and wherein a relatively low value of vacuum is sufficient to maintain a satisfactory seal so that there is substantially no injury to any tissue. I also provide restricted air orifices adjacent the inner rim of the cup for flowing jets of air continuously over the surface of the wound. A pneumatic rubber cushion is applied around the rim of the cup for comfort and to assure a tight seal.

A rubber mat and a muslin abdominal binder are attached to the cup to steady it on the abdomen. The cup is simple in structure and easily removable for cleansing and for replacing the gauze dressing. The cup may be applied immediately following a suprapubic cystotomy operation, and may be used following suprapubic prostatectomy. It is also adapted for other operations. My cup includes means for receiving and retaining a cystotomy tube for as long as such tube must be used, as for removing large clots of obstructing material. Comfort to the patient and cleanliness of the wound are found in using this device.

Advantages of my device are:

The patient is kept dry and comfortable. The usual discomfort of continuous large wet dressings is eliminated. The nervous strain and potential complications of large wet dressings are reduced.

The cup can be employed where no drain of any kind is in the bladder, or it may be employed where a cystotomy tube of large caliber is required.

Continuous gentle decompression with removal of urine and exudate is assured, thus promoting cleanliness of the bladder and wound, and protection against infection.

Toilsome and unpleasant nursing care is minimized, and there is large economy in dressings.

Where the condition of the patient permits, he may get in and out of bed with the apparatus attached and in operation, maintaining complete dryness.

My invention will be better understood by reference to the following description and the accompanying drawings wherein the same reference characters denote corresponding parts in all figures, and wherein:

Figure 1 shows a general assembled top plan view of my apparatus, with parts broken away, showing the drainage cup with its inlet and outlet, and the mat, muslin belt or binder, and thigh straps attached;

Figure 2 shows a bottom plan view with parts broken away, of the cup with the pneumatic rubber rim, mat, belt or binder, and thigh straps, showing the perforated plate in the cup, and the air jet apertures;

Figure 3 is an elevation of the cup with pneumatic rubber rim, inlet and outlet, with belt or binder attached;

Figure 4 is a general sectional view taken on the line 4—4 on Figure 1, showing the cup in position on the abdomen, with gauze in place above the wound, and showing the outlet from the cup;

Figure 5 is a general sectional view taken on the line 5—5 of Figure 1, showing the perforated plate intermediate of the cup, and the restricted air inlet;

Figure 6 is a top plan view partly in section of the inflatable rubber cushion, partly in section, showing the inlet inflating tube; and

Figure 7 is a detailed sectional view of the pneumatic rubber cushion and the inlet tube for inflating it, taken on the line 7—7 of Figure 1.

Referring to the drawings in detail, 1 is the

drainage cup which may be of suitable metal preferably nickel plated and comprising the upper base portion 2, the projecting edge portion 3, and the lateral intermediate portion 5. The cup 1 as shown is essentially frustoconical, or in the shape of a small cake tin. The cup is ordinarily substantially circular and has a central opening 4 which is of the order of 12 centimeters in diameter. A rubber apron 6 is cut from thin sheet rubber, such as is used for inner tubes of automobile tires, and is fitted to surround the side 5 of cup 1 and extend along and beyond the edge 3 thereof. A pneumatic rubber cushion 8 is in the form of an annulus of approximately elliptical section, is attached as by cementing to apron 6 at point 9, and is inflatable by inlet tube 10 which has a closure valve.

Attachment studs 7 are positioned around the rim of apron 6, and comprise a base and stem 7a to which the upper portion of the stud is attached. A metal ring 37 which is preferably flexible as of lead is provided for mounting these studs, and is positioned over the base of the stud. A rubber mat 11 has a substantially circular aperture which fits substantially against the sloping side 5 of cup 1, over apron 6, and is apertured to receive the stems of studs 7, and is fitted over the base of studs 7 and beneath the upper portions of the studs 7.

A buckle structure 13 has engaging fingers 12 which are slotted to engage studs 7. This buckle is large, of the same size as the binder, with a number of engaging fingers extending therefrom. Abdominal binder or belt 14 which may be of muslin passes through and is held by buckle 13, with its free end 15 projecting therefrom, is relatively wide, and is adaptable to fit any shaped person.

A perforated partition or shelf 16 is provided within cup 1 approximately half way intermediate its base 2 and edge 3, and has a lateral frustoconical flange portion 17 which is attached at 18 to the edge portion of cup 1 as by soldering, or may be attached to cup 1 by other suitable structure. The small circular aperture 19 extends around the edge portion of cup 1 close to the inner rim of the edge portion forming a ring. Within aperture 19 a small pipe 20 passes, which may be of copper, and is provided with a plurality of apertures 25 which communicate with corresponding apertures extending through the cup structure substantially at the inner rim where frustoconical portion 17 bends around to edge portion 3. These apertures are relatively small, of the order of 0.30 centimeter in diameter, and are positioned so that jets of air projected through these apertures will pass approximately radially inwardly and across the plane of the edge of the cup.

One end of pipe 20 is in the inner rim of the cup and may have a terminal aperture of the kind described. The other end of pipe 20 passes upwardly and through an aperture in the upper base 2 of cup 1, and terminates in a threaded portion 21 to which a knob 22 is threadedly fitted. Knob 22 has a narrow lateral slot 23 which is adapted to extend from near the inner end of knob 22 well up to its outer larger or knurled end, so that by screwing knob 22 up tight on terminal portion 21, the air inlet aperture may be reduced to a minimum opening or entirely closed, and by screwing knob 22 away from terminal portion 21, any desired value of inlet opening may be obtained.

In the upper base portion 2 of the cup 1, and relatively near the circumferential edge thereof, an outlet aperture 26 is provided, to which is connected outlet pipe 27 which is provided with terminal threads. A coupling terminal member 28 provided with a terminal portion 29 adapted to receive a rubber hose 30 or the like is threadedly attached to pipe 27. A receptacle 31 is provided which is adapted to receive waste liquid or material discharged from the cup. Receptacle 31 is connected by a rubber hose or the like 32 to suction apparatus or aspirator 33. This may be an electrically driven or other air pump, or as shown may be a running water aspirator of the type attachable to an ordinary water faucet, and providing a leading tube as shown, or a restricted Venturi passage or the like, for producing a lowered pressure as a stream of water passes. In the form of vacuum producing apparatus shown particularly in Figure 4, there is shown an aspirator consisting of a pipe 34 within which is a smaller leading tube 35 opening in the direction of flow of the stream of water flowing through pipe 34 from a faucet 36. Leading tube 35 is connected to receptacle outlet 32, and the flow of water thru pipe 34 produces a lowered pressure or vacuum in tube 35 and thereby in receptacle 31. Other suitable means of producing a vacuum may be employed.

The intermediate partition 16 of cup 1 is provided with a large central aperture 38 which may advantageously be approximately 2.5 cm. in diameter and which is adapted to receive a large caliber cystotomy tube. Partition 16 is further provided with a ring of smaller apertures 39 which may be circular, extending in a ring around central aperture 38.

The cup 1 and the partition 16 and its flanges 17 are adapted to receive and hold in the space 4 a light packing of surgical gauze 40, which receives the discharge from the wound.

In Figure 4, the cup is shown in position on the abdomen. The abdomen is shown at A, incised at C, and the bladder is shown at B, incised at D. Urine, blood, pus, or other matter discharged through the incision, is met immediately upon reaching the surface by the jets of air which are discharged from apertures 25 because of the relatively low pressure within the cup, and such discharge is thereby largely evaporated and passes upwards through the small fold of lightly packed gauze 40 and apertures 38, 39, and pipe 27 to receptacle 31, due to the reduced pressure applied thereto from vacuum source 33. In the space between cup base 2 and partition 16, there is therefore air and vapor containing urine.

Attached to the belt or binder 14 are the leg straps 43, having free ends 44, and provided with slotted terminal engaging members 41 on buckles 42, adapted to engage studs 7. These leg straps provide a further element of stability in keeping the cup in place on the abdomen, although as stated, the slight vacuum applied is the principal means by which the cup is held in place. These leg straps are rarely necessary in stout individuals.

In operation, the vacuum applied causes a stream of air of volume determined by the setting of the adjustable knob 22 to be drawn in through pipe 20 and apertures 25 and discharged as jets over the surface of the abdomen across the wound.

When the pneumatic rubber cushion is inflated to a degree to give proper resilience, and wet, it adheres water-tightly to the skin of the abdo-

men, and there is required only slightly diminished interior pressure to maintain this fixation, and this is without undue suction on the skin or bladder. There is no marked vacuum applied, since air is rushing in continuously through the jet apertures. The binder and the rubber mat merely act as a steadying influence and not as a major factor maintaining the water-proof adherence of the inflated rim to the skin. The discharge will be carried away effectively from the abdominal surface of the wound if conditions are such that no cystotomy tube is required to be in place.

The light gauze dressing is easily changed once a day or oftener as required.

I have employed my invention here described with very satisfactory results in a variety of bladder drainage cases, with the discharge quickly becoming mucus- and odor-free and with rapid healing of the wound due to the high degree of cleanliness produced.

It will be obvious that my invention is susceptible of various modifications which will be obvious to those familiar with this art, and all such modifications as are within the scope of the appended claims I consider to be comprised within the spirit of my invention.

Having thus described the invention what I claim is:

1. In a surgical drainage cup, a substantially cup-shaped member having a base portion, an edge portion applicable to the body, and further having a lateral portion intermediate said base portion and said edge portion, an air conducting pipe member extending around the inside of said cup-shaped member adjacent said edge portion thereof and having a plurality of restricted apertures adapted to supply restricted jets of air to the interior of said cup-shaped member, said cup-shaped member having a discharge portal, means for maintaining a pressure below atmospheric pressure at said discharge portal, means connected to said discharge portal for conducting and receiving waste matter, and means for supplying a restricted stream of air to said air conducting pipe member.

2. In a surgical drainage cup, a substantially cup-shaped member having a base portion, an edge portion applicable to the body, and further having a lateral portion intermediate said base portion and said edge portion, an air conducting pipe member extending around the inside of said cup-shaped member adjacent said edge portion thereof and having a plurality of restricted apertures adapted to supply restricted jets of air to the interior of said cup-shaped member, said cup-shaped member having a discharge portal in said base portion near the edge of said base portion, means for maintaining a pressure below atmospheric pressure at said discharge portal, means connected to said discharge portal for conducting and receiving waste matter, and means for supplying a restricted stream of air to said air conducting pipe member.

3. In a surgical drainage cup, a substantially cup-shaped member having a base portion, an edge portion applicable to the body, and further having a lateral portion intermediate said base portion and said edge portion, an air conducting pipe member extending around the inside of said cup-shaped member adjacent said edge portion thereof and having a plurality of restricted apertures adapted to supply restricted jets of air to the interior of said cup-shaped member, said cup-shaped member having a discharge portal, a receptacle for waste matter connected to said discharge portal, means for maintaining pressure below atmospheric pressure connected to said receptacle, and means for supplying a restricted stream of air to said air conducting pipe member.

4. In a surgical drainage cup, a substantially cup-shaped member having a base portion, an edge portion applicable to the body, and further having a lateral portion intermediate said base portion and said edge portion, an air conducting pipe member extending around the inside of said cup-shaped member adjacent said edge portion thereof and having a plurality of restricted apertures adapted to supply restricted jets of air to the interior of said cup-shaped member, said cup-shaped member having a discharge portal, means for maintaining a pressure below atmospheric pressure at said discharge portal, means connected to said discharge portal for conducting and receiving waste matter, and adjustably controllable means for supplying a restricted stream of air of adjustably variable volume to said air conducting pipe member.

5. In a surgical drainage cup, a substantially cup-shaped member having a base portion, an edge portion applicable to the body, and further having a lateral portion intermediate said base portion and said edge portion, an air conducting pipe member extending around the inside of said cup-shaped member adjacent said edge portion thereof and having a plurality of restricted apertures adapted to supply restricted jets of air to the interior of said cup-shaped member, said cup-shaped member having a discharge portal, means for maintaining a pressure below atmospheric pressure at said discharge portal, means connected to said discharge portal for conducting and receiving waste matter, means for supplying a restricted stream of air to said air conducting pipe, member belt means adapted to fit around the body, and engaging means adapted for attachment to said cup-shaped member and said belt means for retaining the same in fixed relative position and for holding said cup-shaped member in desired fixed position on the body.

6. In a surgical drainage cup, a substantially cup-shaped member having a base portion, an edge portion applicable to the body, and further having a lateral portion intermediate said base portion and said edge portion, an air conducting pipe member extending around the inside of said cup-shaped member adjacent said edge portion thereof and having a plurality of restricted apertures adapted to supply restricted jets of air to the interior of said cup-shaped member, said cup-shaped member having a discharge portal, means for maintaining a pressure below atmospheric pressure at said discharge portal, means connected to said discharge portal for conducting and receiving waste matter, means for supplying a restricted stream of air to said air conducting pipe, member and pneumatic sealing means carried on the edge of said cup-shaped member and adapted to be applied against the body for applying an air-tight seal of said cup-shaped member against the body.

7. In a surgical drainage cup, a substantially cup-shaped member having a base portion and an edge portion applicable to the body, said cup-shaped member further having a lateral portion intermediate said base portion and said edge portion, a perforated partition within said cup-shaped member spaced from said base portion and said edge portion thereof, the wall of said

cup-shaped member having a discharge portal communicating with the space between said base portion and said partition, means for supplying a restricted stream of air to a point within said cup-shaped member between said partition and said edge portion, means for maintaining a pressure below atmospheric pressure at said discharge portal, and means connected to said discharge portal for conducting and receiving waste matter.

8. In a surgical drainage cup, a substantially cup-shaped member having a base portion and an edge portion applicable to the body, said cup-shaped member further having a lateral portion intermediate said base portion and said edge portion, a perforated partition within said cup-shaped member spaced from said base portion and said edge portion thereof, the wall of said cup-shaped member having a discharge portal communicating with the space between said base portion and said partition, means for supplying a restricted stream of air to a plurality of spaced points within said cup-shaped member between said partition and said edge portion, means for maintaining a pressure below atmospheric pressure at said discharge portal, and means connected to said discharge portal for conducting and receiving waste matter.

9. In a surgical drainage cup, a substantially cup-shaped member having a base portion and an edge portion applicable to the body, said cup-shaped member further having a lateral portion intermediate said base portion and said edge portion, a perforated partition within said cup-shaped member spaced from said base portion and said edge portion thereof, said partition having a relatively large central aperture of the order of 2.5 centimeters in diameter and further having a plurality of relatively smaller spaced apertures positioned around said central aperture, the wall of said cup-shaped member having a discharge portal communicating with the space between said base portion and said partition, means for supplying a restricted stream of air to a point within said cup-shaped member between said partition and said edge portion, means for maintaining a pressure below atmospheric pressure at said discharge portal, and means connected to said discharge portal for conducting and receiving waste matter.

10. In a surgical drainage cup, a substantially cup-shaped member having a base portion and an edge portion applicable to the body, said cup-shaped member further having a lateral portion intermediate said base portion and said edge portion, a perforated partition within said cup-shaped member spaced from said base portion and said edge portion thereof, the space in said cup-shaped member between said partition and said edge portion being adapted to receive surgical dressing material, the wall of said cup-shaped member having a discharge portal communicating with the space between said base portion and said partition, means for supplying a restricted stream of air to a point within said cup-shaped member between said partition and said edge portion, means for maintaining a pressure below atmospheric pressure at said discharge portal, and means connected to said discharge portal for conducting and receiving waste matter.

11. In a surgical drainage cup, a substantially cup-shaped member having a base portion, an edge portion, and further having a lateral portion intermediate said base portion and said edge portion, and an air-conducting pipe member extending around the inside of said cup-shaped member adjacent said edge portion thereof and having a plurality of restricted apertures positioned to discharge inwardly-directed jets of air substantially in the plane of the edge of said cup.

12. In a surgical drainage cup, a substantially cup-shaped member having a base portion, an edge portion, and further having a lateral portion intermediate said base portion and said edge portion, an air-conducting pipe member extending around the inside of said cup-shaped member adjacent said edge portion thereof and having a plurality of restricted apertures positioned to discharge inwardly-directed jets of air substantially in the plane of the edge of said cup, said cup-shaped member having a discharge portal in said base portion near the edge of said base portion, means for maintaining a pressure below atmospheric pressure at said discharge portal, means connected to said discharge portal for conducting and receiving waste matter, and means for supplying a restricted stream of air to said air conducting pipe.

JOSEPH ELMER TILLOTSON.