

[54] **SURGICAL DRAIN**
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358,937 1/1906 France 128/350 R
 847,475 8/1952 Germany 128/276

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[57] **ABSTRACT**

A surgical drain is disclosed in the form of a drainage catheter about the inner or distal end of which a nylon net is wrapped and retained in position loosely by a plurality of ties with the net and catheter being encased in a thin rubber sheath in a loose manner so that air can flow into the sheath when the outer or proximal end of the catheter is connected to suction; an additional feature resides in an irrigation catheter extending through and along the length of the sheath for providing an irrigation discharge outwardly of the distal end of the sheath for discharging internally of the sheath for internally flushing the sheath for discharge via the suction catheter.

[56] **References Cited**

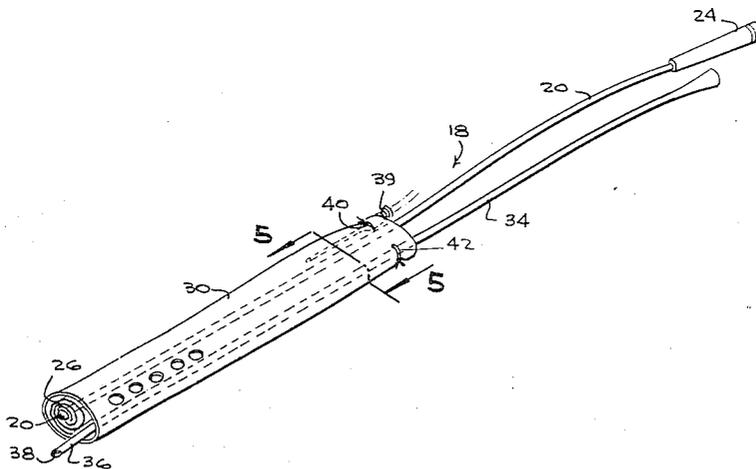
UNITED STATES PATENTS

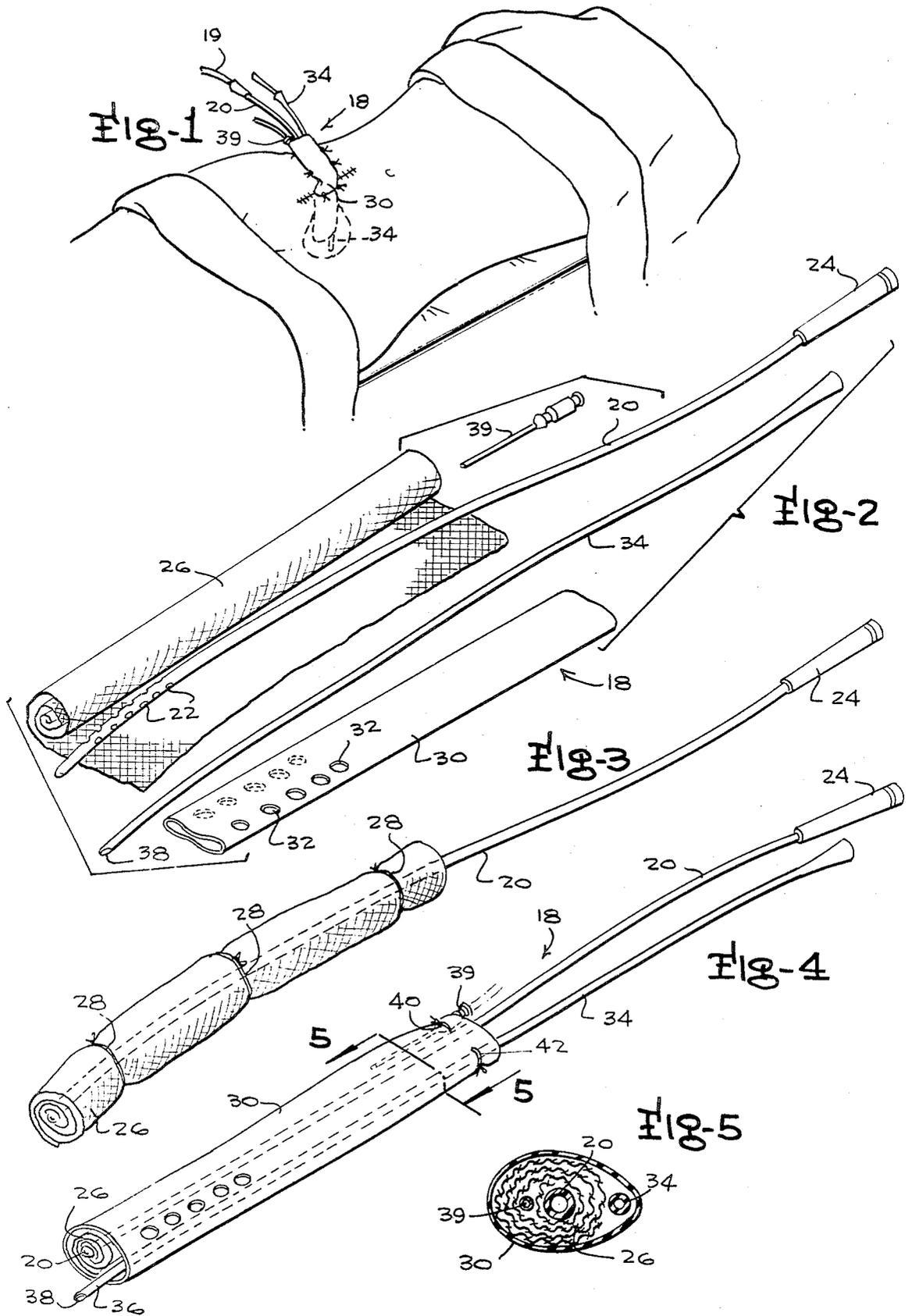
2,492,384	12/1949	Kaslow	128/350 R
2,930,378	3/1960	Buyers	128/350 R
3,089,492	5/1963	Owens	128/268
3,416,532	12/1968	Grossman	128/350 R
3,430,631	3/1969	Abramson	128/350 R
3,753,439	8/1973	Brugarolas et al.	128/350 R

FOREIGN PATENTS OR APPLICATIONS

358,933	3/1906	France	128/350 R
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10 Claims, 5 Drawing Figures





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SURGICAL DRAIN

This invention is in the field of medical equipment and is specifically directed to a new and improved surgical drain insertable in a body cavity or wound for draining naturally occurring liquid from the cavity. Even more specifically, the invention is directed to a new and improved surgical drain including irrigation means for irrigating both the interior of the drain and the cavity with which it is associated.

The desirability of employing surgical drains has been recognized by those of skill in the art for many years and numerous designs have evolved for this purpose. Various structural features incorporating different type materials and structural parts have been employed in surgical drains previously in use and disposable tube type plastic drains have become commercially available in recent years. Drains of the foregoing type usually function quite satisfactorily when serving to drain a thin fluid medium such as urine or bile. Unfortunately, none of the presently known drains provides satisfactory long-term drainage when the liquid being drained is a thick exudate which has a tendency to clog or occlude the drain to such an extent as to render it completely inoperative. Drainage of such thick liquids of the last-mentioned type is a particularly critical problem and must be effected in order to avoid extremely serious consequences to the patient. While the best of the presently known drain devices will usually function for a short period of time, such devices unfortunately tend to clog and become inoperative in a few short hours. Therefore, there is a substantial need for a new and improved surgical drain capable of functioning over a substantial period of time following installation without clogging or otherwise becoming inoperative.

For these reasons, it is the primary object of the subject invention to provide a new and improved surgical drain means.

Achievement of the object of this invention is enabled through the provision of a surgical drain formed of a drainage catheter having a nylon net wrapped around its innermost end in a rather loose plurality of convolutions and held in position by a plurality of silk ties belting the net at spaced points along its length. The drainage catheter and the encircling nylon net are positioned on the interior of a flexible tubular sheath of rubber or equivalent material so that the nylon net provides a porous space on the interior of the sheath. The proximal end of the sheath extends externally of the patient and the application of suction to the drainage catheter creates a flow of air downwardly inside the sheath externally of the drainage catheter which flow of air has a beneficial effect upon the operation of the drain.

Additionally, an irrigation catheter extends internally of the sheath along the entire length of the sheath and protrudes beyond the innermost end of the sheath for enabling the discharge of irrigation fluid in the innermost portions of the cavity in which the drain is positioned.

In addition, a plastic needle extends into the proximal end of the interior of the sheath for enabling the injection of irrigation fluid into the interior of the sheath for flushing the sheath either at timed intervals or continuously as desired. Tie means extend through the sheath for retaining the plastic needle in position and for also

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retaining the irrigation catheter in position with respect to the sheath so that reliable structural integrity is achieved.

The subject invention has been found to be extremely useful in providing draining of serious life-threatening situations where effective drainage over a substantial time period is imperative for the recovery of the patient. Examples of such situations include deep abscesses, contaminated traumatic wounds likely to become severely infected, duodenal and bowel fistulas and pancreatic trauma.

A better understanding of the subject invention will be enabled when the following written description of the preferred embodiment is read in conjunction with the appended drawings, in which:

FIG. 1 is a perspective view illustrating a typical usage of the preferred embodiment in conjunction with an abdominal cavity;

FIG. 2 is an exploded perspective view of the various components of the preferred embodiment;

FIG. 3 is a perspective view of an assembled drainage catheter and nylon spacer net of the preferred embodiment;

FIG. 4 is a perspective view of the completely assembled preferred embodiment; and

FIG. 5 is a sectional view taken along lines 5-5 of FIG. 4.

Attention is initially invited to FIG. 2 of the drawings which illustrates the component parts of the preferred embodiment 18 which includes a drainage catheter 20 preferably of plastic construction having a plurality of inflow openings 22 adjacent its inner distal end and having an outer distal end fitting 24 connectable to a conventional suction source 19 as shown in FIG. 1. Porous spacer means in the form of a nylon net 26 is wrapped about the inner end of the drainage catheter 20 in a plurality of convolutions held in position by three silk ties 28 belting the net as shown in FIG. 3.

The spacer means 26 formed of the convolutions of nylon net and the lower end of the catheter 20 about which the nylon net is wound are positioned on the interior of a thin-walled rubber sheath 30 having a plurality of inflow openings 32 adjacent its innermost distal end. Sheath 30 is the type device frequently referred to as a penrose drain.

An irrigation catheter 34 extends through the sheath 30 and has a distal end which protrudes beyond the distal end of the sheath as shown at 36 with a discharge opening 38 being provided in the distal end of catheter 34.

Internal sheath irrigation means in the form of a plastic needle 39 extends into the interior of the sheath 30 adjacent the proximal end thereof. Needle 39 is of the type frequently referred to as a "rochester" needle and is held in position by a silk tie 40 as shown in FIG. 4 of the drawings. Similarly, the irrigation catheter 34 is maintained in position by a silk tie 42 as is also illustrated in FIG. 4.

FIG. 1 illustrates a typical usage of the preferred embodiment which, in this case, is illustrated in conjunction with the drainage of an abdominal cavity such as is involved in a pelvic abscess.

It should be understood that the drain is capable of usage in a variety of cavities requiring drainage and the size of the drain can vary in accordance with the particular usage in which it is to be employed.

In any event, the spacer means defined by the nylon net 26 serves to space the outer sheath 30 away from the drainage catheter 20. Consequently, an air passage is maintained throughout the entire length of the interior of the sheath 30 and connection of the suction fitting 24 to a source of suction 19 consequently results in a continuous inflow of air into the interior of the sheath and downwardly toward the inflow openings 22 of the drainage catheter 20. This inflow of air has been found to be extremely effective in preventing clogging or occluding of the drain.

Additionally, irrigation of the wound can be effected by the introduction of fluid via the irrigation catheter 34 either upon a continuous basis or upon a cyclic timed basis as the case may be.

Similarly, the internal irrigation means comprising the plastic needle 39 can be either continuously or intermittently operated to provide irrigation fluid to the interior of sheath 30 in an obvious manner. Fluid provided by the needle 39 will be removed by means of the openings 22 of the suction catheter.

The particular fluid provided by the plastic needle 39 and the irrigation catheter 34 will depend upon the nature and condition of the cavity being drained and can include an antibiotic or other medicinal liquid specified by the attending physician. The irrigating catheter 34 serves primarily to irrigate the abscessed cavity or wound and the inflow openings 32 enable drainage of the irrigating fluid to the suction catheter 20 in a self-evident manner.

Numerous modifications of the subject device will undoubtedly occur to those of skill in the art and it should be understood that the spirit and scope of the invention is to be limited solely by the appended claims.

I claim:

1. A surgical drain having distal and proximal ends comprising a thin-walled flexible tubular outer sheath having a proximal end positionable externally of a body cavity to be drained and a distal end positionable on the interior of the cavity, a suction drainage catheter having means on an outer proximal end thereof for connection to a source of suction and having an inner distal end having inflow openings positioned in the interior of said flexible tubular outer sheath adjacent the distal end of said sheath and resilient mesh-like spacer means

extending along the length of said outer sheath on the interior of said outer sheath for maintaining said outer sheath and said drainage catheter in spaced relationship for providing a non-clogging air flow passage in the interior of said tubular outer sheath externally of said drainage catheter for permitting air to enter the proximal end of the outer sheath and flow inwardly externally of the drainage catheter toward the distal end of the drainage catheter to enhance drainage of the cavity and prevent clogging of the drain.

2. The invention of claim 1 additionally including an irrigation catheter extending through said sheath and having a discharge opening adjacent the distal end of the sheath for enabling irrigation of the cavity adjacent the distal end of the sheath.

3. The invention of claim 1 additionally including internal irrigation means communicating with the interior of the proximal end of said sheath for irrigating the interior of said sheath.

4. The invention of claim 3 wherein said mesh-like spacer means comprises an air porous net extending about the outer periphery of the drainage catheter of the interior of said sheath.

5. The invention of claim 4 wherein said internal irrigating means comprises a needle inserted in the proximal end of said outer sheath.

6. The invention of claim 1 wherein said sheath is a rubber-like member and includes a plurality of apertures adjacent its distal end.

7. The invention of claim 6 additionally including an irrigation catheter extending through said sheath and having a discharge opening adjacent the distal end of the sheath for enabling irrigation of the cavity adjacent the inner end of the sheath.

8. The invention of claim 7 additionally including internal irrigation means communicating with the interior of the proximal end of said sheath for irrigating the interior of said sheath.

9. The invention of claim 8 wherein said spacer means comprises a porous nylon net extending about the outer periphery of the drainage catheter on the interior of said sheath.

10. The invention of claim 9 wherein said internal irrigation means comprises a needle inserted in the upper end of said outer sheath.

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