

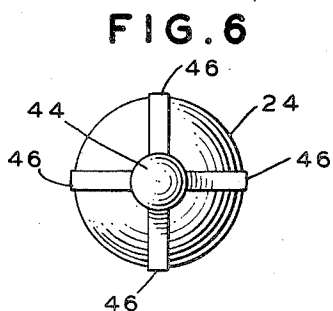
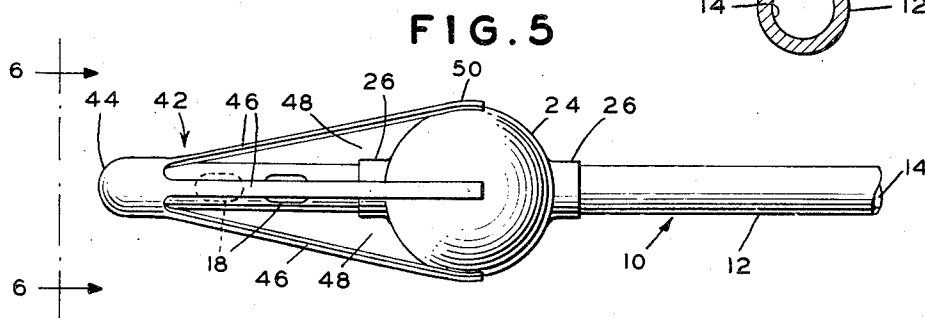
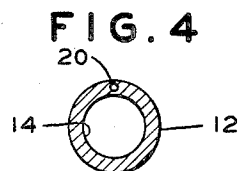
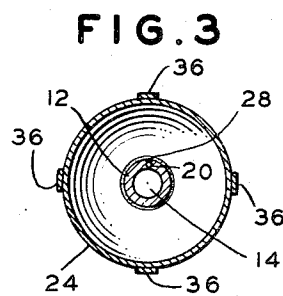
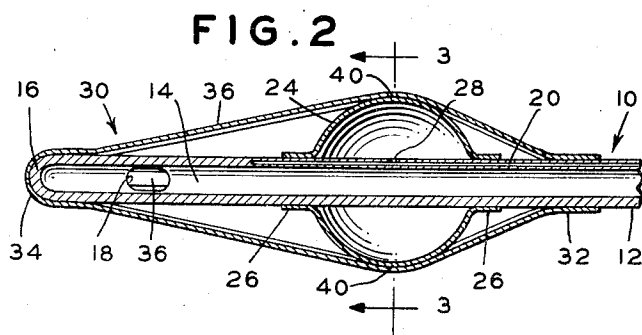
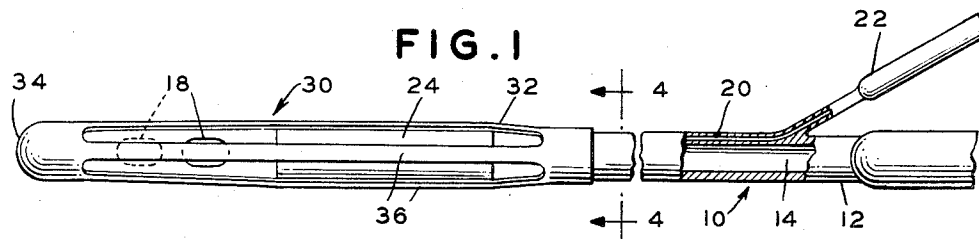
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2,854,983

INFLATABLE CATHETER

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2,854,983

INFLATABLE CATHETER

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This invention relates to the art of catheters, and more particularly to inflatable catheters that are adapted to be advantageously employed in various body drainage procedures.

Catheters constructed in accordance with this invention have wide application and use. They are especially useful in various simple visceral drainage procedures, including drainage of the bladder, gastrointestinal viscera, peritoneal, thoracic and other body regions, preoperative drainage procedures and postoperative drainage procedures.

It is the primary object of this invention to provide an inflatable catheter having improved features of design and construction.

The invention has for another object the provision of an inflatable retention catheter having its parts so constructed and arranged as to prevent its entrance openings from becoming closed, clogged or otherwise obstructed by body tissue or visceral membranes.

Another object of the invention is to provide an inflatable catheter which minimizes trauma from irritation and thereby reduces spasm and pain, in use, as compared to conventional inflatable catheters.

The invention has for a further object the provision of an inflatable retention catheter that may be readily introduced into a body cavity, maintained in the cavity for an extended period of time without accidental dislodgement or obstruction of its entrance openings by body tissue or the like, and subsequently withdrawn from the cavity, all without undue pain or discomfort to the patient.

A still further object of the invention is to provide an inflatable retention catheter that is simple and durable in construction, that is reasonable in manufacturing cost and that is adapted to perform its intended function in a satisfactory and trouble-free manner.

To the end that the foregoing objects may be readily attained, a catheter constructed in accordance with this invention comprises a flexible tubular member which is closed at its forward end and open at its rearward end. The tubular member has a generally central longitudinal passage, which serves as the drainage lumen, and it is provided in its forward end portion with a plurality of spaced entrance openings which establish direct communication between the passage and the exterior of the tubular member. An inflatable bag encircles the tubular member rearward of the openings and is secured thereto in any suitable manner known to the art. The catheter is provided with means within the outer confines of the tubular member for transmitting a fluid, preferably sterile air, into the bag for the purpose of inflating the bag. This means is independent of the central passage and includes a second longitudinal passage in the wall of the tubular member that extends from the rear end of that wall to a point between the ends of the bag. A duct establishes communication between this passage and the interior of the bag. A conduit, connected to the rear end off the second longitudinal passage supplies air to that passage and thence to the bag.

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The catheter is also provided with means to prevent obstruction of its entrance openings by body tissue, visceral membranes, foreign matter, debris or large blood clots. This means comprises at least one flexible strut element which extends between the forward end of the tubular member and the bag. The strut element is adapted, upon inflation of the bag, to extend over and in spaced relation to a corresponding entrance opening. The strut element thus prevents obstruction of the entrance opening, but permits free flow of body fluids into the entrance opening and thence through the central longitudinal passage.

The parts of the catheter may be made of any suitable flexible material or combinations of materials. The materials of the bag and strut elements may be elastic or non-elastic and include compositions of rubber and various known synthetic plastic materials. It is recommended that the catheter parts be made of appropriate thermoplastic materials that are non-irritating and non-toxic and that do not support the deposition of urinary salts, particularly when the catheter is intended to be retained in the bladder for an extended period of time. Among preferred and recommended thermoplastic materials having these properties are polyethylene and copolymers of vinyl chloride and vinyl acetate.

The enumerated objects and other objects, together with the advantages attainable by the practice of this invention, will be readily understood by persons skilled in the art upon reference to the following detailed description taken in conjunction with the accompanying drawing, which respectively describe and illustrate two catheter constructions embodying the invention.

In the drawing, wherein like reference numerals denote corresponding parts throughout the several views:

Fig. 1 is a view in side elevation and partly in vertical cross section of a catheter of this invention, the inflatable bag of the catheter being shown in deflated condition;

Fig. 2 is a view in central vertical cross section through the forward portion of the catheter of Fig. 1, the bag being shown in inflated condition;

Fig. 3 is a view taken along line 3—3 of Fig. 2;

Fig. 4 is a view taken along line 4—4 of Fig. 1;

Fig. 5 corresponds to Fig. 1 and illustrates a modification of the invention, the bag being shown in inflated condition; and

Fig. 6 is a view taken along line 6—6 of Fig. 5.

Referring to Figs. 1 through 4, I have illustrated therein a catheter 10 which comprises a flexible tubular member 12 having a generally central longitudinal passage 14 that serves as the discharge lumen of the catheter. The tubular member is open at its rear end and is closed and rounded at its forward end, as indicated by numeral 16 in Fig. 2. The forward end portion of the tubular member is provided with a plurality of entrance openings 18 which establish communication between passage 14 and the exterior of the catheter. A second longitudinal passage 20 is formed in the wall of tubular member 12. A flexible conduit 22 communicates with passage 20, as illustrated in Fig. 1.

An inflatable bag 24 encircles tubular member 12 and is positioned rearward of openings 18. This bag has a pair of annular end extensions 26 which are cemented or otherwise secured to the tubular member to form a hermetical seal therewith. A duct or port 28 establishes communication between passage 20 and the interior of the bag.

The catheter is provided with a means or unit 30 to prevent obstruction of openings 18 when the catheter is in active use. Unit 30 comprises a flexible tubular device 32 which extends over and along the forward end portion of tubular member 12 and bag 24 as illustrated in Figs. 1 and 2. Device 32 is closed at its forward end

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34 and is slotted so as to obtain a plurality of flexible strut strips or elements 36. These elements engage the bag 24 and are preferably secured thereto by cementing in the regions 40 to prevent lateral movement relative to the bag.

For the purpose of briefly outlining the mode of operation of the catheter shown in Figs. 1 through 4, it is assumed that the bag is deflated and the parts are in the relative position shown in Fig. 1. It is also assumed that the catheter is to be used to drain the bladder. The distal end of the catheter is inserted in the urethra and the catheter moved therethrough until all of bag 24 is introduced into the bladder. The bag is then inflated by air admitted through conduit 22, passage 20 and duct 28, causing the parts to assume the relative position shown in Fig. 2. This draws strut elements 36 taut and in spaced relation to entrance openings 18, thereby preventing obstruction of these openings by body tissue or the like, but permitting free flow of bladder fluids through the openings and central passage 14.

Reference is next had to Figs. 5 and 6 which illustrate a modified form of the invention. The parts of the catheter shown in these views, with the exception of the strut unit, are the same as those of Figs. 1 through 4. The strut unit of Fig. 5 is identified by numeral 42 and comprises a tubular device that is closed at one end 44 and that carries a plurality of strut strips or elements 46 which are spaced apart as indicated at 48. The free ends of the strut elements are cemented or otherwise secured to bag 24, as indicated at 50. The form of the invention shown in Figs. 5 and 6 operates in substantially the same manner as that of Figs. 1 through 4.

It will be apparent that the strut unit may be made of a single piece of flexible, elastic or non-elastic material of the character referred to earlier herein. If desired, the strut unit may be made of separate and independent elements 36 or 46 which are individually secured to tubular member 12 and to the bag. Furthermore, the number of strut elements can be varied depending on the elasticity and/or flexibility of the bag, the number of entrance openings in the catheter and the length of the catheter.

From the foregoing, it is thought that the construction, operation and advantages of the herein described invention will be readily apparent to those skilled in the art, without further description. It is to be clearly understood, however, that the forms of the invention shown and described are to be taken as preferred examples of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or sacrificing any of the advantages.

I claim:

1. In an inflatable catheter, an elongated tubular member having a generally central longitudinal passage and at least one opening in its forward end portion, said opening establishing communication between said passage and the exterior of the tubular member, an inflatable bag carried by the tubular member rearward of said opening, means within the outer confines of the tubular member and the bag for transmitting a fluid into the bag to inflate the same, and a unit engaging the tubular member and the bag, said unit comprising at least one flexible strut element extending between the forward end of the tubular member and the bag, said strut element being adapted, upon inflation of the bag, to extend over and in spaced relation to said opening.

2. In an inflatable catheter, an elongated tubular member having a generally central longitudinal passage and a plurality of spaced openings in its forward end portion, each opening establishing communication between said passage and the exterior of the tubular member, a first unit comprising an inflatable bag carried by the tubular member rearward of said openings, means within the outer confines of the tubular member and the bag for

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transmitting a fluid into the bag to inflate the same, and a second unit engaging the tubular member and the bag, said second unit comprising a plurality of flexible strut elements extending between the forward end of the tubular member and the bag, said strut elements being adapted upon inflation of the bag to be maintained in spaced relation to said openings and to each other.

3. An inflatable catheter according to claim 2 wherein at least one of the units is formed from an elastic material.

4. An inflatable catheter according to claim 2 wherein at least one of the units is formed from a non-elastic thermoplastic material.

5. In an inflatable catheter, an elongated tubular member having a generally central longitudinal passage and a plurality of spaced openings in its forward end portion, each opening establishing communication between said passage and the exterior of the tubular member, an inflatable bag carried by the tubular member rearward of said openings, means within the outer confines of the tubular member and the bag for transmitting a fluid into the bag to inflate the same, and a tubular device that is closed at one end and open at the other end, said tubular member projecting into the tubular device and bearing at its distal end against the closed end of the tubular device, said tubular device including a plurality of flexible strut elements extending between the forward end of the tubular member and the bag and engaging the bag, said strut elements being adapted, upon inflation of the bag, to be maintained in spaced relation to said openings and to each other.

6. In an inflatable catheter, an elongated tubular member having a generally central longitudinal passage and a plurality of spaced openings in its forward end portion, each opening establishing communication between said passage and the exterior of the tubular member, an inflatable bag carried by the tubular member rearward of said openings, means within the outer confines of the tubular member and the bag for transmitting a fluid into the bag to inflate the same, and a perforate tubular device that is closed at one end and open at the other end, said tubular device including a plurality of integral strut elements which extend between its closed and open ends, said tubular member projecting into the tubular device and bearing at its distal end against the closed end of the device, the open end portion of the tubular device being secured to the tubular member rearward of the bag, said strut elements engaging the bag and being adapted, upon inflation of the bag, to be maintained in spaced relation to said openings and to each other.

7. In an inflatable catheter, an elongated tubular member having a generally central longitudinal passage and a plurality of spaced openings in its forward end portion, each opening establishing communication between said passage and the exterior of the tubular member, an inflatable bag carried by the tubular member rearward of said openings, means within the outer confines of the tubular member and the bag for transmitting a fluid into the bag to inflate the same, and a tubular device that is closed at one end and open at the other end and that is slotted intermediate its ends to obtain a plurality of strut elements, said tubular member projecting into the tubular device and bearing at its distal end against the closed end of the device, the open end portion of the tubular device being secured to the tubular member rearward of the bag, said strut elements engaging the bag and being adapted, upon inflation of the bag, to be maintained in spaced relation to said openings and to each other.

8. In an inflatable catheter, an elongated tubular member having a generally central longitudinal passage and a plurality of spaced openings in its forward end portion, each opening establishing communication between said passage and the exterior of the tubular member, a first unit comprising an inflatable bag carried by the

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tubular member rearward of said openings, means within the outer confines of the tubular member and the bag for transmitting a fluid into the bag to inflate the same, and a tubular device that is closed at one end and open at the other end, said tubular member projecting into the tubular device and bearing against the closed end of the device, the open end of the device terminating forwardly of said openings, and a plurality of strut elements integral with the tubular device and extending rear-

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wardly of said openings, said strut elements being connected to the bag and being adapted, upon inflation of the bag, to be maintained in spaced relation to said openings and to each other.

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