Nov. 17, 1959 F. J. KEOUGH 2,912,981

INFLATABLE RETENTION CATHETER

Filed April 10, 1958

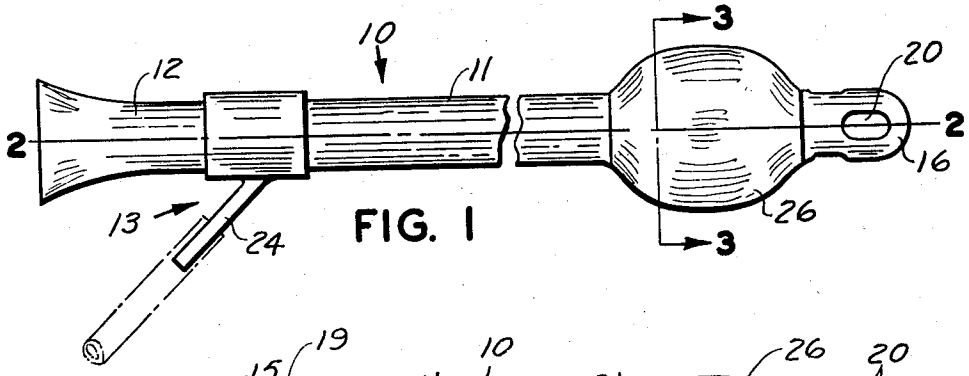

FIG. 1

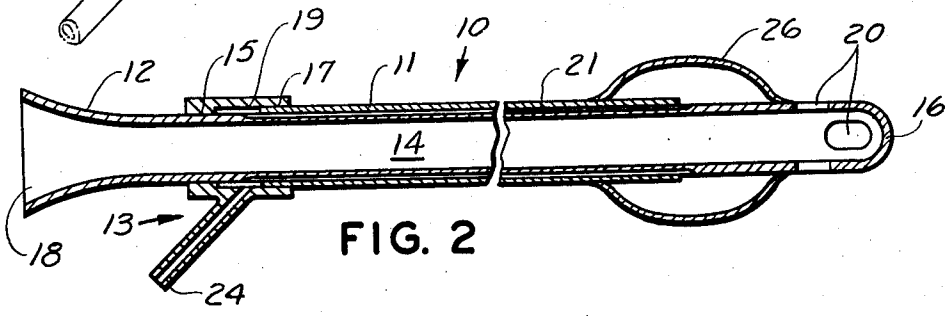

FIG. 2

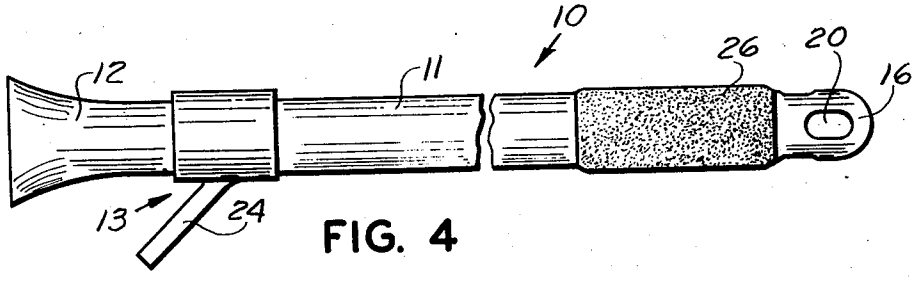

FIG. 4

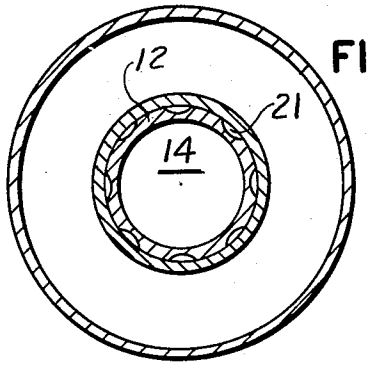

FIG. 3

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United States Patent Office 2,912,981 Patented Nov. 17, 1959

2,912,981

INFLATABLE RETENTION CATHETER

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Application April 10, 1958, Serial No. 727,690

5 Claims. (Cl. 128—349)

This invention relates to catheters, and more particularly to inflatable retention catheters which are employed in various urological procedures, such as drainage of the bladder.

A primary object of this invention is to provide a retention type catheter with improved features of construction to increase the efficiency of the catheter and reduce pain and discomfort to the patient.

Another object of the present invention is to provide an inflatable retention catheter which may be readily introduced into a body cavity, be maintained in the cavity for an extended period of time without fear of clogging or accidental dislodgement and be subsequently removed from the body cavity, without undue pain or discomfort to the patient.

In urological procedures, such as artificial drainage of the bladder by means of the catheter, the surgeon frequently encounters scar tissue. This scar tissue is less resilient than normal tissue and therefore provides resistance to the proper acceptance of a catheter, resulting in faulty drainage.

The membranes through which the catheter passes are delicate and sensitive to the acceptance of foreign bodies such as catheters.

It therefore behooves the manufacturers of catheters to provide a catheter of the smallest possible diameter for easy insertion and to lessen the degree of resistance and consequent irritation to the body membranes while providing a catheter which can be expanded uniformly and to a maximum diameter to insure proper drainage.

In the past inflatable catheters were provided with a single fluid passageway to inflate the retaining bulb. The catheters themselves were semi-rigid and were provided in varying sizes to accommodate the passageway through which they passed. The single fluid passageway had no effect on expanding the catheter body it merely straightened the body. The result was that the body of the catheter very closely approximated the diameter of the passageway through which it passed. If the single passageway became clogged the patient not infrequently died. The catheter could not accommodate scar tissue through circumferential expansion. The catheter was painful to the patient because a large diameter body was necessary to fill out the passageway.

The present invention obviates these difficulties by providing a new and novel construction.

Referring to the drawings in which similar characters of reference indicate corresponding parts in all the figures:

Figure 1 is a side elevational view of the new and improved inflatable retention catheter with the bulb inflated.

Figure 2 is a horizontal cross sectional view taken along line 2—2 of Figure 1.

Figure 3 is a transverse cross sectional view taken along line 3—3 of Figure 1.

Figure 4 is a view similar to Figure 1 showing the bulb deflated.

The illustrated catheter is generally indicated by numeral 10 and comprises an extremely thin walled elongated, flexible tubular member 12, that is fabricated from a suitable material such as natural or artificial rubber or molded or extruded plastic material or dipped tubing or a combination of a polyvinyl resin such as copolymer of vinyl chloride and vinyl acetate or polyethylene coated with latex either by spraying or dipping. The flexible tubular member 12 is substantially concentric or circular in transverse cross-section. A concentric axial longitudinal passageway 14 defines a drainage channel or lumen. Tubular member 12 is closed and rounded at its forward end 16 to facilitate insertion into a body cavity and is open at its rearward end 18. Adjacent the forward end 16 of tubular member 12 is a plurality of openings 20 for permitting body fluids, such as urine in the bladder, to flow into passageway 14 when the catheter 10 is in position.

A plurality of elongated fluted grooves 21 are provided in the outside diameter of flexible tubular member 12. Grooves 21 may be either parallel or spiral shaped.

A second extremely thin walled elongated, flexible tubular member 11 is provided and is fabricated from the same material used to make flexible tubular member 12. Flexible tubular member 11 is shorter in length than the length of grooves 21. Member 11 is positioned over flexible tubular member 12 in telescopic relationship with grooves 21 extending beyond either end of member 11. Member 11 and member 12 are hermetically sealed together.

A distension-duct collar generally indicated at 13 is hermetically sealed on one end to flexible tubular member 12 as at 15 and is hermetically sealed on the other end to flexible tubular member 11 as at 17. A cavity 19 is provided between said ends with a conduit 24 forming an integral part of collar 13. Conduit 24 is in communication with cavity 19 and grooves 21.

Rearward of openings 20 is an inflatable bag 26 hermetically sealed on opposite ends to flexible tubular member 11 and flexible tubular member 12, respectively. Inflatable bag 26 is preferably fabricated of rubber which has great and sensitive expansible qualities. Grooves 21 establish communication between conduit 24 and the interior of bag 26.

For the purpose of outlining the manner of using catheter 10, it is first assumed that the parts are in the relative position shown in Figure 4, and that the rear end of conduit 24 is open to the atmosphere. Bag 26 is manually collapsed and deflated and arranged so that it lies substantially parallel to the outside diameter of flexible tubular member 11. Catheter 10 may be greased as with Vaseline, mineral oil or other membrane lubricant. Closed end 16 of flexible tubular member 12 is then inserted in the urethra and the catheter is advanced through the urethra until the forward portion of the tubular member and all of bag 26 have been introduced into the bladder and lie forwardly of its vesical orifice. A sufficient amount of air or other fluid may next be introduced into bag 26 by way of conduit 24, cavity 19 and grooves 21 to partially inflate bag 26. Catheter 10 is then retracted through the urethra until the end of bag 26 away from end 16 of member 12 bears against the anterior and posterior lips of the vesical orifice to properly position the catheter. Additional air or fluid under pressure is supplied to bag 26 by way of conduit 24, cavity 19 and grooves 21 until bag 26 is fully inflated, as shown in Figures 1 and 2. The free end of conduit 24 is closed by a suitable plug or the like to prevent escape of air or fluid from bag 26 and consequent deflation of the same.

With bag 26 located and inflated as described, the same ensures retention of the catheter in the bladder. In other words, bag 26 prevents accidental dislodgment or removal of the catheter from the bladder, and the

bladder is drained by way of openings **20** and axial longitudinal passageway **14**.

To remove the catheter from the bladder, the rear end of conduit **24** is opened to the atmosphere, permitting discharge of air of fluid from bag **26**, and resulting in collapse of bag **26**. Catheter **10** is then slowly retracted and completely withdrawn from the bladder and the urethra.

It has been found that fabricating flexible tubular members **11** and **12** from plastic material permits the walls of members **11** and **12** to be extremely thin thereby permitting greater drainage for a given diameter of tubular members **11** and **12**. Conversely, a much smaller set of tubular members **11** and **12** may be employed to allow the insertion of catheter **10** into scar tissue and otherwise damaged urethra or a urethra of very small size. The plastic is impervious to urinary salts and is chemically inert and acid resistant.

Molded or extruded plastic tubular member may be fabricated in substantially concentric cross sectional area, thus insuring perfect drainage by eliminating leakage around a catheter which is out of round in cross sectional diameter. Catheters with a single inflating duct or groove **21** had a wall which projected into the drainage passageway **14** which reduced the effective drainage area. The single duct could clog. The likelihood of a plurality of ducts or grooves clogging is greatly minimized. A clogged duct could mean death to a patient. The plurality of ducts or grooves **21** insures a uniform and expanded tubular member **11** which in turn insures leak proof engagement with the urethra.

Catheter **10** may be dipped or sprayed with a very thin filament of latex for certain types of drainage use.

Having shown and described preferred embodiments of the present invention, by way of example, it should be realized that structural changes could be made and other examples given without departing from either the spirit or scope of this invention.

What I claim is:

1. An inflatable retention catheter consisting of two elongated tubular members, one within the other and hermetically sealed together, the inner tubular member defining a smooth walled concentric axial longitudinal passageway and having in its forward end portion at least one opening establishing communication between its interior and exterior, the outer of said tubular members defining a smooth concentric outer wall shorter in length than said inner tubular member, an inflatable bag carried by and encircling said tubular members rearward of said opening with one end of said bag secured to said outer tubular member and the other end of said bag secured to said inner tubular member, and means comprising at least one groove between said inner and said outer tubular members for transmitting a fluid into the bag to inflate the bag.

2. An inflatable retention catheter consisting of a first elongated flexible tubular member closed at its forward end and open at its rearward end, said first tubular member defining a concentric axial passageway having in its forward end portion at least one opening establishing communication between its interior and exterior, a second elongated flexible tubular member hermetically sealed to said first elongated flexible tubular member, a plurality of ducts located between said first and second tubular members and extending the full length of said second elongated flexible tubular member, said first elongated flexible tubular member projecting beyond the opposite ends of said second flexible tubular member, an inflatable bag hermetically sealed on one end to said second flexible elongated tubular member and hermetically sealed to said first flexible elongated tubular member rearward of said one opening, one end of said ducts in communication with said bag, and means, independent of said concentric axial passageway, in communication with said plurality of ducts on the end opposite to the ends of said ducts in communication with said bag for transmitting a fluid into the bag to inflate the same.

3. A catheter as defined in claim 2 in which, said first and second elongated flexible tubular members are formed from a thermoplastic material selected from the group consisting of a copolymer of vinyl resins and polyethylene and said bag is fabricated from rubber.

4. An inflatable retention catheter consisting of a first thin walled elongated tubular member defining a concentric longitudinal axial passageway a plurality of elongated fluted parallel grooves provided in the outside diameter of said first tubular member, said first tubular member having in its forward end portion at least one opening establishing communication between its interior and exterior, a second thin walled concentric elongated tubular member telescopingly embracing and hermetically sealed to said first thin walled elongated tubular member, said second tubular member being of a length to allow said plurality of elongated fluted parallel grooves to extend a distance beyond opposite end of said second tubular member, a distension-duct collar secured on one end to said first tubular member and on the opposite end to said second tubular member and defining a cavity between the ends in communication with said elongated fluted parallel grooves, a tubular extension integrally formed in said collar and terminating in said cavity, an elastic inflatable bag secured on one end to said second tubular member and on said opposite end to said first tubular member rearward of said opening establishing communication between the interior and exterior of said first tubular member, said plurality of elongated fluted parallel grooves establishing communication between said tubular extension and the inside of said elastic inflatable bag to inflate and deflate said bag.

5. An inflatable retention catheter consisting of a first elongated tubular member defining a concentric axial passageway and having in its forward end portion a plurality of openings establishing communication between its interior and exterior, a plurality of open ducts provided in the outside diameter of said first elongated tubular member, a second elongated tubular member telescopingly attached to said first elongated tubular member and of a length less than the full length of said open ducts, said second elongated tubular member closing the open ducts throughout its length, an inflatable bag hermetically sealed on one end to said first elongated tubular member rearward of said plurality of openings and hermetically sealed on the other end to said second elongated tubular member with said plurality of ducts in communication with said bag, said first and second elongated tubular members being made of a thin, flexible material that is substantially impervious to moisture and non-elastic in tension, said bag being made of a soft expansible thin rubber and a distension-duct collar secured on one end to said first elongated tubular member and on the opposite end to said second elongated tubular member and defining a cavity between said ends in communication with said plurality of ducts and a tubular extension integrally formed in said distension-duct collar in communication with said cavity for admitting a fluid for inflating said bag through sad cavity and plurality of ducts.

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