Jan. 5, 1960 SE KYONG KIM 2,919,697

CATHETERS

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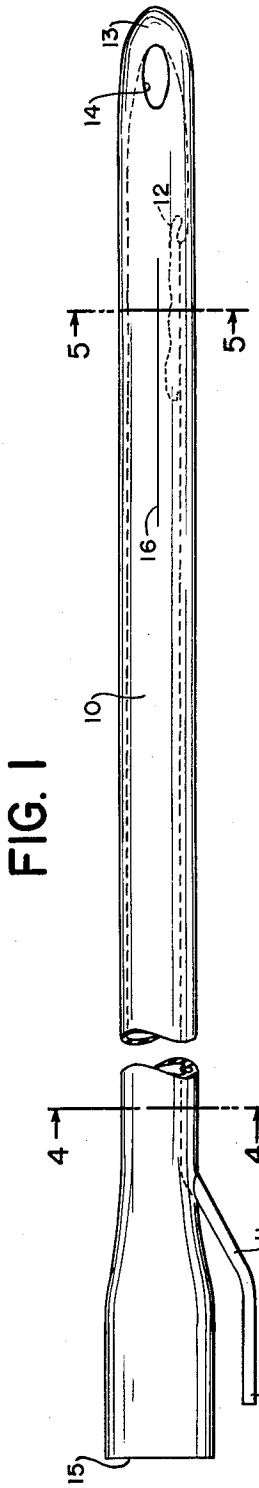

FIG. 1

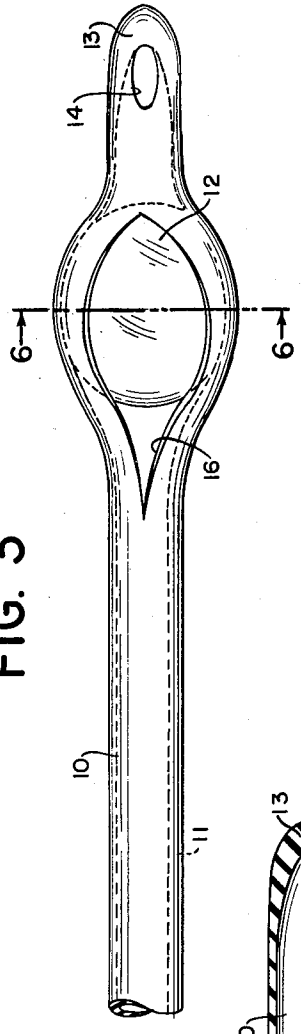

FIG. 3

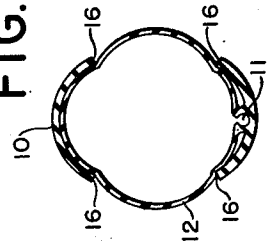

FIG. 6

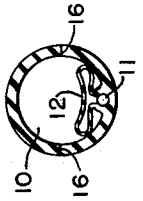

FIG. 5

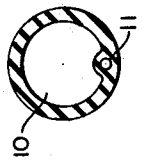

FIG. 4

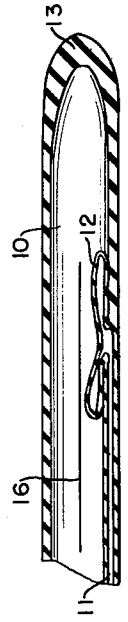

FIG. 2

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CATHETERS

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This invention relates to an improvement in catheters, and more particularly to an improvement in so-called "bag" catheters which overcomes many of the disadvantages of this type of catheter.

A catheter is a long tube-like device that is inserted into the body of a person in order to withdraw fluids therefrom. For example, the most common form of catheter is a rubber tube inserted by way of the urethra into the bladder of a person in order to withdraw fluid from the bladder. The forward or innermost end of the ordinary rubber catheter is tapered to a somewhat blunt point, and a hole is formed in the wall of the catheter near the forward end thereof to admit fluid from the bladder into the interior passageway of the catheter. Fluid entering the interior passageway of the catheter at the forward end thereof is withdrawn or drained from the catheter in a manner well known in the art. Ordinary catheters are not intended to remain in place for protracted periods of time, the catheter being withdrawn from the body of the patient when the bladder or other body cavity has been drained of fluid.

If the catheter is to remain in place for a protracted period of time, a modified form of the device must be employed such as, for example, the so-called "bag" catheter. In general, a bag catheter consists of a standard catheter drainage tube that is provided with a small inflatable rubber bag disposed near the forward end of the catheter and adapted to be inflated and deflated by means of a small auxiliary inflator tube extending alongside the larger drainage tube of the catheter proper. The inflatable rubber bag of a conventional bag catheter is disposed entirely on the outside of the catheter proper, and when inflated the bag forms a balloon-like protrusion on the side of the catheter adjacent the forward end thereof which serves to anchor the catheter in place within the body of the patient. To use a bag catheter the bag is deflated, the tube in inserted in the normal manner, and the bag is then inflated to retain the catheter in position in the body of the patient. To remove the catheter the bag is deflated, and the catheter withdrawn from the body of the patient in the usual manner.

Because the fluid entrance holes at the forward end of conventional catheters are necessarily rather small, trouble arises in the use of such catheters, and particularly in the use of a bag catheter that remains in place for a protracted period of time, due to the plugging of the small fluid entrance hole with blood clots, mucus clots and the like. When the fluid entrance hole becomes plugged, the catheter usually must be withdrawn from the patient in order to remove the plug. Obviously this could be the cause of considerable inconvenience and discomfort to doctor and patient alike. This problem is aggravated in the case of the conventional bag catheter because the inflatable rubber bag is disposed exteriorly of the catheter tube and, although the bag occupies very little space when deflated, the insertion and withdrawal of a bag catheter can occasion considerable discomfort to the patient.

In order to overcome the aforementioned disadvantages of conventional bag catheter, I have developed an improved form of bag catheter that is relatively easy and painless to insert and to withdraw from the body of a patient and that when in place with the bag inflated is provided with a wide open entrance or passageway from the bladder into the interior of the catheter so that the likelihood of the catheter becoming plugged up is greatly reduced. My new bag catheter comprises a main drainage tube formed of a flexible rubber-like material the forward end of which is adapted to be inserted into an opening in the body of a person. The catheter is provided with an auxiliary inflator tube disposed parallel to the main tube and attached thereto, and with an inflatable air-tight bag formed of distensible elastic material that is connected to the forward end of the inflator tube and is inflatable thereby. The side wall of the main drainage tube is formed with at least two coextensive longitudinal slits disposed adjacent the forward end of the tube substantially opposite one another, the slits in the main tube being normally closed when the forward end of the tube is not distended or otherwise deformed. The inflatable bag, when deflated, is disposed entirely within the wall of the main drainage tube adjacent the forward end of the longitudinal slits formed in the side wall of the main tube. When inflated the inflatable bag distends the forward end of the main tube thereby spreading apart or opening up the slits formed in the side wall of the tube and exposing the interior of the tube to the immediate environment of that portion of the tube.

My improvement in bag catheters will be more fully understood from the following description in conjunction with the accompanying drawings of which

Fig. 1 is a side elevation of my improved bag catheter showing the main tube thereof in its normally undistended condition;

Fig. 2 is a sectional view of the forward end of the undistended main tube of the catheter of Fig. 1 showing the inflatable bag in its normally uninflated condition and disposed entirely within the confines of the wall of the main tube;

Fig. 3 is a side elevation of my new catheter showing the distension of the wall of the main tube caused by inflation of the bag of the catheter;

Fig. 4 is a section along line **4**—**4** of Fig. 1;

Fig. 5 is a section along line **5**—**5** of Fig. 1; and

Fig. 6 is a section along line **6**—**6** of Fig. 3.

As will be seen from the drawing my new catheter comprises, in its major components, a main drainage tube **10** adapted to be inserted into the body of a patient and to withdraw fluid therefrom, an auxiliary inflator tube **11** disposed parallel to the main drainage tube and attached thereto, and an inflatable air-tight bag **12** formed of distensible elastic material and connected to the forward end of the inflator tube.

The main drainage tube **10** of my new catheter is advantageously formed of a relatively soft flexible material such as anodically deposited latex rubber. The forward end of the generally cylindrical main tube **10** is formed with a somewhat rounded or blunted point **13** that facilitates the insertion of the tube in the body of the patient. The forward end of the main tube **10** can also be provided with a conventional fluid entrance hole **14** communicating with the interior passageway of the main tube. The rearward end **15** of the main tube **10** is open to permit free drainage from the tube of any fluid contained in the interior passageway of the tube **10**. The cylindrical side wall of the main tube **10** is formed with at least two slits **16** that are longitudinally disposed with respect to the tube and are coextensive with respect to one another, the two longitudinal slits **16** being positioned adjacent the forward end of the tube **10** on opposite sides of the tube,

Due to the resiliency and elastic memory of the material from which the catheter is formed, the main tube **10** tends to retain its normally cylindrical shape so that the slits **16** are normally closed. That is to say, the facing edges of the side wall of the tube at each slit **16** are normally in contact with each other as shown in Figs. 1, 2 and 5, when the forward end of the tube is not distended or otherwise distorted. Distortion of the forward end of the tube **10**, for example by distension of the tube wall adjacent the slits **16**, causes the slits **16** to open and thereby expose the interior passageway of the tube to the immediate environment thereof (e.g. the bladder of a patient) as shown in Figs. 3 and 6.

The auxiliary inflator tube **11** is appreciably smaller in diameter than the main tube **10** and is advantageously integrally formed in the side wall of the tube **10** as shown best in Fig. 4. The rearward end **18** of the inflator tube **11** is adapted to be connected to a source of air, e.g. a syringe, and the forward end of the tube **11** is connected to the inflatable bag **12**. The bag **12** is formed from thin elastic rubber or rubber-like material and when deflated occupies relatively little space as shown in Figs. 1, 2 and 5. When in its normal or deflated condition, the bag **12** is disposed entirely within the confines of the side wall of the main tube **10** and is positioned adjacent the forward ends of the longitudinal slits **16**, as shown best in Figs. 2 and 5. When the bag **12** is inflated by the introduction of fluid thereinto through the inflator tube **11**, the bag occupies a relatively much larger space than when deflated. As a result, inflation of the bag **12** distends the side wall of the main tube **10** adjacent the slits **16** and opens wide the slits **16** formed in the side wall as shown in Figs. 3 and 6.

To use my new catheter, the bag **12** is deflated (or, more accurately, is not inflated) and the catheter is inserted into the body of the patient in the usual manner. Due to the fact that the deflated bag **12** is disposed entirely within the side wall of the tube **10**, insertion of the catheter is relatively easy and painless. The bag **12** is then inflated to distend the side wall of the main tube **10** and to open wide the slits **16** formed in the side wall. Distension of the side wall of the main tube **10** forms a bulge at the forward end of the catheter which prevents the catheter from slipping or being pulled from the body of the patient. The opening of the slits **16** in the side wall of the tube **10** exposes the full cross section of the interior passageway of the tube **10** to the immediate environment of that portion of the tube. As a consequence, blood clots, mucus, bits of tissue and other matter would plug the fluid entrance holes **14** of conventional catheters pass freely into the interior passageway of main tube **10** of my new catheter and thence from the body of the patient. When it is desired to remove my catheter, the bag **12** is deflated thereby allowing the side wall of the tube **10** to return to its normal condition—namely, with the slits **16** closed and the bag **12** disposed entirely within the side wall of the tube **10**. The catheter can then readily be withdrawn easily and painlessly from the body of the patient.

From the foregoing description of my new catheter construction it will be seen that I have made an important contribution to the art to which it relates.

I claim:

1. A catheter comprising a main drainage tube the forward end of which is adapted to be inserted into an opening in the body, an auxiliary inflator tube disposed parallel to the main tube, and an inflatable air-tight bag formed of distensible elastic material and connected to the forward end of said inflator tube, the side wall of the main drainage tube being formed with at least two coxetensive longitudinal slits disposed adjacent the forward end of the tube and substantially opposite each other, said inflatable bag when deflated being disposed entirely within the main tube adjacent the forward end of the longitudinal slits formed in the side wall of the main tube, said inflatable bag when inflated distending the adjacent portion of the main tube and spreading apart the edges of the slits formed therein, thereby forming a bulge adjacent the forward end of the tube and exposing the interior of the forward end of the main tube to the immediate environment thereof.

2. A catheter comprising a main drainage tube formed of a flexible rubbery material the forward end of which tube is adapted to be inserted into an opening in the body, an auxiliary inflator tube disposed parallel to the main tube, and an inflatable air-tight bag formed of distensible elastic material and connected to the forward end of said inflator tube, the side wall of the main drainage tube being formed with at least two coextensive longitudinal slits disposed adjacent the forward end of the tube and substantially opposite each other, said inflatable bag being disposed entirely within the main drainage tube adjacent the forward end of the longitudinal slits formed in the side wall of the main tube when said inflatable bag is deflated, said inflatable bag distending the adjacent portion of the main tube and spreading apart the edges of the slits formed therein when said inflatable bag is inflated thereby forming a bulge adjacent the forward end of the tube and exposing the interior of the forward end of the main tube to the immediate environment thereof.

3. A catheter comprising a main drainage tube having a generally cylindrical side wall the forward end of which tube is adapted to be inserted into an opening in the body, said main tube being formed of a flexible elastic material the elastic memory of which tends to maintain the cylindrical configuration of the side wall of the tube, an auxiliary inflator tube disposed parallel to the main tube and attached thereto, and an inflatable air-tight bag formed of distensible elastic material and connected to the forward end of said inflator tube, the side wall of the main drainage tube being formed with at least two coextensive longitudinal slits disposed adjacent the forward end of the tube and substantially opposite each other, said inflatable bag when deflated being disposed entirely within the confines of the side wall of the main tube adjacent the forward end of the longitudinal slits formed in the side wall of said main tube, the elasticity of the main tube maintaining the edges of the slits formed therein in their closed position when said inflatable bag is deflated, said inflatable bag when inflated distending the adjacent portion of the main tube and spreading apart the edges of the slits formed therein, thereby forming a bulge adjacent the forward end of the tube and exposing the interior of the forward end of the main tube to the immediate environment thereof.

No references cited.