

Aug. 31, 1954

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2,687,731

CATHETER VALVE

Filed Aug. 29, 1951

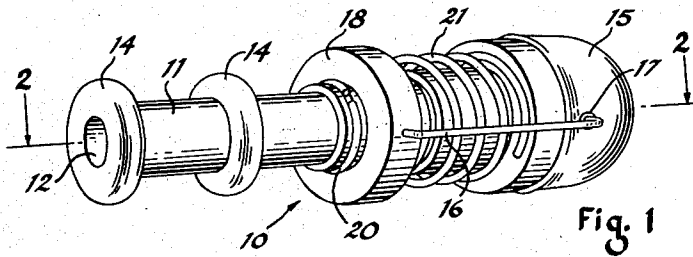


Fig. 1

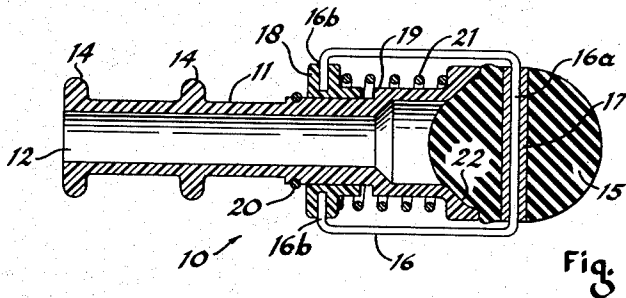


Fig. 2

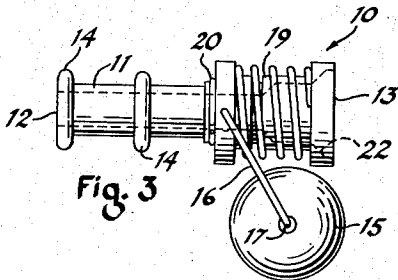


Fig. 3

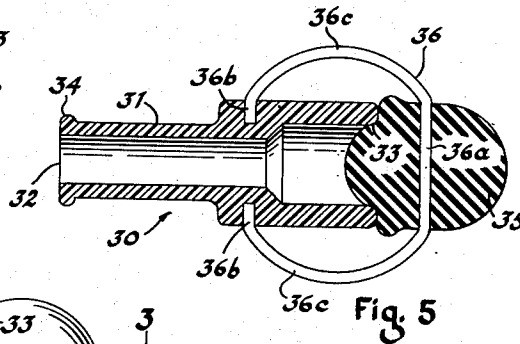


Fig. 5

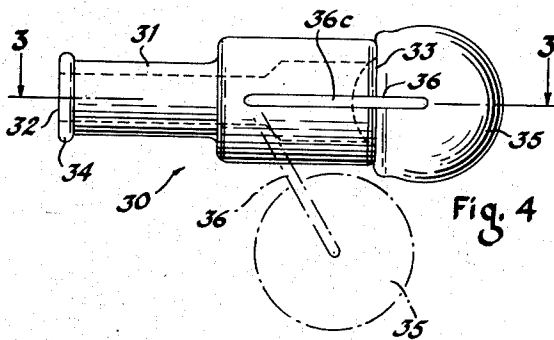


Fig. 4

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2,687,731

CATHETER VALVE

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Application August 29, 1951, Serial No. 244,146

9 Claims. (Cl. 128—349)

1

This invention relates to catheters and more particularly to a catheter having closure means at its discharge end.

One of the objects of the present invention is to provide in a catheter of the type described a swingably mounted valve to close or uncover the discharge end of the catheter.

Another object of the present invention is to provide in a catheter of the type described a resiliently biased valve to cover the discharge end of the catheter.

Other features of this invention reside in the arrangement and design of the parts for carrying out their appropriate functions.

Other objects and advantages of this invention will be apparent from the accompanying drawings and description and the essential features will be set forth in the appended claims.

In the drawings, Fig. 1 is a perspective view of the catheter with the valve in its closed position;

Fig. 2 is a longitudinal sectional view of the catheter of Fig. 1 taken along the line 2—2 of Fig. 1;

Fig. 3 is a side view of the catheter shown in Fig. 1 but with the valve closure stopper swung to its open position;

Fig. 4 is a side elevational view of a modified form of catheter with the closure stopper of the valve shown in its closed position in solid line and in its open position in dot-dash line; while

Fig. 5 is a longitudinal sectional view of the catheter shown in Fig. 4.

As is known to those skilled in the medical arts a catheter is a medical instrument for insertion into a body opening for removal of body fluids therefrom. Of course, the catheter may be used to remove fluid or pus from inside the body through an incision or wound, but its most common use is in catheterization of the bladder. In such function the catheter tube is inserted into the bladder by passing it through the external body opening or meatus and the urethral canal. The catheter is used to draw and to secure a clean urine sample free of any infection which may exist in the urine discharge canal or to empty the bladder of urine for any of various reasons. In catheterization, the urine flows through the inlet end or eye of the catheter and then discharges out the outlet end of the catheter into any suitable container provided. While catheters are often of the continuous flow type it is sometimes desirable to control the flow therefrom. This invention provides a novel valve for controlling the flow from the discharge

2

end of the catheter. Heretofore, the flow was controlled by tying or taping the end of the catheter when termination of the flow was desired or by untying or untaping the end to permit flow. This invention provides a novel valve for controlling the flow.

Figs. 1 to 3 inclusive of the drawing disclose one form that the novel catheter of this invention may take. The catheter, generally indicated at 10, is comprised of a tubular member 11 having an internal axial bore which is open at both ends to provide an inlet end 12 and a discharge end 13. Flanges 14 surround the tubular member 11 adjacent the inlet end and are formed as an integral part of the tubular member. These flanges serve to hold the catheter in place in the body opening and to prevent its slipping out. Since the catheter of this invention has these flanges it may be properly termed an indwelling catheter. It should be noted that the flanges have rounded corners and all parts of the catheter designed to be inserted into the body opening are properly made with no sharp edges so that there is no danger of injury to the mucous membrane sometimes followed by an infection. The portion of the tubular member 11 to be inserted within the body opening is properly made small in diameter so that it may be easily inserted into the body with the minimum discomfort to the patient. However, the discharge end 13 has a larger bore than the inlet end 12, as seen in Fig. 2, so that the closure stopper of the valve for controlling flow will have a large seat and will effectively seal the discharge end.

The valve for controlling the flow from the catheter by closing or opening the discharge end will now be described. The valve consists of a resilient stopper 15. This stopper is made of soft, easily deformable rubber formed into a spherical ball formation. However, it should be clearly understood that this invention also contemplates a spherical stopper made of relatively hard rubber which is not easily deformable, if desired. Means is also provided to swingably mount the stopper 15 on the tubular member 11 for swinging the stopper between the closed and opened positions relative to the discharge end 13 of the catheter. This means comprises a bail 16 having a central portion 16a extending diametrically across the bore of the tubular member when the valve end is in its closed position, as seen in Fig. 2, and extending through a hole in the stopper 15. The stopper is rotatably mounted on the central bail portion 16a extending through the diametrical hole in

the stopper by a cylindrical bearing 17. The opposite bail ends 16b are each pivotally mounted on diametrically opposite sides of the tubular member on an annular sleeve 18. This annular sleeve surrounds the tubular member 11 and is mounted for axial movement thereon between the axial stops consisting of shoulder 19 on tubular member 11 and C-ring 20 resiliently engaged in a groove on the outer surface of the tubular member 11. A resilient means or coil spring 21 biases the sleeve 18 away from the discharge end 13 so that the resilient stopper 15 will resiliently engage in the internal valve seat 22 of the tubular member 11. The stopper 15 is deformed to fill the valve seat by this resilient means which urges it into the discharge end of the tubular member and into sealing engagement therewith.

A modified form of catheter is shown in Figs. 4 and 5 of the drawing. This catheter is generally indicated at 30, as a tubular member 31 opened at both ends to provide an inlet end 32 and a discharge end 33. A flange 34 is integrally formed with the tubular member 31 and serves the same purpose as the flanges 14 described in the first modification. A bail 36 is provided to swingably mount a resilient, easily deformable, soft rubber, spherical bail stopper 35 for swinging the stopper between closed and opened positions with respect to the discharge end 33. The bail 36 has a central portion 36a on which the stopper 35 is rotatably mounted. Opposite ends 36b of the bail are pivotally mounted on diametrically opposite sides of tubular member 31 in holes in the outer wall of the tubular member. Resilient means are also provided in this form of catheter to urge the stopper into the discharge end of the catheter and to deform the stopper into sealing engagement with the discharge end. This means is the outwardly curved, resilient side portion 36c of the bail connecting each end portion 36b of the bail with the central portion 36a thereof. These outwardly curved side portions are adapted to flatten as the stopper 35 is moved away from the bail end portions 36b. However, their inherent resiliency causes the bail 36 to bias the stopper 35 against the discharge end 33 so that the stopper 35 will be easily deformed and create a good seal around the discharge end of the catheter.

It should now be apparent that the resilient stopper 15 or 35 may be swung to either of two positions in controlling flow from the catheter. When it is swung to its outward position, as shown in Fig. 3 or by dot-dash lines in Fig. 4, the body fluids may readily discharge from the discharge end of the catheter. When the stopper is swung to the position shown in Fig. 2 or Fig. 5, the discharge end of the catheter is closed and no fluid may emerge. It should be noted that during the closing movement of the valve, the stopper, since it is rotatably mounted on the bail, has a rolling movement as it moves across the discharge end of the catheter. This rolling movement assures that the resilient stopper will always have a tight closing contact with the discharge end of the catheter since the whole periphery of the stopper may be used at various times as the actual valve seat engaging surface.

The catheter of this invention is specifically designed so that inlet end is relatively small in outside diameter while the bore of the outlet or discharge end is relatively large in diameter. The small inlet end permits the catheter to be easily and painlessly inserted into the body opening of the patient while the large internal bore

at the discharge end permits the stopper to have a large valve seat to insure a tightly closing, leak-proof valve.

If the apparatus described is not used as an indwelling catheter, it should be readily understood that one end of a rubber tube can be slipped over and held in place by flanges 14, 14 while the other end of the tube has means for insertion into a body cavity. Then, stopper 15 can be used to shut off or permit flow.

Various changes in details and arrangement of parts can be made by one skilled in the art without departing from the spirit of this invention or the scope of the appended claims.

What we claim is:

1. A catheter for removing body fluid through a body opening comprising a tubular member having an internal axial bore and open at both ends to provide an inlet end and a discharge end, the bore at said discharge end being larger than at the inlet end, at least one flange surrounding said member adjacent said inlet end for holding the catheter in the body opening, and a valve for closing or opening the larger bore of said discharge end, said valve comprising a stopper to close said discharge end, means to swingably mount said stopper on said member for swinging said stopper between closed and open positions, and resilient means to urge said stopper into said discharge end to deform it into sealing engagement.

2. A catheter for removing body fluid through a body opening comprising a tubular member having an internal axial bore and open at both ends to provide an inlet end and a discharge end, the bore at said discharge end being larger than that at the inlet end, at least one flange surrounding said member adjacent said inlet end for holding the catheter in the body opening, and a valve for closing or opening the larger bore discharge end, said valve comprising an easily deformable spherical stopper to close said last mentioned end, said stopper having a hole extending diametrically through it, a bail, said bail having a central portion adapted to extend diametrically across said bore and having opposite inwardly directed ends pivotally mounted in aligned holes on diametrically opposite sides of said tubular member, the central portion of said bail extending through said hole in said stopper and rotatably mounting said stopper on said bail.

3. In a catheter for removing body fluid through a body opening, a tubular member having an internal axial bore and open at both ends to provide an inlet end and a discharge end with a larger bore than the inlet end and a valve for closing or opening the larger bore discharge end, said valve comprising a deformable spherical stopper to close said last mentioned end, said stopper having a hole extending diametrically through it, a bail, said bail having a central portion adapted to extend diametrically across said bore and having opposite inwardly directed ends pivotally and removably mounted in aligned holes on diametrically opposite sides of said tubular member, the central portion of said bail extending through said hole in said stopper and rotatably mounting said stopper on said bail.

4. In a catheter, a tubular member open at both ends to provide an inlet end and a discharge end and a valve for closing or opening said discharge end, said valve comprising a spherical stopper for closing said last mentioned end, said stopper having a hole extending diametrically through it, a bail having a central portion adapted to extend diametrically across said bore and hav-

5

ing opposite inwardly directed ends pivotally and removably mounted in aligned holes on diametrically opposite sides of said tubular member, the central portion of said bail extending through said hole in said stopper and rotatably mounting said stopper on said bail, said bail also having an outwardly curved resilient side portion between each end and the central portion to resiliently urge said stopper into sealing position with said discharge end.

5. In a catheter, a tubular member open at both ends to provide an inlet end and a discharge end and a valve for closing or opening said discharge end, said valve comprising a spherical stopper for closing said last mentioned end, said stopper having a hole extending diametrically through it, an annular sleeve surrounding said tubular member and mounted for axial movement thereon, a resilient means biasing said sleeve away from said discharge end, a bail having a central portion adapted to extend diametrically across said bore and having opposite ends pivotally mounted on said sleeve on diametrically opposite sides of said tubular member, the central portion of said bail extending through said hole in said stopper and rotatably mounting said stopper on said bail.

6. In a catheter, a tubular member open at both ends to provide an inlet end and a discharge end and a valve for closing or opening said discharge end, said valve comprising a spherical stopper for closing said last mentioned end, said stopper having a hole extending diametrically through it, an annular sleeve surrounding said tubular member and mounted for axial movement thereon, a resilient means biasing said sleeve away from said discharge end, a bail having a central portion adapted to extend diametrically across said bore and having opposite inwardly directed ends pivotally and removably mounted on said sleeve in diametrically aligned outwardly extending holes on opposite sides of said tubular member, the central portion of said bail extending through said hole in said stopper and rotatably mounting said stopper on said bail.

7. In a catheter, a tubular member open at both ends to provide an inlet end and a discharge end and a valve for closing or opening said discharge end, said valve comprising a spherical stopper swingably mounted for opening or closing said last mentioned end, said stopper having a hole diametrically through it, an annular sleeve surrounding said tubular member and mounted for axial movement thereon, a resilient means biasing said sleeve away from said discharge end, a cooperating stop means on said tubular member and sleeve limiting the travel of said sleeve away from said discharge end when said stopper is in the open position, said resilient means being arranged to exert approximately the same force urging said sleeve away from said discharge end when the stopper is either in the opening position with said stop means limiting the travel of said sleeve or in the closing position, a bail having a central portion adapted to extend diametrically across said bore and having opposite ends pivotally mounted on said sleeve on diametrically opposite sides of said tubular member, the central por-

6

tion of said bail extending through said hole in said stopper and rotatably mounting said stopper on said bail.

8. In a catheter, a tubular member open at both ends to provide an inlet end and a discharge end and a valve for closing or opening said discharge end, said valve comprising a spherical stopper for opening or closing said last mentioned end, said stopper having a hole extending diametrically through it, an annular sleeve surrounding said tubular member and mounted for axial movement thereon, a resilient means biasing said sleeve away from said discharge end, a bail having a central portion adapted to extend diametrically across said bore and having opposite ends pivotally mounted on said sleeve on diametrically opposite sides of said tubular member, the central portion of said bail extending through said hole in said stopper and rotatably mounting said stopper on said bail, the positions of said bail between said central portion and said opposite ends being swingable into a straddling relationship outside and over said resilient means as said stopper moves between opening and closing positions.

9. In a catheter, a tubular member open at both ends to provide an inlet end and a discharge end and a valve for closing or opening said discharge end, said valve comprising a spherical stopper swingably mounted for opening or closing said last mentioned end, said stopper having a hole extending diametrically through it, an annular sleeve surrounding said tubular member and mounted for axial movement thereon, stop means on said tubular member and sleeve limiting the travel of said sleeve away from said discharge end when said stopper is in the open position, a resilient means biasing said sleeve away from said discharge end and biasing said sleeve against said stop means in open position, a bail having a central portion adapted to extend diametrically across said bore and having opposite inwardly directed ends pivotally and removably mounted on said sleeve in diametrically aligned outwardly extending holes on opposite sides of said tubular member, the central portion of said bail extending through said hole in said stopper and rotatably mounting said stopper on said bail, the portion of said bail between said central portion and said opposite ends being swingable into a straddling relationship outside and over said resilient means as said stopper moves between opening and closing positions.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
67,292	Gould	July 30, 1867
426,826	Libbey	Apr. 29, 1890
733,152	Chisholm	July 7, 1903
1,661,494	Nielsen	Mar. 6, 1928
2,492,917	Courtot	Dec. 27, 1949

FOREIGN PATENTS

Number	Country	Date
5,997	Germany	Dec. 12, 1878