

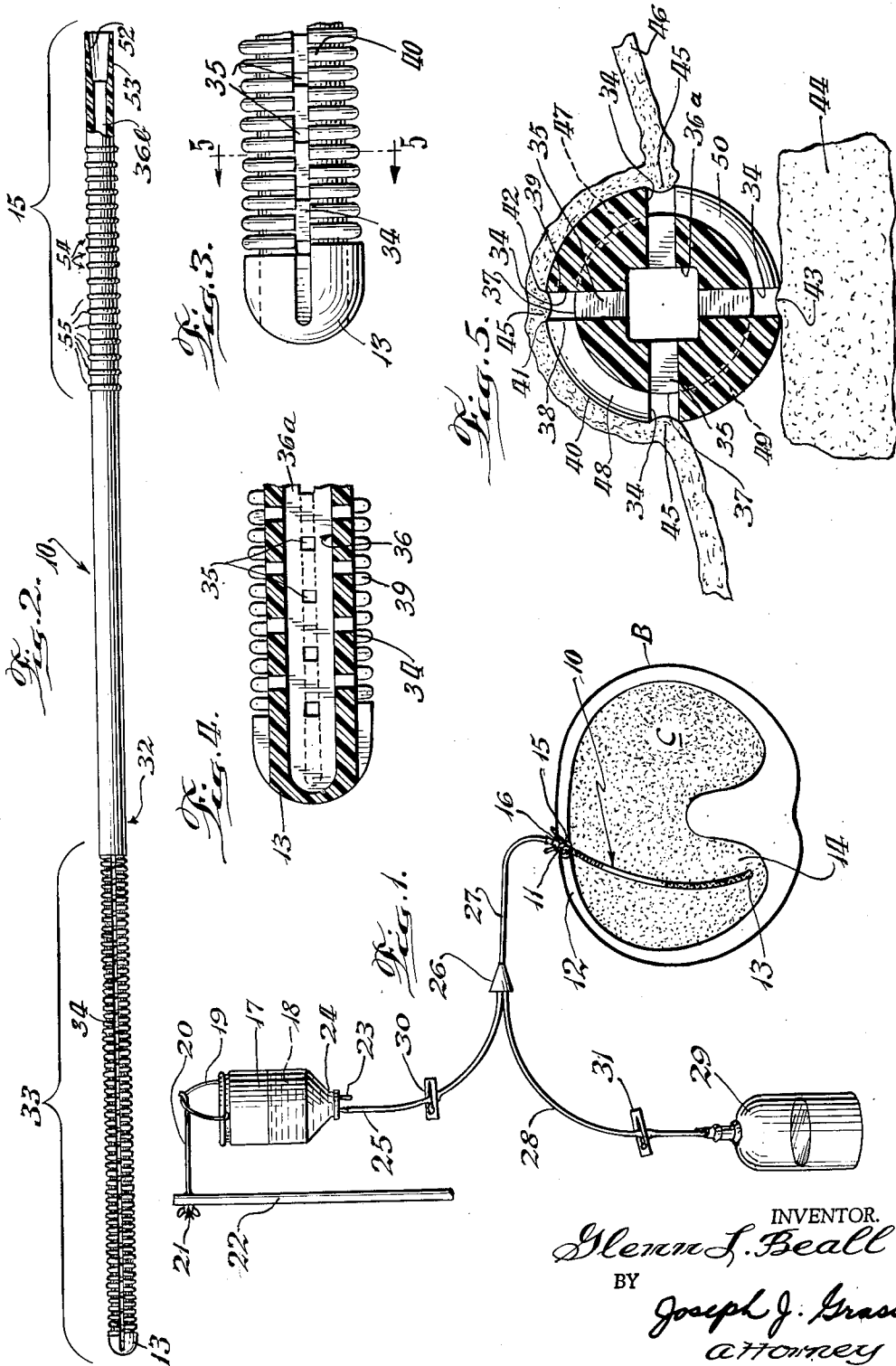
June 9, 1964

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3,136,316

CATHETER

Filed Jan. 19, 1962



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3,136,316
CATHETER

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Filed Jan. 19, 1962, Ser. No. 167,239

1 Claim. (Cl. 128—350)

This invention relates to a catheter and in particular to a catheter which is particularly useful in peritoneal dialysis.

It is one of the prime purposes of the invention to provide a catheter which is effective in both the administration of a solution into and the drainage of the expended solution from the peritoneal cavity of a human being. Prior art catheters for this purpose have not been particularly successfully employed in peritoneal dialysis because tissue, a portion of the bowels, a portion of the omentum, and the like have prevented the flow of the solution and the expended solution through the catheter due to clogging of the one or more apertures provided in the catheter. In accordance with the invention, there are provided several means each of which serves to prevent tissue, portions of the bowels, omentum, and the like from clogging the apertures in the catheter.

It is one of the features of the invention to provide at least one and preferably a plurality of longitudinally extending grooves in a distal marginal end of a tubular body of the catheter. The aperture or apertures are preferably provided in a longitudinally extending groove to provide communication with a longitudinally extending passage formed in the tubular body. The intersection of the outer surface of the tubular body and the side walls of each groove form relatively pointed edges which prevent tissue, portions of the bowels, a portion of the omentum, and the like from clogging or blocking the aperture or apertures in each longitudinally extending groove.

It is another feature of the invention to provide one or more rows of segmental grooves in the periphery of the tubular body which provide liquid communication with one or more longitudinally extending grooves. It is therefore apparent that the solution is not only free to pass out of the apertures into the longitudinally extending grooves but also into the segmental grooves, and vice versa.

It is another feature of the invention to provide at least two rows of segmental grooves in the periphery of the tubular body, wherein the segmental grooves in one row are offset with respect to the segmental grooves in the adjacent row.

It is another feature of the invention to provide apertures in the longitudinally extending grooves, at least a portion of each of the apertures being disposed in the path of two adjacent segmental peripheral grooves.

It is another feature of the invention to provide longitudinally extending grooves in the distal marginal end of the tubular body and to provide a plurality of apertures in the grooves which are as wide as the grooves.

It is another feature of the invention to provide means formed integrally with and disposed at the proximal marginal end of the tubular body whereby the proximal marginal end of the catheter can be secured to the outer portion of the abdominal wall of the patient.

In the diagrammatic drawing:

FIGURE 1 is a perspective view of peritoneal dialysis equipment employing the catheter of the invention and showing the catheter of the invention disposed in the peritoneal cavity which is shown in cross-sectional form;

FIGURE 2 is a side elevation view, partly cutaway, of the catheter of the invention;

FIGURE 3 is an enlarged fragmentary view of a portion of the distal marginal end of the catheter;

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FIGURE 4 is a cross-sectional fragmentary view of a portion of the distal marginal end of the catheter; and

FIGURE 5 is a cross-sectional view taken along line 5—5 of FIGURE 3.

Referring now to FIGURE 1 of the illustrative drawing, there is shown a diagrammatically represented cross-sectional portion of a human body B into the peritoneal cavity C of which a catheter generally indicated at 10 is shown to be inserted through an aperture 11 in the abdominal wall 12. A distal terminal end 13 of the catheter 10 is shown to extend into the pelvic gutter 14 of the peritoneal cavity C while a proximal marginal end 15 of the catheter 10 is shown to be secured to the abdominal wall 12 by a suture indicated at 16.

Peritoneal dialysis equipment, forming no part of this invention, is shown to include a solution container 17 which contains a suitable solution 18. A bail 19 supports the solution container 17 from a supporting arm 20 which is adjustably mounted by a thumb screw 21 on a standard 22. A suitable air vent 23 is shown to be provided at the outlet end 24 of the solution container 17. Tubing 25 leads from the outlet end 24 into a Y-fitting 26. Tubing 27 leads from the Y-fitting 26 to the catheter 10. Tubing 28 leads from the Y-fitting 26 into a container 29. The tubing 25 and the tubing 28 are provided with suitable pinch clamps 30 and 31, respectively.

Referring now to FIGURE 2 of the illustrative drawing, there is shown the catheter 10 which comprises a tubular body 32. A distal marginal end 33 of the tubular body 32 is shown in FIGURE 5 to have four longitudinally extending grooves 34. Although four longitudinally extending grooves 34 are illustrated as being the preferred number a lesser or greater number are employable, if desired. The grooves 34 are shown to contain a plurality of apertures 35 which extend from a passage 36 in the tubular body 32 through a bottom wall 37 of each groove 34. Opposed apertures 35 in opposed grooves 34 are shown to be aligned. The grooves 34 are sufficiently narrow so that it is difficult for tissue and the like to enter thereinto. Moreover, substantially parallel side walls 38 and 39 of the grooves 34 intersect the outer surface 40 of the tubular body to form relatively pointed edges 41 and 42. Pointed edges 41 and 42 prevent, tissue, a portion 43 of a bowl 44, and portions 45 of the omentum 46, for example, from passing into the longitudinally extending grooves 34. The pointed edges 41 and 42 actually serve to support the tissue or the like at spaced points so that the obstruction will have to undergo approximately a right angle bend at each of the spaced pointed edges 41 and 42, assuming the tissue or the like is wider or longer than the distance between the side walls 38 and 39. Since the apertures 35 are preferably as wide as the grooves 34 it is difficult for the tissue or the like to clog or block the apertures 35, and yet the apertures 35 because of their width provide large passages through which liquid can flow.

This distal marginal end 33 of the tubular body 32 is also shown to be provided with a plurality of rows of adjacent opposed segmental grooves 47, 48, 49 and 50. The number of rows of segmental grooves is, of course, defined by the number of longitudinally extending grooves 34. Segmental grooves 48 and 50 are disposed in a first plane, while segmental grooves 47 and 49 are disposed in a second plane which is longitudinally offset from the first plane. The offset arrangement of adjacent segmental grooves provides better administration of the solution and drainage of the expended solution. It will be readily apparent that as the solution passes from the passage 36 through the apertures 35 directly into the grooves 34 and directly into segmental grooves 47, 48, 49 and 50 and vice versa, effective administration of the solution and drainage of the expended solution is accom-

plished. As best shown in FIGURES 3 and 4 of the illustrative drawing, at least a portion of each of the apertures is disposed in the path of two adjacent opposed segmental grooves. The terminal distal end 13 of the tubular body 32 provides easy communication with the liquids in the pelvic gutter 14 since the longitudinally extending grooves 34 are open at their ends.

The passage 36 at the distal marginal end 33 of the tubular body 32 is a generally square cross-sectional passage portion as indicated at 36a, while the remainder of the passage 36 is a generally circular cross-sectional passage portion as indicated at 36b. The passage portions 36a and 36b are formed during the molding operation by a longitudinal core pin (not shown) of the same cross-sectional configurations. The apertures 35 in the distal marginal end 33 of the tubular body 32 are formed by transverse core pins (not shown) which extend into the mold cavity (not shown) and abut against the longitudinal core pin which forms the portions 36a and 36b.

A Luer taper 52 is shown to be formed internally of the tubular body 32, however, a Luer taper or its equivalent might be formed externally, if desired.

The proximal marginal end 15 of the tubular body 32 is shown to be provided with a plurality of outwardly extending projections 54 which are shown to take the form of spaced annular rings 55. The projections 54 enable the proximal marginal end 15 of the tubular body 32 to be secured to the portion of the abdominal wall 12 by a suture 16 or by adhesive tape (not shown). More than one projection 54 is provided so that the proximal marginal end can be quickly and easily secured to the patient. Although the outwardly extending projections 54 are shown to take the form of annular rings 55, the projections 54 are of a character that they can be constructed as lugs or the like. Alternatively, one or more grooves (not shown) can be provided in the proximal marginal end 15 of the tubular body 32 for this purpose, if desired.

In accomplishing peritoneal dialysis, the patient is placed in the supine position and an incision is made through the abdominal wall. A trocar (not shown) is employed to penetrate the peritoneum. After the catheter 10 has been inserted through the trocar into the peritoneal cavity C, the trocar is removed and the catheter remains in place. The catheter 10 is then sutured to the abdominal wall 12. The pinch clamp 30 is then moved to a position in which the solution 18 can pass through the tubing 25, through the Y-fitting 26, through the tubing 27, through the catheter 10, and into the peri-

toneal cavity C of the patient. After the administration of the solution 18 is completed, the pinch clamp 31 is moved to a position in which the expended solution can be siphoned from the peritoneal cavity C of the patient through the catheter 10, through the tubing 27, through the Y-fitting 26, through the tubing 28, and into the container 29. More solution can be administered to the patient from other solution bottles (not shown) if the peritoneal dialysis is to be repeated.

10 The one-piece catheter 10 is preferably composed of polyethylene but any suitable moldable material having a sufficient flexibility and suitability for the purposes herein-described is employable without departing from the spirit of the invention.

15 The above-described embodiment being exemplary only, it will be understood that modifications in form or detail can be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be considered as limited save as is consonant with the scope of the following claim.

20 What is claimed is:

A catheter comprising a tubular body having a longitudinally extending passage therein, a distal marginal end of said tubular body having at least two longitudinally extending grooves, at least one aperture providing communication between said passage and each of said longitudinal grooves, and at least two longitudinally extending rows of a plurality of segmental grooves on the periphery of said tubular body which provide liquid communication with said longitudinally extending grooves, said grooves of said one row being longitudinally offset from said grooves of said other row.

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