

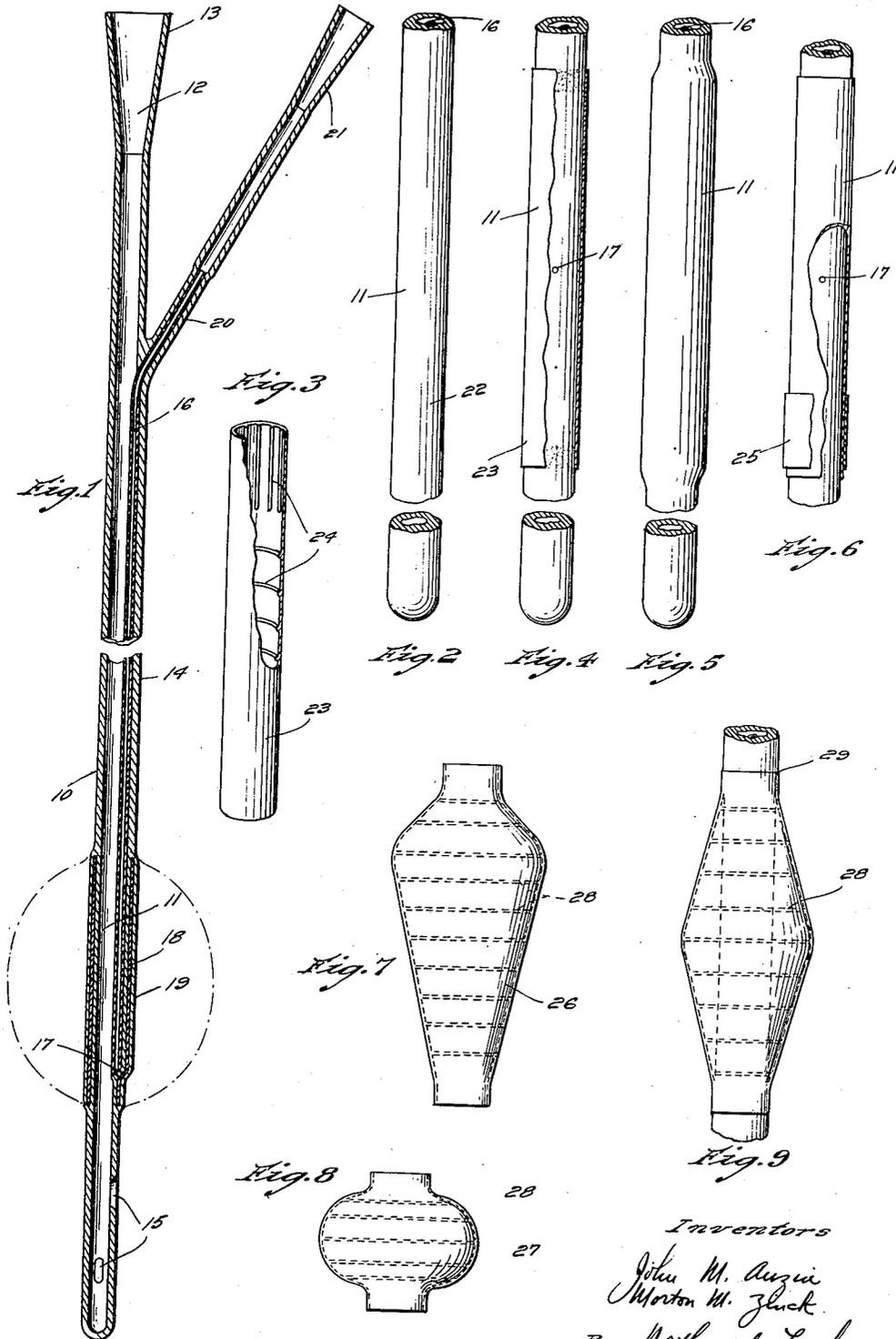
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CATHETER

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CATHETER

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5 Claims. (Cl. 18-58)

Our present invention relates to the manufacture of inflatable catheters of the type disclosed in U. S. Patent No. 2,043,630, and has particular reference to an improved catheter and a novel method for manufacture thereof.

It is the principal object of our invention to simplify the manufacture of inflatable catheters.

A further object of the invention is to provide a catheter having a stronger inflatable balloon section.

Another object is to provide a catheter having a preformed inflatable section of desired shape.

Still another object of the invention is to provide an inflatable balloon section for a catheter having reinforced ends.

With the above and other objects and advantageous features in view, the invention consists of a novel method of manufacture and a novel catheter obtained thereby, more fully disclosed in the detailed description following, in conjunction with the accompanying drawing, and more specifically defined in the claims appended thereto.

In the drawing:

Fig. 1 is a view in section of the novel catheter, the dotted lines indicating the balloon when inflated.

Fig. 2 is a sectional perspective detail showing a partially formed catheter.

Fig. 3 is a perspective detail, partly broken away, of an inflatable balloon section before assembly.

Fig. 4 is a view similar to Fig. 2, the inflatable section being assembled;

Fig. 5 is a similar view after the catheter dipping has been completed;

Fig. 6 is a view similar to Fig. 4, showing the manner of reinforcing the balloon ends;

Fig. 7 is a view of a preformed balloon section;

Fig. 8 is a similar view of a different preformed section; and

Fig. 9 is a view showing a pre-tensioned balloon section.

It has been found desirable to provide inflatable catheters with preformed inflatable sections, whereby the sections may be of any shape desired and may have strengthening ribs of any desired type. This construction ensures a stronger balloon section, while maintaining the thickness of the completed catheter to a desired size. To this end, a catheter base is first provided, as by dipping; a separate inflatable section is then applied thereto, and the catheter is then completed, as by dipping again, to coat both the base and the applied section, whereby a strong, sturdy inflatable catheter is obtained.

Referring to the drawing, the catheter 10 includes a body portion 11 having a central passage-way 12, and terminating in a funnel end 13, the wall 14 having flow ports 15 at the distal end and having an inflation channel 16 therein which communicates through a port 17 with a recess 18 having an inflatable balloon section 19. The inflation channel passes outwardly through an extension 20 and communicates with a funnel-shaped inflating end 21 adapted to be connected to a source of fluid under pressure.

In manufacturing the novel catheter, the catheter body 22, see Fig. 2, is first built up on a form of metal or the like, as by dipping in a coagulant solution and a latex solution, preferably repeatedly, until a desired thickness of wall is obtained containing the inflation channel, described as in U. S. Patent No. 2,043,630, the port opening 17 then being formed, by burning with a hot wire or needle. Then a preformed tubular or sleeve section 23, see Fig. 3, which may have strengthening ribs 24 of any desired length and direction, is moistened with a wetting agent, the body portion being also moistened, and the sleeve is slide over the end of the body portion to cover the inflation port. The preferred wetting agent is water containing dissolved soap, but any suitable wetting agent may be used.

The wetting agent and any foreign solid substances that might have adhered, as by washing, and an additional coat or coats of rubber are then applied by dipping until the desired thickness of balloon is obtained. The sleeve is thus made part of the catheter structure by the provision of an outer wall which locks all the parts together.

The balloon is then air dried for a short time, and air is forced through the inflation channel and put to slightly distend the balloon, so as to positively prevent any adhesion during the drying step. The catheter is now partly dried, and is then leached and dried for a relatively long period of time.

When the sleeve is first placed on the catheter, it is preferably stretched, the ends being designed to grip the catheter body portion; if necessary, a small amount of rubber adhesive may be used on the sleeve ends. If one or both ends of the sleeve are desired reinforced, a reinforcing band 25, see Fig. 6, is placed on the sleeve end, so as to add an additional thickness of rubber, the band tightly gripping the sleeve end and the adjacent catheter parts, and being embedded in the additional dipped layers, it being preferred to use a narrow band.

The sleeve may be of any desired shape, as it

is preformed; a top shape such as indicated at 26 in Fig. 7, or a bulb shape such as shown at 27 in Fig. 8 may be used, reinforcing ribs 28 being provided of any size and direction. The shaped sleeve is made of pre-vulcanized rubber, the main body of the catheter being of unvulcanized rubber which has been distended slightly, the outer surface being dried, and then placed on a mandril, on which it is stretched, dried, and vulcanized while in the stretched position.

A chemical treating agent, such as described in Patent No. 2,051,849, is preferably used on the catheter to prevent adhering of the sleeve to the catheter; to remove any tackiness from the sleeve inside surface, the sleeve may be turned inside out, and dipped into a treating solution while the lower end is kept closed by any suitable means, as for example by the fingers of the operator. Treating solution may also be forced through the inflating passage and into the balloon to prevent adherence after the sleeve has been placed on the catheter body, and either before or after the additional dipping coats are put on.

The use of a pre-vulcanized sleeve permits placing the sleeve under tension when positioned on the catheter, each end being secured to the catheter body, additional coats of rubber then being applied on either end of the catheter as well as on the sleeve ends, but preferably not on the main body portion of the sleeve forming the balloon. This modified construction produces a catheter which has no loose or baggy ends or depressions at each end, the catheter instead always remaining distended intermediate the ends, which merge into the catheter body as indicated at 29 in Fig. 9.

While we have described specific constructional embodiments of the invention, it is obvious that changes in the arrangement and shape of the parts and in the character of the materials used may be made to suit the requirements for different articles embodying the invention, without departing from the spirit and the scope of the invention, as defined in the appended claims.

We claim:

1. The method of forming a tubular article with a wall recess, comprising the steps of coating a form with rubber in solution to provide a tubular body, wetting the tubular body, wetting a preformed tubular section of vulcanized rubber, placing the wetted preformed tubular section on the wetted tubular body, and coating the assembly with rubber in solution to lock the preformed tubular section to the tubular body.

2. The method of forming a tubular article with a wall recess, comprising the steps of coating a form with rubber in solution to provide a tubular body, wetting the tubular body, wetting a preformed tubular section of vulcanized rubber, placing the wetted preformed tubular section on the wetted tubular body after first applying rubber cement to the inner surface of the ends of the preformed tubular section, and coating the assembly with rubber in solution to lock the preformed tubular section to the tubular body.

3. The method of forming a tubular article with a wall recess, comprising the steps of coating a form with rubber in solution to provide a tubular body, wetting the tubular body, wetting a preformed tubular section of vulcanized rubber, placing the wetted preformed tubular section under tension on the wetted tubular body, and coating the assembly with rubber in solution to lock the preformed tubular section to the tubular body.

4. The method of forming an inflatable balloon catheter comprising the steps of coating a form with rubber in solution, placing an inflation tube thereon, again coating the form and tube with rubber in solution to provide a catheter body having an inflation passageway, opening the distal end of the tube through the second coat, wetting the catheter body, wetting a preformed tubular section of vulcanized rubber, placing the wetted preformed tubular section on the wetted catheter body with the open end of the inflation tube intermediate the ends of the preformed section, and coating the assembly with rubber in solution to lock the tubular section to the catheter body.

5. The method of forming an inflatable catheter comprising the steps of coating a form arrangement with rubber in solution to provide a catheter body having an inflation passageway in the wall thereof, opening the distal inflation passageway end, wetting the catheter body, wetting a preformed tubular section of vulcanized rubber, placing the wetted preformed tubular section on the wetted catheter body with the open end of the inflation passageway intermediate the ends of the preformed tubular section, and coating with rubber in solution over at least the ends of the tubular section and the adjacent portions of the catheter body to lock the ends of the tubular section to the catheter body.

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