

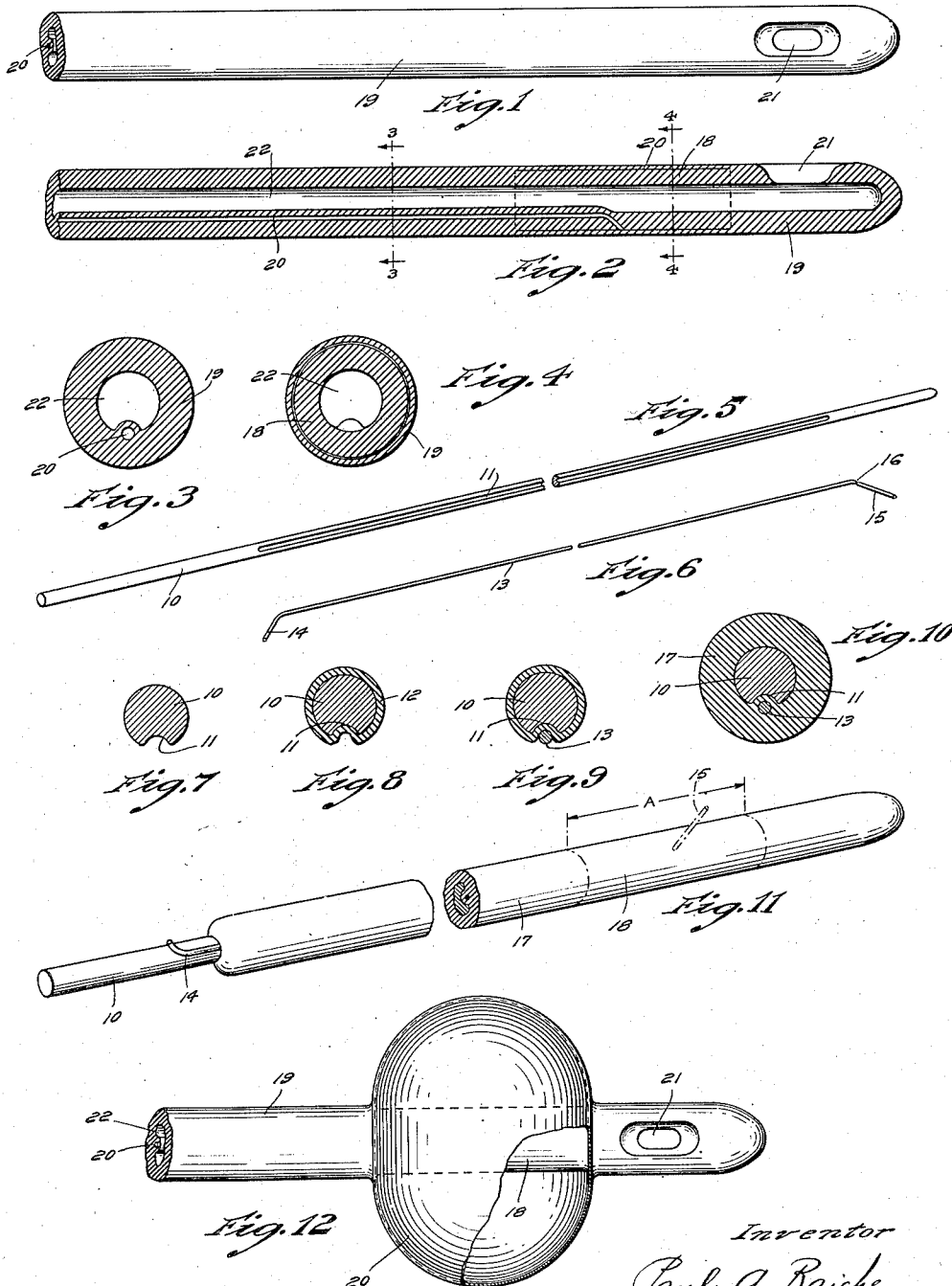
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CONSTRUCTION OF RUBBER ARTICLES

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CONSTRUCTION OF RUBBER ARTICLES

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My present invention relates to medical apparatus and has particular reference to catheters and other articles having inflatable walls.

It is the principal object of my invention to provide a rubber article of integral construction having an interior recess in the walls thereof, whereby part of the wall may be inflated if desired.

It is a further object of my invention to specifically apply the improved construction to a catheter, in order to obtain a retaining or internal treatment catheter having an integral inflatable bulb.

It is a further object of my invention to provide a novel construction for obtaining wall recesses in any dipped article without using separate article pieces which must be cemented together.

With the above and other objects and advantageous features in view, my invention consists of a novel method, and a novel article produced 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, which shows the invention as specifically applied to a catheter,

Fig. 1 is a plan view of a novel catheter embodying the principle of my invention;

Fig. 2 is a section of Fig. 1 on the line 2—2 thereof;

Fig. 3 is a section on the line 3—3 of Fig. 2;

Fig. 4 is a section on the line 4—4 of Fig. 2;

Fig. 5 is a perspective view of a novel dip rod;

Fig. 6 is a perspective view of a novel wire form used in conjunction therewith;

Figs. 7, 8, 9 and 10 are sections showing the sequence of steps in manufacturing the novel catheter;

Fig. 11 is a perspective showing an intermediate stage of construction; and

Fig. 12 is a view, partly broken away, showing the completed novel catheter as it appears when inflated.

It has been found desirable to manufacture rubber articles, and particularly articles intended for medical and surgical use so as to provide an integral article having inflatable wall portions, the inflatable portions being independently controllable. For example, an internal treatment catheter requires a flow channel for the passage of treating fluid, and is made with an inflatable bulb portion according to my invention, which permits an independent inflation of the bulb so

as to retain the catheter in treatment position, and to permit use of the catheter as a yielding massage instrument or the like if desired. Catheters of this type have heretofore been made in several pieces which are cemented together, thus producing undesirable seams which hinder introduction of the catheter, in addition to the danger of the seams separating and coming apart.

I have therefore devised a novel method for manufacturing an integral, one piece bulb catheter, utilizing a dip form such as a rod 10, see Fig. 5, which has a longitudinal groove 11. This dip rod is dipped a predetermined number of times in latex, which may be prevulcanized or unvulcanized, to obtain a coat 12, see Fig. 8; a wire form 13, see Fig. 6, having a manually graspable bent end 14, and a bent end 15 which is breakable from the wire 13 at a point 16 of reduced area, is then positioned in the groove 11 over the latex formed therein, as indicated in Fig. 9, and held in place in any desired manner, as by thin spaced latex bands. The form and wire are then dipped again, whereby a thick coat 17, see Fig. 10 is formed, the form and coat at this stage of manufacture having the appearance shown in Fig. 11. A portion 18 of the coat of any suitable width such as indicated by the letter A is then painted with a local curing agent, such as a solution of sulphur chloride gas in alcohol or a solution of bromine gas in alcohol, the solution providing a surface cure for the painted portion 18. The article is then allowed to dry to facilitate handling; the end 15 is then broken off, and the dipping resumed to produce the completed catheter 19 shown in Figs. 1 and 2, the catheter being dried and then cured, the rod 10 and wire 13 then being withdrawn.

The completed catheter, see Fig. 2, thus consists of an elongated tube which has an integral independent passageway 20 formed in the wall thereof, the passageway 20 terminating between spaced walls 18 and 20 which form a recess 21 due to the initial curing of the portion 18, whereby the recess may be inflated, as indicated in Fig. 12, by forcing air or other fluid under pressure through the passageway 20. An eye 22 is preferably formed at the end of the catheter communicating with the main catheter passageway 23. A small flexible tube may, if desired, be used in place of the wire 13; although a groove in the dip rod produces a more finished catheter, the groove may be omitted.

The above described construction thus produces a one piece, integral catheter having an inflatable bulb portion which has an independent

ent fluid passageway, whereby control of inflation of the bulb, and use of fluids of different temperatures therein is independent of the use of the catheter and of the main catheter passageway. Catheters of the described type as

previously made have had an inflating tube placed in the main passageway, thus reducing the flow area and restricting drainage.

Although I have described the invention as specifically applied to a retaining type catheter, it is obvious that the invention may be applied to any article which is made by dipping into a rubber or rubber like solution for producing a final article having a high degree of elasticity. The preferred dipping solution is latex, which may be prevulcanized or nonvulcanized, but any material having similar characteristics may be used; the article is first formed to an intermediate stage, then a portion thereof is surface cured to prevent adherence, then the dipping is continued so as to complete the article, whereby the completed article is an integral one piece article having an inner recess. The invention may be utilized for the manufacture of rubber articles in general, by dipping, surface curing, and then dipping again, to obtain one piece articles having chambers, recesses, passageways, or openings. I use the phrase "rubber" in the claims and in the description to designate either natural or synthetic rubber or rubber compound, and in a broad sense to designate any material having similar elastic characteristics.

Although I have described the rubber articles as formed by dipping, any coating process may be used, the form being coated, then surface treated locally to prevent adherence over the treated area, and then coated again. Any coating material may thus be used to provide an integral finished product having inner recesses and the like. The surface curing agents are preferably in solution form, the halogen gases in alcohol being suitable for the described purpose, but may be of other materials, either solid, paste, liquid or gaseous, having the property of producing a local surface curing. The term "curing" is used in a broad sense, to denote any treatment which will prevent surface adhesion, whereby a second coat may be applied over the first coat and its heated area.

While I have described a specific constructional embodiment of my invention, it is obvious that changes in the manner of forming, in the materials used for the article and for the dip solution, in the materials used for the local surface curing, and in the arrangement of the parts for producing the desired completed internal recess and the formation of passageways leading thereto, may be made without departing from the spirit and the scope of the invention as defined in the appended claims.

I claim:

1. The method of forming articles by dipping, comprising dipping a form in a coating solution of rubber to form an initial coat, treating a local area of the initial coat with surface curing means to obtain a local curing of the treated area, and again dipping the coated treated form in the coating solution, whereby an integral article with a recess is obtained.

2. The method of forming articles of dipping, comprising dipping a form in a coating solution of rubber to form an initial coat, treating a local area of the initial coat with surface curing means having the adhesion preventing characteristics of sulphur chloride and bromine to obtain a local

curing of the treated area, and again dipping the coated treated form in the coating solution, whereby an integral article with a recess is obtained.

3. The method of forming articles by dipping, comprising dipping a form in a coating solution of rubber to form an initial coat, treating a local area of the initial coat with a solution of sulphur chloride to obtain a local curing of the treated area, and again dipping the coated treated form in the coating solution, whereby an integral article with a recess is obtained.

4. The method of forming articles by dipping, comprising dipping a form in a coating solution of rubber to form an initial coat, treating a local area of the initial coat with a solution of bromine to obtain a local curing of the treated area, and again dipping the coated treated form in the coating solution, whereby an integral article with a recess is obtained.

5. The method of forming articles with wall recesses, comprising the steps of coating a form, placing a passageway form on the coated form, coating the first and second forms, locally treating the coated area about the end of the passageway form to prevent surface adhesion, again coating both forms and their coats, and removing both forms, whereby an integral article having a recess with a communicating passageway is obtained.

6. The method of forming articles with wall recesses, comprising the steps of dipping a form in coating solution, placing a passageway form on the coated form, dipping the first and second forms, locally treating the coated area about the end of the passageway form to prevent surface adhesion, again dipping both forms and their coats, and removing both forms, whereby an integral article having a recess with a communicating passageway is obtained.

7. The method of forming articles with wall recesses, comprising the steps of coating a form having a groove, placing a passageway form in the groove on the coated form, coating the first and second forms, locally treating the coated area about the end of the passageway form to prevent surface adhesion, again coating both forms and their coats, and removing both forms, whereby an integral article having a recess with a communicating passageway is obtained.

8. The method of forming articles with wall recesses, comprising the steps of dipping a form having a groove in coating solution, placing a passageway form in the groove on the coated form, dipping the first and second forms, locally treating the coated area about the end of the passageway form to prevent surface adhesion, again dipping both forms and their coats, and removing both forms, whereby an integral article having a recess with a communicating passageway is obtained.

9. The method of forming tubular articles with wall recesses, comprising the steps of coating a form, locally treating a selected portion of the coated area to prevent surface adhesion, forming a fluid passageway in the wall to communicate with the treated area, and again coating, whereby a tubular article having a wall recess and a fluid passageway communicating with said wall recess is provided.

10. The method of forming tubular articles with wall recesses, comprising the steps of dipping a form in coating solution, locally treating a selected portion of the coated area to prevent surface adhesion, forming a passageway in

the tubular wall which opens into the locally treated area, and again dipping, whereby a tubular article having a wall recess and a fluid passageway communicating with said wall recess is provided.

material, to form an initial coat, treating a local area of the initial coat to prevent surface adhesion, and again coating the coated treated form with a solution of rubber material, whereby an integral article with a recess results.

11. The method of forming articles, comprising coating a form with a solution of rubber ma-

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