

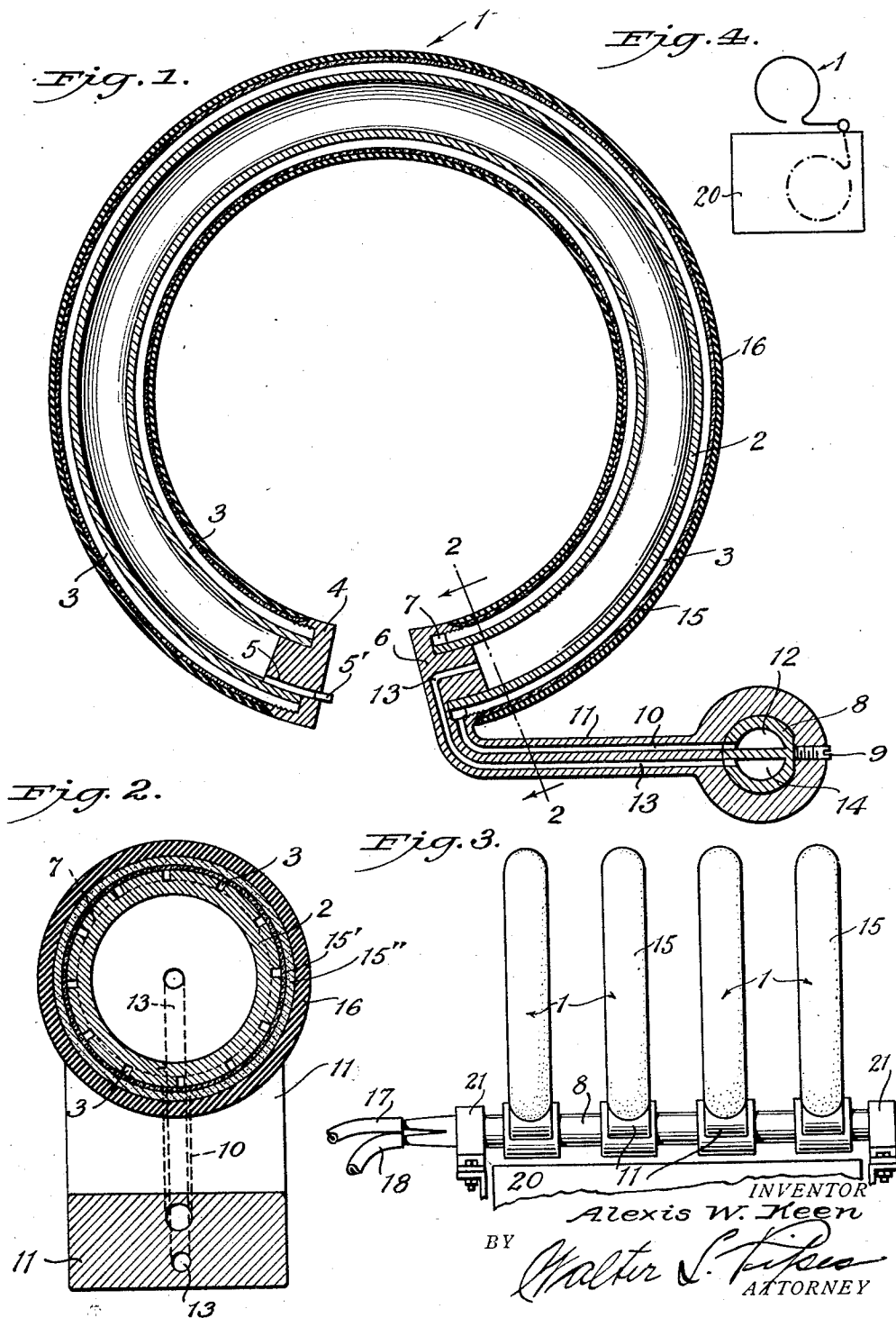
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APPARATUS FOR MANUFACTURING RUBBER ARTICLES

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APPARATUS FOR MANUFACTURING RUBBER ARTICLES

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This invention relates to an improved method and apparatus for the manufacture of articles from dispersions, more particularly of rubber articles from a rubber dispersion, such as latex.

It aims to provide an improved method and apparatus permitting the rubber or like material to be rapidly deposited from the latex or other dispersion, and permitting the deposit to be dried expeditiously. Other objects and advantages of the invention will appear in the following detailed description.

In the single of the many possible embodiments of the invention illustrated in the drawings

Fig. 1 is a cross section through a curled form of a type suited for the manufacture of inner tubes.

Fig. 2 is a transverse section about on the line 2—2 of Fig. 1 and showing on an enlarged scale details of the construction.

Fig. 3 is a side elevation of the apparatus showing a fragment of a tank in which latex or other dispersion may be contained, and

Fig. 4 is a diagrammatic front elevation of the apparatus showing how the form may be moved.

Referring to the single embodiment of the invention illustrated in the drawings, the form indicated generally at 1 comprises a lengthwise curved shape-retaining-member 2, preferably of metal of light weight such as aluminum, in one surface of which is provided a plurality of ducts 3, which may be disposed in any suitable and convenient manner, preferably in parallelism and extending from one end to the other of the form. The surface of the member 2 intermediate the ducts 3 may be knurled, if desired, and as is preferred. The opposite ends of the shape-retaining-member 2, which is tubular in cross section, are plugged as indicated at 4 and 6, plug 4 being provided with a vent 5 of small bore which is adapted to be closed at will as indicated at 5', this vent permitting drainage of any condensate which may collect on the interior of the tubular member 2. The ducts 3 may be placed in communication in any suitable and convenient manner but pref-

erably by providing a header or passage 7 in the plug 6.

While the form may be variously supported for movement into and out of a body of latex contained in a tank 20, Figs. 3 and 4, it is preferred to attach one of its ends to an arm 11 integral or otherwise connected to the plug 6, which arm is suitably fixed to a shaft 8 by a set screw 9. The shaft 8 is rotatably supported in brackets 21 at any desired distance apart, preferably as shown in Fig. 3 to accommodate a plurality of forms 1, and clear the sides of the tank 20. A hand crank (not shown) or other means may be used to turn the shaft 8. Ports 10 and 13 are provided in the arm 11 in communication with the ducts 3 and the passage 13 respectively, said ports 10 and 13 being also in communication with passages 12 and 14, connected respectively to a source of low pressure 17, such as a blower, and a source of supply of a heating medium 18, such as steam.

The channeled surface of the tubular member 2 in which the ducts 3 are provided, may be covered with a wide variety of materials which will permit the aqueous portion but not the dispersed rubber of the latex to pass thereby to build up a deposit of rubber on the form to the desired thickness. In Fig. 1 of the drawings such a layer of material is indicated generally at 15. The layer 15 may comprise a more or less permanent filtering composition 15', Fig. 2, consisting of, for instance, diatomaceous earth and/or celite with a heat-hardening binder, such as any well known phenolic condensation product, and a more or less temporary surfacing stratum 15'' of relatively inexpensive permeable material such as a clay slip which may be applied as a paste. The filtering stratum 15, however, may be made in part of finely woven fabric, or of the described material 15' reinforced with convolutions of wire, or of successive laminae of the latter and of fabric windings with as the other part of the stratum an outside coating of clay slip or suitable alternative. The specific filtering composition forms no part of the present invention, as any construction and arrangements of materials may be applied to the member 2 which will per-

mit the aqueous portion but not the rubber of the latex to pass in the formation of the article, such as the tube 16 shown in the drawings.

5 In the use of the invention, with the manufacture of inner-tubes for pneumatic tires in mind, the form 1, with its previously applied layer of filtering material 15, mounted on the arm 11 attached to the shaft 8, is immersed in a body of the dispersion, such as rubber latex, contained in a tank 20, by rotating the shaft 8, as diagrammatically illustrated in Fig. 4, from the solid to the dotted line position. The drainage vent is either closed with plug 5' or placed in communication with the atmosphere above the latex by a hose (not shown). While the vacuum is applied through the line 17 and passages 12, 10 and 7 to the ducts 3, the rubber is rapidly deposited on the surface of the layer 15 and the aqueous portion of the latex simultaneously withdrawn. A given thickness of deposit may be built up much more rapidly with the apparatus of this invention than heretofore. When the requisite thickness of deposit of a pasty-like mass has been built up on the form, it is removed from the dispersion and with the vacuum still on, at least preferably, a heating medium is supplied from the line 18 through the ports 14 and 13 to the interior of the tubular member 2. The wet pasty deposit on the form is thereby heated while the evacuating means continues to pull the residual aqueous portion of the latex from the deposit. The pressure being reduced while the heat is on, of course, enables the aqueous content of the deposit to be boiled or vaporized off at a temperature substantially below the normal boiling point of 212° F., and this without blowing the deposit which is consolidating all the while.

The conjoint use of vacuum and heat shortens the time required for drying the deposit very substantially.

45 Suitable precautions should be taken to prevent the blowing of the tube or other article as it approaches dryness and during vulcanization. This may be accomplished variously. For instance, steam under appropriate pressure may be applied externally to the tube 16 on the form 1 at the end of the drying operation and preferably a few seconds before. Or the supply of the heating medium to the interior of the tubular member 2 may be cut off at or slightly before the completion of drying, the form for the inner tube 16 or other article thereon, being subjected to any suitable and desirable vulcanizing treatment, for instance, in a chamber or oven with air or steam under pressure, the latter being preferred. Of course also the dried tube 16, or the article, may be stripped from the form 1 and vulcanized, its ends being spliced either before or after vulcanization as desired and

if the article be not completely annular in form.

The apparatus of the present invention may be used in the manufacture of any desired rubber article, shape obviously being not of the essence of the broad invention. It may be used for the formation of an article from any materials capable of being dispersed in water or other liquid medium. And the differential of pressure preferably employed to augment the rate of deposit as well as the rate of drying may be obtained variously, although it is preferred to use normal atmospheric pressure on the latex (or other dispersion) with less than atmospheric pressure on the surface of the form opposite to that with which the latex is in contact. Various changes and alterations in the construction and method of using the invention may be made and all such are within its underlying principles are intended to be comprehended in the broad aspects of the invention.

Reference should therefore be made to the accompanying claims for an understanding of the scope of the invention.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. A form for manufacturing rubber articles from latex comprising a hollow shape retaining member, a filtering stratum upon which the rubber may be deposited covering one surface of the hollow member, and a plurality of ducts intermediate the filtering stratum and the member for the passage of the aqueous portion of the latex, in combination with means for evacuating the ducts to expedite the deposit of rubber and to draw off the aqueous portion of the latex, and means for supplying a heating medium to the interior of the hollow member.

2. A form for manufacturing rubber articles from latex comprising a hollow shape retaining member, a filtering stratum upon which the rubber may be deposited covering one surface of the hollow member, and a plurality of ducts intermediate the filtering stratum and the member for the passage of the aqueous portion of the latex, in combination with means for evacuating the ducts to expedite the deposit of rubber from latex and to draw off the aqueous portion of the latex, means for supplying a heating medium to the interior of the hollow member, and means for venting the interior of the hollow member.

3. An apparatus for manufacturing rubber articles from latex comprising a form having a shape retaining member tubular in cross section, and a stratum of material covering a surface of said member upon which rubber may be deposited to form the article and through which the aqueous portion of the latex may pass, and provided with a plu-

reality of ducts between said member and the stratum of material, in combination with means for drawing off the aqueous portion of the latex which collects in said ducts, and means for heating the tubular member.

4. An apparatus for manufacturing rubber articles from latex comprising a form having a shape retaining member tubular in cross section, and a stratum of material covering a surface of said member upon which rubber may be deposited to form the article and through which the aqueous portion of the latex may pass, and provided with a plurality of ducts between said member and said stratum of material extending lengthwise the member, and a passage communicating with each of said ducts and located adjacent one end of the tubular member, in combination with, means for applying a differential of pressure to said passage for the removal of the aqueous portion of the latex, and means for supplying a heating medium to the tubular member.

5. An apparatus for manufacturing rubber articles from latex comprising a form having a shape retaining member tubular in cross section, and a stratum of material covering a surface of said member upon which rubber may be deposited to form the article and through which the aqueous portion of the latex may pass, and provided with a plurality of ducts between said member and said stratum of material extending lengthwise the member, and a passage communicating with each of said ducts and located adjacent one end of the tubular member, in combination with, means for applying a differential of pressure to said passage for the removal of the aqueous portion of the latex, and means for supplying a heating medium to the tubular member at non-communicating relation to said ducts.

6. An apparatus for manufacturing rubber articles from a body of latex comprising a form having a tubular member, and a layer of material covering one surface of the tubular member upon which rubber may be deposited to form the article and through which the aqueous portion of the latex may pass, said form being provided with ducts beneath the surface of said layer of material for the free passage of the aqueous portion of the latex, an arm attached at one end of said tubular member, a shaft to which said arm is fixed and about the axis of which the form may be swung into and out of the body of latex, said shaft and arm carrying means for placing the ducts provided in the form in communication with a source of low pressure, and said shaft and arm being also provided with means for supplying a heating medium to the interior of said tubular member.

7. An apparatus for manufacturing rubber articles from a body of latex comprising a tubular form, a layer of material covering

one surface of the tubular form and upon which rubber may be deposited to form an article and through which the aqueous portion of the latex may pass, said form being provided with ducts beneath the surface of said layer of material for the free passage of the aqueous portion of the latex, an arm attached at one end of said tubular form, a substantially horizontal shaft to which said arm is fixed and about the axis of which the form may be swung into and out of the body of latex to a position in which the form is above said axis, said shaft and arm carrying continuously operable means for placing the ducts provided in the form in communication with a source of low pressure when the form is either in or out of the latex.

Signed at New York, county and State of New York, this 10th day of March, 1928.

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