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**A. MAGNANI**

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## METHOD OF MAKING TUBULAR BODIES

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Fig.1.

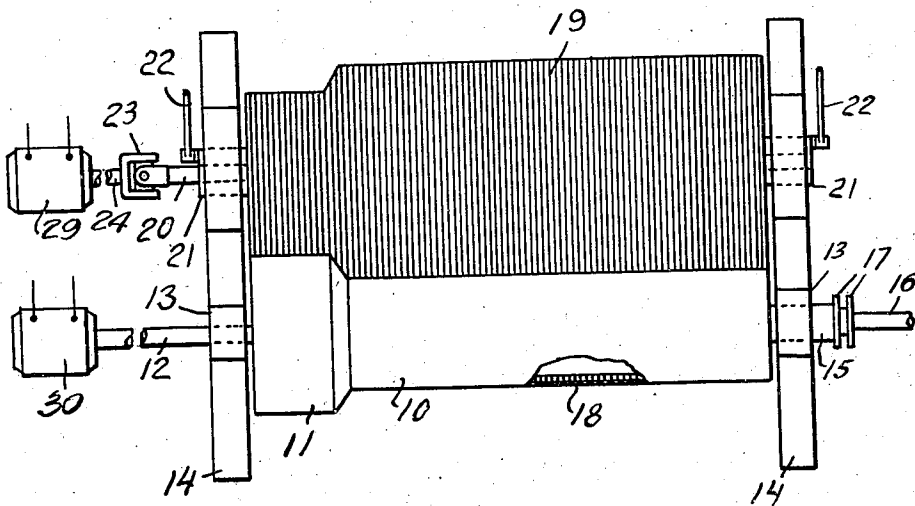
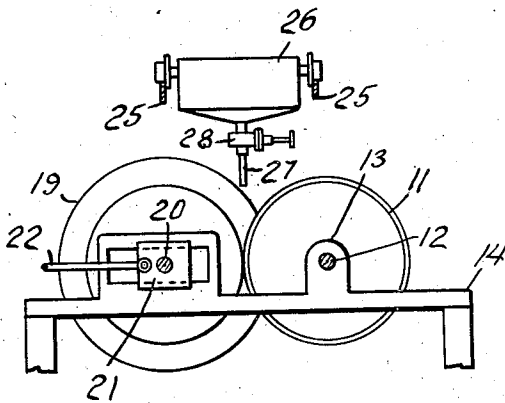


Fig 2.



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## UNITED STATES PATENT OFFICE

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## METHOD OF MAKING TUBULAR BODIES

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## 1 Claim. (Cl. 92—54)

This invention relates to the production of tubular bodies of fibrous pulps, such as asbestos cement, and is concerned more particularly with a novel method by the use of which tubular bodies of fibrous material can be more cheaply and efficiently produced than heretofore and the tubes so produced are of improved quality.

In my Patent No. 1,898,881, there is disclosed a method and apparatus for the production of tubes from fibrous pulps, and according to the method of the invention, the fibrous pulp in fluent form is distributed on the surface of a rotating molding roller having a permeable surface, through which the water is drawn off by suction. As the layer of pulp builds up on the roller, it is shaped by a shaping roller which rotates tangentially to the molding roller and is pressed lightly against the surface of the layer.

The patented process and apparatus are simple and generally satisfactory, but occasionally, the drawing off by suction of the water from the layer of pulp on the surface of the molding roller results in the formation of holes through the layer. This permits air to leak into the interior of the molding roller so that the suction effect is reduced and the layer is not sufficiently deprived of water. In addition, the thickness and surface of the layer are not uniform.

According to the present invention, the pulp in fluent form is applied to the water-permeable surface of a molding roller to the interior of which suction is applied, and as the pulp builds up on the roller to produce a layer, the pulp is pressed and compacted by a calendering roller driven at a higher surface speed than that of the layer. By the use of the calendering roller, the formation of holes through the fibrous layer is prevented, since, if such holes initially develop, they are promptly closed by the troweling action of the calendering roller. Moreover, the pressing and smoothing action of the calendering roller tends to close the pores in the surface of the fibrous layer so that the tube so produced has an impermeable, compact, and uniform wall. For some purposes, the calendering may be performed in successive stages with the calendering roller operating on the fibrous layer at relatively light pressure in the preliminary operation, and pressed more firmly against the layer in the final operation. Also, in some cases, it may be desirable to treat the surface of the tube with a reagent which causes the precipitation of solid material in the surface pores of the tube, as, for example, in the case of tubes made of asbestos cement, treatment of the surface thereof with soapy

water produces a precipitation of lime soap which fills the fine surface pores and thus increases the impermeability of the surface.

For a better understanding of the invention, reference may be had to the accompanying drawing, in which

Figure 1 is a plan view, with parts removed, of apparatus which may be used in the practice of the method of the invention; and

Figure 2 is an end view of the apparatus.

The apparatus as illustrated in the drawing includes a molding roller 10, the exterior shape of which is that of the tube to be produced, the roller illustrated having an enlargement 11 at one end corresponding to the socket of the finished pipe. The roller is closed at its ends and it is mounted on a shaft 12 supported for rotation in bearings 13 on suitable supports 14. The shaft 12 is enlarged at one end, as indicated at 15, and through the enlargement, extends a pipe 16 connected to a vacuum pump, not shown, by which suction can be applied to the interior of the roller, the leakage of air around the pipe being prevented by glands 17. The roller is preferably a seamless tube formed with a multiplicity of perforations through its wall and is covered by a filter cloth 18 of linen or the like.

Adjacent the molding roller is a calendering roller 19 mounted on the shaft 20 which is supported in bearings 21 movably mounted on the support 14. Means, illustrated as links 22, connected to the bearings 21 are provided for maintaining the calendering roller 19 in tangential contact with the surface of the molding roller at a suitable pressure, and the shaft 20 is connected through a universal joint 23 to a drive shaft 24, which is operated at a speed such that the surface speed of the calendering roller is substantially greater than that of the molding roller. This may be accomplished, for instance, by driving the shaft 24 of the calendering roller by an electric motor 29, and driving the shaft 12 of the molding roller by an independent motor 30, the two motors being so controlled that the motor 29 operates at the proper speed in relation to the speed of the motor 30 to produce the desired differential surface speed of the two rollers. The calendering roller may have a smooth surface, but is preferably formed with a series of small circumferential grooves, which may, for example, be 1 mm. deep and spaced apart 2 mm.

Mounted to run on rails 25 above the rollers is a feed hopper 26 for the pulp, and this hopper is provided with a discharge tube 27 provided with a valve 28 by which the rate of flow from the

hopper can be controlled. The tube 27 leads close to the bite of the molding and calendering rollers, as shown in Figure 2.

In the operation of the apparatus in accordance with the new method, the calendering roller is moved toward the molding roller so as to make light contact therewith, and the rollers are then rotated in opposite directions at different peripheral speeds. The fluent pulp, such as asbestos cement slurry, is distributed at the desired rate from the hopper through the discharge pipe into a bite of the rollers, and suction is applied to the interior of the molding roller. A thin layer of pulp is thus applied to the molding roller and dewatered by the withdrawal of water into the interior of the latter, the water being discharged through the pipe 16. As the operation proceeds, the hopper is moved back and forth along the rails 25 so as to build up a fibrous tubular body on the molding roller, and as the thickness of the fibrous layer increases, the calendering roller is progressively withdrawn from the molding roller until a layer of the desired thickness has been produced. The feed of pulp is then stopped, the pressure of the calendering roller against the layer is increased, the rotation of the rollers continuing until the thickness of the fibrous layer has been diminished about ten per cent. This completes the molding of the tube, and, thereafter, if desired, the surface of the tube may be treated with soapy water to cause precipitation of lime soap in the surface pores. Finally, the tube may be subjected to further compression before it is removed from the molding roller for hardening.

By the use of the invention, the formation of the tube is simplified and its quality improved, since proper dewatering of the pulp is insured, and, in addition, the fibrous mass is made compact and of uniform thickness and density. The troweling produced by the rubbing and smoothing action of the calendering roller closes any pores formed in the fibrous mass by the applied suction as the layer is progressively built up and the tube is given a smooth impermeable surface, the impermeability of which can be further increased by the use of the precipitating agent, as described.

I claim:

A method of producing a tubular body from fibrous pulp, which comprises distributing the pulp in slurry form on the surface of a rotating permeable tubular body to progressively build up a layer of the pulp on said body, applying suction within said body to withdraw water from the slurry through the wall of said body while said layer is being progressively built up on the body, and, throughout the building up of the layer of pulp on said body, continuously troweling the surface of the layer simultaneously with the withdrawal of the water from the layer to consolidate the layer and close the pores formed therein by the withdrawal of the water, said troweling being effected by subjecting the surface of the layer to the rubbing and smoothing action of another surface pressed against the surface of the layer and positively moved in the same direction at a substantially higher speed.

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