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K. JUST

2,649,133

METHOD AND DEVICE FOR PRODUCING HIGH-PRESSURE
TUBES OF HARDENING MATERIALS AS CEMENT

Filed Feb. 28, 1948

2 Sheets-Sheet 1

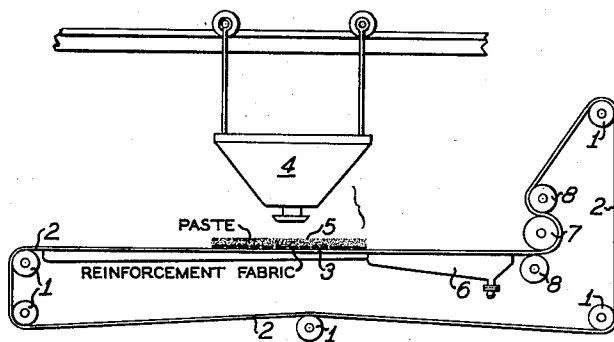


Fig. 1

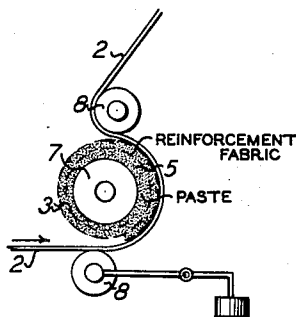


Fig. 2

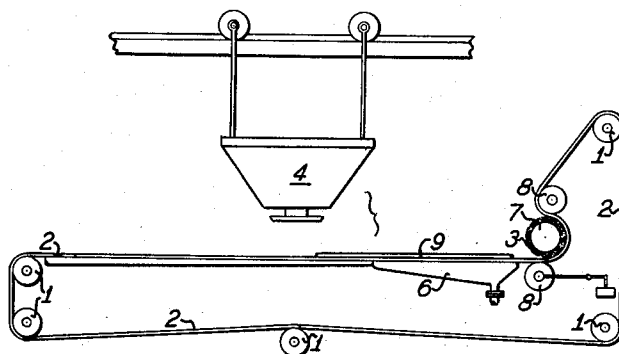


Fig. 3

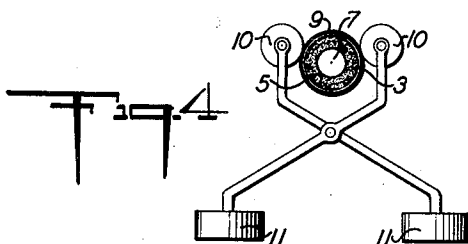


Fig. 4

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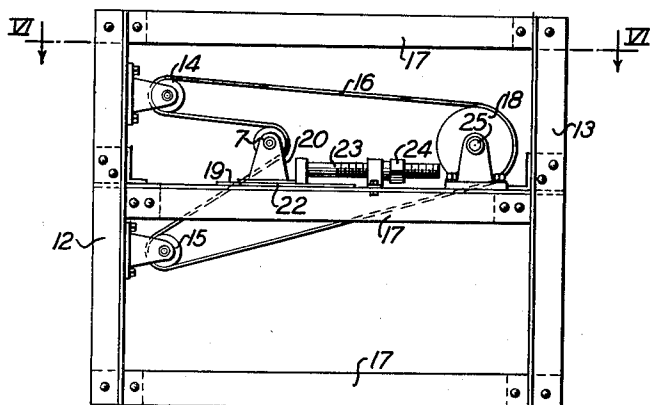
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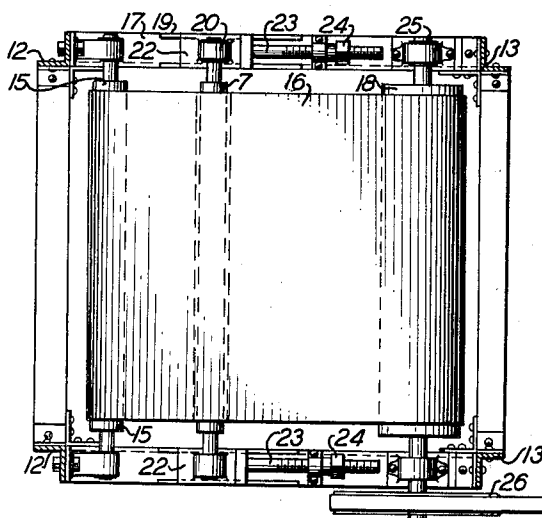
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METHOD AND DEVICE FOR PRODUCING
HIGH-PRESSURE TUBES OF HARDEN-
ING MATERIALS AS CEMENTKonrad Just, Salzburg, Austria, assignor to
Himanit Aktiengesellschaft, Vaduz, Liechten-
stein, a firmApplication February 28, 1948, Serial No. 11,928
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7 Claims. (Cl. 154—1.8)

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This invention relates to a method and a device for producing high-pressure tubes of hardening materials such as cement.

I am aware that a method and a device for producing high-pressure tubes of cement with or without an addition of fibrous materials are known. According to the known method, the material with or without a reinforcement fabric of textiles, wires, glass, or the like is applied to an endless conveyor and winding belt and, after a part of its moisture has been drained off by means of a suction device, is directly wound round a core roll. This method is subjected to difficulties because the structure of the tube is slackened when removed from the core, and a deformation occurs, the diameter of the tube becoming larger than that of the core.

According to another proposal, plates of material in the plastic condition, for instance asbestos cement plates produced in a cardboard machine, are wound round the core roll, which plates, after having been fashioned to form a tube, are wrapped into a waterproof wrap of fabric or perforated sheet metal, whereupon the tube carried by the core roll and enclosed within the wrap is drained and compressed by a press roll.

This method is subject to the difficulty that winding up plates, even while still in a plastic state, does not result in a homogeneous structure of the tube-shaped roll, as it is inevitable that thin layers of air are enclosed between the individual layers of the material forming the roll, which layers of air prevent the material of the superposed plates forming the roll from completely combining, as is indispensable in case of high-pressure tubes. Furthermore, the plates to be worked up are irregularly compressed for the well known reason that by means of an exterior pressure the layers situated close to the surface are compressed to a greater degree than the deeper-seated ones.

The object of the invention is to provide a method enabling the production of tubes having an especially compact structure of the material, such tubes being capable of resisting a high internal pressure even in the case where the walls are thin.

In accordance with the invention a plastic material paste is supplied to a conveyor belt in the form of a layer, and after its moisture has been partly extracted if need be, is wound in the known manner around a core roll by the belt exerting a pressure to it, whereupon the tube formed is encircled and tightly compressed by

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a fabric, for instance of linen, cotton, or any other textile material, which wraps the tube over its whole length preferably in several layers. The fabric is then removed. By the successive application of the two steps of the process, it is possible to compress the sand-cement paste and to press it tightly around the core even in cases where the paste is very soft. The compression may be of such a high degree that the resulting tube has very greatly increased strength when the cement sets, enabling resistance to high internal pressures.

According to the invention the hardening material for producing tubes is preferably applied to a wide-meshed glass fabric which is placed on the circulating belt. This glass fabric remains embedded in the tube, whereas the wrapping of textile material is removed after compressing has been accomplished, and may be used again for the production of other tubes.

Some preferred embodiments of the device for carrying out the process are illustrated by way of example in the accompanying drawings, in which:

Figs. 1 to 3 are diagrammatic side elevations of the winding machine showing different steps of the process.

Fig. 4 is a side elevation of a compressing device, and:

Figs. 5 and 6 are a side elevation and a top view partly in section respectively of another embodiment of the compressing device.

Referring to Figs. 1 to 3, the machine comprises an endless conveyor belt 2 guided by rolls 1, onto which belt is put a preferably wide-meshed flat fabric 3, textile, wires, or other material, in the case where the tube is to be provided with a reinforcement insertion. The belt 2 carries the fabric 3 to a position under the container 4 containing the material to be worked up, for instance a sand-cement paste with an addition of fibrous material if need be. The material to be worked up is uniformly applied to the reinforcement fabric 3 in the form of a layer of the desired thickness and is carried by the belt across a suction device 6, where the moisture of the material is partly drained off. The fabric and the layer of material deposited thereon is then fed to the winding device which comprises a middle core roll 7 and two press rolls 8, i. e., an upper and a lower. The lower press roll mounted on a two-armed lever is continually pressed against the core roll by means of a counterweight. At this point the material along with the fabric 3 starts winding round

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the core roll 7 under the influence of the belt 2, which surrounds half the circumference of the core roll and runs off across the upper press roll 8. The material 5 and the reinforcement fabric spirally envelop the core roll 7 forming a tube thereon which tube may comprise two or more layers according to the desired wall thickness, as Fig. 2 illustrates on a larger scale.

In the case where the tube is not to be provided with a reinforcement insertion 3 the material paste 5 is supplied from the container 4 directly to the belt 2. Especially in this case, but also in the case of inserting reinforcements 3, it is expedient to spread a base sheet of textile fabric on the belt. This, on the one hand, preserves the belt which consists mostly of felt, and on the other hand, insures the coherence of the material paste 5. This base sheet however has to be drawn off the tube as soon as it passes from between the upper press roll 8 and the core roll 7, in order to prevent its being wound into the material 5.

Directly following this step, a piece of fabric 9 is put on the belt, as shown in Fig. 3 for which purpose the base sheet of linen, cotton or the like as used for the winding process may be employed. This fabric 9 is made to pass through the winding device 7, 8, however without removing it when it leaves the upper press roll 8, thus causing the fabric sheet to compress the still soft tube and to completely envelop it. The length of the fabric sheet 9 is adjusted in accordance with the dimension of the tube in order to encircle it at least once, but preferably several times. If the machine is now run for a short time further, the fabric 9 presses the material of the tube tighter and tighter onto the core 7 as a consequence of the tension exerted on the fabric 9 by the belt 2. This results in the squeezing out of excess water without any loss of material, and in the compressing of the wall of the tube to a high degree.

In order to make the device ready for another working process as fast as possible, the process described may be interrupted after the winding up of the fabric 9, that is, before the compressing is done, the core roll 7 along with the tube and the wrapping 9 may be removed and replaced by another roll 7, while the first one is mounted in a compressing device according to Fig. 4. This device essentially comprises two bearings for the roll 7 and two press rolls 10, which exert a high pressure to the surface of the tube, by virtue of two weights 11. When rotating the core roll 7 or one of the two press rolls 10, the compression of the tube to a high degree is obtained. The tube is tightly pressed around the core by the fabric 9 and the pressure of the rolls 10, and is drained to such an extent that it may safely be removed from the core after a short time and stripped from the fabric 9.

The compressing device according to the Figs. 5 and 6 serves the same purpose. In this device the press rolls 10 are replaced by an endless belt 16, which is adjustable to control the pressure exerted by it. The device comprises a frame of bars 12, 13 the vertical ones 12 carrying the tension rollers 14, 15 of the endless belt 16. Horizontal middle bars 17 are provided for supporting the driving roller 18 and bearings 20 of the roll 7, which bearings are adjustably arranged between slide bars 19. For adjustment of the core roll 7, the base plates 22 of its bearing 20 are movable to and fro between the slide bars 19 by means of screw spindles 23 engaging stationary nuts 24.

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The drive of the roller 18 is effected by a pulley 26 fixed to the shaft 25.

After a tube has been wound round the core roll 7 in the machine according to Figs. 1 to 3, the roll 7 is removed from the machine and mounted into the bearings 20 so that the endless belt 16 touches the surface of the tube. The belt is stretched by rotating the two nuts 24 so as to obtain the desired pressure. Now the belt 16 is driven by the roller 18 and compresses the wall of the tube to a high degree. After the compressing is done the core roll is removed from the bearing 20 in order to enable another roll 7 coming from the winding machine to be mounted into the compressing device. The described design enables the pressure exerted by the belt 16 to be adjusted according to the nature of the material used, to the diameter and the thickness of the wall of the tube, and so on. Pressing of the belt to the tube or vice versa may be effected in another way too, for instance hydraulically or pneumatically.

I claim:

1. A method of producing high-pressure tubes from hardening materials, which comprises pouring the material to form a layer of adequate thickness in amorphous plastic state to a conveyor belt, winding the material around a core by means of the belt exerting a pressure on the material, feeding of a piece of fabric to the conveyor belt, winding the piece of fabric around the tube produced by winding the material around the core, the piece of fabric having a length to encircle the tube at least once, and tightly rolling the tube along with the piece of fabric.

2. A method as set forth in claim 1 which comprises putting a piece of fabric on the conveyor belt prior to the supplying of the plastic material, feeding the plastic material to the piece of fabric, passing the piece of fabric along with the material to the winding rolls, and removing the piece of fabric after the material has been wound round the core roll but before said fabric has become compressed into the material.

3. A method as set forth in claim 1 which comprises putting a wide-meshed reinforcement insertion of any material on the conveyor belt prior to the supplying of the plastic material, feeding the plastic material to the reinforcement insertion, and winding the reinforcement insertion along with the plastic material round the core roll.

4. A method as set forth in claim 1 which comprises winding the plastic material with the reinforcement insertion round a core roll, wrapping said material and reinforcement with said piece of fabric in the winding machine, removing the core roll along with the material and the wrap from the machine, and compressing the tube in another device.

5. Apparatus for producing tubes of plastic cement comprising, an endless belt, means for driving said belt, a hopper for the plastic cement and having a bottom discharge opening disposed above said belt, a core roll having a substantial portion of its periphery surrounded by said belt, press rolls cooperating with said core roll, and means for elastically exerting pressure from said press rolls to said core roll.

6. A device as defined in claim 5, said core being rotatable, said means for elastically pressing the press rolls onto the core roll comprising said endless belt, and means for adjusting the pressure exerted by the belt.

7. A device as defined in claim 5, said core being rotatable, said means for elastically pressing

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the press rolls onto the core roll comprising said endless belt, and means for adjusting the pressure exerted by the belt, the means for adjusting the pressure comprising a tension pulley.

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