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PROCESS AND APPARATUS FOR FORMING RAPIDLY AND VIBRO-COMPRESSING HOLLOW BODIES MADE OUT OF A PASTE OF CEMENT AND FIBROUS MATERIALS OR BY ANY SIMILAR PASTE

Filed Jan. 16, 1940

Serial No. 314,030

2 Sheets-Sheet 1

FIG. 1.

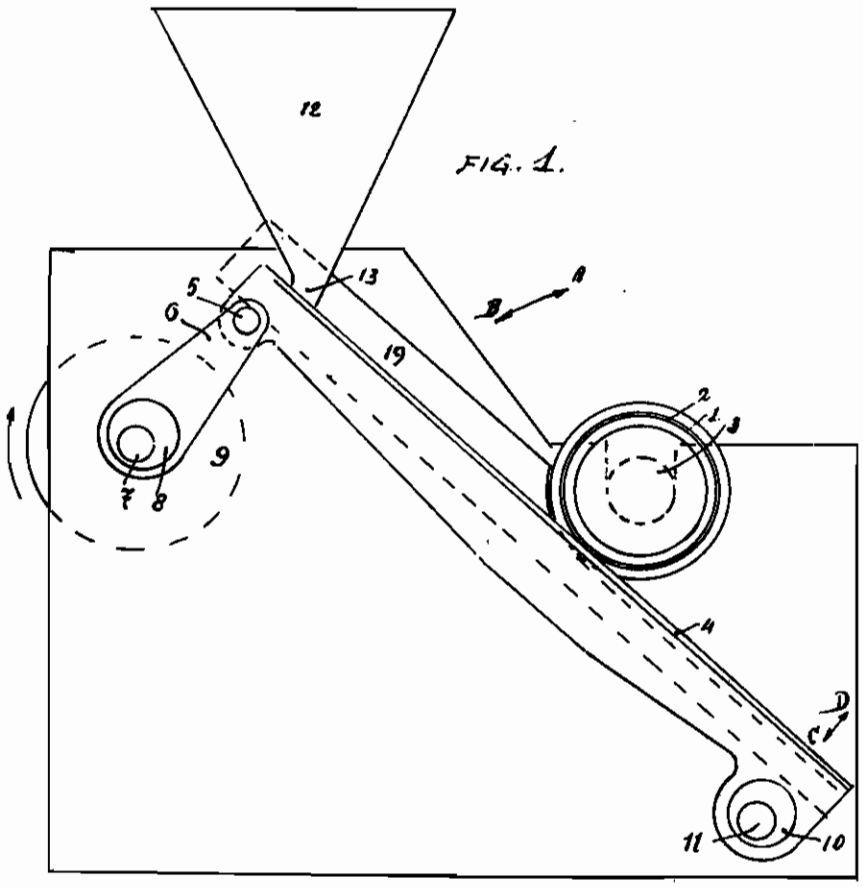
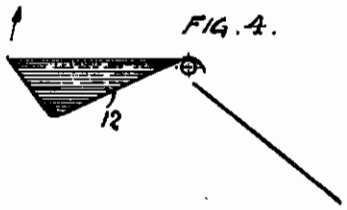


FIG. 4.



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2 Sheets-Sheet 2

FIG. 2

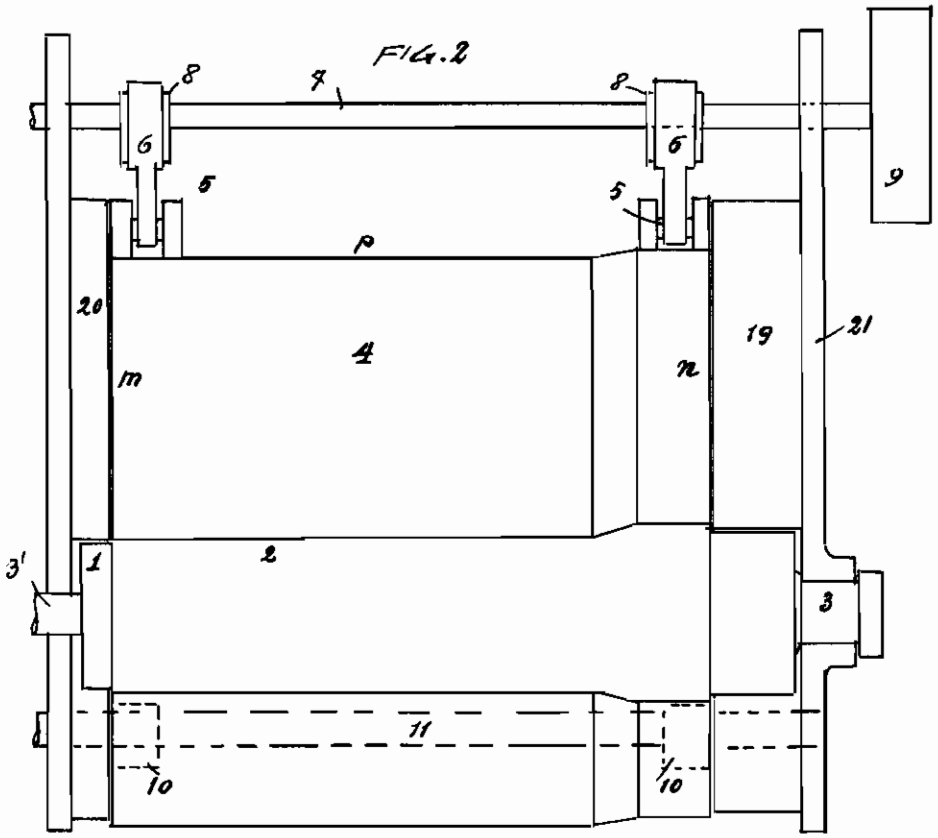
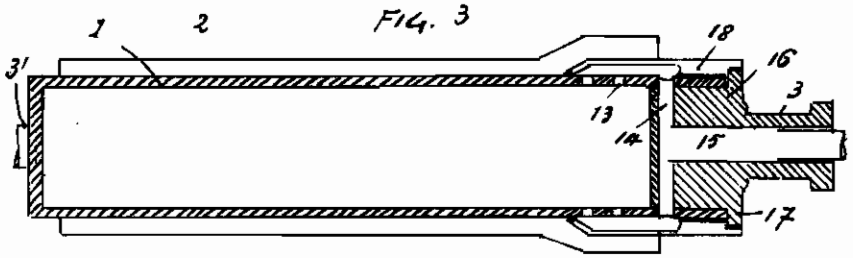


FIG. 3



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PROCESS AND APPARATUS FOR FORMING RAPIDLY AND VIBRO-COMPRESSING HOLLOW BODIES MADE OUT OF A PASTE OF CEMENT AND FIBROUS MATERIALS OR BY ANY SIMILAR PASTE

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Application filed January 16, 1940

The process used for manufacturing pipes, with or without sockets, with pastes of cement eventually containing fibrous matter, are well known. In many such processes the speed of the wrapping drum, or cylinder on which the pipe is being formed by subsequent layers and is being compressed, depends on the speed of a felt band, of a ribbon or of a roller.

Therefore, when, for instance, a pipe with socket is wrapped-up, the angular speeds of the contacting rollers or the linear speed of the felt-band or ribbon, cannot be constant for the whole pipe's length, but they are, on the contrary, proportional, in a certain manner, to the various diameters of said pipe.

Consequently, whatever be the mechanical device adopted, the fillet-zone between two different diameters of the same pipe are always regions of least mechanical resistance and of least impermeability and the tools required are always complex and expensive.

The same may be repeated concerning the compression, simultaneous or subsequent to the shaping of the pipe, with the extra-charge that the high pressure acting, even when partially reduced or compensated with mechanical provisions, require heavy tools to avoid flexural yields.

The weight of the parts in motion and the inherent friction, cause, in general, the whole compression system to be less sensitive in its operation.

Other processes for manufacturing pipes with fibrous pastes are also known, whereby a supporting cylinder, pierced in any way with holes and eventually rotatable, covered by a filtrating tissue, is smeared with a given thickness of paste, the inside of said cylinder being subjected to a depression for draining out the water by means of vacuum from said paste applied or smeared on the filtering tissue or practised in the operation of any drum-filter. (See, for instance, "Die Asbest-Zement-Schiefer-Fabrication"—a practical handbook—by K. A. Weniger, M. Krajn editors, Berlin, 1926, from page 160 to page 164). In these processes, however, the condensing and compression of the material are limited.

The process concerned in the present invention, allows the manufacture of pipes, in general of hollow bodies of the most various shapes and dimensions, avoiding, with cheaper means, the drawbacks above stated.

The present invention is characterized by the feature that the kneaded paste, whatever be its nature, is dropped upon a vibrating table placed at a certain distance from a revolving cylinder of porous or permeable material, in the inside of which a depression may be maintained, the paste being thrown against the cylinder and compressed on it by the vibrating table itself. There follows that the angular speed of the cylinder, whereupon the paste is being applied, is dependent from the speed of the other members of the apparatus, whatever be its diameter or its diameters. The other distinguishing features of the present invention will be disclosed in the specification of the process with the help of the attached drawings, which should be intended to give purely an example of an embodiment which is liable to vary in practice in its details; without thereby exceeding the limits of the present invention.

In said drawings:

Fig. 1 shows a cross-section of the apparatus.

Fig. 2 is a plan view, and

Fig. 3 shows an example of a drum for manufacturing a pipe with socket, provided with a suction from the inside.

Fig. 4 shows an alternative for the feeding hopper.

1 is the drum over which is strewn the paste; 2 is the pipe during its formation; 3 and 3' are the trunnions of the cylinder; 4 is the vibrating table, which by way of example, is pivoted on eccentric 10 and has therefore an alternating motion in the direction A—B and B—A impressed by link 6, articulated to said vibrating table by means of pin 5 and engaging on the other end the eccentric 6 of the driving shaft 7, upon which is keyed the flywheel 9, eventually counterbalanced.

The vibrating table is articulated to the eccentric 10 fixed on shaft 11. On revolving the shaft 11, the vibrating table, fulcruming on the system 5, 6, 7 and 8 moves away from and approaches alternatively to the drum in a direction D—C or C—D.

The two sides 19 and 20, fixed on the frame 21, prevent the paste from falling-off sideways from the vibrating table; they are shaped in such a way as to graze without touching the cylinder over which the paste is applied. Hopper 12 is the charging hopper, wherein is charged the whole amount of paste for obtaining a pipe of a given size. 13 is an opening which can be closed or in any way reduced by said vibrating table when the link 6 is at top-end of its stroke.

On starting the table, the paste falls out of the hopper on the table which receives it. In Fig. 3: 1 is the drum or cylinder whereupon is applied the paste, this cylinder is porous or permeable only in the part which shall receive the paste: it

is provided with holes 13 and with a head 16 with projection 17 fixed on it. The head is pierced with a longitudinal hole 15 and with radial holes 14.

Upon the cylinder 1 is slipped-on the sleeve 18 whose outside diameter corresponds to the inside diameter of the pipe's socket. It is anyhow porous or permeable only in the part which shall receive the paste and bears against the projection 17.

The eventual water in excess filtering through the porous cylinder, gathering inside of it, discharges through openings 13, joins the water permeating through sleeve 12 and runs in the passages 14 and 15 towards the device causing the suction.

The description of the cylinder on which the paste is strewn or applied is given just as an example of embodiment, but the suction device may be replaced or completed by a device for warming or cooling or for wetting the paste with any proper liquid: it may be eventually covered with a woolen cloth or with a felt or filtering cloth, as if it should operate as a filtering drum.

The operation is as follows:

The required paste is placed in 12, after having set the vibrating table at its top-dead-centre so as to close or reduce the opening 13. The vibrating table is then set in motion and the paste flows from opening 13 towards the cylinder: at a proper moment said cylinder 1 is started rotating, eventually starting also, in its inside cavity, one or more of the above stated conditions of temperature, pressure or moisture. On rotating shaft 11, the vibrating table is gradually moved away from the pipe in formation, until all the paste has been strewn or applied upon the cylinder.

If the vibro-compression actuated by the vibrating table together with the formation of the pipe is not considered sufficient the cylinder is kept rotating and the vibrating table is kept going, approaching it in the direction C—D.

As soon as the pipe is considered finished, after the above stated operations, it is possible to go on vibro-compressing, eventually reducing the suction in the inside of cylinder 1, so as to obtain that the inside surface of the finished pipe may separate from the outside surface of the cylinder.

When the operation is ended, the cylinder 1 surrounded by the finished pipe, is taken out and the pipe slipped-off. This operation can be achieved, for instance, either by pushing the sleeve 18 towards 3' or by holding sleeve 18 and by extracting the cylinder or else by placing both in an upright position and dropping the cylinder and the sleeve so as to leave the pipe vertical.

In the practical embodiment of the process, the vibrations may be very different in nature, frequency, direction and amplitude: in the apparatus shown in Figures 1 and 2, as an example, they have the direction A—B, B—A and they are gradually damped as the drum reaches the fulcrum of the table. These vibrations may be replaced by others, whatever be the cynematic or dynamic law they are obeying and whatever be the rotation ratio between the vibrations at a certain point and those at any other point of the vibrating table.

Hopper 12 shown in Fig. 1, may be eventually replaced by a dumping hopper 12', which hopper is provided with a device keeping it in proper balance in any position (Fig. 4).

It is not necessary to drop uniformly the paste on the vibrating table for the entire length of the pipe's generatrix. The vibrating table itself provides in fact for the application of the paste where required.

By using fibrous pastes, the vibrating table, besides the functions already stated above, may be used for directing or for interlacing, or for felting the fibres in various manners according to the laws ruling the vibrations themselves.

The manufacture of the pipe may be obtained even in a single revolution of the drum, in which case the distance or the air-gap between the edge of the vibrating table and the cylinder establishes the thickness of the non-compressed pipe. In such a case the vibrating table, in proximity of the cylinder, may be made suitably concave, whereby it would follow completely the body of the cylinder for a certain space or else follows it only approximately.

The pressing down and the finishing of the ready formed piped by means of vibro-compression, may be obtained whatever be the way the paste is applied over the drum.

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