J. E. LAPPEN.

MACHINE FOR MAKING TUBES FROM FIBROUS MATERIAL.

APPLICATION FILED DEC. 30, 1911.

1,079,774.

Patented Nov. 25, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

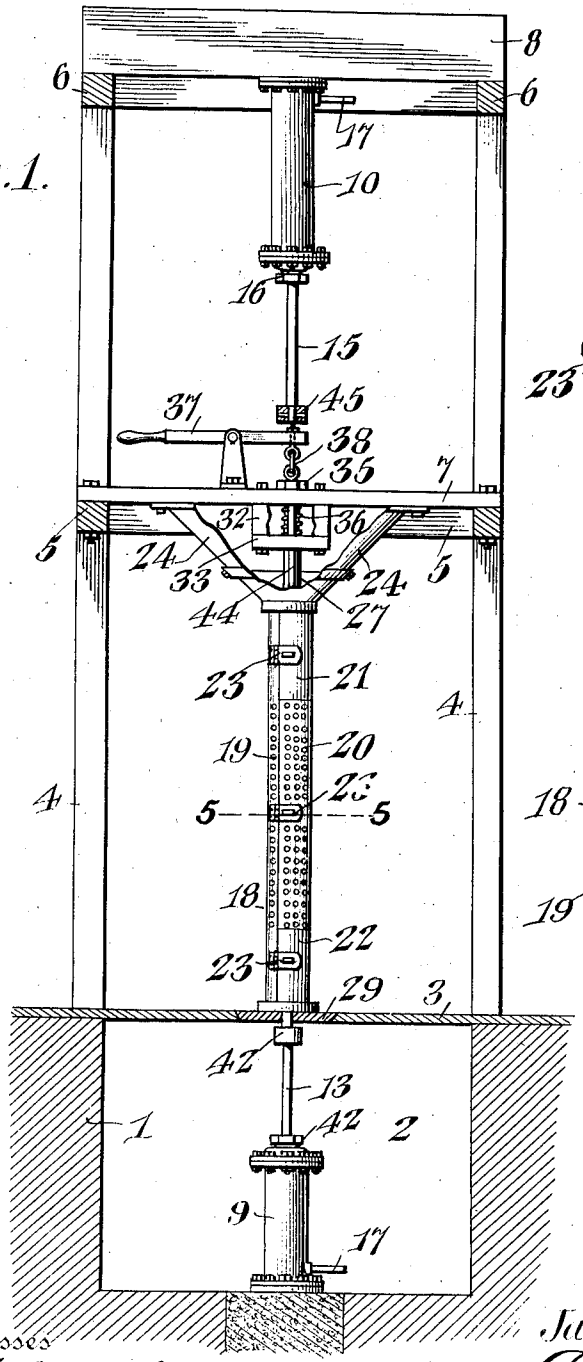


Fig. 5.

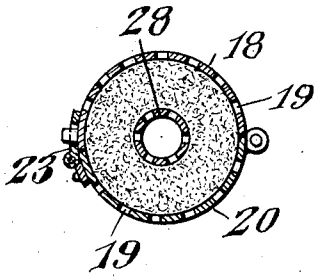
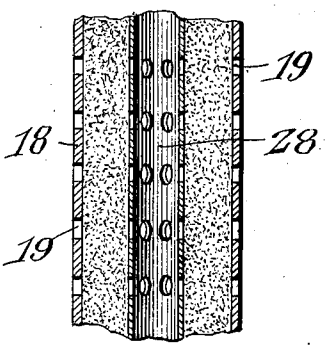


Fig. 6.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 4.

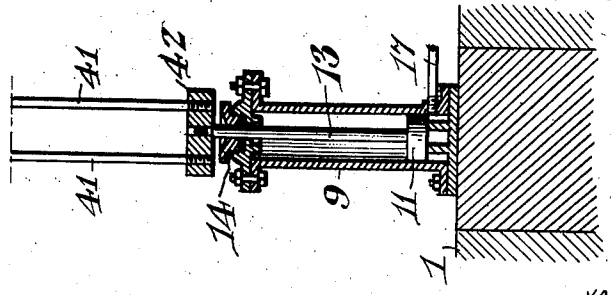


Fig. 3.

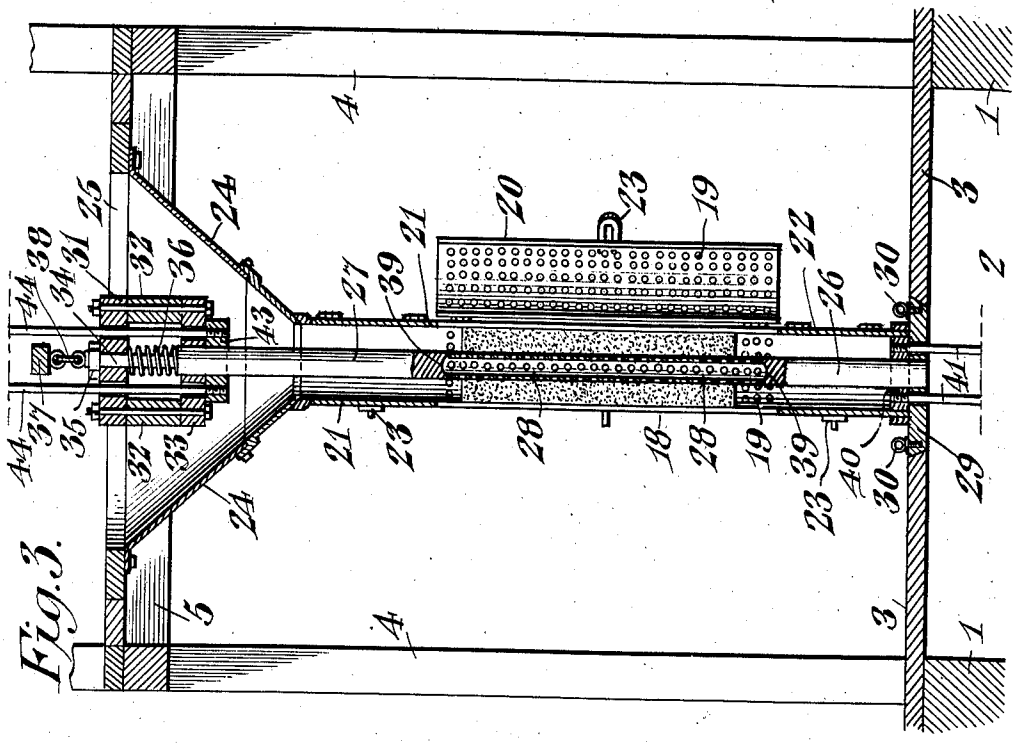
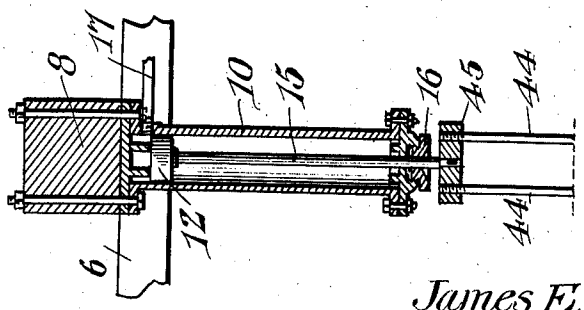


Fig. 2.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING TUBES FROM FIBROUS MATERIAL.

1,079,774. Specification of Letters Patent. Patented Nov. 25, 1913.

Application filed December 30, 1911. Serial No. 668,779.

To all whom it may concern:

Be it known that I, JAMES E. LAPPEN, a citizen of the United States, residing at Winona, in the county of Winona and State of Minnesota, have invented new and useful Machines for Making Tubes from Fibrous Material, of which the following is a specification.

The invention relates to improvements in machines for making tubes from wet fibrous material, and has for its object to provide improved means for compressing the fibrous stock into tubular shape and permitting the escape of the expressed liquid, and for the removal of the fibrous tube so formed.

The invention is particularly well adapted for forming the fibrous material commercially known as "lith" into tubes for the covering of pipes. Lith is composed of fibrous material usually including fireproof fiber and this fiber has incorporated with it a binding material and sometimes a water proofing material which may also have some binding effect. The fibrous material with the other materials added is mixed with a suitable quantity of water forming a pulpy mass which must then be pressed into the desired shape at the same time forcing out the water to an extent to leave the resultant material quite compact and nearly dry, after which the material is finally brought to the dry state.

The present invention comprises a tubular mold with a tubular core in spaced relation to the walls of the mold and plungers are arranged to enter both ends of the mold in a manner to press a mass of fibrous material introduced into the mold into a compact mass intermediate of the ends of the mold where provision is made for the escape of water both through the outer walls of the mold and through the core. When the compressed material is sufficiently compact to hold its shape the mold is opened and the compacted mass, together with a section of the core, is withdrawn from the mold, after which the core is removed and the tube of fibrous material is subjected to a drying action by any suitable means, as by a drying oven.

The invention will be best understood from a consideration of the following detailed description, taken in connection with the accompanying drawings forming a part of this specification, with the understanding that while the showing of the drawings is of a practical embodiment of the invention the latter is susceptible of other practical embodiments differing in details from the showing of the drawings, wherefore the invention is not limited to any exact conformity with the showing of the drawings but such changes and modifications may be made as do not mark a material departure from the scope of the invention.

In the drawings:—Figure 1 is an elevation with some parts in section of a press constructed in accordance with the present invention. Fig. 2 is a longitudinal section of the upper end of the press drawn on a larger scale than Fig. 1. Fig. 3 is a longitudinal section of the intermediate portion of the press on the same scale as Fig. 2. Fig. 4 is a longitudinal section of the lower portion of the press on the same scale as Figs. 2 and 3. Fig. 5 is a cross section on the line 5—5 of Fig. 1, but drawn to a larger scale. Fig. 6 is a longitudinal section through a part of the intermediate portion of the mold on the same scale as Fig. 5.

Referring to the drawings, there is shown a base or foundation 1 in which may be formed a well 2 and this well in the particular showing of the drawings is covered by a flooring 3. Rising from the foundation 1 at the margins of the well 2 is a framework consisting of uprights 4 and cross pieces 5, 6, the cross pieces 5 sustaining a flooring 7, while the cross pieces 6 sustain a beam 8. Of course, the framework will vary with installations of different sizes and, therefore, the showing of the drawings may be taken as simply typical of any suitable framework.

Within the well 2 there is disposed a cylinder 9 and carried by the beam 8 is another cylinder 10, these cylinders being in line one with the other and designed to form the actuating members of the press. In the cylinder 9 there is a piston 11 and in the cylinder 10 there is a piston 12. The piston 11 is provided with a piston rod 13 extending through a gland 14 on the head of the cylinder 9 remote from the supporting end of the cylinder. The piston 12 is provided with a piston rod 15 extending through a packing gland 16 on the head of the cylinder which is remote from the beam

8. The cylinders are entered by suitable pipes 17 by means of which fluid under pressure may be supplied to the cylinders and through which, or by any other means the cylinders may discharge the compressed fluid after it has performed its work.

Mounted on the flooring 3 is a mold cylinder 18 in line with the operating cylinders 9 and 10. This cylinder 18 is perforated as indicated at 19 and is provided with a door 20, which door need not be longer than the perforated intermediate portion of the cylinder, while separate doors 21 and 22 may be provided at the opposite ends of the mold cylinder 18, all the doors being held in the closed position by latches 23.

Since in operation the parts are customarily arranged upright, the terms of position herein used will refer to an upright structure such as disclosed in Fig. 1.

At the upper end of the mold cylinder or casing 18 there is secured a hopper 24 in turn secured at the wider end to the under side of the flooring 7 and by providing an opening 25 in the flooring 7 material may be readily introduced into the mold casing through the hopper 24.

Extending axially through the mold 18 is a core made up of end sections 26, 27 and an intermediate section 28. The core section 26 is central to the mold section containing the door 22 and may be secured to a section 29 on the flooring 3, this section 29 supporting the corresponding portion of the mold 18 and may be made removable, eyes 30 being provided for convenience of handling the floor section 29 and parts carried thereby.

Extending across the opening 25 is a beam 31 from which depend the side members 32 of a frame having a cross piece 33 carried by the side members. This cross piece is traversed by the core section 27, which may, above the cross piece 33, be reduced in diameter, as indicated at 34, and this reduced portion traverses the timber 31 being supported by a nut 35 applied to the reduced portion 34 above the timber 31. The reduced portion 34 where it joins the core section 27 forms a shoulder and this reduced portion is surrounded by a spring 36 bearing at one end against the shoulder at the junction of the reduced portion 34 and the core section 27 and at the other end against the under side of the timber 31, so that the core section 27 is normally held with the nut 35 in engagement with the upper face of the cross timber 31.

Mounted on the cross timber 31 is a manipulating lever 37 connected by a chain 38 or other suitable means to the reduced portion 34 of the core section 27 so that by a suitable manipulation of the lever 37 the core section 27 may be lifted against the action of the spring 36.

The core section 28 is a tubular member, the walls of which are perforated and at the ends this tubular member seats in appropriate sockets 39 in the corresponding ends of the respective core sections 26 and 27, the arrangement being such that on moving the section 27 in the direction of its length against the action of the spring 36 the core section 28 is readily released from its seat but the spring 36 will maintain the core section 28 with its ends in the seats of the core sections 26 and 27 during operations to be described.

Within the lower portion of the mold 18 is a plunger head 40 connected by spaced rods 41 to a cross head 42 in turn connected to the piston rod 13, the rods 41 traversing guiding passages in the floor section 29. The plunger 40 is of annular form to surround the core section 26. Surrounding the core section 27 is another annular plunger head 43 carried by rods 44 traversing the cross pieces 33 and 31 on opposite sides of the core section 27 and these rods 44 extend to a cross head 45 secured to the piston rod 15.

In the ordinary operation of the machine when the plungers are at rest and in the retracted position the plunger 40 is at the bottom of the mold casing 18, while the plunger head 43 is against the under face of the cross piece 33 and the arrangement is such that then the plunger head 43 is some distance above the upper end of the mold casing 18 where joining the hopper or funnel 24. Under the assumption that the parts are in the position just described and the doors 20, 21 and 22 are closed, a suitable quantity of wet lith pulp is introduced into the hopper 24 and gravitates into the mold casing 18 until the latter is full. Then fluid under pressure is introduced into the cylinders 9 and 10 and the pistons 11 and 12 are actuated one toward the other, the plungers 40 and 43 moving one toward the other, the plunger head 40 lifting the mass of wet pulp in the casing 18 and the plunger head 43 moving down against the mass of pulp as soon as the plunger head reaches the upper end of the cylinder 18 which it enters. As soon as the plunger head 43 enters the mold casing 18 the mass within this mold casing is subjected to pressure from both ends simultaneously, which pressure increases as the plunger heads approach, the water carried by the pulpy mass finding escape through the perforations 19 in the casing 18 and through the perforations in the core section 28 to the interior thereof. This arrangement prevents loss of efficiency in the press due to the elasticity of the material being treated since the mass is attacked from both ends at once, while the expressed water finds ready escape both from the outer and inner walls of the material being

treated. It will be observed that the cylinder 10 is longer than the cylinder 9, so that the extent of travel of the plunger 40 is less than that of the plunger 43, since the plunger 43 must be raised sufficiently above the mouth of the casing 18 to admit the inflow of pulp thereinto. A sufficient pressure is applied to the material to force out the water therein contained and compress the material to a comparatively solid mass, which, however, is still quite light and porous, the length of the mold 18 being so arranged that when the desired condition of the material under pressure has been reached the compressed tube will be of less length than the core section 28 and its ends will be within the range of the ends of the core section 28. The plungers 40 and 43 are now retracted and the door 20 is opened, exposing the pressed tube of material which is still damp and yet sufficiently cohesive to withstand handling. The lever 37 is manipulated to lift the core section 27, thus releasing the upper end of the core section 28 and the pressed tube of material may then readily be removed from the mold 18 through the opening unclosed by the open door 20. The core tube 28 may now be removed from the formed tube of lith, but since the pulpy material has to a greater or less extent penetrated the perforations in the tubular section of the core, the latter is given a twist resulting in shearing off or withdrawing to the exterior of the section 28 those fibers which have passed into or through the perforations in the core section 28, thus leaving the interior of the tube smooth and at the same time not in any manner mutilating the interior of the molded tube or interfering with the withdrawal of the core section. The withdrawn core section may now be replaced or another core section may have been placed in the mold when the operation may be repeated. After the removal of the core from the molded fibrous tube, the latter is carried to a suitable place where it may become thoroughly dried, such drying being usually hastened by the aid of heat. The liquid which is pressed out of the material and escapes through the openings in the outer casing and core may flow to a sewer connection or other suitable conduit (not shown), as it is simply waste liquid.

What is claimed is:—

1. A press for forming tubes of fibrous material comprising a mold casing, a sectional core therefor having an intermediate hollow section perforated for the escape of liquid and capable of sidewise removal from the contiguous core sections, and oppositely movable plungers working within the casing and adapted to compress the material from both ends of the casing into the intermediate portion thereof surrounding the removable section of the core, said intermediate portion of the casing being perforated for the escape of liquid and provided with a side door of sufficient length to permit the sidewise withdrawal of the compressed tube and the perforated core section together.

2. A press for forming tubes from fibrous material comprising an elongated mold casing, a core extending therethrough and having an intermediate hollow, removable section perforated for the escape of liquid and sections abutting the same, one of said abutting sections being longitudinally movable to release the perforated section, and plungers arranged to enter both ends of the casing and adapted to compress the material into the intermediate portion thereof surrounding said removable core section, said intermediate portion of the casing being perforated for the escape of liquid and provided with a gated-opening of sufficient length to permit the withdrawal of the compressed tube and the removable core section together.

3. A press for forming tubes from wet pulpy fibrous material comprising an elongated mold chamber, a core extending therethrough and provided with an intermediate removable perforated tubular section, one section of the core being longitudinally movable to release the perforated section at will and the mold being provided with a door intermediate of its length, the intermediate portion of the mold and the door being perforated, plungers movable through the mold toward the intermediate portion thereof, one plunger being permanently located in the mold and the other being movable into and out of one end thereof, a feeding hopper connected to the end of the mold into and out of which one plunger moves, and alined actuating means for the plungers.

4. A press for forming tubes from wet pulpy fibrous material comprising an elongated mold chamber, a core extending therethrough and provided with an intermediate removable perforated tubular section, one section of the core being longitudinally movable to release the perforated section at will and the mold being provided with a door intermediate of its length, the intermediate portion of the mold and the door being perforated, plungers movable through the mold toward the intermediate portion thereof, one plunger being permanently located in the mold and the other being movable into and out of one end thereof, a feeding hopper connected to the end of the mold into and out of which one plunger moves, and alined actuating means for the plungers, said alined actuating means being of different lengths to impart a greater extent of travel to the plunger moving into and out of the hopper end of the mold.

5. A press for forming tubes of fibrous material from a wet pulpy mass thereof comprising an elongated mold having an inter-

mediate perforated section and an intermediate door for access to the interior portion of the mold, plungers movable lengthwise of the mold from the ends toward the center portion thereof simultaneously, and a core for the mold comprising socketed end sections and an intermediate perforated tubular portion adapted to engage in the sockets in the end portions, one end portion of the core having a normal tendency toward the other end portion of the core and provided with manipulating means for moving it against its normal tendency to release the intermediate portion of the core from engagement therewith.

6. A press for forming fibrous tubes comprising an elongated molding chamber having a core with a removable hollow section in the intermediate portion thereof and located intermediately of the chamber, the removable portion of the core and the intermediate portion of the molding chamber being perforated.

7. A press for forming fibrous tubes comprising an elongated molding chamber having an intermediate portion provided with means for the escape of liquid therefrom through its walls, a hollow removable core for the intermediate portion of the molding chamber having means for the escape of liquid through its walls to the interior of the core, and plungers arranged to enter both ends of the chamber and move toward the central portion thereof.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JAMES E. LAPPEN.

Witnesses:
OSCAR H. NICLAI,
R. T. SCHNEIDER.