Nov. 7, 1944. J. FERLA 2,361,933

COMPRESSION APPARATUS FOR PRODUCING PIPES

Filed Nov. 20, 1940 2 Sheets-Sheet 1

Fig. 1.

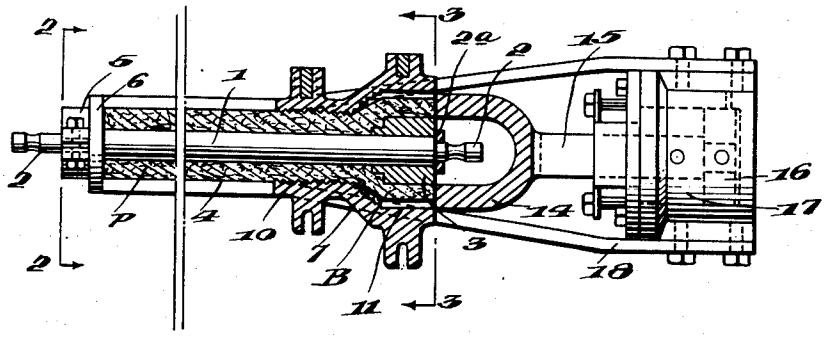


Fig. 2.

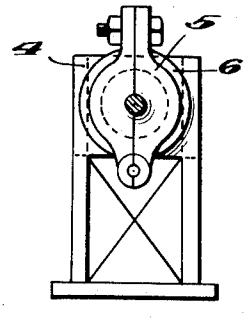
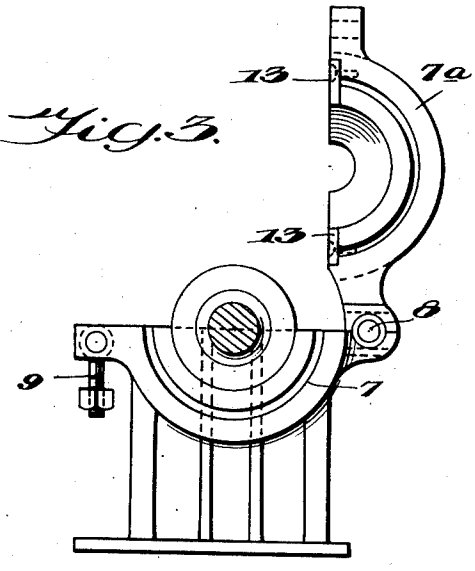


Fig. 3.



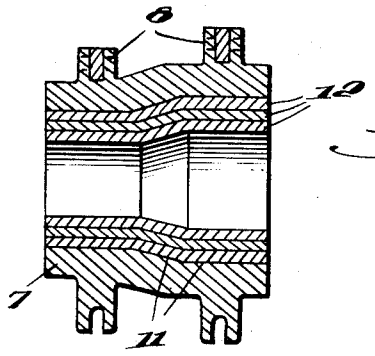


Fig. 4.

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Fig. 5a.

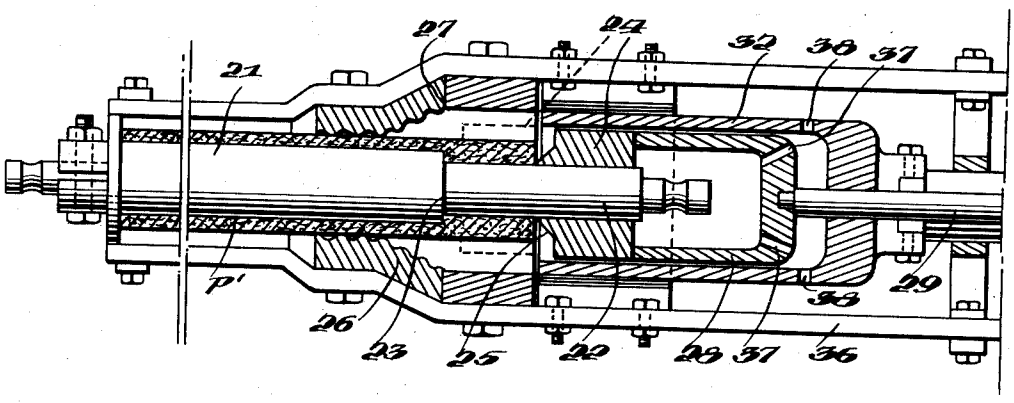


Fig. 5b.

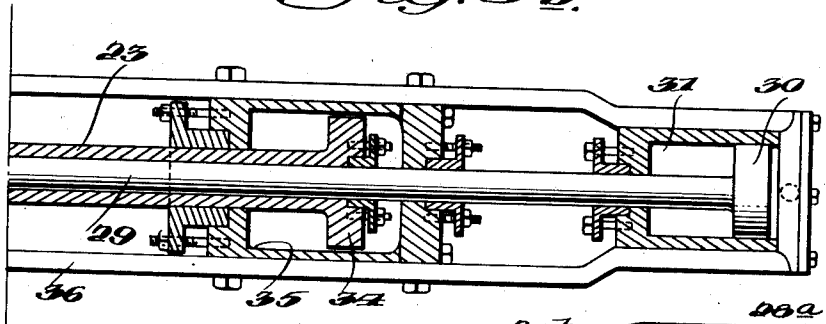
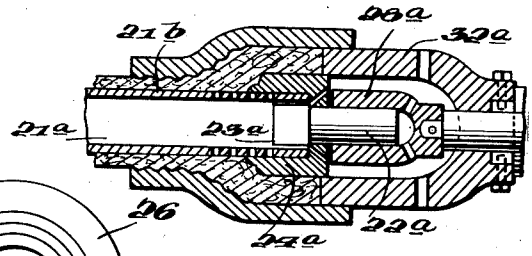


Fig. 6.



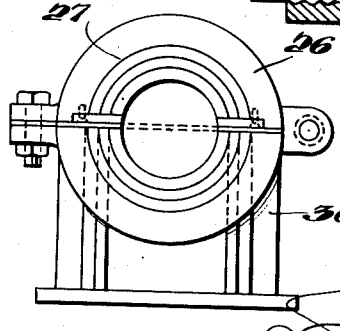


Fig. 7.

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UNITED STATES PATENT OFFICE

2,361,933

COMPRESSION APPARATUS FOR PRODUCING PIPE

John Ferla, Camden, N. J.

Application November 20, 1940, Serial No. 366,480

1 Claim. (Cl. 25—30)

This invention relates to an improvement in apparatus for producing pipe, and more particularly to the production of pipes formed with a bell collar thereon, of asbestos cement, or like composition or moldable material.

In the manufacture of pipes from asbestos cement material, it is desirable, and frequently required, that the bell collar of the pipe be constructed to withstand greater pressure than the barrel of the pipe.

The object of this invention is to improve the method and apparatus of forming pipes from asbestos cement material or other compositions suitable for the pipes, by the construction of a bell collar on the pipe of appreciably greater thickness than the thickness of the barrel thereof.

This is accomplished preferably by applying an expanding action axially of the pipe on the bell collar thereof before the material of the collar sets, either with or without the addition of like or suitable material to the bell collar portion, sufficient to shape and mold the collar suitably and to form it of greater thickness than the thickness of the barrel of the pipe. This may be carried out either by initially forming a bell collar on the pipe of the same thickness as the wall of the barrel and then applying a compressing action thereto sufficient to reshape it to a greater wall thickness, or by forming the pipe without a bell collar and then expanding an end portion thereof while yet moldable to form the bell of the proper thickness greater than the wall of the barrel.

Apparatus suitable for the performance of the method is illustrated in different embodiments thereof in the accompanying drawings, in which:

Fig. 1 is a longitudinal sectional view through one form of compression apparatus adapted to shape a molded or formed pipe with a thick bell collar;

Fig. 2 is an end elevation thereof partly in section, taken on the line 2—2 of Fig. 1;

Fig. 3 is a similar view of the opposite end of the molding apparatus taken on the line 3—3 of Fig. 1;

Fig. 4 is a longitudinal sectional view through the molding casing with liners in place therein;

Fig. 5*a* is a longitudinal sectional view through a modified form of molding structure;

Fig. 5*b* is a similar view through the power unit therefor;

Fig. 6 is an end elevation of the molding casing thereof; and

Fig. 7 is a sectional view through a further modified form.

Referring to Fig. 1, the pre-formed pipe may be molded in any suitable manner, such as by the system shown in my prior patent, No. 2,200,267, granted May 14, 1940, or in my prior applications on Apparatus for producing pipes, Ser. No. 247,507, filed December 23, 1938, or Machine for producing pipes, Ser. No. 284,987, filed July 17, 1939. When thus formed, the pipe is constructed of asbestos cement material or other suitable molding or composition material, and is formed with an elongated barrel designated P, and a bell collar on one end portion thereof, designated B. Before the material has set or hardened, it is desired to expand the collar and to remold it into a shape and size whereby it will be constructed of greater wall thickness than the barrel P. For this purpose, the formed pipe is formed and supported on an elongated mandrel 1, having axial trunnions 2 on opposite ends thereof, with a metal collar 3, mounted on the mandrel but within the formed bell B.

The apparatus for reshaping the bell B, as illustrated in Figs. 1 to 4, includes a cradle 4, adapted to receive and support the barrel P, on which is mounted a clamp 5 at one end thereof receiving and holding one of the trunnions 2, and forming an abutment for the pipe. A flange 6 surrounds the trunnion 2, between the clamp 5 and the adjacent end of the pipe barrel P to form an abutment therefor.

At the opposite end of the cradle 4 is mounted a molding casing 7, having a cover portion 7*a* hinged to the base portion thereof at 8 to provide for the opening and closing of said casing, with an eye-bolt 9, provided to connect the parts thereof together under pressure. The casing 7 has a reduced end portion 10 of a size substantially to receive and fit the periphery of the formed pipe barrel P, and preferably is corrugated or internally grooved to prevent the extruding of material therefrom. At its opposite end, the casing 7 has an enlarged bell cavity 11, preferably formed of a size corresponding substantially with the desired size of the periphery of the bell to be formed on the pipe. However, this may be varied as desired by the use of one or more liners designated 12 in Fig. 4, which are removably inserted into the molding casing 7, being constructed of semi-circular sections corresponding with the sections of the molding casing, and where used, such liner sections may be secured in place in the molding casing cover 7*a*, by removable clamps 13, as shown in Fig. 3.

Arranged in axial alignment with the cavity 11 is a dome-shaped plunger 14 of a size adapted to fit substantially between the collar 3 and the inner wall of the cavity 11 or the interior of the liner or liners 12 inserted therein to apply pressure to the molding material in said cavity for molding it to the desired shape and thickness. For this purpose, the plunger 14 is attached to a connecting rod 15, extending to a piston 16 in a cylinder 17 of a hydraulic power device adapted to be supplied with hydraulic fluid under pressure sufficient to operate the plunger 14. The cylinder

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17 is shown as connected by a frame 18 with the molding casing 7 and cradle.

In reforming the bell collar to provide a greater thickness than the barrel P, the pre-formed pipe on the mandrel 1 is placed in the cradle 4, the collar 3 being held in place during compression by a clamping ring 2a on the adjacent trunnion 2; one end of the mandrel being in the clamp 5, and with the pre-formed bell B in the enlarged cavity 11 of the molding casing 7, where it is centered by the reduced end portion 10 of said casing. When the cover section 7a thereof is closed and clamped in a closed position, the pre-formed bell B will be disposed in spaced relation from the wall of the cavity 11 sufficiently for an expanding action to the desired extent. A specially treated material of a strength equal to that of the pre-formed bell and barrel of the pipe, may be placed around the exterior of the bell B, within the cavity 11 and sufficient moisture added to make it set and to mold the barrel of the required wall thickness, or the pre-formed bell may be made of greater length than required to allow for the compression of this excess length to form a solid mass between the casing and the mandrel, reshaping the bell before it sets.

When thus prepared, the plunger 14 is brought against the end of the pre-formed bell B in the cavity 11 before the material thereof has set, and hydraulic pressure applied to the piston 16 at the outer end thereof sufficient to force the plunger 14 against the bell B with or without the additional material mentioned, to expand and mold the material to fit and fill the cavity 11, reshaping the bell to the desired wall thickness. This should be done before the material of the formed pipe has set to allow for such reworking of the material thereof, and after being thus reformed, the pipe on the mandrel 1 may be removed from the structure and finished and dried in the usual way.

Another form of apparatus for molding the bell under pressure is shown in Figs. 5a—5b, in which a pipe P' is shown as formed on a mandrel 21, but in which a bell collar is not formed thereon, such a pipe being constructed in a manner as represented in Mazza patents, Nos. 1,786,215 and 1,984,073, in Rocca patents, Nos. 2,022,009 and 2,113,096, Reid, No. 2,177,810, or Rembert, No. 2,182,353. In this form, the mandrel 21 has an elongated reduced end portion 22 with a shoulder 23 between the body of the mandrel and the reduced end portion. A collar 24 is slidably mounted on the reduced end portion 22 of the mandrel, which collar has a tapering end 25 formed thereon.

The pressure casing is shown at 26 having an enlarged cavity 27 therein adapted to shape and form the bell of the pipe, which cavity may be provided with lining sections corresponding with those designated 12 in Fig. 4, if desired, for varying the outside diameter of the formed bell.

A hollow plunger 28 surrounds an end of the mandrel 21 and is of a size to bear against the end of the collar 24 to apply pressure thereto for forcing the collar into the end of the pipe. The plunger 28 has a connecting rod 29 extending therefrom to a piston 30 in a cylinder 31.

An enlarged plunger 32 is telescoped over the plunger 28 and has a tubular connecting rod 33 extending therefrom to a piston 34 in a cylinder 35, through which piston and connecting rod 33 the connecting rod 29 extends. The parts are joined together by a frame 36.

The manner of using this form of compressor device for forming the bell collar of the desired thickness, will be obvious. After the pipe P' is formed in the manner described, and before the material thereof has set, it is placed in the cradle and casing 26 on the mandrel 21, with the collar 24 in alignment with the adjacent end of the formed pipe. Additional material of the same or suitable character as the pipe, may be placed in the cavity 27 of the desired quantity according to the size and thickness desired for the collar.

After the casing 26 is closed, hydraulic pressure is applied to the piston 30 to force the plunger 28 to the left in the drawings, which drives the collar 24 into the end of the pipe P', expanding said end in the cavity 27 until the collar 24 is stopped by engagement with the shoulder 23 on the mandrel, substantially as indicated in dotted lines in Fig. 5a. Thereafter, the hydraulic pressure is applied to the piston 34 to force the plunger 32 inward which imparts pressure to the expanded bell of the pipe to cause it to fill and to conform to the shape of the cavity 27. The pressure applied to both of the pistons 30 and 34 should be the same to hold these against creeping during the molding operation.

After thus shaping the bell, the plungers are withdrawn and the pipe is removed from the molding casing to a calender for finishing and drying, after which the mandrel may be removed therefrom in the usual way.

In this way, the bell may be shaped with the desired wall thickness, preferably twice the thickness of the barrel of the pipe to furnish the added strength needed therein.

The hollow plungers 28 and 32 are vented, preferably, at 37 and 38, respectively, for the discharge of air and liquid therefrom when moved to closed positions, as shown in Fig. 5a.

Fig. 7 shows a further modification in which the mandrel 21a has a perforated sleeve 21b thereon which extends beyond the end 23a of the body portion of the mandrel, while the reduced mandrel portion 22b projects through said sleeve 21b and slidably receives thereon the collar 24a. Then when the hollow plungers 28a and 32a are forced inward, as shown, the moisture in the pipe-forming material is caused to be expressed through the perforations in the sleeve 21b and in the collar 24a for discharge.

I claim:

Apparatus for forming a pipe comprising a mandrel adapted to support a formed tube of asbestos cementitious material, a molding casing surrounding an end portion of the mandrel with a cavity spaced therefrom to form a bell collar on the formed tube and having a reduced portion in position to surround the formed tube adjacent an end thereof to confine the same, a sleeve slidably mounted on the mandrel for movement lengthwise thereof and constructed for entering and expanding said end portion of the tube, a plunger in position to bear against the sleeve to move the same lengthwise of the mandrel, a second plunger surrounding the first-mentioned plunger in position to bear against the expanded portion of the pipe to mold the same in the casing, and hydraulic power means connected with the plungers.

JOHN FERLA.