J. G. ZWICKER.

MOLD FOR MANUFACTURING CEMENT PIPE.

APPLICATION FILED JULY 9, 1910. RENEWED NOV. 10, 1913.

**1,160,235.** Patented Nov. 16, 1915.

FIG. 1.

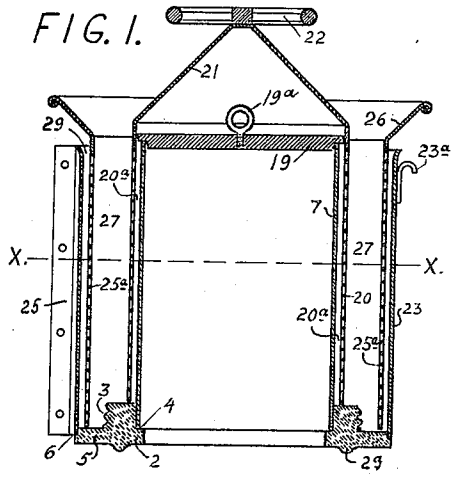
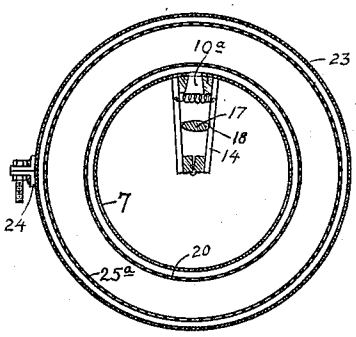



FIG. 2.



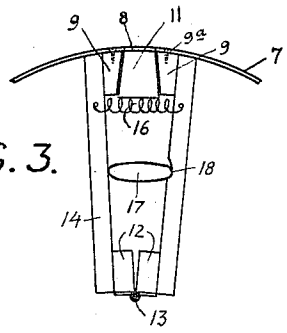




FIG. 3.

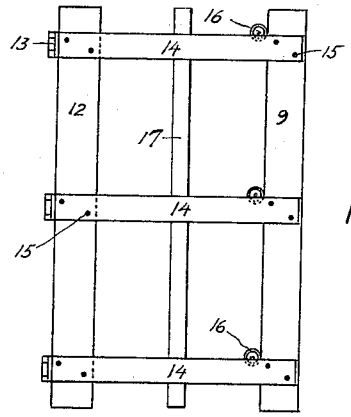
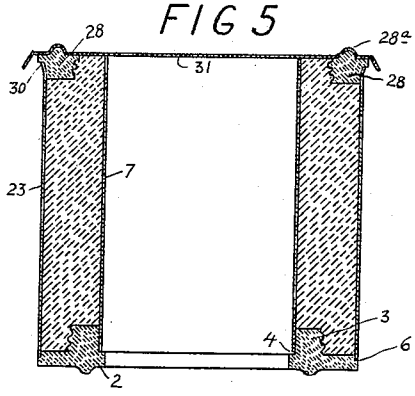



FIG. 4.

FIG 5



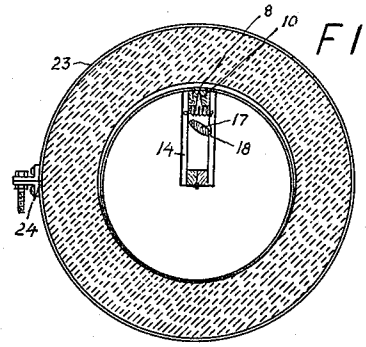




FIG. 6.

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# UNITED STATES PATENT OFFICE.

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## MOLD FOR MANUFACTURING CEMENT PIPE.

1,160,235. Specification of Letters Patent. Patented Nov. 16, 1915.

Application filed July 9, 1910, Serial No. 571,231. Renewed November 10, 1913. Serial No. 800,229.

*To all whom it may concern:*

Be it known that I, JULIUS GOTLOB ZWICKER, citizen of the United States, residing at the city of Mexico, Mexico, have invented certain new and useful Improvements in Molds for Manufacturing Cement Pipe, of which the following is a specification.

My invention relates to a mold for forming pipes of cement, concrete or similar material which may be poured into the mold in a plastic state and becomes hard and tenacious when dry, which pipes are threaded at both ends, being similar to the pipes with threaded ends covered by my application Serial No. 522,442, filed October 13, 1909, but differing from these in that their inner and outer surfaces are made smooth and of a very close grained texture somewhat resembling glazed earthen ware pipes. These surfaces being made of pure cement which incases the concrete shell of the pipe proper necessarily require an adaptation of the mold to the introduction therein of two separate materials; hence require a double-walled mold. Pipes thus lined within and without with a compact, homogeneous material forming a smooth surface, offer many advantages compared to those having asperities, and pores or intersticial recesses on their inner and outer walls. For the interior the reduction in frictional resistance to the passage of liquids is an improvement apparent to the layman. In addition to this when rough-lined pipe are used for sewers or drainage out falls, much of the entrained solid material lodges in the recesses and crannies, small though they be, or against the internally projecting asperities, where they form nuclei for and give foothold to constantly increasing deposits which are sure to materially reduce the effective area of passage while correspondingly increasing the frictional resistance. As to the outer surface a smooth, compact facing prolongs the life, improves the appearance and in many cases facilitates the handling of such conduits.

To obtain these results I use a double-walled mold, represented in the accompanying drawings; in which:

Figure 1, is a vertical diametrical section of the mold as it appears when ready for pouring in the conrcete; Fig. 2, a horizontal section of Fig. 1 taken on line X—X, showing the restoring and collapsing device for inner shell in top plan view; Fig. 3, a detail showing in top plan view the device for restoring and collapsing inner shell of mold; Fig. 4, a side elevation of restoring and collapsing frame; Fig. 5, a vertical diametrical section of the main mold, or mold proper filled with cement-lined concrete, the auxiliary or surfacing shells having been withdrawn, and the pipe covered to protect it while becoming hard, and Fig. 6 is a horizontal section of the mold filled with concrete partly set, showing the inner shell after collapsing.

As a foundation or support I prefer the ground or the floor of the molding yard. On this the base-ring 2 is laid the annular bead $2^a$ sinking into the ground. This ring is virtually a modification of the female matrix described in my United States application Serial No. 522,441, filed October 13, 1909, being made of plaster of Paris as before. The matrix or thread-forming part proper 3, projects upwardly from the base-ring part proper, which extends inwardly for a short distance, forming an annular ledge 4, and outwardly for a greater distance, forming the ledge or flange 5, the outer face of which has an off-set or jog making annular ledge 6. Shell 7, made of thin sheet metal slit vertically at 8, is next set upon ledge 4. A batten 9 extending the full height of shell 7, is secured to the inside of each side of the slit 8, by screws or nails $9^a$, the meeting sides of said battens being chamfered so that when they come together they will form a prism of wedge-shaped horizontal section 10, the base of which is on the inside and when spread apart, a prism having a rhomboidal section $10^a$. These two battens form the front or outer vertical members of a pair of equal frames, extending inwardly as far as the center of the inner shell where their rear upright members 12 are connected by a plurality of hinges 13 (in this case three), equally distributed along the height of the frame. Horizontal cross-strips 14 connect the uprights of the frames, being secured to their outer faces by screws or nails 15.

In the angle between the upper edge of each cross-strip and the rear edge of the upright, a spiral spring 16, the ends of which engage staples or screws in said upper edge tends to keep the frames together. A vertical cam-bar 17, preferably of wood,

having an elliptical cross-section is adapted to engage with one of the short curves of the ellipse, a row of vertical cam-kerbs 18 of curved section, provided in the inner face or side of each cross-strip 14 of one of the frames. As the major diameter of said ellipse is longer than the distance between the bottoms of two opposite slots 18, turning the cam-bar to bring its free short curve to bear against the smooth faces of the opposite cross-strips the short curve working in the set of kerbs as bearings or pivots, will cause the two frames to open out, at their free outer ends, as shown in Fig. 3. Fig. 6 shows the position of the cam-bar after it has been turned out of the restoring position. From this it will be seen that upon turning it toward the diameter of the shell parallel to its major axis the short curve presses against the straight inner faces of the cross-strips, forcing the jaws apart. When the jaws are opened the battens 9 carry with them the edge of the slit in shell 7, the width of opening of the jaws being such that the shell is restored to its true geometrical figure, when a vertical distance-batten 11 of rhomboidal section is inserted in the opening of the same section, now formed between the inner sides of battens 9, 9. To the shorter or outer face of the distance-batten a curved strip of sheet iron is secured which just completes the figure of the inner shell 7. The distance-batten is kept in position by bearing against the sides of the three springs 16. In expanding this shell the bottom part is pressed tightly against the inner face of matrix 3, whereby it is securely held in place; which is important as in withdrawing the auxiliary or inner surfacing shell, it will tend to pull the main inner shell with it.

A turned disk 19, having an eye-bolt 19ª for handling it, is pressed into the mouth of shell 7, the lower part of its edges flaring upward as far as a jog or offset which rests on the upper edge of shell 7, the upper part of the disk extending outward for a quarter of an inch or thereabout, to keep the auxiliary shell at the proper distance from the inner shell, while the inner part of the jog keeps the mouth of shell 7 extended to its full or exact diameter.

Auxiliary or surfacing shell 20 is a cylindrical bell, about one quarter inch greater in diameter than the inner shell 7. The cylinder is perforated throughout its height with small holes pitched closely together. A hollow cone 21 crowns the cylinder 20 and supports at its apex hand-wheel 22. This surfacing cone is slipped over the outside of shell 7, forming a cylindrical space 20ª about one quarter inch wide between the mold-shell proper and the surfacing shell, which latter rests on the top of matrix 3. Into this space a cement paste is forced through the perforations, being pressed against the holes with a trowel, until said space is completely filled.

The outer shell 23, is a cylindrical shell concentric with shell 7, having a vertical slit 24, on each side of which a vertical angle iron 25 is riveted to the outside of the shell, provided with bolts and nuts to enable the two parts of the shell to be drawn together. This is set upon the ledge 6 formed in base-ring 2, and is then drawn together against the vertical edge of flange or ledge 6, which edge has the true diameter of the inside of shell 23. An outer surfacing shell 25ª, having perforated, cylindrical walls, concentric with and fitting tightly against the inside of shell 23, is pushed down into the latter, until it rests on flange or ledge 5 of the base-ring. At the top of its cylindrical portion shell 25ª flares outward in the form of a conical funnel 26, of unperforated sheet iron, which guides the concrete that is next introduced, into the space 27 between the outer and inner surfacing shells, filling it to within a short distance from the top. While the concrete is still plastic, inner surfacing shell 20 is turned back and forth on its axis by hand-wheel 22, this oscillatory movement being continued while the shell is being drawn upward, allowing the cement paste that was in space 20ª to unite with the concrete, forming one body therewith. This provides the inner surface of the pipe with a compact, smooth lining of pure cement. Now outer surfacing shell 25ª is withdrawn in the same way as was the inner one, the beaded rim of funnel 26 serving as a hand hold for pulling upward and turning the strainer-like shell to and fro. In this operation, owing to the tight fit between the two cylindrical walls, and the oscillatory movement, a sufficient quantity of cement will be drawn from the concrete to the surface to cause the outer layer of the finished pipe to be practically pure cement. At the same time the bubbles of air which form on the inner surface of the outer shell are burst, the air being drawn out with the shell. From the combined effects a smooth, close-grained outer surface results, made of a homogeneous material—a result which thus far has never been attained with pipes made of concrete. Next the male matrix 28 is inserted, the flaring mouth 29 of the outer shell facilitating its introduction. This matrix, made of plaster of Paris, differs from the one of my previously mentioned application Serial No. 522,441 only in having its upper portion made of an increased diameter forming a ledge 30, which rests on top of the outer shell, and prevents the matrix from sinking into the soft concrete, whereby the threads would come into the wrong place. The mouth of the outer shell is now

drawn tightly against the matrix. Disk 19 is removed and the surplus concrete is stricken level with the top of the mold, which is then covered with a flat sheet iron plate 31, having its edges bent down to allow the plate to fit snugly over the mold, in order to protect it against the weather. An annular recess is provided in this plate to take in the upwardly projecting annular bead $28^a$, the purpose of which is fully explained in the applicaton above referred to. When the concrete has become sufficiently hard to allow the inner shell 7 to be withdrawn, which will be after about 12 hours, plate 31 is removed, the distance-batten 11 is pulled out, cam-bar 17 is turned to the position shown in Fig. 6, allowing the two frames or jaws of the restoring and collapsing device to be drawn together by the springs, carrying with them the sides of the slitted cylinder wall. This enables the inner shell to be readily withdrawn. Plate 31 is now again put on, and the concrete pipe with its cement lining allowed to set, which will take from six to eight days. Then the cap or plate 31 is lifted off, the nuts of the bolts holding together the angle-irons on each side of slit 24 are unscrewed, and the sides of the shell sprung apart sufficiently to allow it to be lifted off, by handles $23^a$ secured to the outside of the shell near its top.

Having thus described my invention what I claim as new is the following:

1. In a mold for making plastic articles, a main shell, and a perforated surfacing shell removably disposed within said main shell.

2. A mold for making plastic pipes comprising inner and outer concentric shells, and two perforated surfacing shells, one fitting near the inner main shell and one fitting near the outer main shell.

3. A mold for making plastic pipes comprising inner and outer concentric shells, two perforated surfacing shells, one fitting near the inner main shell and one fitting near the outer main shell, and means carried by said surfacing shells for feeding cement into the mold.

In testimony whereof I affix my signature in presence of two witnesses.

JULIUS G. ZWICKER.

Witnesses:
G. A. GUENA,
EDWARDO ROMERO.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."