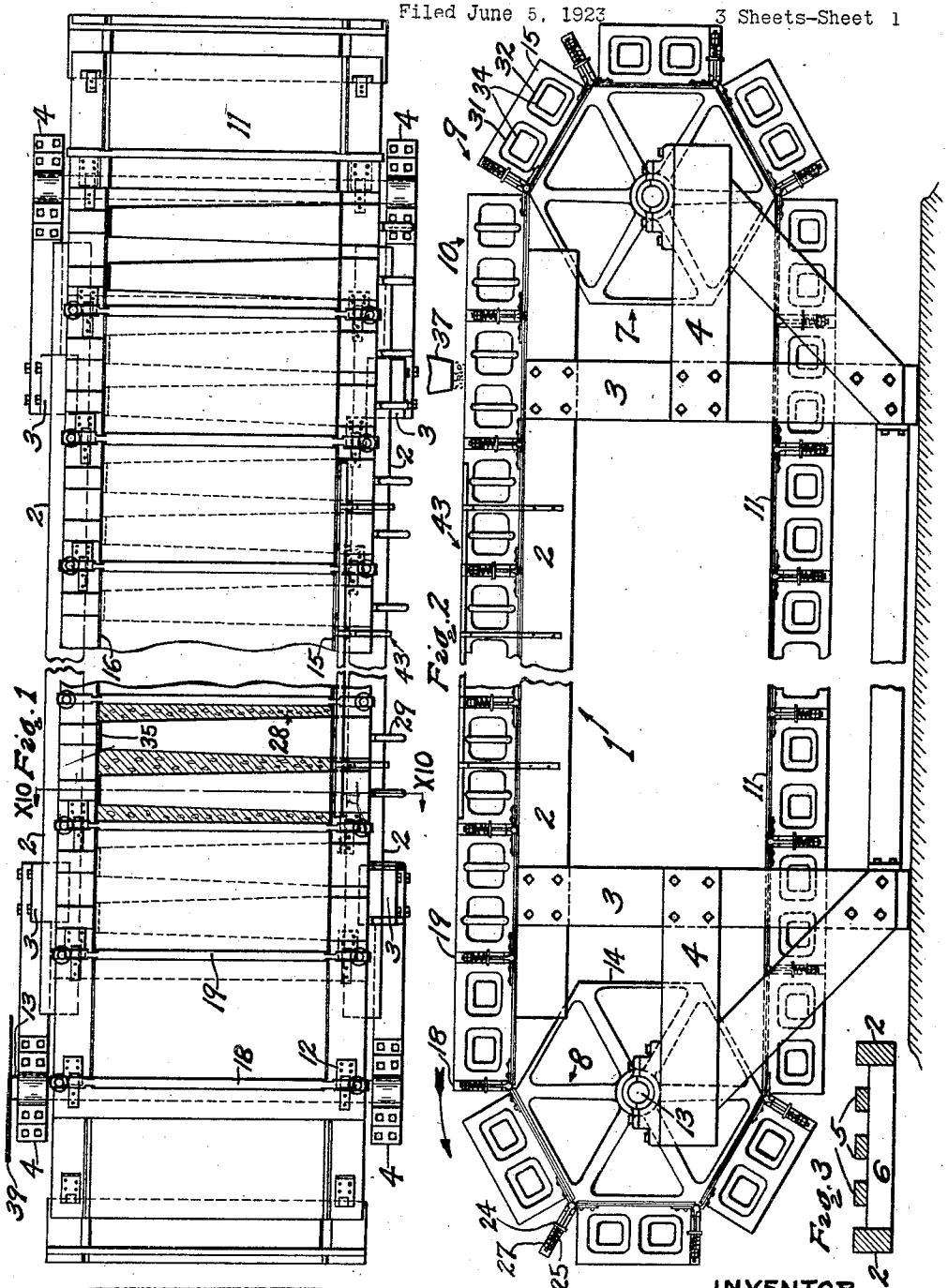
June 9, 1925. 1,541,206

A. J. BRUCE

HOLLOW TILE MACHINE

Filed June 5, 1923 3 Sheets-Sheet 1



INVENTOR
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WITNESS:
J. A. McDowell

June 9, 1925. 1,541,206

A. J. BRUCE

HOLLOW TILE MACHINE

Filed June 5, 1923 3 Sheets-Sheet 2

Fig. 4

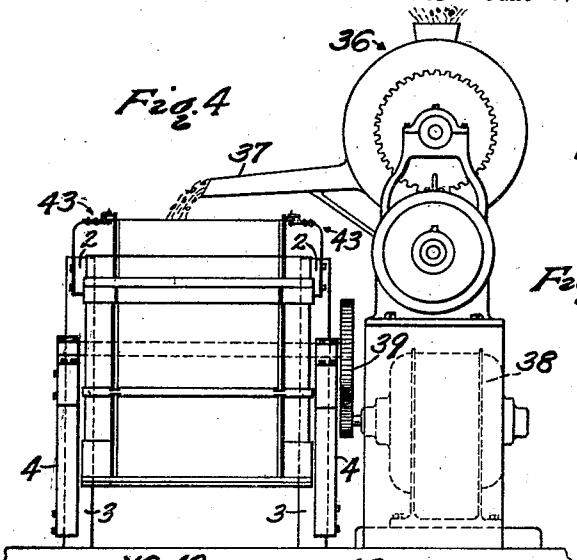


Fig. 5

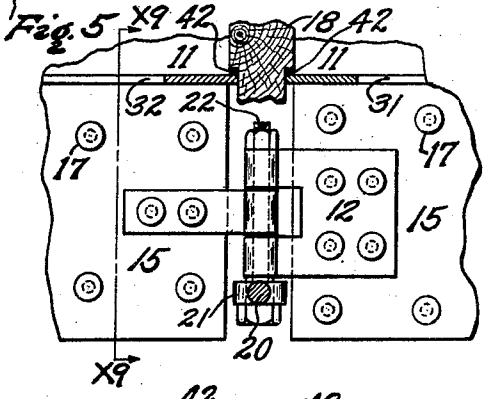


Fig. 6

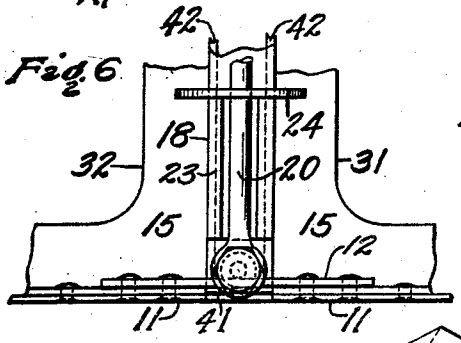


Fig. 7

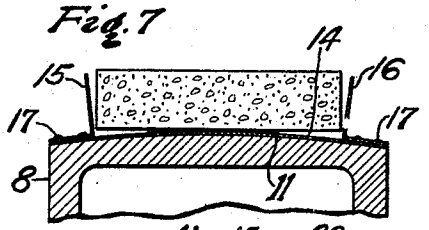


Fig. 8

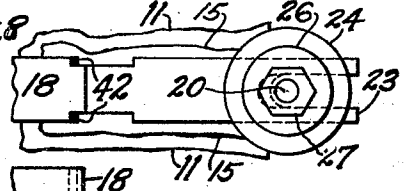


Fig. 9

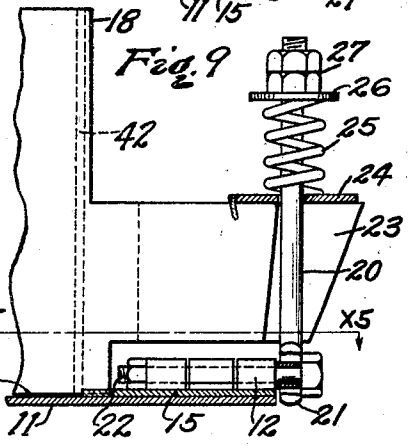


Fig. 10

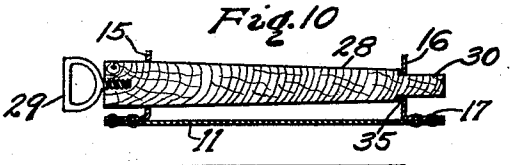


Fig. 11

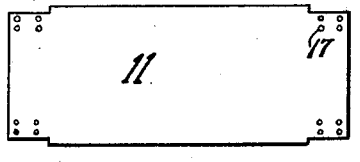


Fig. 12

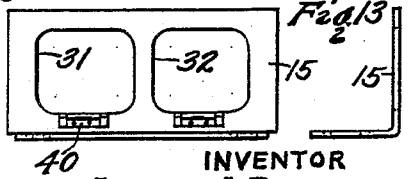


Fig. 13

Fig. 14

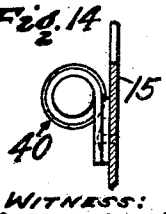
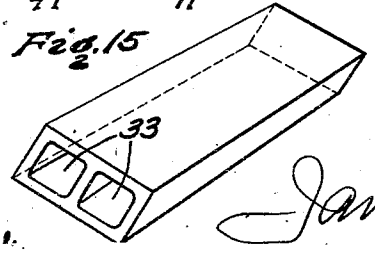


Fig. 15



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HOLLOW TILE MACHINE

Filed June 5, 1923 3 Sheets-Sheet 3

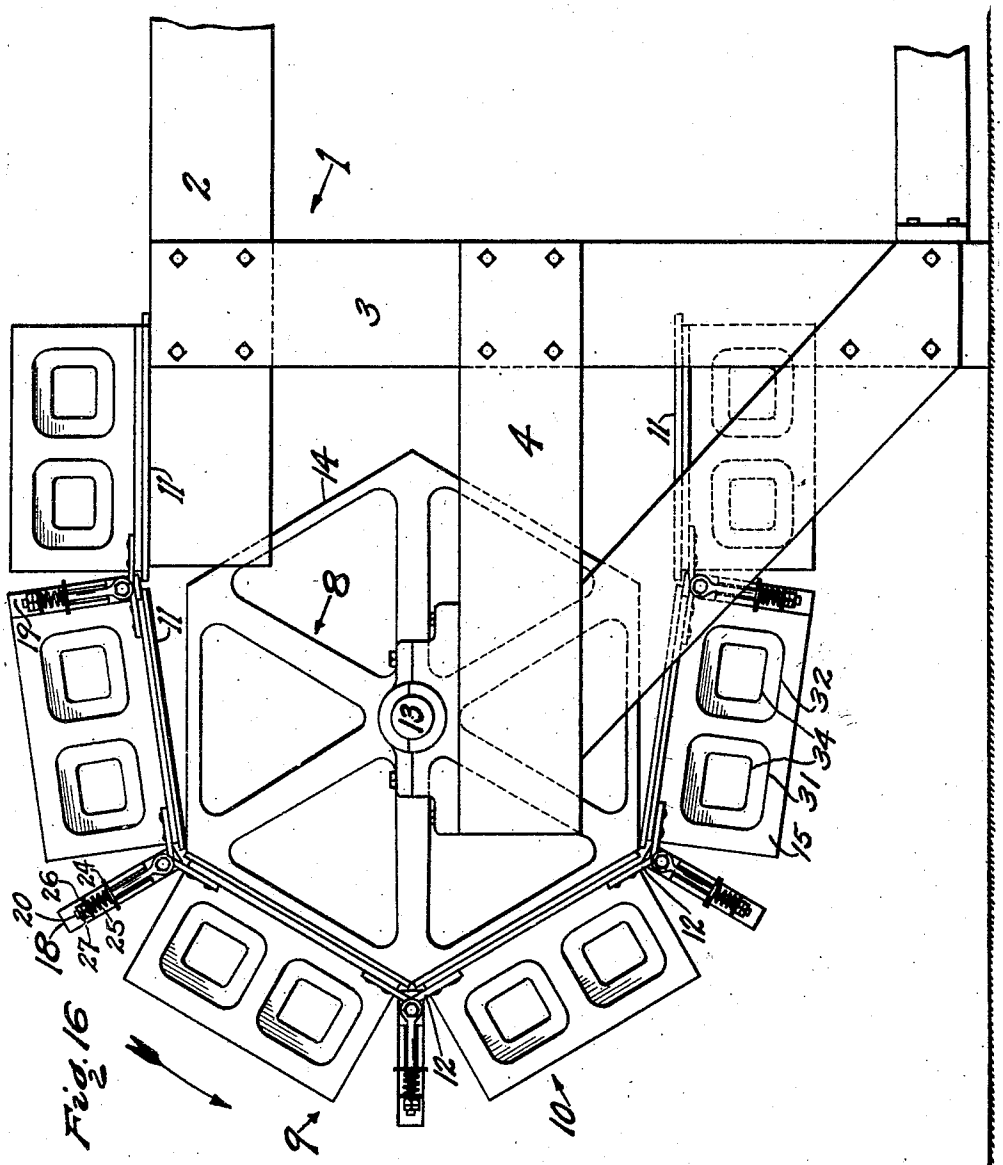


Fig. 16

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Patented June 9, 1925. 1,541,206

UNITED STATES PATENT OFFICE.

ARTHUR J. BRUCE, OF HOLLYWOOD, CALIFORNIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO NATIONAL GYPSUM PRODUCTS COMPANY, A CORPORATION OF CALIFORNIA.

HOLLOW-TILE MACHINE.

Application filed June 5, 1923. Serial No. 643,532.

To all whom it may concern:

Be it known that I, ARTHUR J. BRUCE, a citizen of the United States, residing at Hollywood, in the county of Los Angeles and State of California, have invented a new and useful Hollow-Tile Machine, of which the following is a specification.

An object of this invention is to provide a machine into which a casting plaster, cement or the like may be poured and there be automatically molded to form hollow tiles and building blocks, which will be hardened therein and discharged therefrom with but little attention upon the part of the operator; and the invention is broadly new, basic, pioneer and primary in that I provide a travelling system of automatic assembling, molding, releasing, expelling and re-assembling molds adapted to mold blocks, and have arranged said molds to receive removable and replaceable cores by which they are adapted for casting the blocks in hollow form.

In this invention I adapt the molds to be connected to form a belt and I so connect such molds and train the resulting belt over angular faced pulleys; and I provide the molds with flexible bottoms and train them over pulleys having means to bow the bottoms out, and to swing the walls of the mold away from the hardened molded block, so that such block will be automatically released from its mold, and whereby the molded product will be discharged after the hardening has been effected.

A feature of the invention resides in hinging together molds with flexible bottoms and causing the molds at the discharge end of the machine to pass over an angular pulley, the faces of which are crowned from side to side of the machine, so that the bottom of the mold will be bent as it passes the pulley to free the hardened tile from the surface upon which it is molded.

Another feature resides in the provision of molds having end walls provided with openings to receive detachable cores thrust in from the side of the machine to complete the mold and then withdrawn to allow the molded block to be thrown out.

An object is to rapidly and cheaply make gypsum hollow blocks to the standard size required for houses and other buildings, and to cut down the cost of labor and increase the output of tile blocks.

Another feature of this invention is the novel hinge and lock on each mold which holds the molds in position and eases the mold while it is going over the pulleys.

An object is to make it practicable to make blocks right in the building where they are to be used thus to save in transportation.

Another feature of the invention resides in the elimination of all roller means for supporting the molds and in the provision of rails that present a smooth surface over which the molds are moved. By my novel construction and arrangement of parts the sliding of the molds over the rails automatically cleans the rails and leaves a smooth surface so that the molds are not vibrated during the entire setting of the block which may be made of gypsum.

In making gypsum blocks a high power microscope discloses that small crystals shoot out from the mass during the setting period and if the block is vibrated during the setting period, as for example, by running the mold over an uneven surface, such crystals will be broken off and the surface of the block will be materially weakened. With tile machines heretofore known the molds have been supported by rollers which run on tracks, and the casting plaster will accumulate on the tracks and solidify, and the molds will then be vibrated due to the rollers running over the track and plaster which presents an uneven surface.

An advantage is that by fixing the ends to the bottom of the mold the number of movable parts is reduced thereby reducing wear and manufacture cost.

Another advantage is that by flexing the large area of contact of the mold, in this instance the bottom of the mold, away from the block, the block is easily released from the mold.

Other objects, advantages and features of invention may appear from the accompanying drawings, the subjoined detail description and the appended claims.

The accompanying drawings illustrate a machine constructed in accordance with this invention.

Figure 1 is a fragmental plan of a machine constructed in accordance with this

invention and in operation molding hollow building blocks; one of such blocks is shown in section to expose the core, and a complete block is shown on edge at the discharge end.

Fig. 2 is a fragmental side elevation of what is shown in Fig. 1 and showing also a fragment of a delivery spout in position delivering liquid plaster to the mold; the discharged block of Fig. 1 being omitted.

Fig. 3 is a reduced fragmental view showing in section, the end of the upper part of the frame.

Fig. 4 is an end elevation of the machine shown in Figs. 1 and 2 together with apparatus for mixing the fluid material and delivering it into the mold; an electric motor is also indicated as geared to drive the continuous mold.

Fig. 5 is a fragmental plan detail of one of the hinges between two adjacent individual molds. Line x^5, Fig. 9 indicates the plane of section.

Fig. 6 is a fragmental elevation of the parts shown in Fig. 5.

Fig. 7 is a transverse sectional detail showing the mold with a molded block therein as going over a crown face of the pulley which is shown, in longitudinal section, operating to withdraw the ends of the bottom of the mold away from the molded hardened block which is shown intact.

Fig. 8 is a fragmental plan of one end of the partition between two molds, and of the connection between the end of the partition and the terminals of two mold bottoms.

Fig. 9 is an elevation, partly in section on line x^9, Fig. 5, and showing take-up hinge bolt and its spring.

Fig. 10 is a cross section on line x^{10}, Fig. 1, showing a core in place in a molded block.

Fig. 11 is a detached view of the bottom of one of the individual molds.

Fig. 12 is an edge elevation of one of the end walls of the mold for an individual block.

Fig. 13 is a side elevation of Fig. 12 omitting the roller.

Fig. 14 is a fragmental detail partly in section, illustrating the roller arrangement.

Fig. 15 is a perspective view of one of the hollow blocks or tiles.

Fig. 16 is a fragmental side elevation of one end of this invention on a larger scale showing the pulley and molds in a position different from that shown in Fig. 2 and omitting the cores and blocks; the apertured further ends of the molds are seen through the apertures in the near ends of the molds.

The mold-way 1 is at the top of a frame comprising the sills 2, end posts 3 and brackets 4; the way 1 also has intermediate joists or rails 5 that are supported by cross pieces 6 and form a track over which the molds are moved. Angular pulleys 7, 8 are journaled to the brackets 4 and arranged to deliver to, and receive from said way, a series 9 of molds 10, the bottoms 11 of which are flexible sheets hinged together by hinges 12 to form a continuous belt, and the bottoms 11 rest upon and slide over the rails 5.

The angular pulley 8 is connected to a power shaft 13 and is indicated as revolving over toward the left in Fig. 2 so that the upper line of the pulley runs to the left in the direction of the large arrow.

The pulleys 7 and 8 are shown in the drawings as constructed alike in a number of faces, each pulley being shown of the hexagon type.

The power applying and discharge pulley 8 is shown as having crowned faces 14, that is to say, the face of the pulley is arched transversely of the belt as indicated at 14 in Fig. 7 so that as the flexible bottoms 11 of the molds 10 ride upon the pulley 8, said bottoms will be bowed as indicated in said Fig. 7.

The end walls 15, 16 of the mold are fixed to the ends of the bottoms 11 by any suitable means and in the drawings are shown as angle plates riveted by rivets 17 to the bottom plate so that when the bottom plate 11 is crowned as shown in Fig. 7 the end walls 15, 16 will be spread apart at their tops. The side or front and back walls 18, 19 of the mold are connected to the bottom plates by yielding means connected to the hinge 12 and as shown in the drawings, such means comprise eye bolt 20, the eye 21 of which is held between pintle 22 of the hinge 12 and extends up through a solid end 23, a front or back wall of the mold as the case may be, through a washer 24 supported by said wall and through a spring 25 and a compression washer 26 which is held down upon said spring by nuts 27 so that when the mold bottom is bowed up relative to the ends of the mold in passing over a pulley face as shown in Fig. 7, the back and front walls may be drawn up relative to the ends of the plates so that when the molds are upon a flat surface as upon the rails 5 in the way 1, the springs 25 will exert their pressure to hold the molds in true form.

The end walls 15, 16 formed of the angle plates as shown, are adapted to receive and support core means as the tapering mandrels 28 which are shown with the handles 29 and with a reduced support tip 30.

The means for receiving and supporting said mandrels are formed in the end plate or wall 15 by margins of two orifices 31, 32 which correspond in shape to one end of the opening desired to extend through the molded block or tile. There may be one or more of such openings in each end wall and two are shown in each end wall for the reason that it is deemed desirable to illus-

trate the invention as constructed to make a hollow tile having two cavities 33 extending from end to end.

The other end wall 16 of the mold is provided with orifices 34 of less cross sectional area than the orifices 31 and 32 so that they form supports for the smaller ends of the core means or mandrels 28.

The mandrels are preferably conformed in cross section to the orifices in the two end plates so that when the mandrel is inserted, it fits tightly in the orifices in the two plates, and is free from likelihood of leakage. The packing ring 35 is shown in Fig. 10 as fitting against the inside of the end wall 16, thus to allow the mandrel to be shoved tightly into place.

The material from which the block is to be molded may be of any suitable composition adapted to flow freely into a mold and there to harden; and such material may be calcined gypsum mixed with water by a mixer 36, the spout 37 from which discharges the fluid mixture into the molds driven by the motor 38 operating through the gear 39.

The operator will be provided with a complement of mandrels, which are inserted in the orifices 31, 32 and 34 as soon as the mold comes into flat position in the slideway 1, then the mold moves beneath the spout 37 which fills the mold from side to side and end to end entirely enveloping the inserted mandrels. As the belt progresses along the slideway, and the gypsum or plaster of Paris mixture approaches the discharge end of the machine, the attendant will withdraw the mandrels and will return them to the head of the machine.

The orifices into which the mandrel is inserted may be provided with roller means 40 mounted below the orifice upon one side of the molds, and the mandrel may be supported upon such roller means during the operation of inserting it and bringing its reduced tip 30 to rest in the further end 16.

As the mold comes onto the discharge pulley 8 the crowning pulley moves the bottom and sides and end plates; and at the same time the bending of the belt formed by the molds withdraws the side walls 15, 16 away from the ends of the end walls and also spreads the tops of the end walls apart, and in this way every side of the molded block is freed from such block.

The walls of the mold have a packing 41 between the bottom 11 and the walls of the mold, best shown in Fig. 9 of the drawings. The ends of the walls are provided with rubber packing strips 42 against which the ends 15 and 16 of the mold rest as shown best in Figs. 5 and 8 of the drawings.

After the fluid of gypsum composition is poured into the molds, said molds travel a distance allowing the gypsum to harden. During the travelling of this distance a roller guide 43 may be used that rests up against the ends of the mold 15 and 16 as shown in Figs. 1, 2 and 3 of the drawings.

I claim.

1. In a tile machine, molds having bottoms hinged together to form a continuous belt; and pulleys around which the belt is trained, one of said pulleys having a crowned support adapted to bow up the bottoms of said molds as they pass over such pulleys.

2. In a tile machine, a way comprising rails; molds having bottoms hinged together to form a continuous belt, the bottoms of said molds resting upon and adapted to be slid along said rails; means to move the belt along said way; means to pour plaster into the molds adjacent one end of the way; means to loosen the mold from the block; and means to discharge the blocks from the molds.

3. In a tile machine, a way; a belt of molds arranged to run in said way; and angular faced pulleys at the ends of said way to drive said belt; one of said pulleys having crowned faces to bow the bottom of the molds to loosen the mold from the object molded.

4. In a tile machine, molds having flexible bottoms; hinges connecting said bottoms together to form a continuous belt; end walls fixed to said bottoms; front and back walls; means connecting said front and back walls to said hinges and adapted to permit said front and back walls to be drawn up relative to the end walls; and means inside said belt adapted to support said molds.

5. In a tile machine, molds having flexible bottoms; hinges connecting said bottoms together to form a continuous belt; end walls fixed to said bottoms; front and back walls; yielding means connecting said front and back walls to said hinges; pulleys around which said belt is trained; and means adapted to flex the large area of contact of the mold from the object molded to permit easy discharge of the object from the mold.

6. A mold having a flexible bottom, front and back walls hingedly connected to the ends of such bottom; end walls fixed to the ends of the bottom and a crowned support adapted to bow up the bottom at the center; and yielding means adjustably connecting the front and back walls of the mold to the bottom so as to allow the bottom to be bowed.

7. A way; a train of molds adapted to be moved along the way; said train comprising a belt formed of flexible mold bottoms; hinges connecting the ends of each bottom with the ends of the adjacent end walls fixed to the ends of the bottoms; yielding means connecting the front and back walls to the hinges; pulleys around which the belt is trained, one of said pulleys being angular to

afford faces corresponding in width to the width of the bottoms respectively; and a flat way inside the belt to carry the upper run thereof and to hold the bottoms in flat form while they pass over such way; said angular pulleys being adapted to bow the bottoms as they pass over such pulley.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 23rd day of May, 1923.

ARTHUR J. BRUCE.

Witness:
JAMES R. TOWNSEND.