No. 819,931. PATENTED MAY 8, 1906.

J. M. & J. SCHENK.

TILE MACHINE.

APPLICATION FILED JULY 1, 1905.

3 SHEETS—SHEET 1.

Fig. 1.

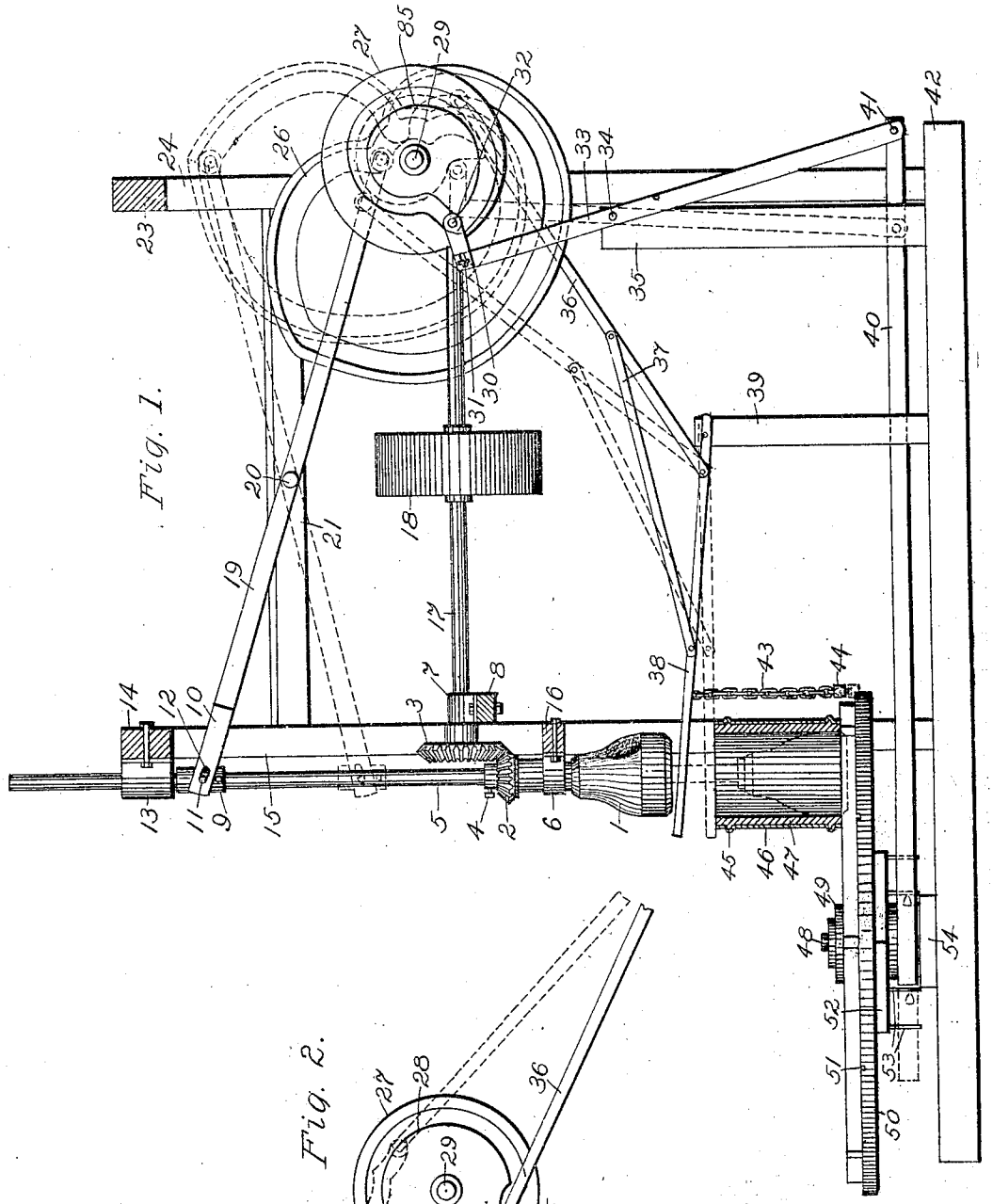


Fig. 2.

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3 SHEETS—SHEET 2.

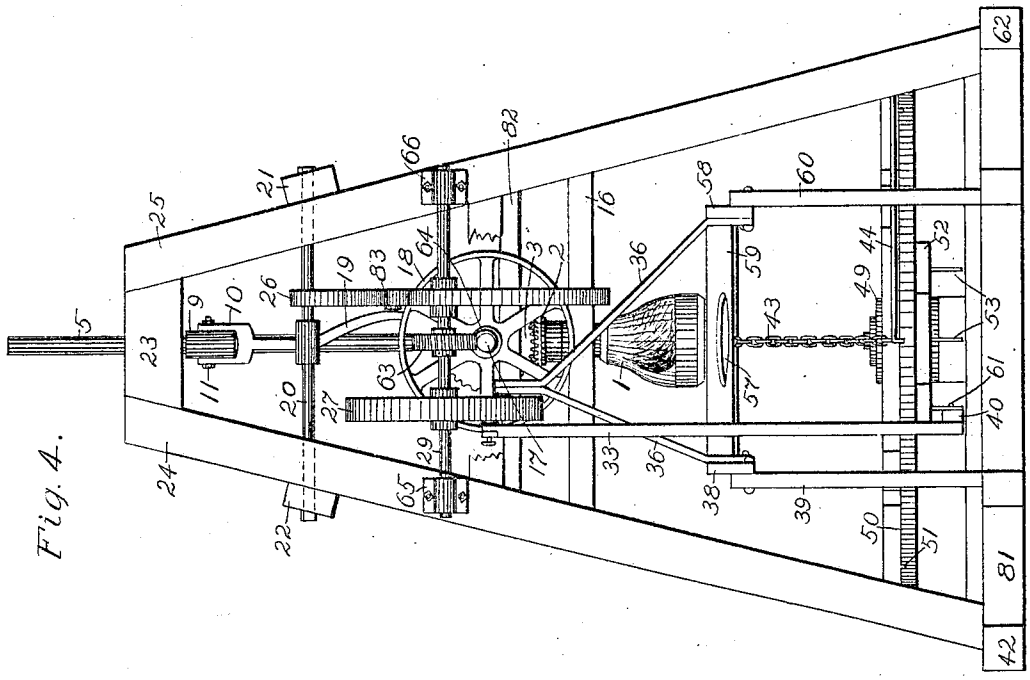


Fig. 4.

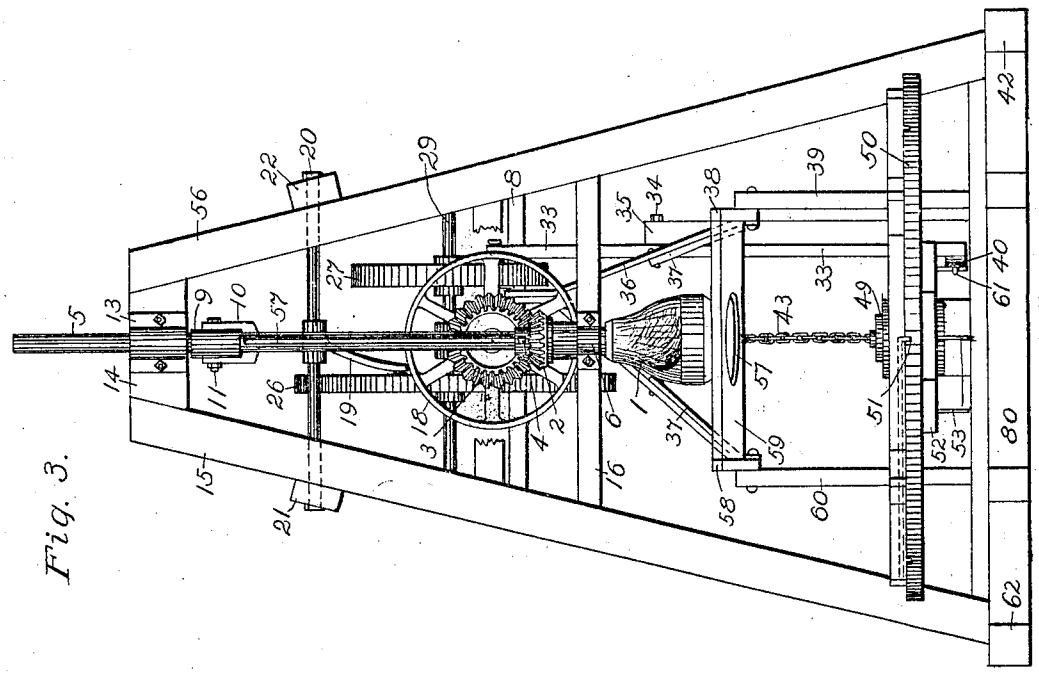


Fig. 3.

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3 SHEETS—SHEET 3.

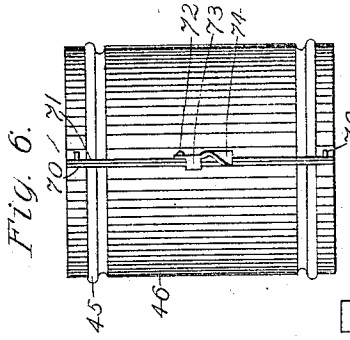


Fig. 6.

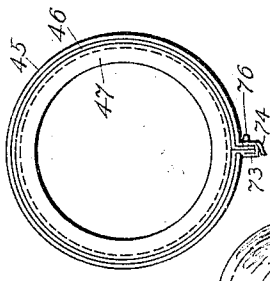


Fig. 2.

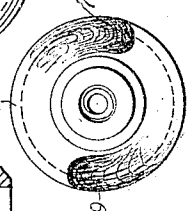


Fig. 11.

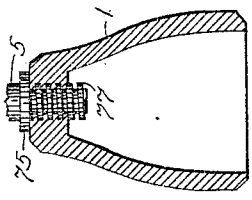


Fig. 10.

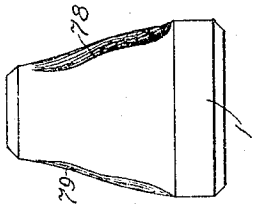


Fig. 9.

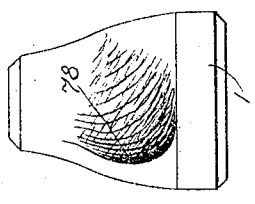


Fig. 8.

Fig. 5.

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UNITED STATES PATENT OFFICE.

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TILE-MACHINE.

No. 819,931. Specification of Letters Patent. Patented May 8, 1906.

Application filed July 1, 1905. Serial No. 267,950.

To all whom it may concern:

Be it known that we, JOHN M. SCHENK, a resident of Waterloo, Blackhawk county, and JOSEPH SCHENK, a resident of Emmetsburg, Palo Alto county, State of Iowa, citizens of the United States of America, have invented certain new and useful Improvements in Tile-Machines, of which the following is a specification.

Our invention relates to tile-machines; and the object of our invention is to provide a mechanism by which drain-tiles may be successfully and perfectly formed from cement or concrete materials; and it is also an object of our invention to use a tile-mold having elastic and detachable casing in combination with a peculiar former-head for shaping the interior of the hollow cylindrical tile, such head being so constructed as to effectuate the necessary spiral rubbing action on the interior surface of the tile to properly consolidate the materials and lock their constituent particles together in the most favorable positions where the contacting angles of such particles will most effectually cohere and adhere to bind together the parts of the arched walls of the cylinder. These objects we have accomplished by the mechanism which is hereinafter described and claimed and which is illustrated in the drawings hereto annexed, in which—

Figure 1 is a side elevation of our improved tile-machine. Fig. 2 is a detail view of the inner side of the double-faced cam. Fig. 3 is a front elevation of said machine. Fig. 4 is a rear elevation thereof. Fig. 5 is a plan view thereof. Fig. 6 is an elevation of the cylindrical mold-casing. Fig. 7 is a plan view thereof. Fig. 8 and Fig. 9 are elevations of the former-head. Fig. 10 is a central vertical section of the former-head, and Fig. 11 is a plan view of said former-head.

Similar reference-numerals refer to similar parts throughout the several views.

The mechanism of our invention is supported by two upright frames at front and rear, which rest on the parallel horizontal longitudinal timbers 42 and 62 and on the parallel horizontal transverse timbers 80 and 81, respectively. The front upright frame is composed of the side pieces 15 and 56, connected at the top by a cross-piece 14. The rear upright frame is composed of the side pieces 24 and 25, connected at the top by a cross-piece 23. The two upright frames are connected together by means of the two horizontal longitudinal timbers 21 and 22. The drive-wheel 18 is mounted on horizontal drive-shaft 17, and the front end of said shaft is mounted in a bearing 7, set on a cross-timber 8, and the rear end of said shaft is mounted in a bearing placed on the cross-timber 82. The rear end of said shaft is also provided with a worm-wheel 64, which intermeshes with the teeth of a worm-gear 63, the latter being mounted on a transverse shaft 29, set in the bearings 65 and 66. On the same shaft 29 are likewise mounted the single-faced cam 26 and the double-faced cam 27. The rear end of the lever 19, which lever is medially pivoted on a transverse shaft 20, mounted in the side timbers 21 and 22, has a stud carrying an antifriction-wheel 83, which works in the cam 26. The front end of said lever has a bifurcation, each of whose forks is provided with slotted openings 12 to receive the studs 11, extending from the fixed sleeve 9 on the vertical shaft 5. The vertical shaft 5 is made rotatable and slidable within the bearings 13 and 6, affixed to the cross-timbers 14 and 16, respectively.

As shown in Fig. 3, the shaft 5 is provided with a longitudinal groove 67 to receive the inner end of a key 4, the latter being mounted in a hub of a bevel-gear 2, the latter resting upon the upper surface of a bearing 6 and being slidable over the shaft 5, although, by means of the key, being made to rotate therewith. The bevel-gear 2 is actuated by means of the intermeshing bevel-pinion 3, fixed to the front end of the horizontal shaft 17. The inner cam of the double-face cam-wheel 27 (shown in Fig. 2) is provided with a cam-groove 28, within which works the antifriction-wheel 55, mounted on a stud on the rear end of the lever 36, the bifurcations of the front end of said lever being fixed to the side bars 38 and 58 of the table 59 at points anterior to the pivots on which said bars are mounted on the uprights 39 and 60, respectively. Braces 37 also connect said bifurcations to the side bars 38 and 58. The horizontal table 59 has a circular opening 57 that the former-head 1 may move therethrough. The outer cam of the double-faced cam-wheel 27 has a cam-groove 85, within which works an

antifriction-wheel 32, mounted on a stud extending from the adjustable arm 30, which latter has a slotted opening and thumb-screw 31 working therethrough to adjustably connect said arm to the upper end of the lever 33, which is medially pivoted on a stud 34, extending from the upright 35. The lower end of said lever 33 is pivoted on a stud 41, attached to the rear end of a horizontal shifting bar 40, the inner side of whose front end is provided with a backwardly-bent projection or tooth 61. A supporting-block 54 is placed between the front ends of the longitudinal timbers 42 and 62, so as to be a suitable distance anterior to the front upright frame, and on this block rests a bearing 49, within which the vertical stub-axle 48 of a horizontal wheel (shown in Fig. 5) is rotatable. This wheel has diverging spokes 69, attached to a rim 50. Cross-pieces 52 connect the spokes 69 equidistantly from the center of the wheel and at their middle points bear the upper ends of the downwardly-directed pins 53. The spaces between the spokes are filled by removable segmental plates 67, each of which has circular openings 68 of equal diameters and placed at equal distances from the center of the wheel. Each of these segmental plates is so formed as to leave a handhold-space 84 in order to provide means for moving said plates when it is desired to replace them with other plates having circular openings of a different diameter. The circular openings 68 are made of a diameter sufficient to permit the former-head 1 to pass therethrough in close contact with the inner side thereof. The former-head 1 is made of a shape somewhat resembling that of a bell, having an upper central threaded opening to receive the threaded lower end 77 of the shaft 5 below the fillet 75. The lower edge of said former-head is beveled from the outside inward, that space of the outer surface extending upward for a short distance beyond and above the said bevel being the shape of a flat ring with vertical edge. Just below the top horizontal surface of the former-head is another beveled surface, and the surface between the upper bevel and the flat ring periphery is gradually increased in a developing swell from its upper to lower edges. Diametrically opposite each other are depressions 78 and 79 in the outer swell, one edge of each depression on the following side being abrupt and sharp and having the deeper portion of the depression excavated up to its line. From thence to the leading edge of the depression the hollowing diminishes to the vanishing-point, and the uses of these depressions in the former-head will be hereinafter explained fully.

The mold for tile sections is shown on a larger scale in Figs. 6 and 7. It consists of a cylindrical casing, preferably of an elastic material, as metal, in a thin plate bent to the required inner diameter and having its vertical edges 70 71 flanged out so as to lie parallel and in contact with each other when fastened together. The flange 70 is provided with studs 76, which lie in a position to coincide with and pass through openings in the adjacent flange 71. The fastening means is represented by a clip 73, pivoted on a stud 72, attached to the flange 71, and which is turned over to hold the flanges together by means of the handle 74. We have shown in Fig. 6 the corrugations 45 around the casing 46, whose function it is to strengthen and stiffen the thin casing and also to form such projections and depressions in the outer surface of the inclosed tile 47 as to prevent the tile from becoming displaced from the casing when being removed from the machine to the place of deposit.

The machine is operated in the following manner: When the drive-wheel 18 has been put in revolution through the use of any suitable source of power, the movement of the worm-gear 64 63 causes the cam 26, also the cams on the double cam-wheel 27, to revolve. The shaft 17 also puts in motion the bevel-gears 3 2, the latter rotating the vertical shaft 5 by means of the key 4 in the groove 57. The dotted lines in Fig. 1 now show the relative positions of the parts of the machine in the moment when the former-head is about to start upward to form the tile within the mold-casing 46. The full lines show the positions of the same parts when the tile has been formed and the former-head has arrived at its highest point of upward movement. When the former-head 1 is in its lowermost position within the mold-casing 46, a quantity of cement sufficient in amount to constitute one section of tile may be deposited within the open upper end of the mold-casing, so as to fall down between the interior surface of the mold-casing and the exterior periphery of the former-head to the upper surface of the segmental plate 67. The machine is then put in motion, with a consequent rotation of the former-head 1, the movement of the cam 26 causing the lever 19 to gradually lift said former-head, thus giving it an upward spiral motion throughout the length of the casing. As the former-head 1 spirally ascends its depressions 78 and 79 grasp and pull around with them a considerable portion of the cement or concrete material, the effect being to draw such material down within the space between the inner surface of the mold-casing 46 and the flat zone of the former-head. The consolidation thereby effected is enhanced and perfected by reason of the spiral rotatory movement and rubbing pressure of the flat zone of the former-head. The action of this flat zone in its spiral upward movement is similar to that of the rubbing pressing movement of a mason's trowel when applying soft plaster to a wall. The progressive rubbing

action of this flat zone compresses together the angular particles of sand in the mixture, the sidelong rubbing action of such zone in its spiral movement tending to arrange the said angular particles in the most effective position to interlock their contacting projections. This double action of outward pressure of the spirally-applied rubbing contact results in arching up the said particles into a strong homogeneous integral mass. When the former-head has become elevated so that its lower edge has cleared the platform 59, the movement of the inner cam 28 through the medium of the lever 36 causes the said platform to lift sufficiently far to clear the upper edge of the mold-casing 46, so that the finished tile may be removed. When the former-head 1 has arrived at its topmost position, as shown in Fig. 1, its vertical movement ceases during a few revolutions before it begins to descend. During this time the movement of the outer cam 85 causes the slide-bar 40 to move back horizontally from the position indicated by the dotted lines in Fig. 1 to that indicated by the full lines in the same figure, the projection 61 during said movement engaging the nearest adjacent pin 53 and causing the wheel to rotate through the space of one-sixth of a revolution. This movement of the wheel brings the mold-casing previously placed on the next segmental plate 67 directly under the former-head in position for the repeating of the molding operation. By means of any suitable link or chain connection 43, connected at its upper end to the bottom of the platform 59, we have suspended the inner free end of a horizontal pawl 44, whose outer end is fastened to the frame of the machine. The inner end of said pawl is furnished with a downwardly-bent projection, which during the operation of molding the tile is dropped within one of the grooves 51 in the upper edge of the rim 50 and is after the elevation of the platform 59 withdrawn from said groove to permit the partial revolution of the rim, as heretofore described. The further movement of the machine results in a lowering of the former-head 1 to its lowermost position within the mold-casing 46, the platform 59 also lowering into contact with the upper edge of said mold-casing and the projection on the pawl 44 engaging the groove 51 in the rim 50 to hold the wheel in a fixed position during the formation of a tile. While the former-head 1 has been lowering, the continued revolution of the cam 85 has drawn back the wheel 32, causing the slide-bar 40 to be projected forward into the position required for engaging the next successive pin 53.

An especially valuable feature of our improved mold-casing 46 is its manner of separation from the formed tile, which is encompassed by removing the clip 73 from engagement with the flanges 70 71, and then spreading apart the flanges from each other. The result is a separation gradually effected along single lines of contact, being a peeling away of the elastic sides of the mold-casing from the fresh tile, preventing any distortion thereof or damage, such as might otherwise occur in a form of mold where a sudden separation is caused simultaneously throughout the extent of a large area of adhering surfaces. In other words, the effect is to separate the mold-casing from the soft tile along a line instead of throughout a large contacting area, thus doing away with the suction between the surfaces and insuring perfect separation.

The action of the cam 26 is such that when the former-head 1 is at its lowermost position within the mold-casing 46 said former-head is caused to rotate several times before elevation thereof begins. In consequence the rotating flat zone of the former-head engages the more or less imperfectly distributed portions of the loosely-aggregated mass of concrete material deposited between said former-head and the lower part of the inner periphery of the mold-casing and forcing it around causes the mass to become equally distributed and compressed within such space preliminary to the actual ascent of the former-head in its spirally-rotatory course.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a device of the type set forth a rotatable mold-carrier, a plunger, a pivoted element to engage the molds, and means for imparting a spiral and upward movement to said plunger and for raising said element when the plunger has been raised out of the mold.

2. In a device of the type set forth a rotatable mold-carrier, a plunger, a pivoted element to engage the molds, means operated by said element to lock said carrier in predetermined position, and means for operating said plunger and for rotating said carrier.

3. In combination with a mold-carrier and a mold thereon, a former-head having a pair of diametrically-opposed depressions formed therein, and means for moving said head upwardly through said mold and synchronously rotating the same to draw the material downwardly through said depressions.

4. In combination with a mold, a former-head for operating therein, and means for raising said head upwardly out of said mold and synchronously imparting a rotary movement thereto, and for slightly depressing said head previous to its leaving said mold.

5. In a device of the type set forth, a rotatable mold-carrier, molds thereon, a plunger for operating in said molds, means whereby said carrier may be rotated, a pivoted table for engagement with the upper ends of said molds, means for retaining the carrier in predetermined position, a connection between

said last-named means and said pivoted table, and means for rotating and reciprocating said plunger, and for actuating said carrier-rotating means, and for raising said table out of engagement with said molds.

6. In a device of the type set forth, a rotatable mold-carrier, means whereby said carrier may be rotated, molds on the carrier, a plunger operating in the molds, a pivoted table for engaging the upper ends of said molds, means for retaining the table in predetermined position, means for raising said table, means for operating said carrier-rotating means, and means for simultaneously rotating and reciprocating said plunger and for operating said table-raising means, and said carrier-rotating means.

7. In a device of the type set forth, a rotatable carrier, with molds thereon, means for rotating said carrier, a pivoted lever connected to said means, a pivoted table for engagement with said mold, a lever connected to said table for raising and lowering the same, a plunger, a pivoted lever connected to said plunger, a shaft, cams on said shaft for operating said lever of the carrier-rotating means, said lever of the table, and said lever of the plunger, and means connected to the plunger and to the said shaft for rotating each of the same in synchronism.

8. In a device of the type set forth, a rotatable carrier with molds thereon, means to engage said molds and retain the same on said carrier, a plunger for operating in the molds, and means for operating said carrier and for raising and lowering said molds-engaging means, and for rotating and reciprocating said plunger.

9. In a device of the type set forth, a rotatable carrier and molds thereon, a pivoted element for engaging the tops of the molds, a plunger, and means for raising said plunger upwardly through the molds and imparting a rotary movement thereto throughout such movement, and for slightly depressing said plunger previous to the same leaving the molds, and for raising said pivoted element after the plunger has become free of the molds.

10. In combination with a mold, a former-head for operating therein, said former-head having depressions therein, and means for operating said head so as to draw the material downwardly through said depressions, and means for depressing said head previous to its leaving the mold.

11. In combination with a mold, a former-head for operating therein, said head being of bell shape and having diametrically-opposed depressions formed therein having their greatest depths at the base of said head, and means for spirally operating said head.

12. In combination with a mold, a former-head for operating therein, said head being of bell shape and having a portion at its base of equal diameter with depressions leading from the termination of said portion and diminishing in depth and width as they approach the top of said head, and means for operating said head.

Signed at Waterloo, Iowa, this 23d day of June, 1905.

JOHN M. SCHENK.
JOSEPH SCHENK.

Witnesses:
G. C. KENNEDY,
D. A. KENNEDY.