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PATENTED FEB. 28, 1905.

T. S. LAWRENCE.
BRICK MAKING MACHINE.
APPLICATION FILED OCT. 31, 1904.

2 SHEETS—SHEET 1.

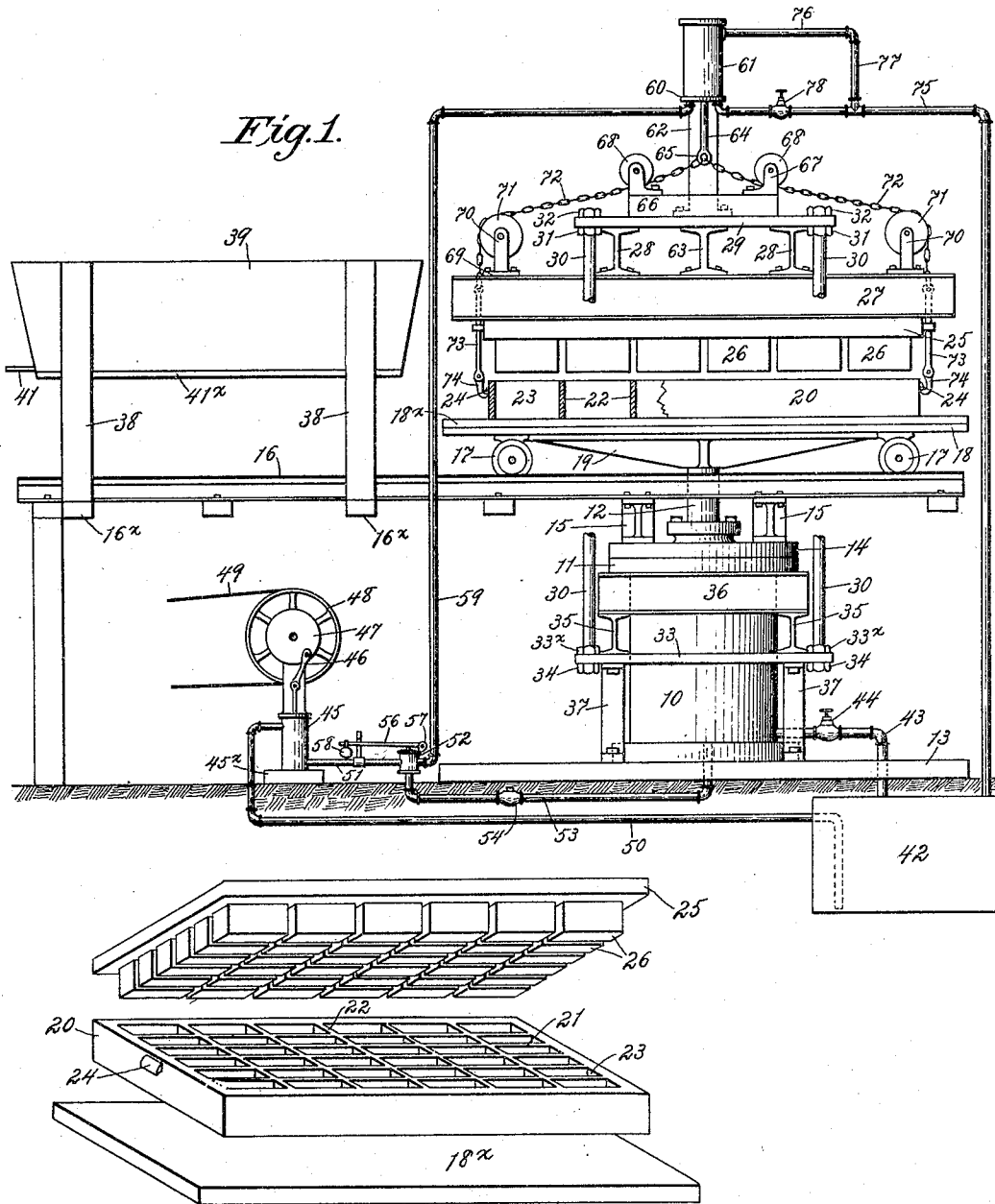


Fig. 5.

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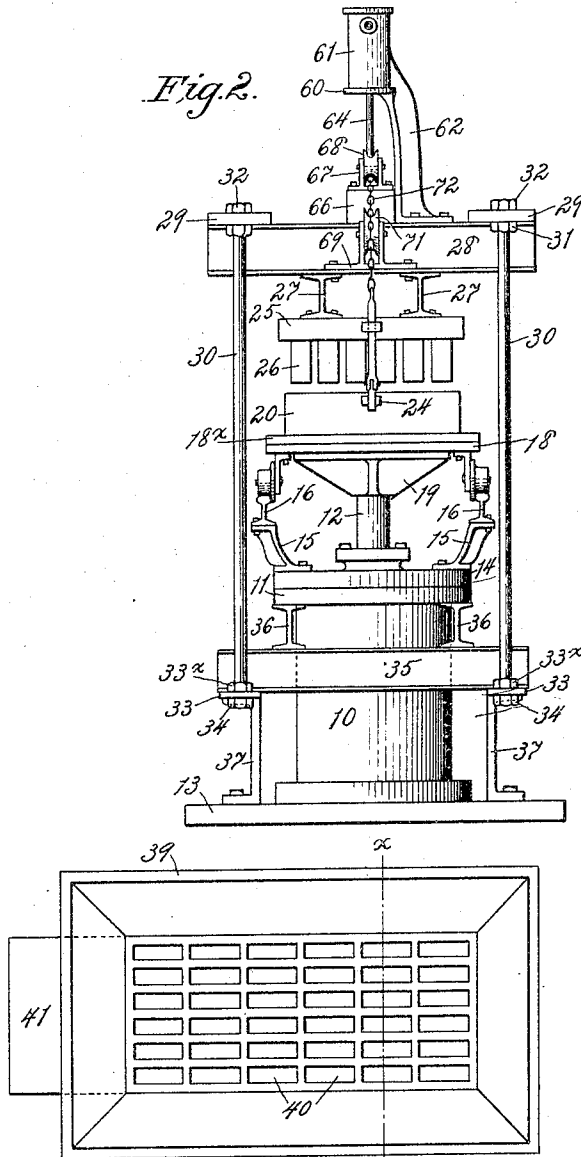


Fig. 2.

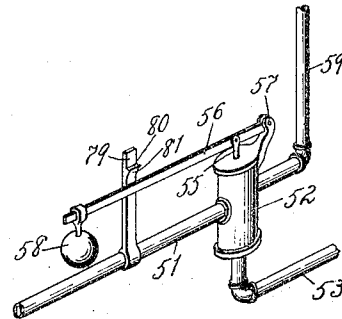


Fig. 6.

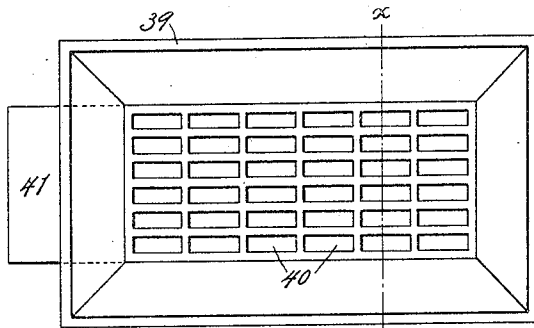


Fig. 3.

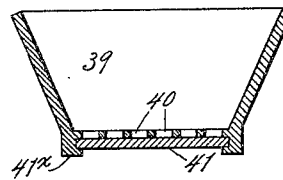


Fig. 4.

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UNITED STATES PATENT OFFICE.

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BRICK-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 783,442, dated February 28, 1905.

Application filed October 31, 1904. Serial No. 230,847.

To all whom it may concern:

Be it known that I, THOMAS S. LAWRENCE, a citizen of the United States of America, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Brick-Making Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

The object of my invention is, primarily, to make the surfaces of a brick or block compact and smooth, so as to resist moisture, absorption, and more especially to produce a cement brick or block the material of which under compression will become dense, and in this density the saturation of the materials is thoroughly effected; second, to automatically remove the molds after compression of the material; third, the reciprocal relation of the pallet and mold and die in the formation of the brick or block; fourth, the automatic control of the mechanism for raising the molds after compression of the material.

The invention consists in the novel construction and combination of parts, such as will be first fully described, and specifically pointed out in the claims.

In the drawings, Figure 1 is a side elevation of the novel brick-making machine, showing a portion of the mold broken away and the dies in position above the mold and the latter being full of the material in readiness for compression, also showing the track extended outwardly from one end of the machine and the hopper or trough for the brick-making material, also showing the underground water-reservoir and the power-operated pump for operating the hydraulic cylinder. Fig. 2 is an end view of the machine, taken from a position opposite to that supporting the hopper or trough for the material. Fig. 3 is a plan view, and Fig. 4 is a cross-section, of the feed-trough. Fig. 5 represents detail views in perspective of the dies, mold, and pallet shown in their respective positions and separated at short distances from each other. Fig. 6 is a detail view of the water-

conducting pipes leading to the hydraulic cylinder, showing the automatic devices for cutting out the supply of water to the cylinder.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

Referring to the drawings, 10 indicates a hydraulic cylinder of the usual description for raising loads, and 12 is the piston rod or plunger. The lower end of the cylinder rests upon a horizontal base 13 of considerable length and width and placed upon the ground.

With the head 14 of the cylinder are connected rigidly the rail-chairs 15, which are arranged in pairs upon opposite sides of the cylinder-head, and upon which chairs are mounted the horizontal track-rails 16, these rails being of considerable length. Upon these track-rails is mounted the flanged wheels 17, above which wheels and supported thereby is a horizontal platform 18. Beneath the platform 18 and secured to the upper end of the piston 12 is an outwardly-flaring head 19, the upper surface of which comes into contact with the under surface of the platform 18. (See Fig. 2.)

Upon the upper surface of the platform is a thin plate or pallet 18^x of nearly the same length and width as platform 18 of the carriage. Upon the pallet is placed the brick-mold frame 20, which is rectangular in form, the width of the sides and ends in a vertical direction being considerably in excess of the width of an ordinary brick. The frame 20 is divided in a longitudinal direction by the partitions 21 and in a transverse direction by the partitions 22, so as to form separate rectangular-shaped openings 23 in any desired number of the requisite dimensions of the brick to be made, and these openings extending to the platform 18. Upon the other surface and at each end of the mold-frame 20 at a point equidistant from the sides of said frame are the lugs 24.

Directly above the brick-mold frame 20 is the stationary die-supporting plate 25, upon the under surface of which are the dies 26, corresponding in number to the molds 23 in the frame 20 and nearly of the same size as

said openings, so as to admit of the entrance and withdrawal of the dies, as hereinafter explained. The die-supporting plate 25 is secured to the lower flanges of the separate parallel I-beams 27, which extend in the same longitudinal direction as the track-rails 16, supporting the movable platform 18, and are about the same length as the said platform supporting the I-beams 27 and separate transverse I-beams 28 28, which are spaced apart about equal distances from each other and the ends of the I-beams 27, these beams being bolted to one another in a suitable manner through the respective flanges, as indicated in the drawings.

Upon the upper surface and near the outer ends of the I-beams 28 are the supporting-plates 29 29, the ends of which plates extend a short distance beyond the outer edges of the upper flanges of the I-beams and are perforated to receive the upper ends of the pairs of supporting-rods 30 30. The upper ends of the rods 30 are screw-threaded and upon each rod is a nut 31, bearing upwardly against the under surface of the plate 29, and a separate nut 32, bearing upon the upper surface of said plates. The lower ends of the rods 30 extend downwardly to a position a considerable distance above the base 13 for the hydraulic cylinder 10 and are connected by transverse plates 33, secured to the rods by nuts 33^x and 34 in precisely the same manner as the plates 29 to the upper ends of the rods. Upon these plates 33, near the rods, are supported the transverse I-beams 35. Extending in a transverse direction to the I-beams 35 are the separate I-beams 36 36, the upper flanges of which beams extend beneath the annular flange 11 on the cylinder 10, with which the cylinder-head 14 is connected.

In order to support the beams 35 35 and the superstructure, webbed feet 37 37 are connected with the under surface of said plates 33 33, which extend downwardly to and are bolted to the base 13, supporting the cylinder 10. In another manner the cylinder 10 would be arranged in an excavation, which would permit of the beams 35 resting upon the ground and the weight of the beams and superstructure sustained thereby. With the ends of the track-rails 16, which extend beyond the position of the machine, are connected the up-rights 38 38, which support the feed spout or hopper 39 a suitable distance above the plane of the track-rails, so that the platform-vehicle, with the mold frame 20 thereon, may pass beneath the bottom of the trough or hopper. The bottom of the trough is provided with separate openings 40 of the same size and corresponding in number to the molds 23, beneath which openings, on the under surface of the bottom, is a slide 41, which moves in the guides 41^x.

Beneath the ground and at one end of the base 13 is a reservoir 42 for water. With the side

of the cylinder 10 near its lower end is connected one end of a discharge-pipe 43, the other end of which pipe is bent and extends downwardly through the base 13 within the top of the reservoir 42. In this pipe is a valve 44. At the other end of the base 13 is a vertical pump-cylinder 45 for supplying the cylinder 10 with water under pressure and secured to a base 45^x. The piston of the pump is driven by a crank-arm 46, connected with a wheel 47, upon the axle of which wheel is a band-pulley 48. Over the band-pulley extends a belt 49, the other end of which belt is extended over a band-pulley upon an engine. (Not shown.)

Within the side of the reservoir 42 a short distance from the top is connected one end of a suction-pipe 50, which is bent downwardly nearly to the bottom of the reservoir. The other end of said pipe extends horizontally to a position near the pump 45, thence bent at right angles and extended upwardly to a position near the upper end of the side of the pump-cylinder and connected therewith. With the side of the pump-cylinder 45 near the lower end and the base 45^x is connected one end of a pipe 51, which is short in length, the other end of said pipe being connected with one side of a pressure-regulating-valve casing 52. With the bottom of said casing is connected one end of a pipe 53, the other end of which pipe extends to and within the lower end of the hydraulic cylinder 10 and supplies the pressure of water to raise the piston and piston rod or plunger 12. In the pipe 53 is a check-valve 54.

The pressure-regulating-valve stem 55 bears against the under side of the horizontally-extended arm 56, which is pivotally connected at its inner end to the lug 57 on the side of the valve-casing. Upon the outer end of the arm or lever 56 is a weight 58, which is slidable on the said arm, so that the amount of resistance to the water-pressure may be varied. With the opposite side of the valve-casing to that having the pipe 51 is connected one end of a valve-conducting pipe 59, which is bent at right angles and extended upwardly to a position a considerable distance above the plane of the I-beams 28, thence bent at right angles and extended to a position above said I-beams and connected with the lower head 60 and in the direction of one side of the vertical hydraulic cylinder 61, which is small in circumference. This cylinder is secured in a fixed position to the upper curved end of a standard 62, which standard is connected with the side of the cylinder. The lower end of the standard is connected with the upper surfaces of a transverse I-beam 63, located between the I-beams 28 28 and secured at the respective ends to the upper surfaces of the beams 27.

The cylinder 61 is provided with the usual piston and piston-rod 64, the outer end of the rod being provided with an eye 65.

Directly beneath the cylinder 61 and con-

nected with the upper surfaces of the beams 28 28 is a block 66, extending parallel with the bars 29, and upon the upper surface and at each end of the said block are vertical brackets 67 67, in which are mounted the grooved wheels 68 68. Connected with the upper surfaces of the I-beams 27 near the outer ends are bracket-supports 69, upon which are mounted the upright brackets 70 70, in which brackets are journaled the grooved wheels 71 71. With the eye 65 on the piston-rod 64 is connected the upper ends of the separate raising and lowering chains 72 72. The other ends of the chains extend beneath the guide-rollers 68 68, thence over the rollers or wheels 71 71, and with said ends are connected the upper ends of short rods 73 73, the lower ends of which rods extend downwardly to a position in a horizontal line with the under surface of the dies 26, and with said ends of said rods are pivotally connected the hooks 74 74, which hooks engage with the lugs 24 on the ends of the mold-frame 20. With the head 60 of the lower end of the hydraulic cylinder 61 is connected one end of a discharge-pipe 75, which extends outwardly and is bent at right angles and extended downwardly and connected with the top portion of the reservoir 42 beneath the ground. With the side portion of the cylinder 61 near its upper end is connected one end of an overflow-pipe 76, which extends outwardly a short distance, and a portion 77 is bent at right angles and extended downwardly and connected with the pipe 75. In the pipe 75, between the connection of the portion 77 of pipe 76 and the cylinder 61, is a valve 78. Upon the pipe 51, leading from the pump 45 and upon the side of the arm 56, is a spring-plate 79, extending around the pipe at its lower end and provided with a shoulder or notch 80, and from the side of the plate upwardly to the outer edge of the shoulder 80 is an incline 81.

In operation the platform 18, with the pallet 18^x and the mold-frame 20, is moved upon the track-rails 16 to a position directly beneath the feed-trough 39 and in which the feed-openings in the bottom of the trough register with the openings or molds 23 on the mold-frame 20. In this position the slide 41 is operated and the brick-making material is discharged and the molds are filled evenly. The slide is then pushed in and the flow cut off at the time the material is cut off even with the upper edges of the mold-frame. The platform 18 is then moved in position on the track-rails so that the molds 23 are brought directly beneath the dies 26 and also above the head 19 of the piston or plunger 12 of the hydraulic press, which head is of sufficient dimensions to extend beneath each end of the platform and normally is in position a short distance beneath the under surface of the platform.

The piston of the hydraulic cylinder 61 be-

ing at this stage fully extended and the valve 78 in the pipe 75 and the valve 44 in the pipe 43 being closed and the chains 72 72 slackened, the hooks 74 are in a position to engage with the lugs 24 on the ends of the mold-frame 20. The reservoir 42, which is drawn upon for the supply of water for the hydraulic cylinder, is filled with water. Power being communicated to the belt 49 on the band-wheel 48, the pump 45 is operated and the water is drawn through the pipe 50 from the reservoir and forced through the pipes 51 and 53 into the hydraulic cylinder 10. The plunger 12 being moved upwardly, the plunger-head raises the platform 18 from the track-rails 16 and the brick material in the molds is brought into contact with the lower surfaces of the dies 26 and the material compressed within the molds until the required pressure is reached on the pressure-regulating valve. The back pressure of water from the pump 45 is held by the check-valve 54.

In the position described of the pressure-regulating valve, which allows the water to flow through the pipe 59 to the hydraulic cylinder 61, the piston and its rod move upwardly within the cylinder and draw upon the chains 72, and the mold-frame is drawn upwardly in the direction of the dies until the piston reaches a position above the discharge-opening in pipe 76, which allows the overflow of the water to flow through the pipe 76 to the reservoir 42, the molds being held in a raised position.

The valve 44 in the pipe 43, leading from the hydraulic cylinder 10, is now opened and the platform 18 moves downwardly upon the track 16, the bricks which are now upon the pallet are removed with the pallet, a new pallet is placed in position, the valve 78 in pipe 75 opened, which allows the mold-frame to descend upon the pallet, and the operation repeated.

The mold-frame affords a capacity for turning out a large number of bricks at each operation and the compression made with rapidity, so that the cost of production may be materially decreased.

In the manufacture of cement blocks or bricks the cement and sand are fed from the trough 39 in a slightly moist state to the molds, and the compression causes the material to be thoroughly saturated.

Such modifications may be employed as are within the scope of the invention.

Having fully described my invention, what I now claim as new, and desire to secure by Letters Patent, is—

1. In a machine for making brick, &c., the combination with a suitable frame of stationary dies, a mold-plate and a mold for the material, material-compressing mechanism for compressing the material in the mold, and a motor, motor-operated mold-lifting devices for raising said mold from the mold-plate, and

means for transferring the power from the motor, actuating the material-compressing mechanism to the motor operating the mold-lifting devices when the desired pressure is reached upon the material in the mold.

2. In a machine for making brick, &c., the combination with a suitable frame, of a hydraulic compression-cylinder and its plunger, in the lower part of said frame, and a suitable 10 valved discharge-pipe, a mold and mold-raising devices within said frame, a fluid-conducting pipe connected with the compression-cylinder, having a suitable source of fluid under pressure, a pressure-regulating device connected with said pipe, and a check-valve in 15 said pipe between the pressure-regulating device and the compression-cylinder, and means actuated by the pressure-regulating device for controlling the mold-lifting devices.

3. In a machine for making brick, &c., the combination with a suitable frame, of a hydraulic compression-cylinder in the lower part of said frame, and a suitable valved discharge-pipe, a stationary die, a pallet and a mold, a 25 hydraulic mold-lifting device in the upper part of said frame, a fluid-conducting pipe connected with the compression-cylinder having a suitable source of supply of the fluid under pressure, a pressure-regulating-valve casing, 30 and a valve connected with said pipe, a check-valve in said pipe between said pressure-regulating valve and the compression-cylinder, and a fluid-conducting pipe leading from the pressure-regulating-valve casing to the hydraulic 35 mold-lifting devices in the upper part of said frame.

4. A machine for making brick, &c., comprising a stationary frame, a die-supporting plate in the upper part of said frame, and suitable 40 dies thereon, a hydraulic compression-cylinder and its plunger, and a liquid-conducting pipe connected with the cylinder having a suitable source of supply of liquid, under pressure, and a valved discharge-pipe, a pallet 45 and a mold, a hydraulic lifting-cylinder in the upper part of said frame, and a piston and piston-rod, mold-lifting devices connected with the piston-rod and said mold, a pressure-regulating-valve casing and valve connected 50 with the liquid-supply pipe leading to the hydraulic compression-cylinder, and a check-valve in the said pipe, between the pressure-regulating-valve casing and the compression-cylinder, and a pipe connected with the said 55 valve-casing and also with the hydraulic cylinder operating the mold-lifting devices.

5. In a machine for making brick, &c., a stationary frame, a die-supporting plate within said frame and supported thereby, dies upon 60 the said plate, a fluid-pressure-operated cylinder in said frame above said die-supporting

plate, a piston and its rod, a mold-frame, and suitable raising and lowering devices connected with said piston-rod and said mold-frame.

6. In a machine for making brick, &c., a stationary frame, a die-supporting plate within the said frame, and dies thereon, a fluid-pressure-operating cylinder, a piston and a piston-rod, a mold-frame, raising and lowering chains connected with said piston-rod, guide- 70 rollers for said chains above the ends of the die-supporting plate, and pivoted grasping devices on the ends of said chains connected with the mold-frame.

7. In a machine for making brick, &c., a stationary frame, a die-supporting plate within the said frame, and dies therein, a fluid-pressure-operating cylinder, a piston and a piston-rod, a mold-frame, raising and lowering chains for the mold-frame, rods connected 80 with said chains and guides for the rods on the die-supporting plate, lugs on the mold-frame, and hooks on the said rods engaging with said lugs.

8. In a machine for making brick, the combination with a suitable frame, of a hydraulic, pressure-operated cylinder, supported in said 85 frame, and a piston and piston-rod, and suitable lifting-chains on said rod, a hydraulic compression-cylinder, and a piston and a piston rod or plunger on said cylinder, a reservoir for the liquid, a suction and force pump, a suction-pipe leading from the pump to the 90 reservoir, and a discharge-pipe leading from the pump to the compression-cylinder, and a check-valve in said pipe, a pressure-regulating-valve casing and valve in said pipe, a discharge-pipe leading from the compression-cylinder to the reservoir, and a cut-off valve 95 in said pipe, and a separate pipe connected with the pressure-regulating-valve casing and leading to the hydraulic cylinder supported by said frames, a discharge-pipe leading from the hydraulic cylinder in said frame to the 100 reservoir, and a cut-off valve in said pipe, and an overflow-pipe connected with the said hydraulic cylinder and said discharge-pipe. 105

9. The combination in a brick-making machine, with the movable brick-carrying platform and its track, of a perforate mold-frame 110 on said platform, and a material-feeding trough above said mold-frame, having openings registering with the perforations in the mold-frame, and a sliding cut-off plate beneath the bottom of the trough, adapted to 115 close said openings and striking the material even with the upper edges of the mold-frame.

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