May 21, 1946. R. W. DARDEN 2,400,631

BUILDING BLOCK FORMING MACHINE

Filed Oct. 4, 1943 7 Sheets-Sheet 1

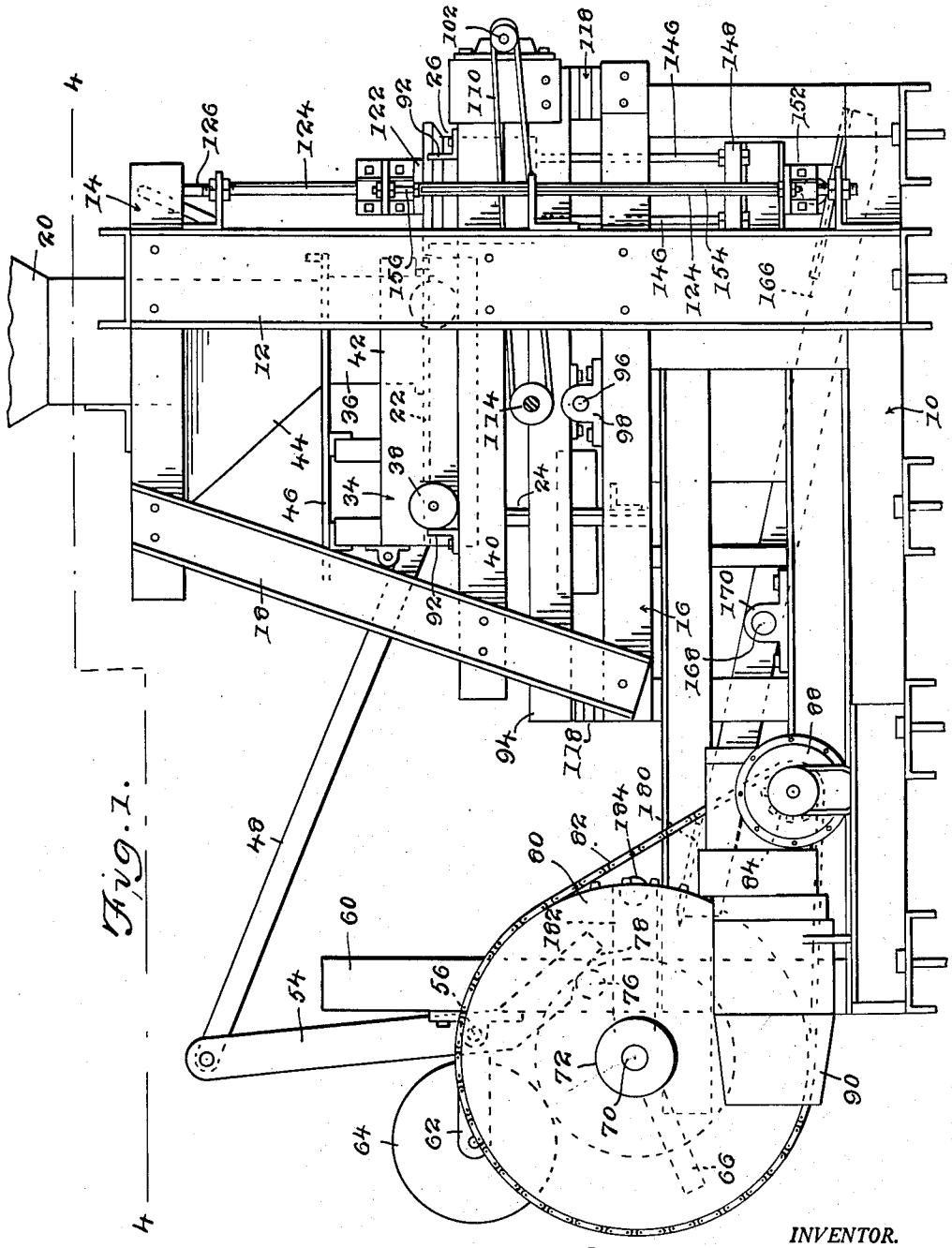


Fig. 1.

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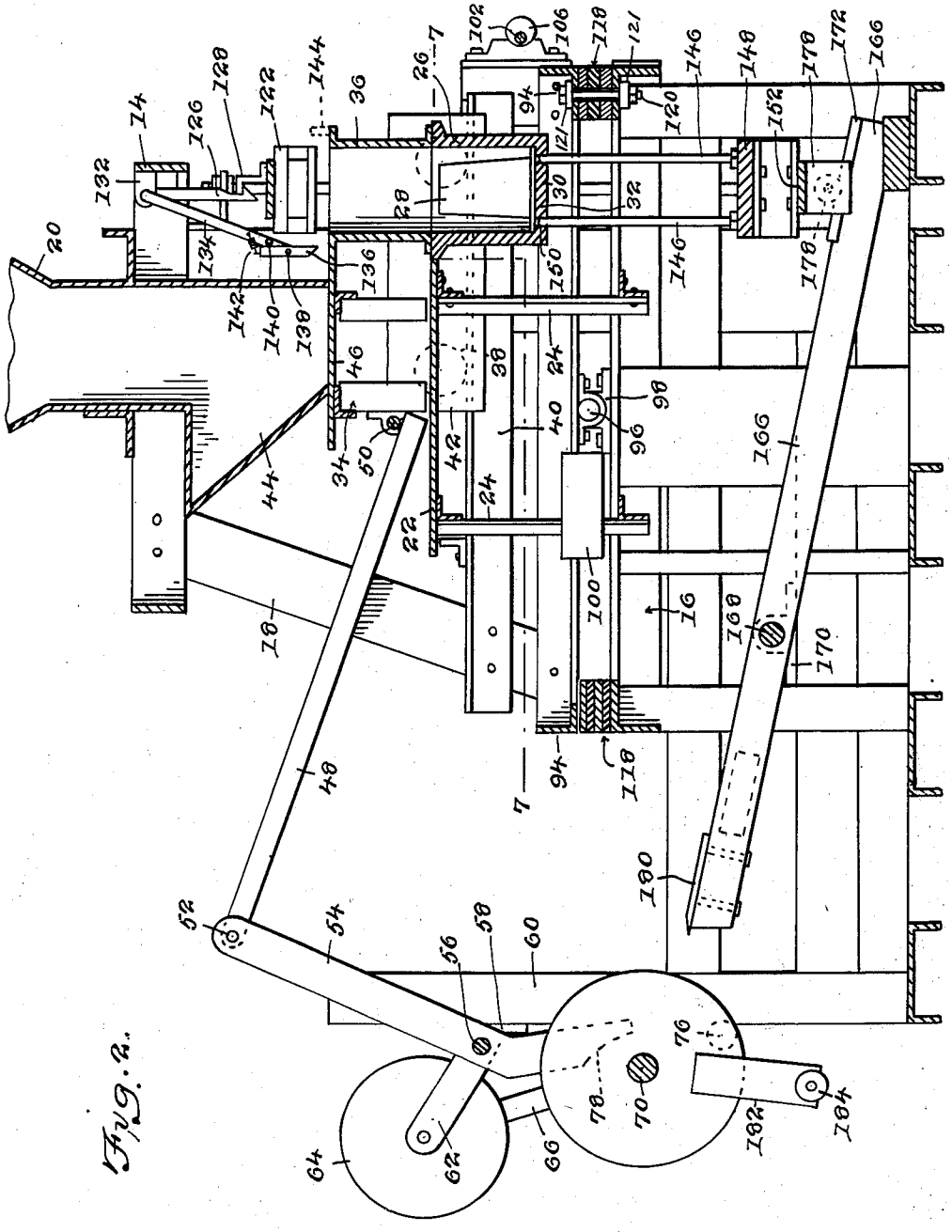


Fig. 2.

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BUILDING BLOCK FORMING MACHINE

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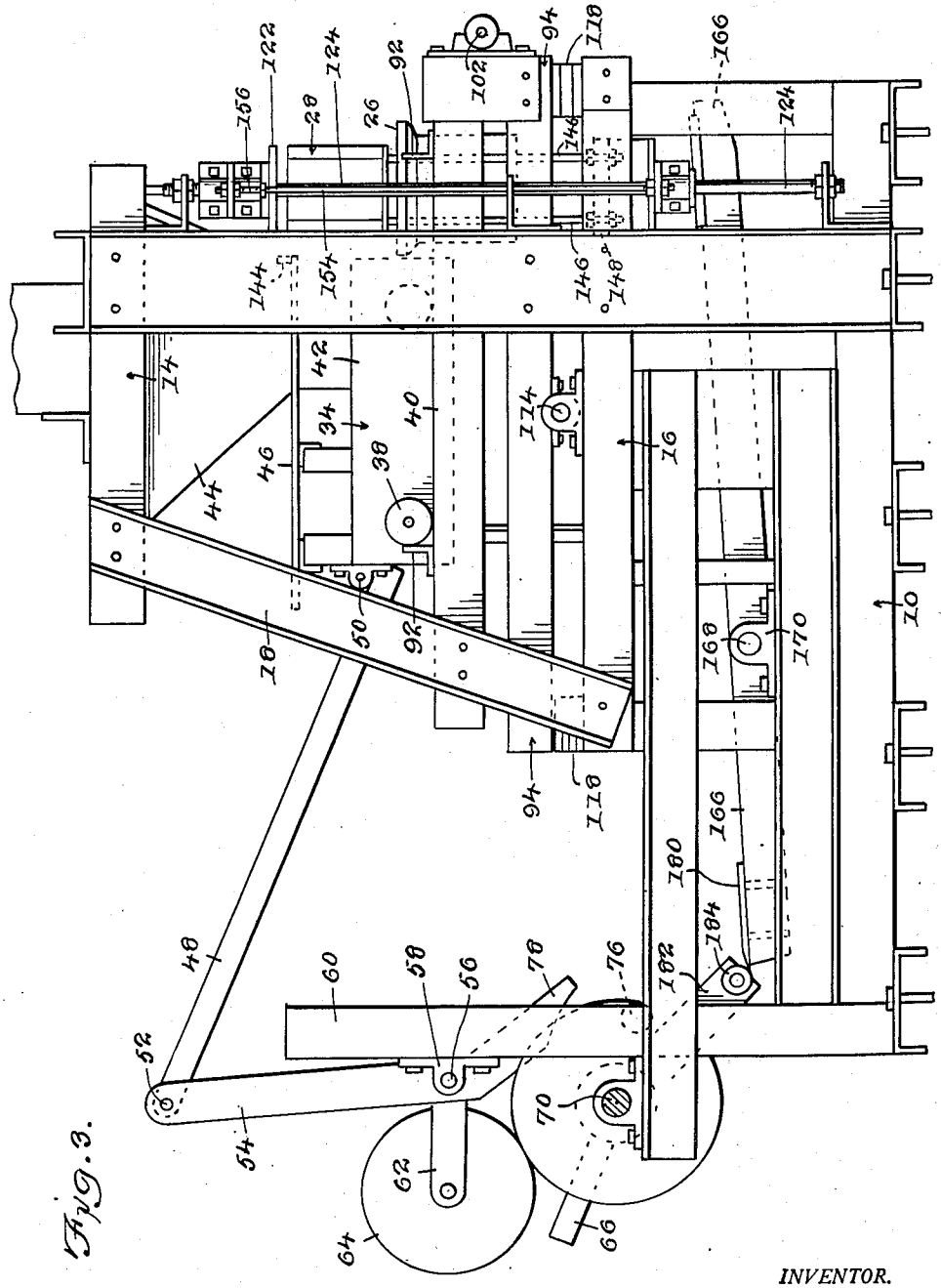


Fig. 3.

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BUILDING BLOCK FORMING MACHINE

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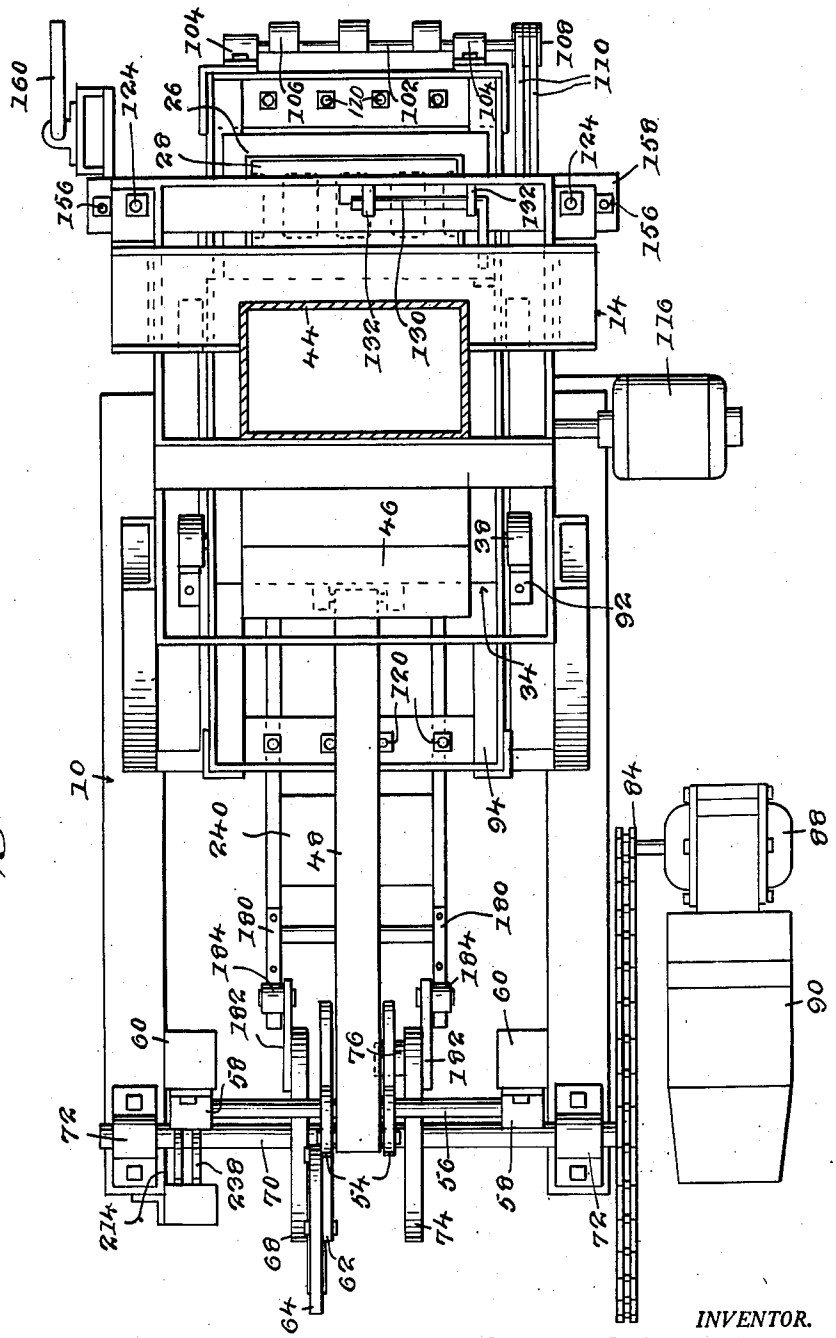


Fig. 4.

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BUILDING BLOCK FORMING MACHINE

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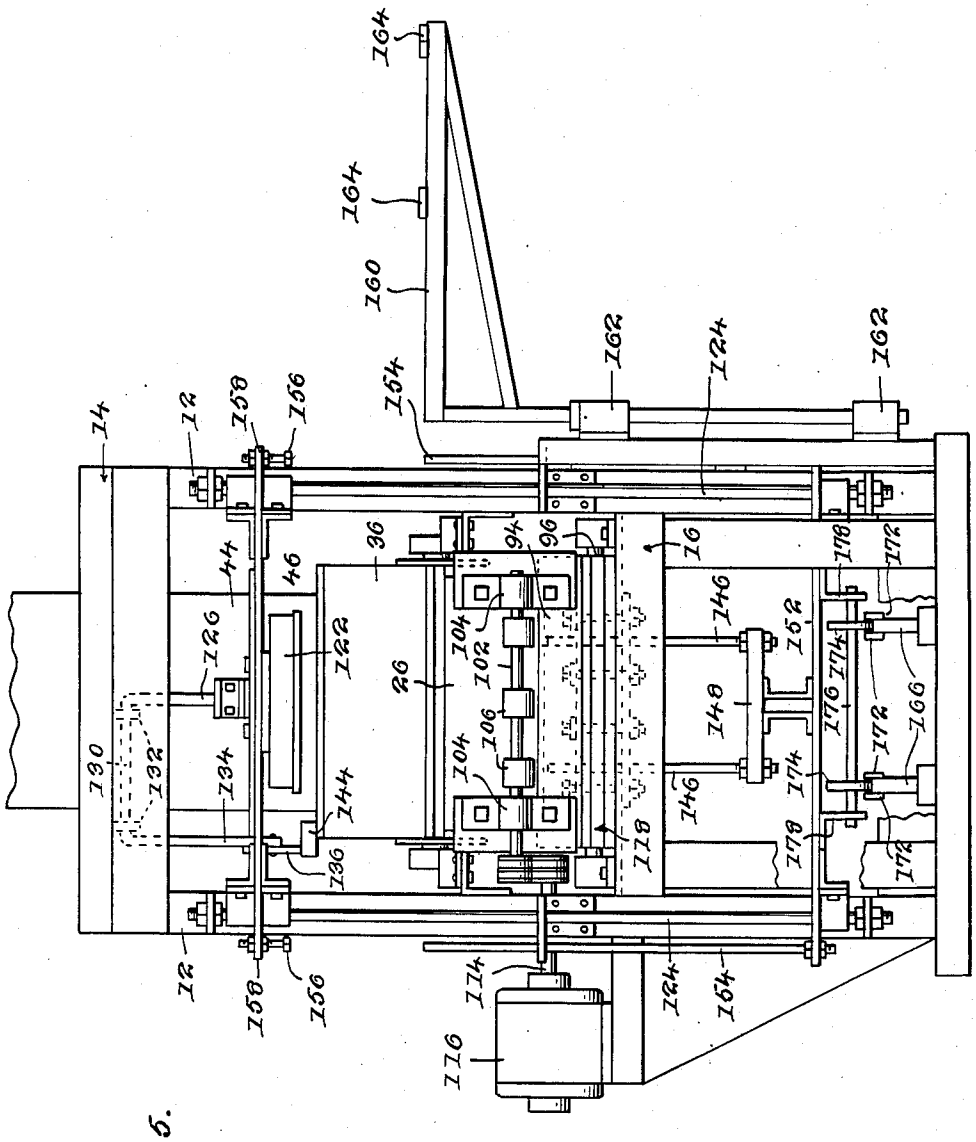


Fig. 5.

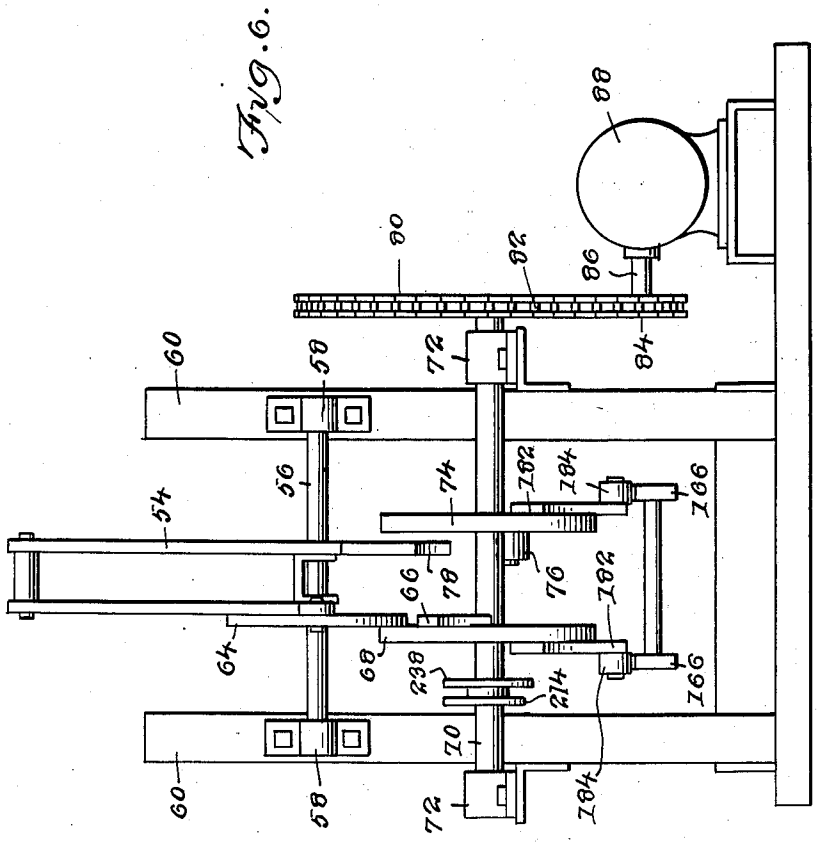
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BUILDING BLOCK FORMING MACHINE

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Fig. 6.



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BUILDING BLOCK FORMING MACHINE

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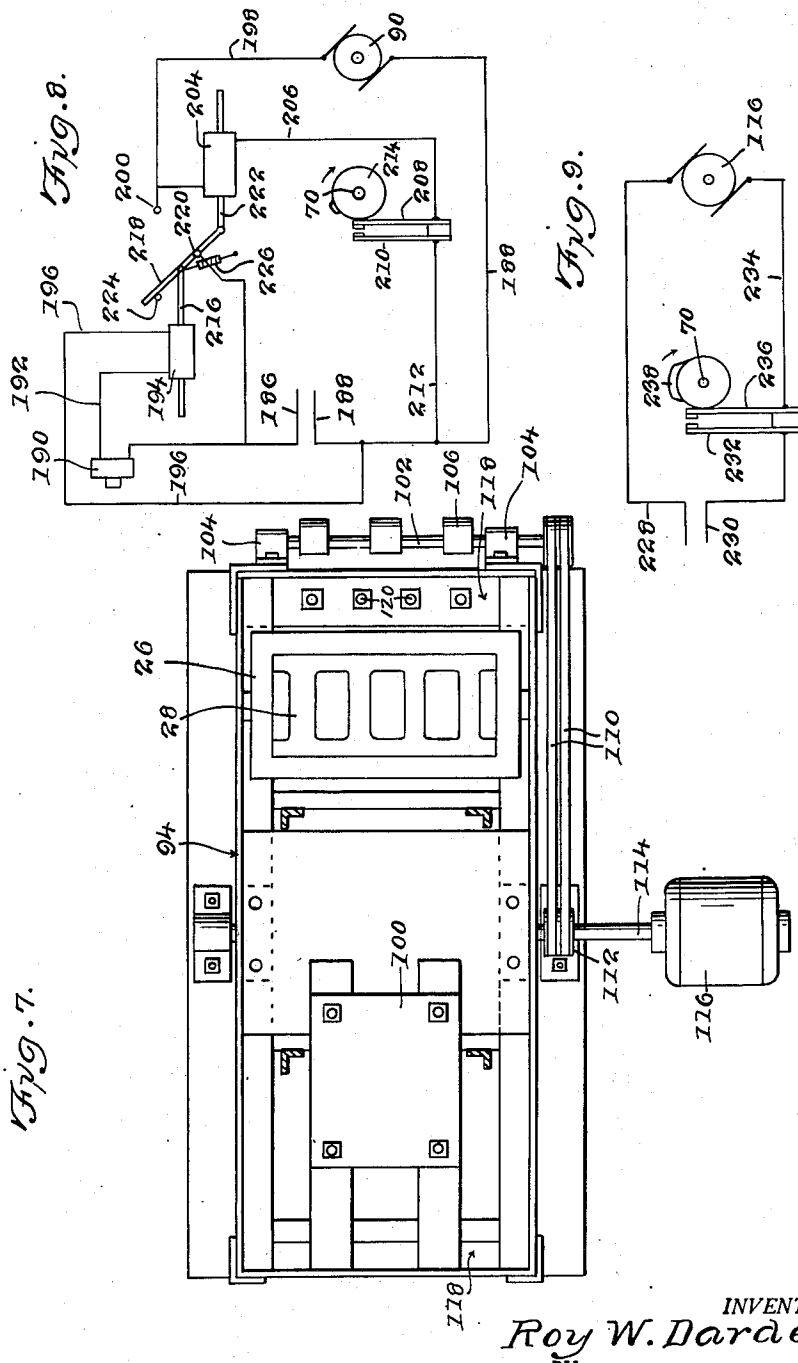


Fig. 7.

Fig. 8.

Fig. 9.

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Patented May 21, 1946 2,400,631

UNITED STATES PATENT OFFICE

2,400,631

BUILDING BLOCK FORMING MACHINE

Roy W. Darden, Atlanta, Ga.

Application October 4, 1943, Serial No. 504,938

9 Claims. (Cl. 25—41)

My invention relates to the manufacture of concrete blocks and has among its objects and advantages the provision of an improved block-forming machine embodying a novel vibration packer and a novel stripping mechanism for removing the finished block from the mold.

In the accompanying drawings:

Figure 1 is a side view of a machine in accordance with my invention;

Figure 2 is a vertical sectional view;

Figure 3 is a view similar to Figure 1 but with certain parts removed for the sake of clearness;

Figure 4 is a view taken from the position indicated by line 4—4 of Figure 1;

Figure 5 is a front view;

Figure 6 is a rear view of the rear end only of the machine;

Figure 7 is a view taken from the position indicated by line 7—7 of Figure 2;

Figure 8 is a diagrammatic view of the electric circuit for the motor operating a greater part of the machine; and

Figure 9 is a diagrammatic view of the electric circuit of the motor which operates the vibrating mechanism.

In the embodiment selected for illustration, I make use of a base frame 10 to which are connected upright channels 12 having a top frame 14 secured to the upper ends thereof. An intermediate frame 16 is mounted on the base frame 10, and diagonal frame members 18 are connected with the frame 16 and the upper frame 14 to afford additional support for the latter. The upper frame 14 carries a hopper 20 within which the concrete mix is deposited for delivery to the machine.

A table 22 is mounted on upright members 24 secured to the frame 16. Adjacent one end of the table 22 is located a block mold 26 for shaping the concrete blocks. The upper end of the block mold 26 lies in a plane flush with the upper face of the table 22. A core pallet 28 is placed in the block mold 26 for each block pouring. This pallet includes a plate 30 lying on the bottom 32 of the block mold and having close fitting engagement with the side walls of the mold.

A carriage 34 is provided with a spout 36 arranged to align vertically with the block mold 26 to drop a measured quantity of concrete into the mold. Figure 2 illustrates the spout 36 in vertical alignment with the block mold 26, the spout being of the same size and contour as the block mold.

The carriage 34 includes wheels 38 running on angles 40 secured to the frame structure of the machine, and the carriage also includes two depending side plates 42 having close fitting engagement with the two opposite side edges of the table 22. The concrete mix in the hopper 20 gravitates downwardly through a hopper spout 44 which may be opened and closed by a plate 46 having close fitting engagement with the lower end of the spout and comprising a fixed part of the carriage 34. Movement of the carriage 34 to the position of Figure 1 brings the spout 36 into vertical alignment with the hopper spout 44. Since the spout 36 opens through the plate 46 and moves as a unit therewith, positioning of the spout 36 in accordance with Figure 1 permits the concrete mix to flow into the spout 36. Since the lower end of the spout 36 has close fitting engagement with the table 22, the concrete mix is prevented from flowing out through the bottom of the spout and discharges therefrom only when the spout is moved to the position of Figure 2. The plate 46 provides a closure for the hopper spout except when the spout 36 is in communication therewith.

Means for reciprocating the carriage 34 comprises a beam 48 pivotally connected at 50 with the carriage 34 and at 52 with a beam 54 pivotally mounted on a shaft 56 carried in bearings 58 mounted on upright posts 60 at the rear end of the machine. An arm 62 is fixedly related to the beam and carries a roller 64 engageable by an arm 66 secured to a disk 68, see Figures 4 and 6, secured to a shaft 70 rotatably supported in bearings 72 attached to the posts 60. Engagement of the arm 66 with the roller 64 moves the carriage 34 to the position of Figure 2. Upon the shaft 70 is secured a second disk 74 provided with a roller 76 engageable with the edge 78 on the lower end of the beam 54 to return the carriage to the position of Figure 1.

To the shaft 70 is connected a large sprocket wheel 80 driven by a chain 82 passing around a small sprocket 84 driven by a shaft 86 of a speed reducer 88 operated by a motor 90, best illustrated in Figure 4. Stops 92 are mounted on the frame members 40 to positively limit further movement of the carriage 34 in either of its two extreme positions should the momentum thereof be sufficient to propel the carriage short distances beyond its limits. The stops are engaged by the wheels 38 of the carriage.

The block mold 26 is secured to a vibration frame 94 pivotally mounted intermediate its ends on a shaft 96 through the medium of bearings 98. One set of bearings is mounted on the frame 16 and the other set on the vibration frame 94.

While the block mold 26 is located at one end of the vibration frame 94, the latter is balanced by a weight 100 located on the opposite side of the shaft 96. Means for vibrating the frame 94 comprises a shaft 102 rotatably supported in bearings 104, see Figures 4 and 7, secured to the vibration frame. This shaft is provided with a plurality of weights 106 fixedly secured thereto with their greater masses located to one side of the axis of the shaft to impart vibratory motion thereto which is transmitted to the vibration frame through rapid rotation of the shaft.

Grooved wheels 108 are secured to the shaft 102 for connection with V belts 110 passing around grooved wheels 112 driven by the shaft 114 of a motor 116. I prefer to operate the motor 116 at 3400 R. P. M. Underneath the two ends of the vibration frame 94 are located cushioning devices 118 made up of alternate pieces of rubber and iron straps held together by bolts 120. The rear cushioning device 118 functions principally as a shimming means to provide a clearance of $^{25}/_{1000}$ of an inch with the vibration frame. At the front end of the vibration frame, the bolts 120 pass loosely through the aligned openings in the elements of that cushioning device and the vibration frame and the frame 16, and rubber washers 121 are mounted on the bolts between their heads and the vibration frame and between the lock nuts and the frame 16. These bolts are first tightened and then backed off $^{25}/_{100}$ of an inch.

The machine is so timed as to set the vibration frame 94 into motion as the spout 36 begins its movement over the mold form 26 so that the vibration effectively transfers the mix from the spout to the mold. The rapid vibration imparted to the mold causes the mix to pack firmly in the mold.

The carriage 34 is pulled rearwardly to position the spout 36 to one side of the mold 26 at which time a pressure head 122 drops into the upper end of the mold 26. The head 122 sinks approximately ½ inch in the mold 26, the mold being vibrated as the head falls into engagement with the mix. Vibratory motion ceases shortly after the head has fallen into pressure engagement with the mix.

The head 122 is slidably guided on two upright rods 124 and is normally held in the position of Figure 2 by a hook 126 engaging underneath a latch 128 fixed to the head. The hook 126 comprises a depending end of a shaft 130 rotatably mounted in bearings 132 attached to the frame 14. The shaft is provided with a second depending end portion 134 provided with a trip 136 pivoted at 138 on the end portion 134 and normally lies in the position of Figure 2 against a stop 140. A tension spring 142 yieldingly holds the trip in the position shown, which trip is located in the path of a projection 144 secured to the plate 46 to engage the trip and pivot the hook 126 out of holding engagement with the latch 128 as the carriage 34 moves from the position of Figure 2 to that of Figure 1.

With the head 122 at rest in the mold 26, the block therein is lifted from the mold through elevation of the core pallet 28. Rods 146 are attached to a head 148 and pass through openings 150 in the bottom of the mold 26 to engage the plate 30 and elevate the plate with the block thereon to a position clearing the upper end of the mold.

The head 148 is mounted on a bar 152 slidably guided on the two rods 124, and this bar is provided with two upright rods 154 arranged to engage pins 156 threaded into a member 158 to which the head 122 is fixedly connected. With the head 122 at rest in the mold 26, as in Figure 1, a slight upward movement of the two rods 154 brings the rods into engagement with the pins 156 for elevating the head to the position of Figure 2 to bring the head 122 into latched engagement with the hook 126. During such elevation of the head 122, the rods 146 lift the core pallet from the mold 26.

Figure 3 illustrates the core pallet 28 without the block in its elevated position, at which time the block laden pallet may be shifted onto a frame 160 pivoted in bearings 162 to rotate the frame to a position adjacent the block laden pallet and to bring the two bars 164 underneath the plate 30 to facilitate shifting of the block laden pallet onto the frame. The head 122 is elevated slightly above the block laden pallet, as in Figure 3, to permit free removal of the pallet and its block.

Means for elevating the member 148 to which the rods 146 and 154 are connected comprises parallel beams 166 pivotally mounted intermediate their ends on a shaft 168 supported in bearings 170. The beams 166 are provided with flanges 172 serving as guides for rollers 174 mounted loosely on a shaft 176 secured to brackets 178 attached to the member 148. Pivotal movement of the beams 166 from the position illustrated in Figures 1 and 2 to that of Figure 3 elevates the head 122 and lifts the block laden pallet from the mold 26.

The two beams 166 are connected as a unit and each is provided with a metal bar 180 at its end adjacent the shaft 70, see Figures 2, 4 and 6. Each of the disks 68 and 74 is provided with an arm 182 having a roller 184 arranged to engage one of the bars 180 to pivot the beam 166 for lifting the member 148 which carries the core pallet lifting rods 146 and the head lifting rods 154.

Figures 8 and 9 respectively illustrate the electric circuits of the motors 90 and 116. With respect to the circuit of Figure 8, the current supply lines are indicated at 186 and 188. A normally open switch 190 is interposed in the wire 186 and is connected with a wire 192 leading to a solenoid 194. The second wire 196 of the solenoid is lugged to the line wire 188. Wire 188 leads to the motor 90 and the second wire 198 of the motor 90 connects with a contact 200. Wire 198 is electrically connected with a second solenoid 204 and the second wire 206 of the solenoid 204 is electrically connected with a flexible contact 208 normally spaced from a companion contact 210 electrically connected with a wire 212 lugged to the wire 188. The contact 208 is electrically engageable with the contact 210 by a cam 214 attached to the shaft 70.

The armature 216 of the solenoid 194 is connected with a conductor 218 pivotally mounted at 220 and having one end connected with the armature 222 of the solenoid 204. Normally the conductor 218 rests on a stop 224 and is spring tensioned thereagainst by a tension spring 226 which yieldingly holds the conductor 218 in engagement with the stop 224 or the contact 200. The switch 190 is normally open. To set the machine in operation, the switch 190 is pressed to close the circuit through the solenoid 194 which pivots the conductor 218 into engagement with the contact 200. This sets the motor 90 in operation and the motor continues operating until the cam 214

rotates to a position for bringing the contact 208 into engagement with the contact 210 for closing the circuit through the solenoid 204. Such closing of the solenoid 204 pivots the conductor 218 back to its normal position of Figure 8 which breaks the circuit through the motor 90. The current supply wires 228 and 230 in the circuit of Figure 9 are respectively connected with the motor 116 and a contact 232. The second wire 234 of the motor 116 connects with a contact 236 arranged to engage the contact 232 by a cam 238 fixed on the shaft 70. The cam 238 controls the current supply to the motor 116 which operates the vibration frame 94.

From the foregoing description of the various parts of the device, the operation thereof will be readily understood. The cam 238 is so arranged on the shaft 70 as to set the vibration frame 94 in operation as the spout 36 begins its passage over the mold 26. As the mix is emptied into the mold 26, the carriage 34 is pulled back underneath the hopper spout 44. The head 122 is tripped just before the carriage 34 reaches its final position underneath the hopper spout. The vibration frame 94 continues its operation as the head 122 falls into the mold. At this time the cam 238 opens the circuit through the motor 116 to discontinue the vibrating action.

As the shaft 102, which carries the vibrating weights 106, loses its momentum, the beams 166 are engaged by the rollers 184 to elevate the lifting rods 146 and the head 122. The block laden pallet is lifted slowly from the mold 26. With the block laden pallet clear of the mold, the pallet and block are shifted onto the frame 160, and the beams 166 and the member 148 drop to their normal positions of Figure 2.

The rods 154 engage the pins 156 slightly prior to engagement of the rods 146 with the plate 30 to lift the head 122 approximately ¼ inch clear of the block on the pallet to remove contact between the block and the head during the block lifting period. As the head 122 is elevated to its position of Figure 2, the head is latched in this position and the cam 214 is brought into engagement with the contact 208 to open the circuit through the motor 90 and stop the machine until the switch 190 is again manually closed. A weight 240 is fixedly connected with the two beams 166 to counterbalance some of the weight of the block and head lifting structure and to relieve the load on the motor 90.

Without further elaboration, the foregoing will so fully illustrate my invention, that others may, by applying current knowledge, readily adapt the same for use under various conditions of service. Manifestly the invention is susceptible of modification in other respects than described, and right is herein reserved to such other modifications as fall within the scope of the protection prayed.

I claim:

1. In a building block forming machine, the combination of a block mold, means for feeding a predetermined quantity of plastic block material into the mold, a horizontal support pivotally supported intermediate its ends and having said mold mounted thereon on one side of its pivotal axis and counterbalanced upon the opposite side of the pivotal axis, rotary means on said support for vibrating the latter and said mold to pack the plastic block material, and means for removing the packed block from the mold.

2. In a building block forming machine, the combination of a vibrating block mold having openings in its bottom, a pallet removably resting on said bottom, a horizontal support pivotally supported intermediate its ends and having said mold mounted thereon on one side of its pivotal axis and counterbalanced upon the opposite side of the pivotal axis, rotary means on said support for vibrating the latter and said mold to pack the plastic block material, and means movable in said openings for engaging the pallet and lifting the latter and the packed block from the mold.

3. In a building block forming machine, the combination of a vibrating block mold having an opening in its bottom, a pallet removably resting on said bottom, means for feeding a predetermined quantity of plastic block material into the mold and upon said pallet, a weight movable into engagement with the plastic block material in the mold, a pivoted support for the mold, rotary means on said pivoted support for vibrating the latter and said mold to pack the plastic block material, means movable in said opening for engaging the pallet and lifting the latter and said packed block from the mold, and means movable with said last-mentioned means to elevate said weight clear of the mold and the packed block.

4. In a building block forming machine, the combination of a hopper for a plastic block material having an open lower end, a stationary table located underneath the open end of the hopper and spaced therefrom, a block mold located at one end of said table and having an open upper end lying flush with the table, a track, a carriage movable on said track and having a spout provided with upper and lower open ends, said spout having its lower end resting on said table to be closed thereby and its upper end in registration with the open end of the hopper and engaging the hopper, a pair of rotatable discs, an arm carried by one disc, a roller carried by the other disc, a pair of pivoted beams connected with the carriage, a roller on one beam engaging the arm on one disc for moving said carriage to position the spout in registration with the open upper end of said mold to deposit a predetermined quantity of plastic block material in the mold, said carriage being provided with a plate closing the open end of the hopper when said spout is moved out of registration therewith, the roller on the other disc engaging the beam pivoted to the carriage for moving said carriage to alternately position said spout in registration with the lower end of the hopper and said mold, a core pallet removably contained in the mold and lying on its bottom, said mold being provided with openings in its bottom, a normally elevated weight, a latch means for supporting said weight, said carriage being provided with a trip engageable with said latch to release the weight upon return of the carriage to position said spout in registration with the hopper, said weight being guided to fall upon the block material in said mold, means for vibrating the mold to pack the fluid block material, means movable in said openings to engage the pallet and elevate the latter and the packed block thereon to a position clear of the mold, and means movable with said last-mentioned means to elevate said weight into latched engagement with said latch means.

5. In a building block forming machine, the combination of a hopper for a plastic block material having an open lower end, a stationary ta-

ble located underneath the open end of the hopper and spaced therefrom, a block mold located at one end of said table and having an open upper end lying flush with the table, a track, a carriage movable on said track and having a spout provided with upper and lower open ends, said spout having its lower end resting on said table to be closed thereby and its upper end in registration with the open end of the hopper and engaging the hopper, means for moving said carriage to position the spout in registration with the open upper end of said mold to deposit a predetermined quantity of plastic block material in the mold, said carriage being provided with a plate closing the open end of the hopper when said spout is moved out of registration therewith, means for moving said carriage to alternately position said spout in registration with the lower end of the hopper and said mold, a core pallet removably contained in the mold and lying on its bottom, said mold being provided with openings in its bottom, a normally elevated weight, a latch means for supporting said weight, said carriage being provided with a trip engageable with said latch to release the weight upon return of the carriage to position said spout in registration with the hopper, said weight being guided to fall upon the block material in said mold, a horizontal support pivotally supported intermediate its ends and having said mold mounted thereon to one side of the pivotal axis of the support, said support being counterbalanced upon the opposite side of its pivotal axis, a rotary shaft having unbalanced weight means mounted thereon and rotatably supported on said support to vibrate the latter and said mold through rotation of the shaft and the weight means, means for rotating said shaft and the weight means, means movable through said openings for engaging the pallet and lifting the latter and the packed block from the mold, and means movable with said last-mentioned means for elevating said first-mentioned weight into latched engagement with said latch means.

6. The invention described in claim 1 wherein resilient bumpers are provided for said horizontal support.

7. The invention described in claim 1 wherein said rotary means comprises a shaft and unbalanced weights fixed to the shaft.

8. The invention described in claim 1 wherein a motor is provided for operating said rotary means and in which a second motor is operatively connected with said last-mentioned means, and switches respectively controlling said first and second motors to respectively open the circuit of the motors in a predetermined timed order, a shaft having cams for actuating said switches and driven by one of said motors, and a manual switch for setting the said one of said motors into operation.

9. The invention as defined in claim 5, wherein the means for moving the carriage comprises a pair of discs, means for rotating the discs, a roller carried by one disc, an arm carried by the other disc, a beam pivoted to the carriage, a second beam pivoted to the first beam, an arm on the second beam, and a roller carried by the arm engaging the arm on the disc to indicate the carriage in one direction, and the roller on the other disc engaging the second beam to actuate the carriage in the reverse direction.

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