March 4, 1930. V. DAHL 1,749,375

CINDER BLOCK MACHINE

Filed Aug. 26, 1927 4 Sheets-Sheet 1

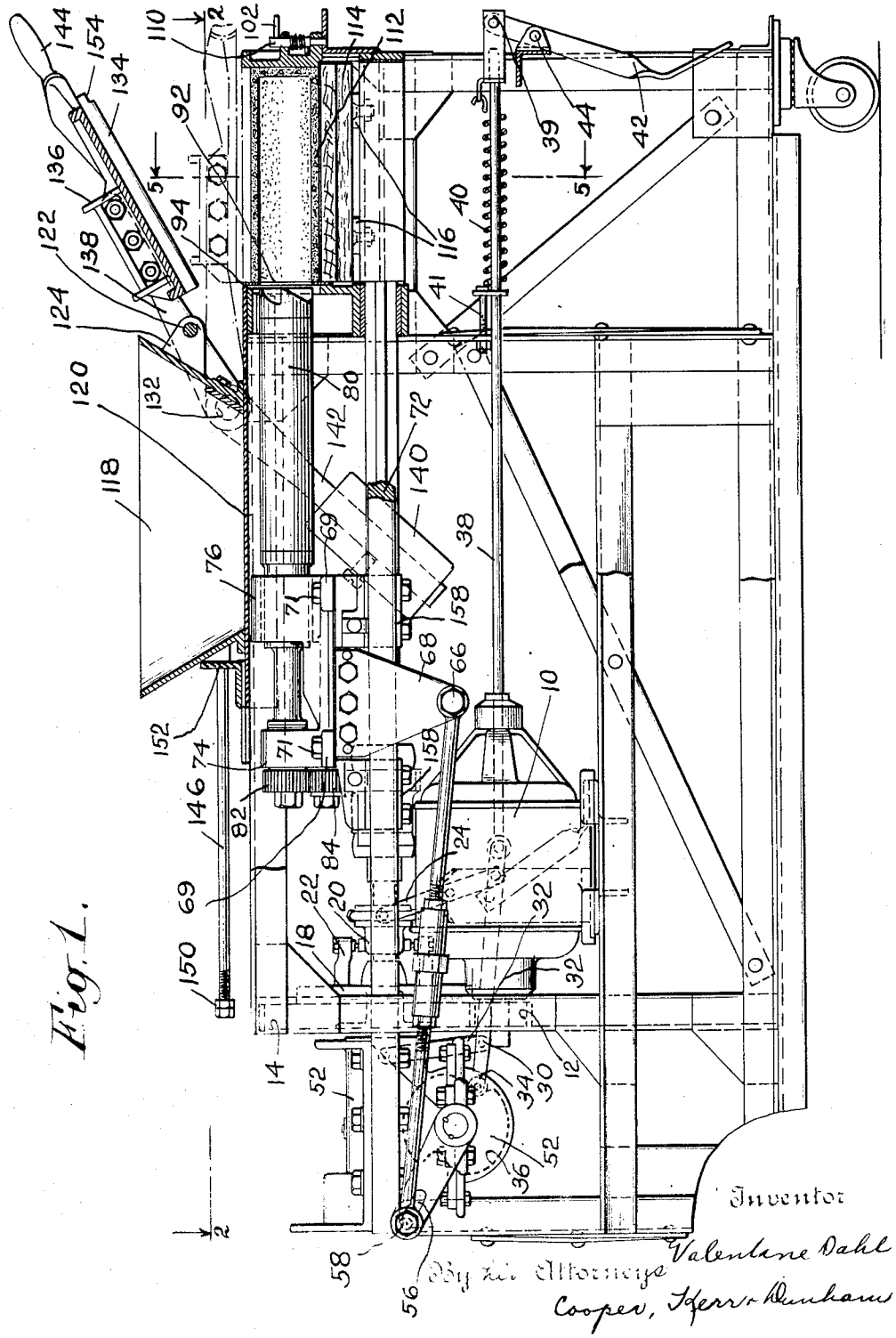


Fig. 1.

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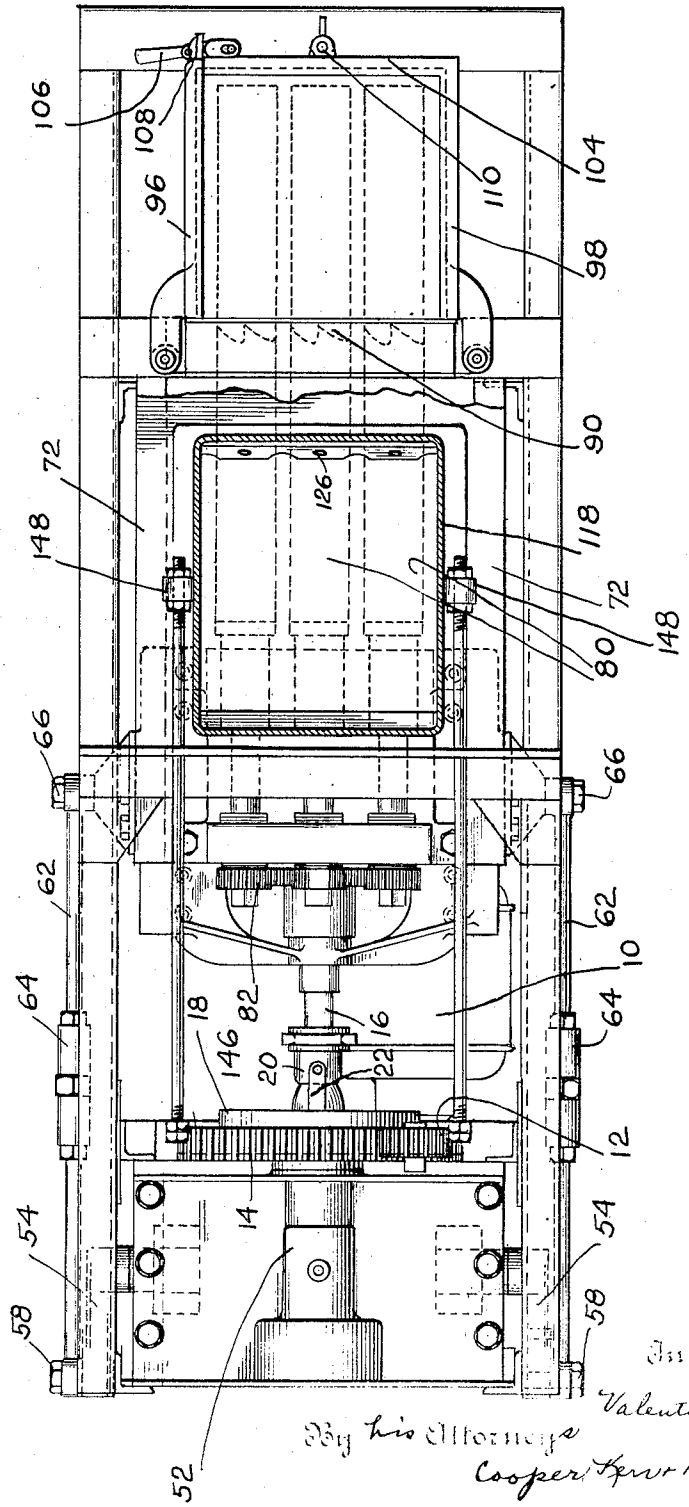


Fig. 2.

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CINDER BLOCK MACHINE

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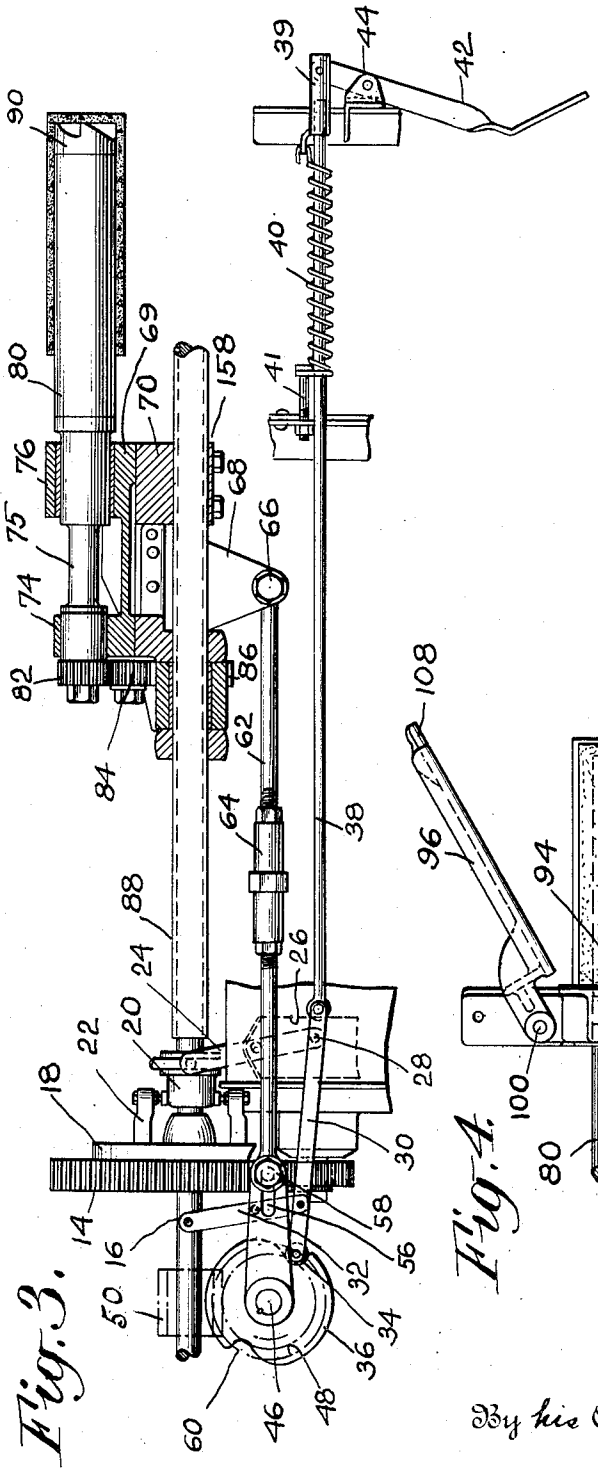


Fig. 3.

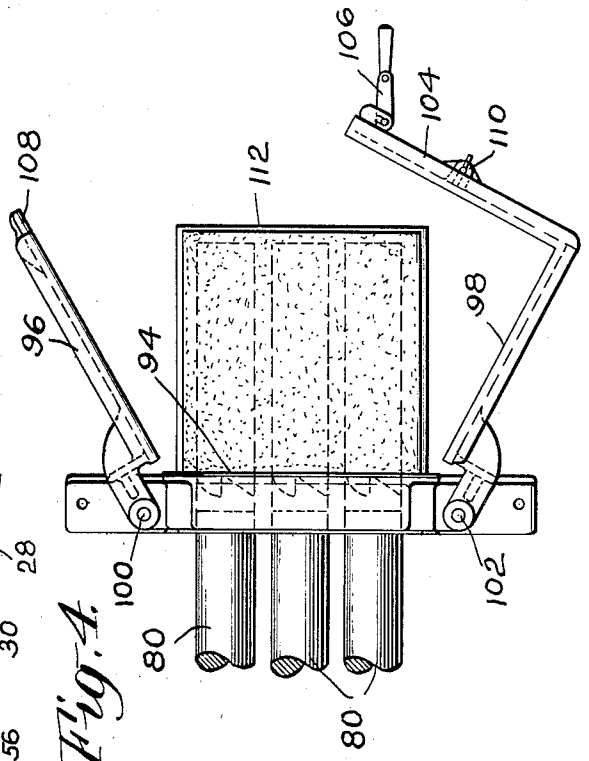


Fig. 4.

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CINDER BLOCK MACHINE

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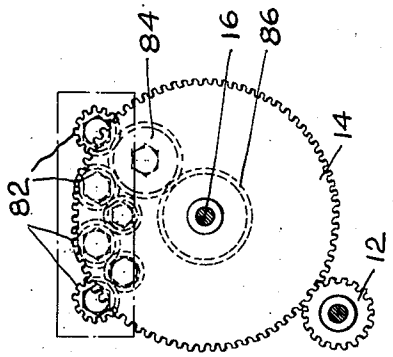


Fig. 8.

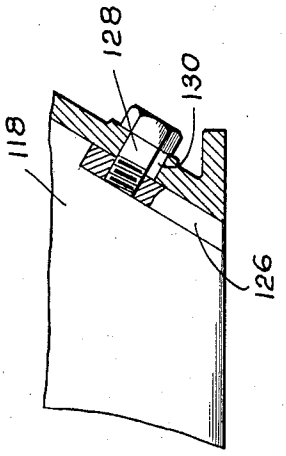


Fig. 7.

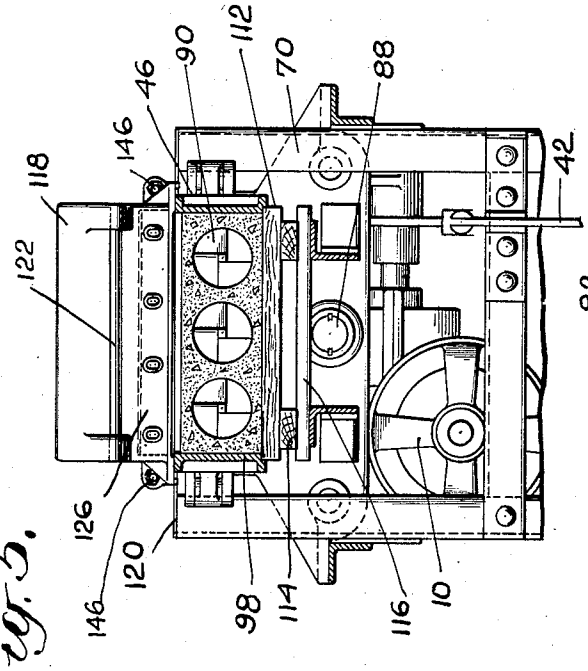


Fig. 5.

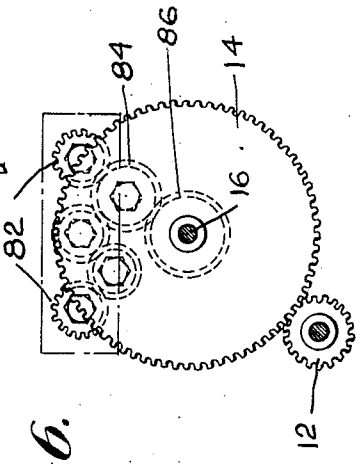


Fig. 6.

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Patented Mar. 4, 1930

1,749,375

UNITED STATES PATENT OFFICE

VALENTINE DAHL, OF WOODHAVEN, NEW YORK

CINDER-BLOCK MACHINE

Application filed August 26, 1927. Serial No. 215,539.

This invention pertains to machines for making hollow concrete blocks for building purposes, especially blocks composed of cinder concrete. A machine for that purpose is described in my copending application Serial No. 20,029, filed April 2, 1925, which has become Patent No. 1,656,097, and the object of the present invention is to improve the design of that machine whereby it is adapted for more rapid and efficient operation.

To these and other ends the invention comprises the novel features and combinations of elements hereinafter described and shown in the drawings which by way of illustration show what is now considered to be the preferred form of the invention.

In the drawings,

Fig. 1 is a side view of the machine partly in section.

Fig. 2 is a top plan view on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged detail view showing plungers and method of operating them.

Fig. 4 shows details of the mold.

Fig. 5 is an end view of the machine on the line 5—5 of Fig. 1.

Fig. 6 is a detail view showing method of driving three plungers.

Fig. 7 is a detail view of the scraper.

Fig. 8 is a detail view showing method of driving four plungers.

In general, the purpose of the machine is to make hollow blocks of uncompacted concrete and with thin walls, whereby the blocks are of unusually light weight. This is accomplished by filling a mold with uncompacted concrete and running a number of rotary plungers through the concrete in the mold to form cavities therein. The advancing ends of the plungers are so shaped as to form the cavities without appreciably compacting the concrete, by forcing the displaced material upwardly through the open top of the mold where it is subsequently scraped off.

The plungers are rotated while being retracted from the cavities they have formed. During the retracting operation a so-called "pressure plate" is held in place on top of the newly formed block or tile in the mold. The rotation of the plungers while being withdrawn serves to burnish the surfaces of the newly formed cavities, thereby adding to their ability to resist collapse and permitting the making of blocks with thinner walls than would otherwise be possible.

The frame of the machine comprises structural steel shapes bolted and riveted together to properly support the working parts. The structure is preferably mounted on wheels for easy portability.

Mounted on the frame is an electric motor 10 which runs constantly while the machine is in operation. On the motor shaft is a pinion 12 in mesh with a gear 14 mounted for free rotation on shaft 16 extending lengthwise of the machine above the motor. Thus, gear 14 turns constantly while the motor is running but shaft 16 is stationary except while clutch 18 is engaged. The clutch is so arranged that when cone 20 is pushed to the left (Figs. 1 and 3) thus forcing arms 22 apart, clutch 18 couples gear 14 and shaft 16 together and they turn in unison until cone 20 is shifted to the right again, whereupon shaft 16 again comes to rest.

Clutch cone 20 is actuated as above by a lever 24 pivoted on a bracket 26 fast to the frame. The lower end of lever 24 is pinned at 28 to a substantially horizontal link 30 which is supported for endwise motion by the aforesaid lower end of lever 24 and by a link 32 parallel to lever 24 and pinned at its lower end to link 30 and at its upper end to the frame. The left end of link 30 carries a roller 34 bearing on the surface of cam 36, while the right end is connected by a pin joint to a horizontal rod 38 which is connected at its other end, through a yoke 39 to the upper end of a lever 42 pivoted to the frame at 44. The lower end of lever 42 forms a pedal so located as to be conveniently reached by the foot of the operator. Spring 40, anchored to the frame by threaded bolt 41, draws rod 38 constantly to the left.

Cam 36 is keyed to a cross shaft 46 which is rotated by a worm gear 48 driven by a worm 50 on shaft 16.

The worm and gear are enclosed in a housing 52 (Fig. 2). Keyed to each end of cross

shaft 46 is a crank arm 54, one at each side of the machine. Arms 54 are slotted as at 56 whereby the crank pin 58 may be moved to different settings for the purpose of adjusting the effective lengths of the crank arms.

By reference to Fig. 3 the operation of the above described mechanism will be readily understood. With motor 10 running and gear 14 rotating, the operator, with his foot, pushes the lower end of lever 42 to the left, whereupon the upper end of the lever moves in the opposite direction, drawing rod 38 and link 30 to the right against spring 40. This movement of link 30 moves clutch cone 20 to the left and couples gear 14 to shaft 16 causing it to rotate with gear 14, and rotating shaft 46, cam 36, and cranks 54. As soon as cam 36 has turned sufficiently from its home position so that a concentric portion of the cam is opposite roller 34 the operator removes his foot from the pedal and roller 34 contacts with the cam. So long as roller 34 engages the concentric rim of the cam, clutch 18 is held in engagement, but when the roller drops into one of the recesses 60 of the cam, cone 20 is drawn to the right, clutch 18 is disengaged, and the rotation of shafts 16 and 46 ceases.

There are two recesses 60 at diametrically opposed points on the cam, so located that roller 34 is in one recess when cranks 54 are extended horizontally to the right and in the other recess when the cranks are extended horizontally to the left.

As a result of the above arrangement the machine always stops with crank pins 58 at one or the other of their extreme horizontal positions. Then after pedal 42 is momentarily actuated, shaft 46 makes half a revolution and stops with pins 58 in their other extreme position. The next depression of the pedal causes the crank to turn through another half revolution, and so on.

Connected to each crank pin is a connecting rod 62. Each rod is provided with a turnbuckle 64 by means of which the length of the rod may be adjusted. The free end of each rod 62 is connected to a pin 66 set into a downwardly projecting extension 68 of a carriage 70 mounted for reciprocation on the square bars 72 which form part of the frame of the machine. Each half-revolution or stroke of cranks 58 moves carriage 70 on guides 72 from one end of its stroke to the other. The upper part of carriage 70 comprises a removable portion 69 secured by bolts 71.

Mounted for rotation in bearings 74 and 76 of carriage 70 are a plurality of plungers 80. Keyed to the rear end of each plunger is a pinion 82 driven through intermediate gears 84 by pinion 86 which is splined to the enlarged portion 88 of shaft 16 so that plungers 80 are rotated whenever shaft 16 turns, regardless of the position of carriage 70.

In Figs. 6 and 8 are shown detail arrangements of gears suitable for driving groups of three or four plungers. The outer end of each plunger 80 is provided with a so-called "cutter" 90, which is detachable.

When the plungers are moved to the right they pass through closely fitting circular openings 92 in vertical plate 94 which serves as one wall of the mold in which the concrete block is formed. The other three side walls of the mold are arranged as shown in Fig. 4. Side walls 96 and 98 are hinged at 100 and 102 on a cross member of the frame. The front wall 104 is integral with side wall 98. When the mold is closed the adjoining ends of walls 96 and 104 are locked together by latch 106 on wall 104, which engages lug 108 on wall 96, as shown in Fig. 2, and wall 104 is secured in position by spring-retained dowel pin 110 (Fig. 1) which enters a hole in the machine frame.

Preparatory to forming a block a wooden pallet 112 is placed in position underneath the mold. The pallet is a flat board with two or more cross strips 114 on its under side. These strips are laid on the transverse metal bars 116 which extend across the machine. The top of the pallet is at such height that the mold walls may be closed above it without leaving appreciable space between walls and pallet.

Slidably mounted on top of the machine frame is a shallow hopper 118. As shown in Fig. 1 the hopper is resting on the wide steel plate 120, which abuts plate 94 at the right and extends toward the left of the machine past the hopper. For the convenience of the operator a round horizontal cross bar 122 is supported at the front of the hopper by lugs 124 cast on the hopper, one toward each side thereof. Across the inside front edge of the hopper is secured a hardened scraper knife 126, best shown in Fig. 7. Knife 126 is held in place by screws 128 through slotted holes 130 in the wall of the hopper so that the knife may be adjusted vertically. When plate 94 wears away due to the action of the scraper the plate may be replaced.

Pivotally supported above the hopper, by studs 132 at each side of the machine, is a presser plate 134. The presser plate is mounted on a frame 136 which in turn is adjustably carried by side arms 138 so that plate 134 may be aligned to enter the top of the mold. The pressure plate structure is counterbalanced by a weight 140 on an arm 142 so placed that the presser plate will normally stand above the hopper and not interfere with the back and forth movement thereof. Extending radially from the front corners of frame 136 are handles 144 for the use of the operator in manipulating the presser plate.

In the operation of the machine an operator places enough concrete on plate 120 within hopper 118 to fill the mold. He then, by means of handle 122, draws the hopper to the

right along plate 120 until the bottom opening of the hopper coincides with the top of the mold. For his convenience in so locating the hopper a stop gage is provided which comprises steel rods 146 tapped into a boss 148 on the side of the hopper and extending horizontally toward the rear of the machine. The outer end of rod 146 is provided with adjustable lock nuts 150 so positioned that when they contact with angle 152, fast on the frame, hopper 118 is then in proper position with reference to the mold.

After the hopper has been drawn forward as above described, the mold is full of uncompacted concrete and plungers 80 are in substantially the position shown in Fig. 1. The operator then presses pedal 42, whereupon as previously described the machine will start. The plungers will advance, rotating, through the material in the mold and will come to rest, when they reach their limit of travel into the mold. While the plungers were advancing the cutters 90 were pushing the concrete aside to form cavities of the desired shape, all surplus material being pushed out of the top of the mold into the hopper. Cutters 90 are so shaped as to push the displaced material aside with only sufficient force to insure the filling of all corners of the mold with concrete, the force not being sufficient to appreciably compact the concrete.

After the advancing plungers have come to rest, and while they are still in the mold, the hopper is pushed back to its normal position, during which operation knife 126 scrapes all surplus material from the top of the mold to be carried back by the hopper on to plate 120. The mold is then level full of concrete. Then the operator draws down the presser plate, which enters the top of the mold until stop 154 contacts with the top of the mold. The presser plate enters the mold sufficiently so that the top portion of the newly formed block will be compacted to the same slight degree as the bottom portion of the block was compacted by the plungers.

The operator then presses pedal 42 again and the cranks 54 make another half revolution, withdrawing the plungers, rotating, from the mold while the presser plate is still held in position on the mold. The plungers are then back at their original positions, substantially as in Fig. 1.

Th rotating of the plungers while being withdrawn from the mold serves the very important purpose of polishing or burnishing the insides of the cavities in the mold thereby strengthening and stiffening the walls of the cavities without adding material thereto, and permitting the manufacture of blocks with thinner walls than would otherwise be possible.

The mold is then opened, the pallet and newly formed block are removed, a new pallet is placed in position, and the operation repeated.

By adjusting the effective lengths of cranks 54 and of connecting rods 62 as previously described, the plungers may be made to enter the molds any desired distance, thereby leaving an end wall of any desired thickness, or no thickness at all.

If cavities of different diameters are desired in the block, plungers 80 are changed to the desired diameters and plate 94 is replaced by a plate having holes 92 to fit the new plungers.

When the machine is in operation, carriage 70 is prevented from rising from its guides by means of plates 158 attached to the carriage and extending under guide bars 72. By removing bolts 71 the upper section 69 of the carriage, and the entire assembly of plungers, gears, etc., may easily be removed and replaced by a different section 69 which carries a different number or arrangement of plungers. For instance the set of three plungers in Fig. 6 may be replaced by the set of four in Fig. 8. Pinion 86 would remain in place but each carriage would have its own set of gears 82 and 84 as well as its own plungers.

It is evident that the machine may be constructed to reciprocate the mold relatively to the plungers instead of reciprocating the plungers into and out of the mold, but the latter design is preferred and has therefore, been illustrated and described.

It is to be understood that the invention is not limited to the specific construction herein illustrated and described but can be embodied in other forms without departure from its spirit, as set forth in the following claims.

I claim—

1. In a machine of the class described, in combination, a block mold, a plunger, means for imparting advancing and retracting strokes to said plunger to move it into and out of said mold, settable means for adjusting the lengths of said strokes, and settable means for adjusting the positions of said strokes relatively to said mold.

2. The invention set forth in claim 1 in which said first settable means comprises an adjustable crank arm and said second settable means comprises a connecting rod adjustable as to length and cooperating with said crank arm.

3. In a machine of the class described, in combination, a block mold, a carriage, a plunger supported for rotation on said carriage, a first shaft, a second shaft, a clutch operable to start or stop rotation of said shafts, a crank on said first shaft whereby said carriage is reciprocated relatively to said mold, and gears connecting said second shaft to said plunger whereby said plunger is rotated only when said clutch is engaged to rotate said first shaft.

4. The invention set forth in claim 3 in

which said first shaft actuates said carriage by means of a crank and connecting rod, and in which said second shaft drives the gears on said carriage by means of a pinion splined on said second shaft.

5. In a machine of the class described, in combination, a block mold, a plunger, means for advancing said plunger axially into said mold, means for rotating said plunger while it is being advanced, means comprising a clutch under control of the operator for starting said advancing and rotating means into operation, a cam device for disengaging said clutch when said plunger has reached a predetermined position in said mold, means under control of the operator for retracting said plunger from said mold and for rotating said plunger while it is being retracted, and a cam device for stopping the movement of said plunger when it has been retracted from said mold.

In testimony whereof I hereto affix my signature.

VALENTINE DAHL.