Jan. 20, 1942. H. A. WELLNITZ 2,270,829

MACHINE FOR FORMING BUILDING BLOCKS

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Fig. 1.

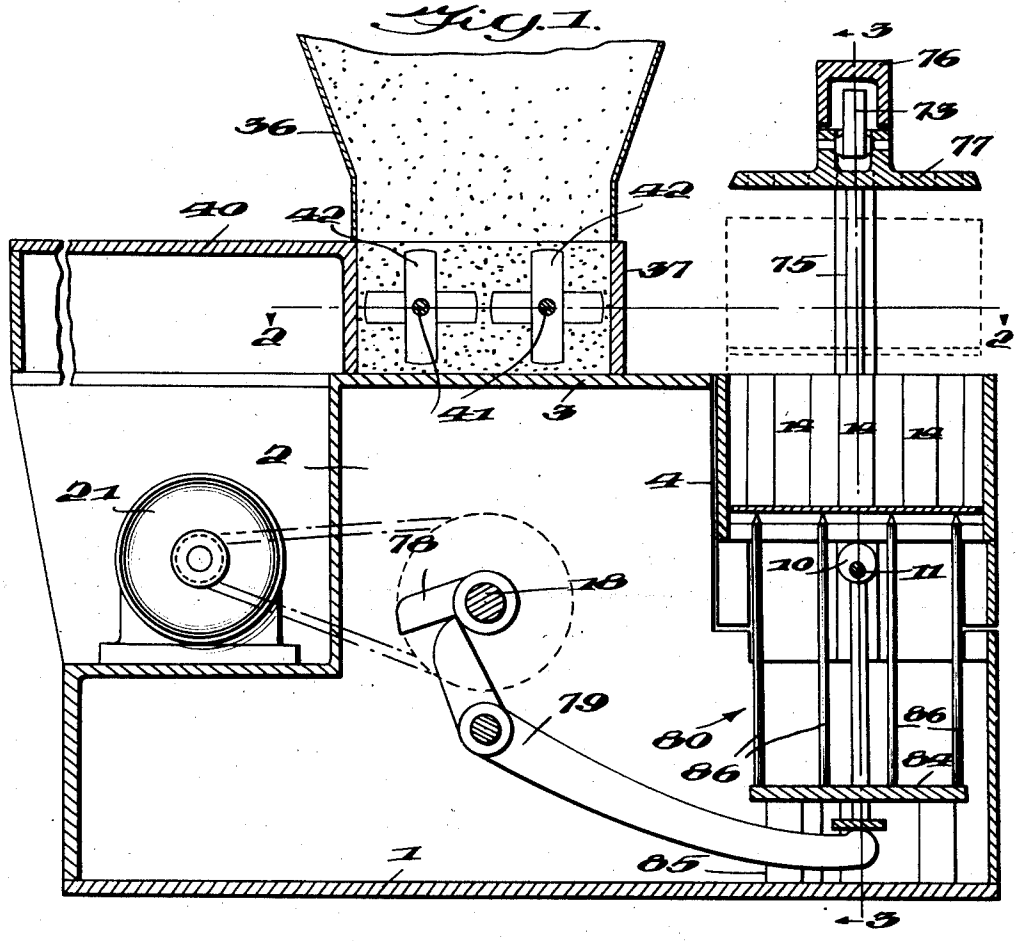

Fig. 4.

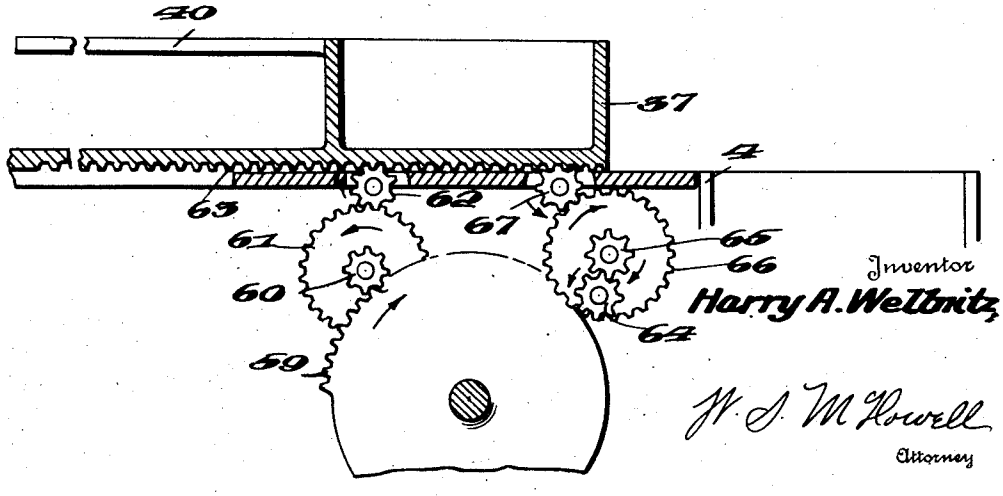

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Fig. 2.

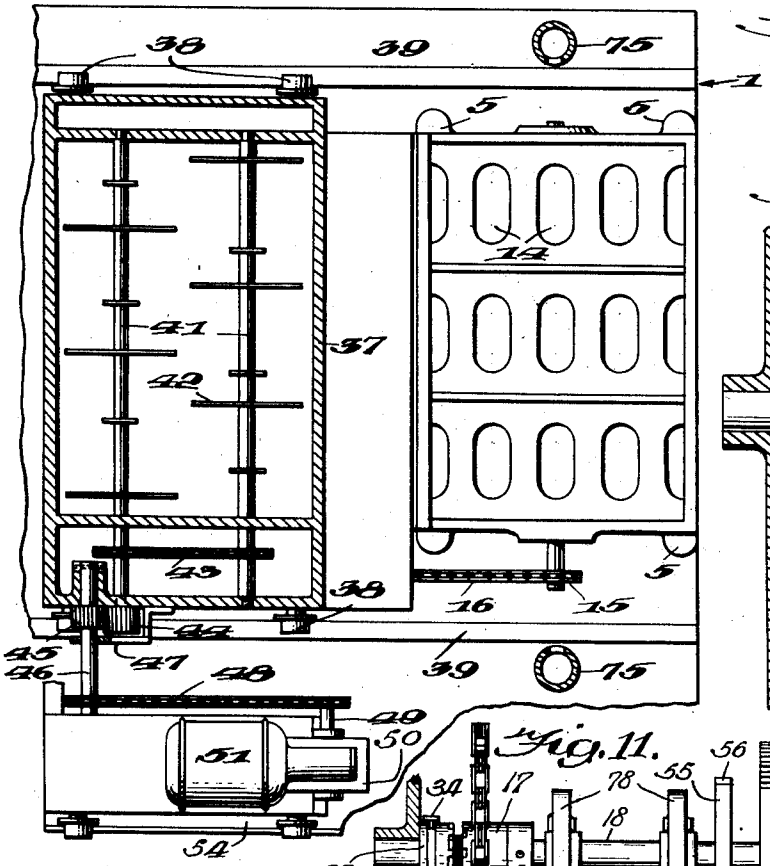


Fig. 9.

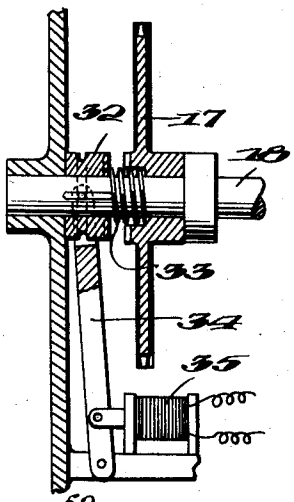


Fig. 11.

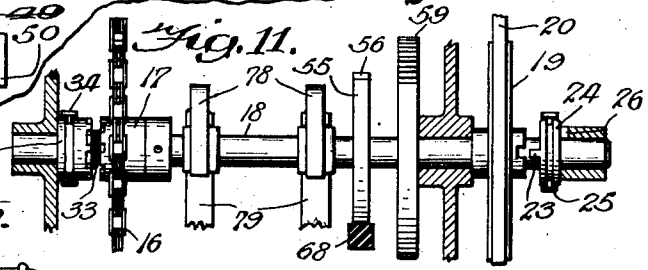
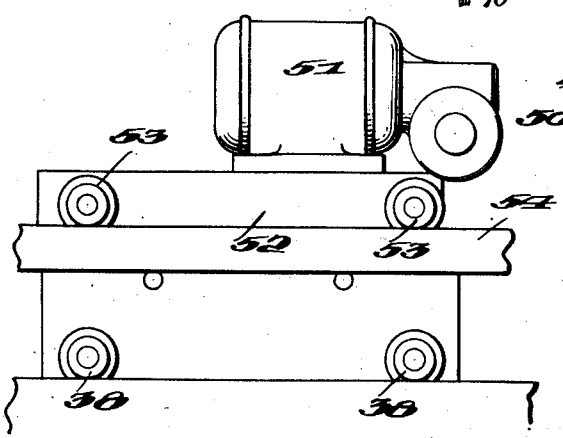


Fig. 5.



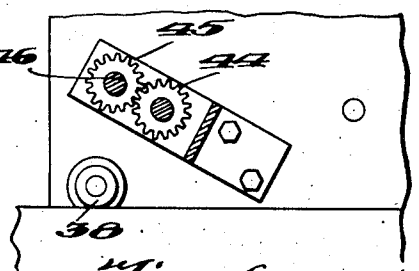


Fig. 6.

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Fig. 3.

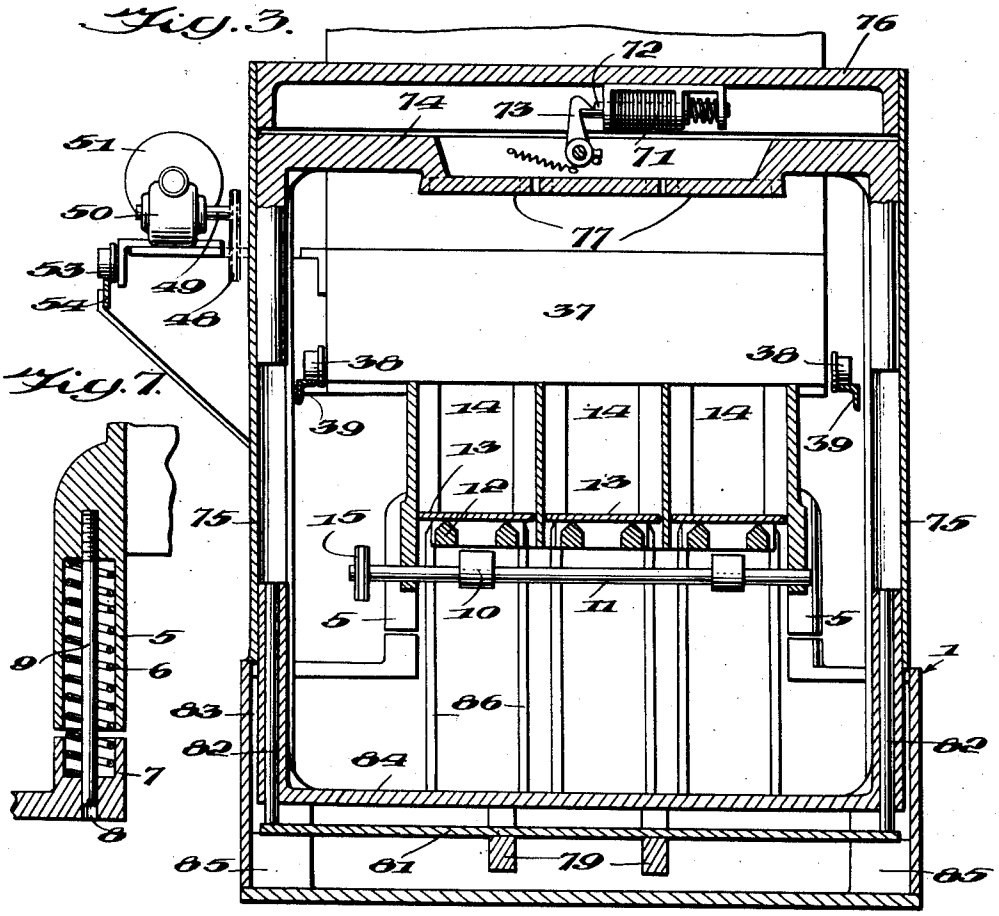


Fig. 8.

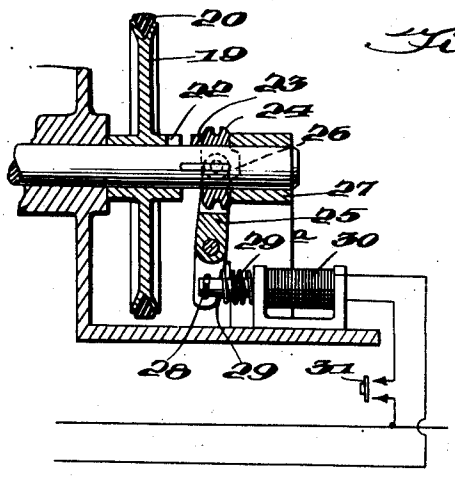
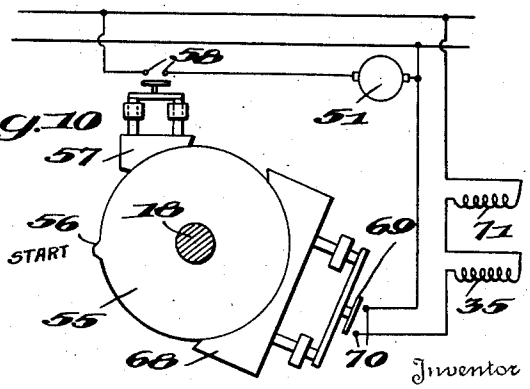


Fig. 10



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UNITED STATES PATENT OFFICE

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MACHINE FOR FORMING BUILDING BLOCKS

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Application April 7, 1939, Serial No. 266,584

6 Claims. (Cl. 25—103)

This invention relates to concrete working machinery and, in its more particular aspects, is directed to improvements in a machine for forming cementitious building blocks. Prior to this invention, machines have been employed for the purpose of making such blocks but these machines have all been objectionable in that the blocks formed thereby contained air pockets and were so coarse grained, due to being insufficiently compacted, that they readily crumbled and otherwise prematurely deteriorated. Another objection to the previous machines is the difficulty of quickly and surely forming perfect blocks due to inconveniences encountered in transferring the mixed materials from which the blocks are formed from a supply hopper to the forming molds.

The primary object of this invention resides in the provision of a machine which will avoid the above noted objections and produce accurately formed, close grained blocks at relatively high speeds.

The invention also proposes the formation of a machine with a material receiving hopper, a block forming mold mounted in spaced relation from the hopper and the provision of a measuring box mounted for movement from a position in registration with the hopper to one in registration with the mold to transfer the mixed cementitious materials from the former to the latter, the measuring box having improved agitating means to loosen and prevent the retention of the materials in the measuring box and provide for the free flow thereof into the forming mold.

It is also proposed to provide a movable support for the mold and means for imparting vibratory movement to the mold during the block forming operation, plate-like means also being provided to supply pressure to the top of the material disposed in the mold during the vibratory period to cause a more perfect compacting of the materials and the production of improved building blocks.

A further object rests in constructing a machine such as described above and providing power driven means to operate the various parts thereof, the machine being further provided with timing means to synchronize the operation of the various elements and make the machine substantially automatic.

A more complete understanding of the invention and the objects thereof will be had from the following description of the block forming machine illustrated in the accompanying drawings, it being understood at this time that the machine shown in the drawings is merely illustrative of one form of mechanism for carrying out the invention.

In the drawings:

Fig. 1 is a vertical longitudinal sectional view taken through a machine for forming building blocks constructed in accordance with the present invention;

Fig. 2 is a horizontal sectional view taken on the plane indicated by the line II—II of Fig. 1;

Fig. 3 is a vertical transverse sectional view taken on the plane indicated by the line III—III of Fig. 1 and showing the mold for forming the blocks, means for vibrating the mold and means for applying pressure to the block as the mold is being vibrated;

Fig. 4 is a detail sectional view illustrating means employed in moving a measuring box from a position in registration with a supply hopper to and from the mold;

Fig. 5 is a side elevational view of the measuring box and motor means for driving an agitator positioned in the measuring box;

Fig. 6 is a detail view of motion transmitting mechanism arranged between the agtiator in the measuring box and the driving motor therefor;

Fig. 7 is a detail sectional view showing means for resiliently supporting the mold;

Fig. 8 is a detail sectional view showing clutch means by which a single cycle of operation of the machine is secured;

Fig. 9 is a similar view of a clutch providing for the connection of the vibrating mechanism to a driven shaft of the machine;

Fig. 10 is a diagrammatic view of the means for timing the operation of the various parts of the machine;

Fig. 11 is a horizontal sectional view taken through the machine and disclosing shaft 18 and the elements carried thereby in plan.

The machine shown in the drawings comprises a base 1 having vertically extending side walls 2 and a top wall 3. At the forward end of the machine, a block shaping mold 4 is resiliently supported by providing its corner portions with hollow bosses 5 for the reception of coil springs 6, the latter, at their lower ends, engaging the supporting bosses 7 provided with the side walls. The bosses 7 are formed with central openings 8 to receive guide bars 9 threadedly carried by the mold bosses 5. The bars 9 permit the mold to move vertically with respect to the base in response to impulses produced by eccentrics 10

secured to a horizontally extending shaft 11 journaled in the side walls of the mold.

In the present instance, the mold is formed with three compartments, the lower ends of which have transversely extending bars 12 for the support of pallets 13 on which the material to make the building blocks is deposited. The bars 12 also support oval shaped cores 14 employed in forming openings in the blocks. The transversely extending shaft 11 has one end provided with a sprocket 15 around which an endless chain 16 extends, the chain also passing around a larger sprocket 17 journaled on a transversely extending main shaft 18. The main shaft is journaled for rotation in the side walls of the base of the machine and has one end equipped with a sheave wheel 19 driven by a belt 20 which receives motion from an electric motor 21. The sheave wheel 19 is freely rotatable about the axis of the shaft 18 and has one end of its hub formed with a notch 22 to receive a dog 23 formed on a clutch disk 24. This disk is splined to the shaft 18 and moves longitudinally thereof in response to forces applied by a pivoted lever 25.

The outer side wall of the clutch disk is also formed with a dog 26 adapted to be positioned in a notch formed in a bearing 27 at the outer end of the shaft 18. When the dog 26 is in the notch in the bearing, the shaft 18 will be held against rotation. When the clutch disk is moved into engagement with the sheave wheel, it will couple the sheave wheel to the shaft and provide for its rotary movement. To move the clutch disk into engagement with the wheel 19, the lower end of the lever 25 is connected as at 28 to the armature shaft 29 of a solenoid 30. A coil spring 29*a* is placed between the lever 25 and the frame of the solenoid to hold the lever in a position to maintain the clutch disk free from engagement with the wheel 19.

By energizing the field coil of the solenoid through the actuation of a push button switch 31, the lower end of the lever 25 will be drawn toward the solenoid and the upper end will cause the clutch disk to move into engagement with the wheel 19 and couple the shaft 18 thereto. The clutch disk will be held in this position during one complete revolution of the shaft or until the dog 26 again registers with the notch in the bearing 27 at which time the spring 29*a* will move the lever 25 to free the clutch disk from the wheel.

Suitable speed reducing gears may be placed between the motor 21 and the wheel 20 to provide for the timed rotation of the shaft 18 in order that the machine will complete one cycle of operation during such rotation. A portion of the time the shaft 18 is rotating, the sprocket 17 will be connected therewith by a second clutch disk 32 resiliently held in spaced relation from the sprocket by the coil spring 33. When the sprocket 17 is coupled with the shaft 18, rotary movement will be imparted to the vibrator shaft 11 through the chain 16 which passes around the sprockets 15 and 17. The clutch disk 32 is moved into engagement with the sprocket 17 by a pivoted lever 34 actuated by another solenoid 35. The operation of this solenoid is controlled and timed by mechanism to be later described.

Above the top plate 3, the machine is equipped with a hopper 36 for the reception of previously prepared cementitious materials from which the building blocks are formed. The lower or discharge end of the hopper is spaced from the top wall 3 and a measuring box 37 is located in this space. The end walls of the box are provided with rollers 38 arranged to run on longitudinally extending track rails 39 and to provide for the movement of the measuring box from the position shown in Fig. 1 in registration with the outlet of the hopper to a position registering with the mold. The rear wall of the box 37 is formed to include a shelf 40 which engages the lower end of the hopper and closes the outlet when the box is moved toward the mold. The wall 40 prevents the materials in the hopper from falling out when the measuring box is out of registration with the discharge outlet.

The end walls of the box have aligned bearing openings for the rotatable reception of agitator shafts 41 having the agitating blades 42 secured in longitudinally spaced relation thereon. At one end of the mold box, the shafts have sprockets secured thereto and an endless chain 43 extends around the sprockets and provides for the rotation of the shafts 41 in unison. One of the shafts extends beyond the end of the measuring box and has a spur gear 44 secured thereto. This gear meshes with a similar gear 45 carried by a stub shaft 46 supported for rotation by the end wall of the box 37 and a plate 47 carried by the end wall. The outer end of the stub shaft has a sprocket secured thereto and which is connected by a chain 48 with a similar sprocket provided on the shaft 49 extending from a gear reduction housing 50 supported by an electric motor 51.

The motor 51 is mounted on a carriage 52 having rollers 53 positioned for longitudinal movement on a rail 54 supported at one side of the machine. The carriage 52 is rigidly connected with the measuring box and moves in unison therewith when the box is moved from registration with the hopper to the mold. When the measuring box is in registration with the mold, the motor 51 will be energized to cause a rotation of the shafts 41 and the blades 42 will agitate the materials in the box and provide for their free flow into the mold. The motor 51 only receives current when the measuring box is in registration with the mold. The timing of the flow of current is controlled by a disk 55 secured to the shaft 18. As the disk 55 revolves with the shaft 18, a projection 56 on its periphery engages a switch carrying block 57 and moves the switch element thereon into engagement with a pair of spaced contacts 58 connecting the motor 51 with a source of current. After the projection 56 moves out of engagement with the block 57, current flow to the motor will be discontinued and the agitator shafts 41 stopped. Injury to the agitating mechanism by its engagement with rigid substances is prevented by the use of the chains 43 and 48 which will break in the event anything engages the agitator blades to prevent their rotation.

To provide for movement of the measuring box, the shaft 18 has a gear segment 59 secured for rotation therewith. As the shaft 18 revolves, the teeth of the segment 59 will engage a pinion 60 carried by the machine and connected with a larger gear 61 arranged in meshing engagement with a second pinion 62, the teeth of which engage a rack 63 connected to the measuring box. Continued movement of the segment causes the gears 60, 61 and 62 to transmit motion to the rack and the measuring box. The direction of movement is forwardly of the machine. By the time the measuring box registers with the mold, the segment will have passed the gear 60 and

further movement of the box will be precluded. Continued movement of the segment will bring the teeth of the segment into engagement with a second gear 64 similar in size to the gear 60 and meshing with an idler gear 65 secured for rotation with another gear 66 corresponding in size to the gear 61. The teeth of the gear 66 mesh with a small gear 67. The teeth of the gear 67 are also in mesh with the rack 63.

When the segment imparts motion to the gears 64, 65, 66 and 67, the mold box will be moved rearwardly of the machine, due to the provision of the extra idler gear 65. The spacing between the gears 60 and 64 is sufficient to permit the measuring box to remain over the mold long enough to provide for the complete discharge of the cementitious mixture from the measuring box into the mold. When the segment is disposed between the gears 60 and 64, the projection 56 on the timing disk will engage the block 57 to complete the circuit for the motor 51. After the measuring box has been moved away from the mold, the projection 56 on the timing disk will engage a second movable block 68 and move it to a position wherein a switch plate 69 carried thereby will bridge a pair of spaced contacts 70 connected in circuit with a pair of solenoid coils, the first of which is the solenoid 35 used to connect the sprocket 17 with the main shaft 18.

As long as the contacts 70 are bridged, the sprocket 17 will be coupled to the main shaft and rotary movement will be imparted to the vibrator shaft 11 causing the vibration of the mold. As the solenoid 35 receives current, a third solenoid 71 will also be energized. The armature 72 of the solenoid 71 engages a spring pressed latch 73 provided with a pressure plate carrying frame 74. This member is mounted for sliding movement in a pair of vertical guides 75 carried by the machine at the ends of the mold. The upper ends of the guides support a transversely extending bar 76 to which the frame of the solenoid 71 is secured. When the solenoid 71 is actuated, the member 74 will be released and permitted to drop, bringing the plates 77 carried on its under side into engagement with the material deposited in the mold by the measuring box. The plates 77 apply pressure to the material as the mold is being vibrated and a more compact block will be made.

After the projection 56 moves away from the block 68, the contact 69 will move away from the contacts 70 and further current flow to the solenoid 35 will be discontinued. The spring 33 will then move the clutch disk 32 away from the sprocket 17 and vibration of the mold will stop. By this time a cam 78 secured for rotation with the main shaft will engage one end of a pivoted lever 79, the opposite end of which is disposed beneath an elevating mechanism 80. In this instance, the elevating mechanism includes a transversely extending bar 81 provided at its ends with vertically extending rods 82. These rods are slidably received in sleeve members 83 mounted for vertical movement in the guides 75 and carried by a second transversely extending plate 84. This plate normally rests on stops 85 which serve to hold it spaced from the member 81 so that initial movement will be imparted to the member 81 and the rods 82 before movement is initiated by the plate 84. The plate 84 is provided with vertically extending pins 86 which when the member 84 is moved upwardly, engage the pallets and move the blocks upwardly out of the mold. The initial movement of the members 82 serves to move the plates 77 out of engagement with the formed blocks prior to their movement out of the mold. After the blocks have been moved to an elevated position, they may be removed by lifting the pallets of the pins 86. When the blocks have been raised to their elevated position, the member 74 will have been moved upwardly a distance sufficient to permit the latch 73 to engage the armature 72 to locate the member 74 in its elevated position. As the cam 78 passes the end of the lever 79, the plates 81 and 84 will drop by gravity to their lowermost positions when the machine will be in condition for another cycle of operation.

Prior to closing the switch 31 to start the machine in operation, the operator will insert a pallet 13 in each of the compartments of the mold. These pallets support the blocks while they are being cured after which they may be used in the formation of additional blocks.

I claim:

1. In a building block forming machine of the type having a movable measuring box for transferring the cementitious materials from a hopper to a mold, means for agitating the material in said box comprising guide means carried by said machine adjacent said hopper and mold, a carriage secured for movement with said measuring box on said guide means, motor driven speed reducing means mounted on said carriage, a pair of shafts journaled in said measuring box, longitudinally spaced knife-like agitating blades carried by each of said shafts, the blades on each shaft being offset with relation to those on the other shaft, a sprocket secured to each shaft, chain means extending around said sprockets, and motion transmitting means connecting said speed reducing means and said shafts.

2. In a building block forming machine of the type having a measuring box for transferring the cementitious materials from a hopper to a mold, means for agitating the material in said box comprising a pair of rotatable shafts extending transversely of said measuring box in parallel relationship, longitudinally spaced knife-like blades carried by said shafts, motor driven actuating means secured for movement with said measuring box, and motion transmitting means connecting said shafts with said actuating means.

3. In a building block forming machine of the type having a measuring box for transferring cementitious materials from a hopper to a mold, means for agitating the material in said box comprising guide means carried by said machine adjacent to said hopper and mold, a carriage secured for movement with said measuring box on said guide means, motor driven speed reducing means mounted on said carriage, a shaft journaled in said measuring box, knife-like agitator blades secured to said shaft in longitudinally spaced relation, and motion transmitting means connecting said speed reducing means and said shaft.

4. In a building block forming machine of the type having a movable material measuring and transferring box, a plurality of agitator shafts extending transversely of said box and journaled for rotation therein, longitudinally spaced agitator blades carried by said shafts, means connecting said shafts and operating to rotate the same in unison, and electrically operated power

means for imparting rotary movement to said shafts, said power means being movable with said box and operated only when said box is in a particular position of adjustment.

5. In a building block forming machine of the type having a movable material measuring and transferring box, a plurality of agitator shafts extending transversely of said box and journaled for rotation therein, longitudinally spaced agitator blades carried by said shafts, chain and sprocket means connecting said shafts and providing for the rotation thereof in unison, motor driven speed reduction gear mechanism having a rotatable stub shaft, and motion transmitting mechanism connecting said stub shaft and one of said agitator shafts, said speed reduction mechanism being operated in one position of movement of said box only.

6. In a building block forming machine of the type having a movable material measuring and transferring box, a plurality of agitator shafts extending transversely of said box and journaled for rotation therein, longitudinally spaced agitator blades carried by said shafts, chain and sprocket means connecting said shafts and providing for the rotation thereof in unison, an electric motor mounted in fixed relation to said box, means for transmitting rotary movement from said motor to one of said agitator shafts, and means for establishing current flow to said motor when said box occupies a predetermined position.

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