AUTOMATIC MIX REGULATING DEVICES FOR CEMENT BLOCK MOLDING MACHINES

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10 Claims. (Cl. 25—104)

This invention concerns automatic devices to regulate the amount of mix which is to be compressed into blocks in the mold boxes of cement block molding machines by varying the height of the cut-off bar of the feed drawer relative to the top of the mold box.

This device is intended as an improvement on power driven, cyclic operating, concrete block molding machines of the type particularly known as the “Besser” block machines, as described in Patent No. 1,659,218, and various improvement patents thereon. Since these machines, their parts, and their mode of operation is well-known to the art, only such description is included as will be necessary to understand the application of my improvements to block machines now in common use.

Hereinafter, the amount of mix remaining in the mold box has been regulated by the height of the cut-off bar as governed by spacing washers placed on vertical attaching bolts at each lateral end of the bar. Since the quality of the mix varies from time to time, and from batch to batch, the setting of the cut-off bar could be only approximate. Furthermore, when the mix was varied by a change of aggregate or portions of aggregate and cement, the machine had to be shut down and the height of the cut-off bar varied by changing the spacing washers so that it would have the proper position above the top of the mold box in order to leave sufficient mix on and in the mold box to produce blocks of the desired size and density.

In view of the foregoing, one of the objects of this invention is to provide means for automatically regulating the vertical position of the cut-off bar relative to the top of the mold box in cement block molding machines of the type above mentioned.

Another object is to provide electrically controlled mechanical means for automatically regulating the height of the cut-off bar, above mentioned, so that regardless of the quality of the mix, the proper amount of mix will be retained in and on the molds, following each filling, in order to produce blocks which will compress to the density desired.

Still another object is to provide guide blocks, attached to the lateral ends of the feed drawer cut-off bar, which can be moved vertically by tapered adjusting bars which extend along the sides of the feed drawer of the block making machine, and which are moved fore and aft, relative to and within the said guide blocks by motor mechanism at the rear of the feed drawer to provide means for obtaining the desired vertical variance of the bottom edge of the cut-off bar; said motor means being controlled either manually, as desired, or automatically, by timing devices which are responsive to the time consumed in attaining the desired degree of compression of concrete mix during the compression of the previous block.

Tattain the foregoing objects by means of the construction, devices and combination of parts shown in the accompanying drawings in which:

FIGURE 1 is a front elevational view of the machine showing the feed drawer with my improvements incorporated thereon;
FIGURE 2 is a similar view of the machine, with the stripper bar and feet dropped and the front portion of the mold box sectioned off on line 2—2, FIGURE 3, and with the feed drawer omitted;
FIGURE 3 is a side view of a portion of the frame of the machine showing a side view of the feed drawer with my improvements incorporated thereon;
FIGURE 4 is a plan view of the feed drawer as viewed substantially from line 4—4, FIGURE 3;
FIGURE 5 is a front elevational view of the feed drawer drawn on a somewhat enlarged scale;
FIGURE 6 is a side elevational view of the front portion thereof;
FIGURE 7 is a perspective view of the feed drawer with my improvements incorporated thereon;
FIGURE 8 is a partial sectional view of the limit stops of the machine with a diagrammatical view of the electrical connections thereeto; and
FIGURE 9 is an electrical wiring diagram showing the connections of the several electrical control parts.

Similar numerals refer to similar parts in the several views.

In the drawings parts of the cement block molding machine which do not directly concern this improvement are shown only in part. The frame A and base B are indicated only generally and details have, for the most part, been omitted. Other non-related parts are shown in dotted outline.

The feed drawer is indicated by numeral 2, and the mold box by numeral 3. The feed drawer is driven from its filling position under the mix hopper 4 to its position over mold box 3 by links 5, driven by cams 6, which are mounted on the main driving shaft 7 of the machine. This shaft is operated by electric motor 119. The several successive cyclic operations of the machine are controlled by cams, riders, cranks, links and other suitable mechanism, and those operations which are best driven or controlled electrically are indicated on the switches on switch shaft 8 which is driven from main shaft 7 by chain and sprocket mechanism.

A transverse heavy bar 15, called a stripper head, is movably disposed on the basic elements of the block machine above mold box 3. Stripper shoes 15 are attached to its lower face and compress mix in the mold box when dropped onto it while the mold is vibrated. Downward movement of these shoes and the stripper bar is checked by head stops 17 which contact base or pallet guide frame stops 18. Electrical contact buttons 19 on the adjacent faces of these stops close an electrical circuit, including cam limit switch 130, which energizes an electrically driven motor which drives the general operational parts of the machine, including shaft 7 carrying cams 6. This operation causes the mix in the mold box to be compressed to form blocks. It is resumed when the blocks are compressed, as hereinafter explained.

Pallet 20, beneath the mold box 3 is removable and is pressed upward against the bottom of mold box 3 by pallet receiver 21 which operates vertically in pallet receiver guide frame 22.

The feed drawer 2 has sides 46 connected by hopper cut-off plates 47. The front end of the feed drawer is closed by cut-off bar 10. This cut-off bar is attached to the fore ends of the sides 46 of the feed drawer by bolt pins 48 which pass downward through, and slide within, holes in overhanging lug portions 50 at the lateral ends of bar. The lower ends of bolt pins 48 thread into lugs 51 on the fore ends of sides 46 and are secured by jam nuts 52. Heads 53 at the upper ends of said bolt pins secure springs 54 which surround the upper ends of the bolts and resiliently press downward the lug portions 50 and keep the bar at the lower limit of its permitted vertical travel on the upper portions of the bolt pins.

At each end of cut-off bar 10 there are guide blocks or boxes 55 which slideably receive the fore ends of longitudinally slideable adjusting bars 30. These adjusting bars ride with the feed drawer 2 and are supported on the
outer faces of its side members 46 by guides 34 near their front ends, and by guides 36 near their rear ends. Adjusting bars 38 are joined at the rear by transverse bars 37 and 38. A jack screw nut 40 is centrally attached to transverse bars 37 and 38, and receives screw 41 journaled at its front end in a double thrust bearing 43 which is centrally attached to the rear portion of the body of dancer 2. Screw 41 is rotated in either direction by reversible electric motor 45 operating through worm and sector means 44. Motor 45 is connected through switches including circuits shown in detail in FIGURE 9 so that it may be driven in either direction as may be required to attain the results herein desired. Rotation of this motor in one direction will slide adjusting bars 30 forward relative to the feed drawer, while rotation in the opposite direction will slide these bars rearward.

The forward end portions of bars 30 are angularly beveled forward and downward to form tapers. The upper faces 56 of these tapered ends slantly engage the lower inner faces 52 of the upper ends of guide boxes 55 so that forward motion of bars 30 forces boxes 55 and the cut-off bar 10 upward, and rearward motion of these bars will permit springs 54 to force the cut-off bar downward. Raising and lowering of the cut-off bar is here controlled by motor 45.

In general operation of the machine the bottom edge 12 of cut-off bar 10 is arranged to screen off excess or undesired mix from the mold box and carry it back within the open compartment of the drawer to its filling position beneath hopper 4. This excess partially fills the drawer and only an additional amount necessary to fill the drawer is received from the hopper for the next operation.

The sequence of cyclic operations of the machine, as here concerned, consists substantially of the following: (a) with the feed drawer 2 under mix hopper 4, the feed drawer is filled with mix; (b) mechanism, including links 5, moves feed drawer 2 forward over mold box 2, mix fills mold box which then moves rearward and leaves a predetermined excess on top of the mold box. This excess is controlled by cut-off bar 10, the lower edge 12 of which screens off all mix above the level of said predetermined amount when the feed drawer is moved back to its position under hopper 4; (c) the main shaft 7 of the machine then stops, due to the opening of switch 120 which includes main-shaft driving motor 119, and stripper head 16 and stripper shoes 15 drop onto and into mold box 3 and these parts are vibrated by mechanism (not shown) until the mix in the mold box is compressed into blocks having a predetermined height as governed by contact of the adjustable stripper head stops 17 with the lower edge frame stops 18; (d) when these upper and lower stops meet, electrical contact buttons 19 on their adjacent surfaces contact and close an electrical circuit 118 which is shunt with switch 120 and thus includes motor 119. This causes the cyclic operation of the machine to be resumed, whereupon (e) vibration stops, pallet 20 drops, and shoes 15 act as strippers and force the compressed blocks downward out of mold box 3. The pallet is then removed and an empty pallet substituted and brought up against the bottom of the mold box by mechanism not shown. A new cycle of operations then commences. Since the general structure and cyclic operations of these machines are well understood to the art, further details of their structure and operation are unnecessary to the understanding of the present improvements. The operation of the improvements here concerned takes place during cyclic operation (e), above explained.

It is thought that the cyclic operation of the machine depends on the pressing of blocks to uniform size, and this factor is affected by and directly related to the time necessary for the stripper shoes 15 to compress the mix in the mold to the desired size and thus bring the stops 17 of the stripper block and stops 18 of the pallet carrier block into contact. This brings the electrical contact buttons 19 on these stops together and this is necessary before the machine will resume the cyclic operation which ceased during the block compression time.

Under certain assumed conditions, 3 sections is a predetermined suitable time to allow for compression. With mix of a proper quality, and with the mold box filled to a proper, predetermined level, and with proper vibration, the compression height desired can be made in approximately 3 seconds. As the machines have been built, in case there is not sufficient compression in this given time, the cycle may be resumed by closing a hand operated switch which bridges switch 120. The oversize blocks must then be specially removed and set aside. Therefore, either the quality of the mix is changed, or the cut-off bar is lowered, by removing shims washers provided for the purpose. Such changes are time consuming and difficult to gauge. In view of this I have provided the mechanism and means, herein described, for varying the amount of mix left in the mold box by automatically varying the height of the cut-off bar, whereby, under proper operating conditions, a sufficient amount of mix, only, will remain in and on the mold box so that compression to size may be had within approximately three seconds.

In general, the mix is of proper quality and amount this automatic cut-off bar height varying mechanism does not function. When, however, during any one cycle more than 3 seconds is required to bring the contact points together, too much mix has been left in and on the mold box by the cut-off bar. It is, therefore, lowered so that on the next cycle less mix will be left in and on the mold box and, therefore, less time will be necessary to bring the contact limit stops 17 and 18 together.

Conversely if the total compression is attained in less than three seconds in any one cycle, insufficient mix is indicated, and the cut-off bar is raised to screen off less mix and leave more mix in the mold box, for the next cycle.

To provide mechanism and electrical controls for motor 45 the electrical connections and controls shown in FIGURE 9 are used.

When stripper head 16 drops, cam limit switch 100 actuated by shaft 8 closes a circuit including the operating solenoids of delayed action switches 101, 102, and 103.

Delayed action switch 101, which is normally closed, is thus set to open after 3 seconds. If the contact buttons 19 meet before 3 seconds, thus starting the machine on the next cycle, cam limit switch 110 closes as the shaft 8 turns due to the resumed operation of the machine. This switch closes the circuit through field coil 105 and the commutator of motor 45 for the remainder of 3 seconds which drives worm and sector gearing 44 in a direction to operate jack screw 41 to push tapered bars 30 forward and raise cut-off bar 10 thereby permitting more mix to remain in and on the mold box 3 for the next operation.

Delay switch 102, which, when set, remains open for 3½ seconds, remains open under the above conditions. If contact buttons 19 do not close within 3½ seconds after cam limit switch 100 closes, due to too much mix in and on the mold box, delayed action switch 102 closes, thus closing the circuit through field coil 106 and commutator of motor 45 which then operates in a reversed direction, relative to the direction operated under the conditions first above stated, and this moves bars rearward and causes cut-off bar 10 to lower so that less mix is left in and on the mold box on the next successive action.

Delayed action switch 103, which, after being set, is normally closed for 3¾ seconds, is wired in series with switch 102 and acts as a safety step to keep motor 45 from over-running and moving the adjusting bars too far in a rearward direction in case the machine is stopped by
the operator, or by accident after the feet 15 have dropped and before the contact buttons 19 have contacted. Switches 107 and 108 act as additional safety stops and are placed on the feed drawer frame. These switches are normally closed but open when contacted by a lug 109 on bar 30 whenever it moves too far in either direction.

Delayed action switches 101, 102, and 103 may, for the purpose of definition, be termed timer switches. Thus means actuating the timer devices as a unit switch 101 may be referred to as the first timer switch, switch 102 as the second timer switch, and switch 103 as the third or over run cutoff switch. Since cam limit switch 100 acts to set or actuate the above timer switches it may be termed a timer setting switch, and since cam limit switch 110 closes the circuit through field coil 105 of motor 45 it may be termed a cam limit motor switch.

The circuit which includes button 19 on stops 17 and 18, and main operating motor 119, is designated by numeral 118. Thus is the circuit that starts operation of the main motor (or a clutch operated from it) after it has been stopped by the opening of cam limit switch 120. Mechanically operated safety switches 107 and 108 afford protection from undesired override operation of motor 45 in either direction.

While motor 45 has been described as having two sets of field coils it will be readily understood that other equivalent motor means may be employed. Further the timer switches described may be of various types some of which may be set mechanically rather than by electrical means, as shown.

I claim:
1. In a block molding machine having:
   (a) a moldbox,
   (b) a feed drawer that moves back and forth across the moldbox to deposit a successive charge of material in the moldbox,
   (c) and stripper shoes above said moldbox operable to compress said mix delivered by said feed drawer in said moldbox,
   (d) the improvement comprising a cut-off bar on said feed drawer vertically adjustable relative to said moldbox,
   (e) power actuated means on said feed drawer for vertically adjusting said bar,
   (f) and further means responsive to the position of said stripper shoes compressing the mix in said moldbox to energize said power actuated means for said bar including,
   (g) apparatus to cause said power actuated means to raise said bar when said compression time interval to reach said position is shorter than a definite standard interval,
   (h) and to cause said power actuated means to lower said bar when the compression time interval to reach said position is longer than said standard interval.

2. A cement block molding machine having,
   (a) a main drive motor,
   (b) a moldbox,
   (c) a mix hopper,
   (d) a feed drawer for presenting definite amounts of mix to said moldbox,
   (e) and stripper shoes above said moldbox operable to compress said mix delivered by said feed drawer in said moldbox,
   (f) the improvement comprising a vertically adjustable cut-off bar on said feed drawer,
   (g) power means on said feed drawer for vertically adjusting said bar,
   (h) means actuable by said main drive motor to energize said main drive motor, and energize said stripper shoes,
   (i) and further means responsive to the position of said stripper shoes in compressing the mix in said moldbox to energize said power means for said bar including,
   (j) apparatus to cause said power means to raise said bar when said compression time interval to reach said position is shorter than a definite standard interval,
   (k) and to cause said power means to lower said bar when said compression time interval to reach said position is longer than said standard interval.

3. A cement block molding machine having,
   (a) a main drive motor,
   (b) a moldbox,
   (c) a mix hopper,
   (d) a feed drawer for presenting definite amounts of mix to said moldbox,
   (e) and stripper shoes above said moldbox operable to compress said mix delivered by said feed drawer in said moldbox,
   (f) the improvement comprising a vertically adjustable cut-off bar on said feed drawer,
   (g) power means on said feed drawer for vertically adjusting said bar,
   (h) means actuable by said main drive motor to energize said main drive motor, and energize said stripper shoes,
   (i) and further means responsive to the position of said stripper shoes in compressing the mix in said moldbox to energize said power means for said bar including,
   (j) apparatus to cause said power means to raise said bar when said compression time interval to reach said position is shorter than a definite standard interval,
   (k) and to cause said power means to lower said bar when said compression time interval to reach said position is longer than said standard interval.

4. A cement block molding machine having:
   (a) a main drive motor,
   (b) a moldbox,
   (c) a mix hopper,
   (d) a feed drawer for presenting definite amounts of mix to said moldbox,
   (e) and stripper shoes above said moldbox operable to a definite position to compress said mix delivered by said feed drawer in said moldbox,
   (f) the improvement including a vertically adjustable cut-off bar on said feed drawer,
   (g) reversible power means on said feed drawer for vertically adjusting said bar,
   (h) a switch shaft driven from said main drive motor,
   (i) a cam limit switch on said shaft operable upon rotation of said switch to a definite position to energize said main drive motor,
   (j) a cam limit switch actuated to closed position from said switch shaft when said main drive motor is deenergized,
   (k) a first normally closed timer switch energized by operation of said cam limit switch for controlling the energizing of said power means for raising said bar,
   (l) and a second normally open timer switch energized by the operation of said cam limit switch for controlling the energizing of said power means for lowering said bar,
   (m) the time interval of said first timer being set below and the time interval of said second timer being set above a definite standard time interval required by said stripper shoes to move to said definite position in compressing said mix in said moldbox.
5. In a block molding machine having:
(a) a mold,
(b) an aggregate supply hopper,
(c) a feed drawer that moves back and forth between the hopper and the mold to transfer aggregate from one another by master control means that operate through a cycle,
(d) pallet receivers below the mold,
(e) a pressure head assembly above the mold,
(f) mold vibrators,
(g) all of which are operated in timed relation with one another by master control means that operate through a cycle,
(h) the improvement that comprises an adjustable element for controlling the amount of material charged into the mold from the feed drawer,
(i) and means for controlling the height of the block including a device responsive to the position of the pressure head assembly with respect to the master control means,
(j) and a controller that operates the adjustable element in response to the position of said device.

6. A block making machine including,
(a) a mold,
(b) a feed drawer that moves back and forth across the mold to deposit a successive charge of material in the mold for each cycle of operation of the machine,
(c) a strike-off bar carried by the feed drawer,
(d) vibrators for the mold,
(e) and means for controlling the height of the block including
(f) a controller that raises and lowers the strike-off bar,
(g) and a device responsive to the height of the charge in the mold at a time in the cycle of operation of the machine for controlling the operation of said means for controlling the height of the block.

7. A block making machine including,
(a) a mold,
(b) apparatus for charging material into the mold,
(c) an adjustable element for controlling the amount of material charged into the mold,
(d) a pressure head assembly that advances as the material is compacted in the mold,
(e) sizing pin stops including,
(f) at least one connected to and movable with the pressure head,
(g) and at least one at a relatively fixed location in the path of the first sizing pin,
(h) mechanism that operates the machine through a cycle,
(i) apparatus that moves in relation to the cycle of operation of the machine,
(j) means for controlling the height of the machine including,
(k) control means responsive to contact of the sizing pins and to the height of material in the mold,
(l) means for changing the position of the adjustable element to control the amount of material charged into the mold.

8. A block making machine including,
(a) a mold,
(b) apparatus for charging material into the mold,
(c) an adjustable element for controlling the amount of material charged into the mold,
(d) a pressure head assembly that advances as the material is compacted in the mold,
(e) sizing pin stops including,
(f) at least one connected to and movable with the pressure head,
(g) and at least one at a relatively fixed location in the path of the first sizing pin,
(h) mechanism that operates the machine through a cycle,
(i) apparatus that moves in relation to the cycle of operation of the machine,
(j) means for controlling the height of the block including,
(k) control means responsive to contact of the sizing pins and to the height of material in the mold,
(l) means for changing the position of the adjustable element to control the amount of material charged into the mold,
(m) said means responsive to the height of the charge in the mold operates at a definite period in the operating cycle of the machine,
(n) and said control means includes a motor operating the adjustable element,
(o) and automatic control means responsive to the position of said means responsive to the height of the charge for controlling the operation and direction of operation of said motor.

9. In a block molding machine that operates through successive cycles,
(a) a mold,
(b) a feed drawer that moves back and forth across the top of the mold to supply cementitious material to the mold,
(c) a strike-off bar carried by the feed drawer in position to determine the level of cementitious material left in the feed drawer by the feed drawer as it moves away from the mold,
(d) a motor and connections operated thereby for raising and lowering the strike-off bar,
(e) a pressure head for contact with the cementitious material in the mold after the feed drawer has moved away from the mold,
(f) a vibrator that shakes the mold to settle the material therein,
(g) and mechanism for increasing the length of time, during a cycle, that the motor runs to raise or lower the strike-off bar, the mechanism for increasing the length of the cycle including,
(h) an automatic stop for stopping cyclic operation of the machine,
(i) and a timer for re-starting the cyclic operation.

10. In a block molding machine having:
(a) a moldbox,
(b) a feed drawer that moves back and forth across the moldbox to deposit a successive charge of material in the moldbox,
(c) and stripper shoes above said moldbox operable to compress said mix delivered by said feed drawer in said moldbox,
(d) the improvement comprising a cut-off bar on said feed drawer vertically adjustable relative to said moldbox,
(e) power means for vertically adjusting said bar,
(f) and further means responsive to the position of said stripper shoes compressing the mix in said moldbox to energize said power means for said bar including,
(g) apparatus to cause said power means to raise said bar when said compression time interval to reach said position is shorter than a definite standard interval,
(h) and to cause said power means to lower said bar when the compression time interval to reach said position is longer than said standard interval.

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