Dec. 8, 1970 J. BESSER 3,545,053

APPARATUS FOR CONTROLLING THE HEIGHT OF CONCRETE BLOCK DURING THEIR MANUFACTURE

Filed March 8, 1967 3 Sheets-Sheet 1

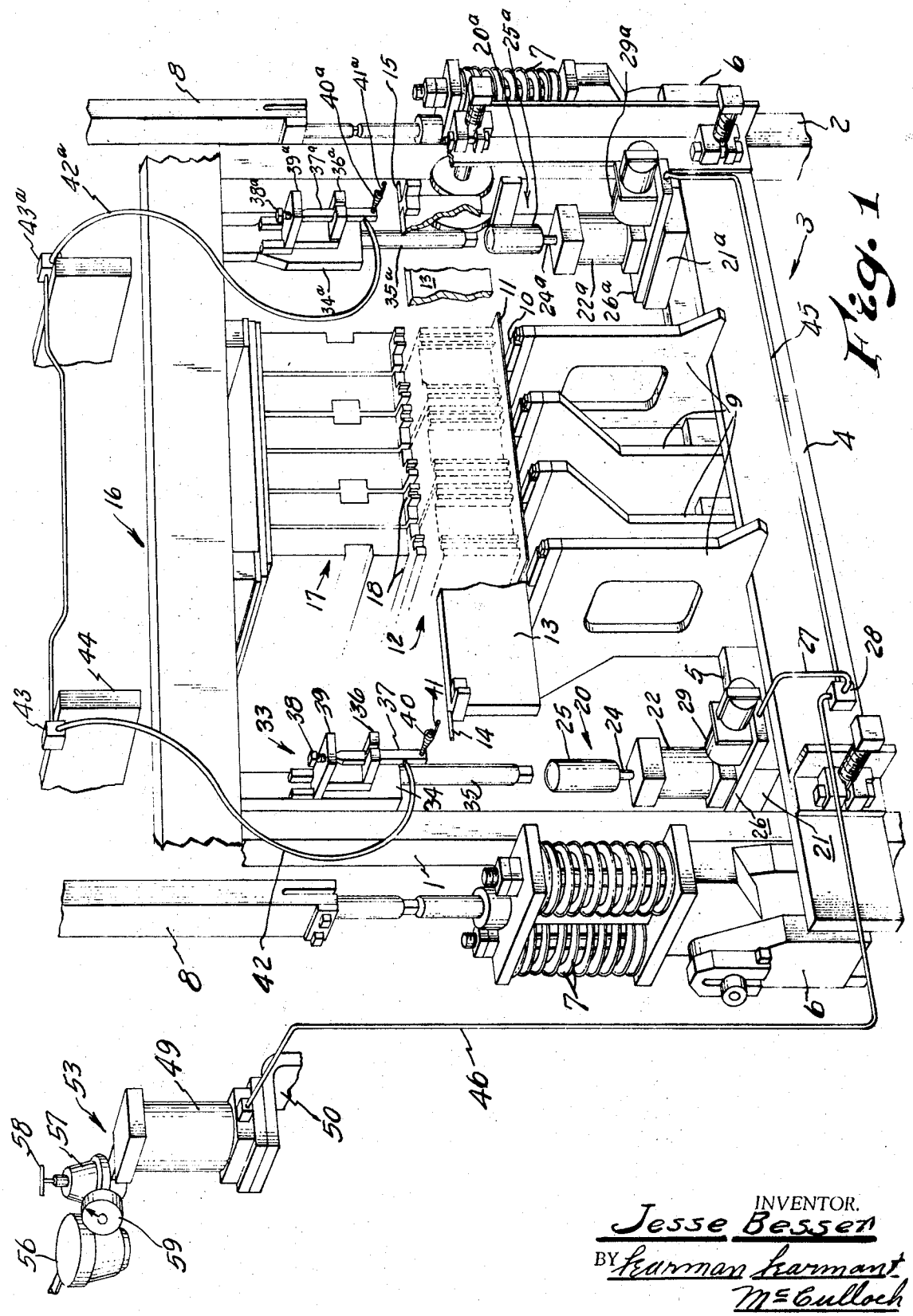

Fig. 1

INVENTOR.
Jesse Besser
BY Harman Harmant McCulloch
ATTORNEYS

Dec. 8, 1970 J. BESSER 3,545,053

APPARATUS FOR CONTROLLING THE HEIGHT OF CONCRETE BLOCK DURING THEIR MANUFACTURE

Filed March 8, 1967 3 Sheets-Sheet 2

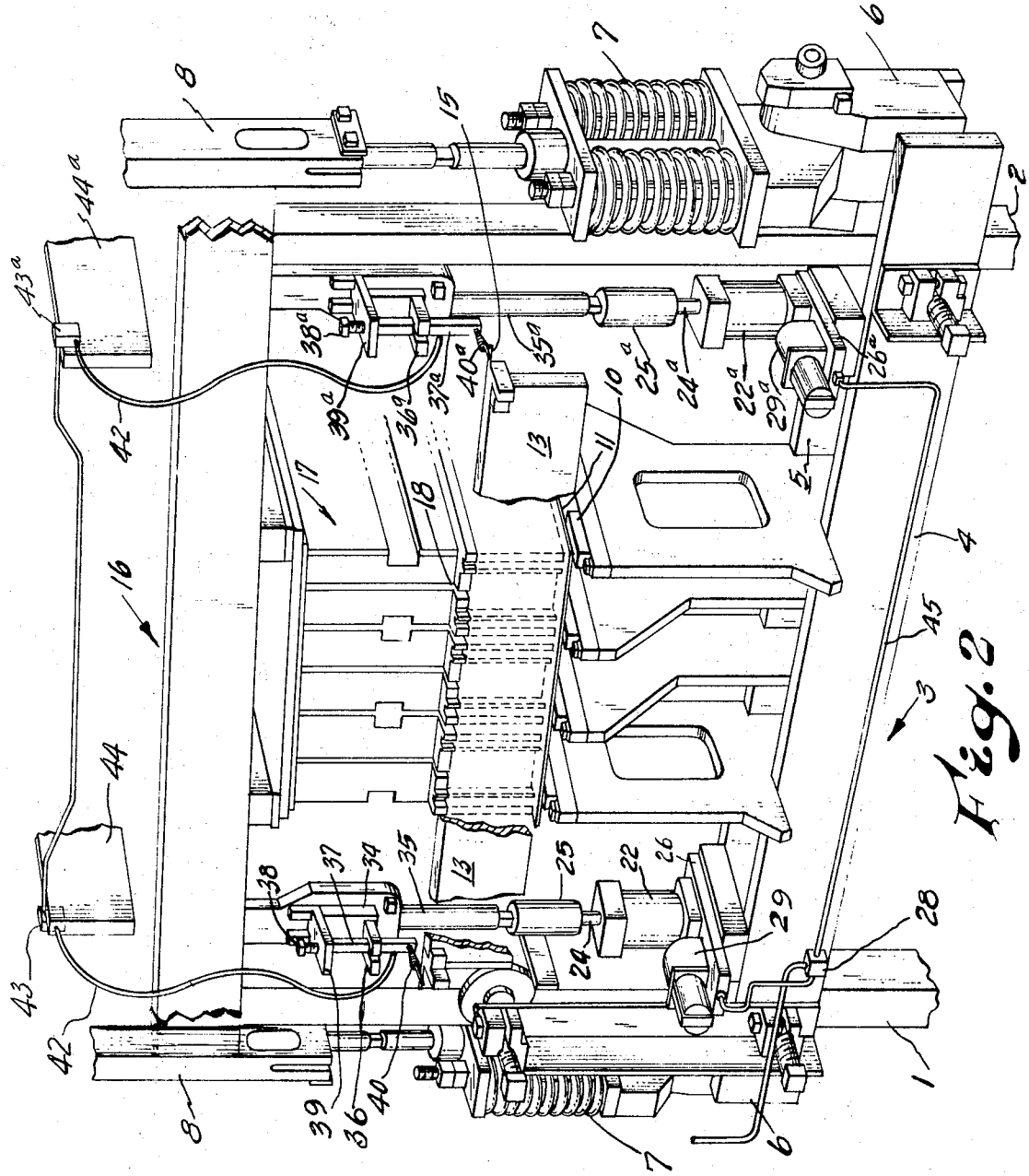

Fig. 2

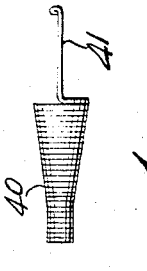

Fig. 4

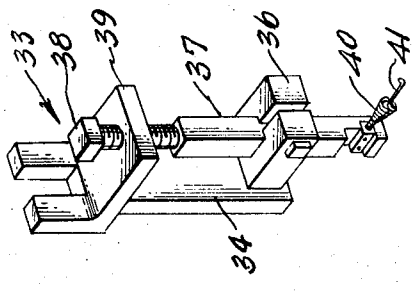

Fig. 3

INVENTOR.
Jesse Besser
BY Fearman Fearman & McCulloch
ATTORNEYS

Dec. 8, 1970 J. BESSER 3,545,053

APPARATUS FOR CONTROLLING THE HEIGHT OF CONCRETE BLOCK DURING THEIR MANUFACTURE

Filed March 8, 1967 3 Sheets-Sheet 3

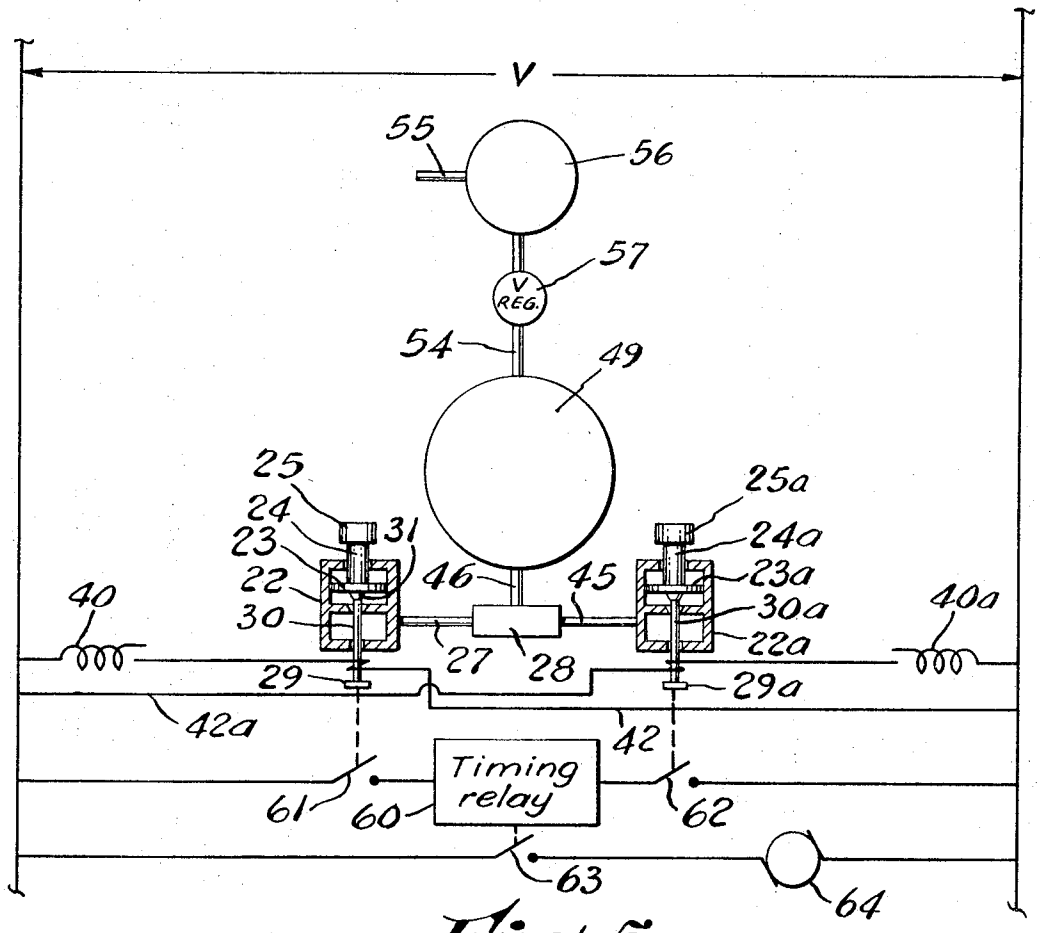

Fig. 5

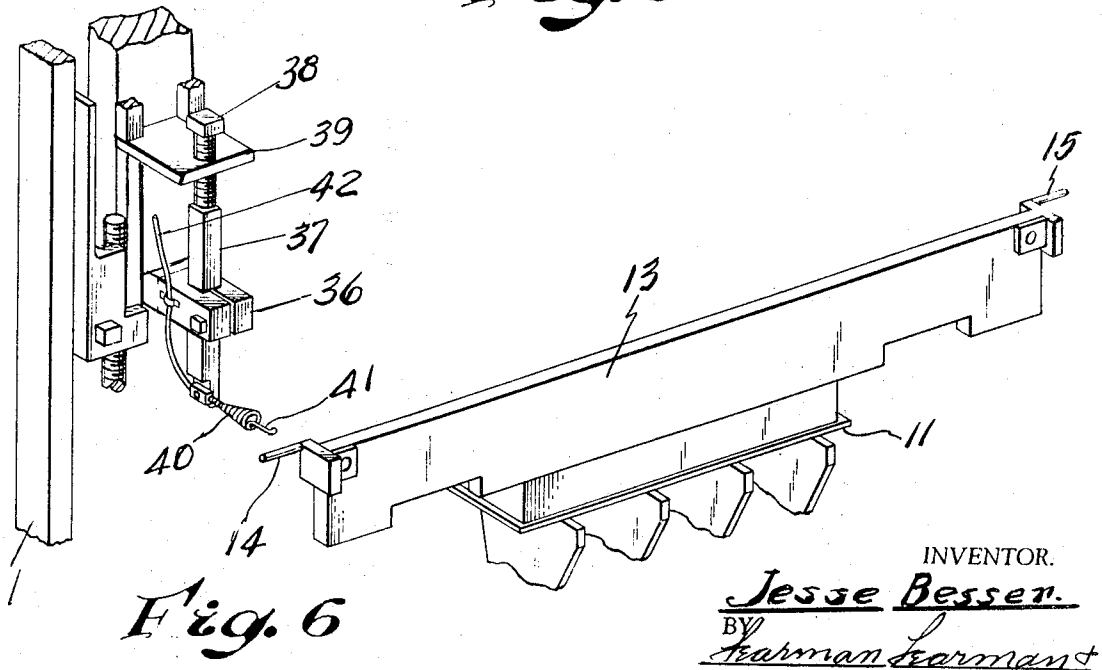

Fig. 6

INVENTOR.
Jesse Besser.
BY
Fairman Fearman & McCulloch
ATTORNEYS

United States Patent Office 3,545,053 Patented Dec. 8, 1970

3,545,053

APPARATUS FOR CONTROLLING THE HEIGHT OF CONCRETE BLOCK DURING THEIR MANUFACTURE

Jesse Besser, Alpena, Mich., assignor to Besser Company, Alpena, Mich., a corporation of Michigan

Filed Mar. 8, 1967, Ser. No. 621,505
Int. Cl. B86b 7/12
U.S. Cl. 25—41 12 Claims

ABSTRACT OF THE DISCLOSURE

Concrete blocking apparatus having a mold frame and a stripper frame relatively movable toward one another including normally yieldable pressure means engageable with each other as the frames approach each other and electrically operable control means actuated in response to relative movement of the frames to a predetermined distance from one another to rigidify the stops and preclude further relative movement of the frames toward each other.

This invention relates to block molding machinery for molding blocks of concrete, made of cinders, sand and gravel and like materials and more particularly to apparatus for controlling the height of blocks during their manufacture.

In the manufacture of concrete blocks, it is conventional to support a pallet beneath an open bottom mold box into which aggregate and cement may be poured, following which the mold is vibrated to compact or settle the block-forming materials. As the mold is vibrated, it is conventional practice to effect relative movement of the mold and a stripper head or frame so that, when the block has been formed, further relative movement of the mold and stripper frame head toward one another strips the block from the mold whereupon the block and its supporting pallet are conveyed to a suitable curing and storage station. Another pallet then is positioned beneath the mold box and the cycle repeated.

Inasmuch as the aggregate used in the manufacture of concrete block is extremely abrasive, it is not uncommon for the thicknesses of successive pallets to vary, nor is it uncommon for certain parts of the block-forming machinery to be eroded. As a consequence, accurate control of the block height becomes difficult. Control over the block height has been simplified recently by the practice of limiting relative movement of the stripper head and mold box toward one another. In this manner, variations in pallet thickness do not affect the block height inasmuch as the upper surface of the pallet always will be at the base of the mold box. Nevertheless, erosion of parts of the forming machine itself, and particularly those parts of the machine utilized in controlling the relative movement of the mold box and the stripper head toward one another, still presents problems in accurate block height control.

An object of this invention is to provide apparatus for controlling accurately the height of molded concrete blocks and which apparatus is self-compensating for any wear or variations in thickness between successive pallets.

Another object of the invention is to provide combined hydraulic and pneumatic or mechanical stop or limit means operable to terminate relative movement of a concrete block machine's mold and stripper frames toward one another when such frames have reached a predetermined spacing according to the height of the block to be molded.

A further object of the invention is to provide apparatus of the character described and in which improved electrical sensing means is operable to control the stop or limit means.

Other objects and advantages of the invention will be pointed out specifically or will become apparent the following description when it is considered in conjunction with the appended claims and the accompanying drawings.

In the drawings:

FIG. 1 is a fragmentary perspective view of apparatus constructed according to the invention and incorporated on a conventional block molding machine, certain parts of the latter being broken away for clarity, and illustrating the relative positions of the apparatus at an early stage of a block molding machine.

FIG. 2 is a view similar to FIG. 1, but illustrating the relative positions of the apparatus near the end of a molding operation.

FIG. 3 is an enlarged view of one of the sensing probe members.

FIG. 4 is a perspective view of one of the probe mounting assemblies.

FIG. 5 is a schematic diagram illustrating certain electrical, pneumatic and hydraulic apparatus utilized in the construction.

FIG. 6 is a fragmentary perspective view of one of the probe mounting assemblies and mold box.

Apparatus constructed in accordance with the invention is applicable to conventional concrete block molding machines, such as that disclosed in Pat. No. 2,566,787 or Pat. No. 2,985,935 (now Reissue Pat. No. 25,404), and to which reference may be had for a more detailed disclosure of the manner in which the movable parts herein to be described may be driven. Accordingly, only so much of the conventional apparatus is disclosed as is necessary to provide an understanding of the invention and its operation.

The block molding machine comprises upright slide frame members **1** and **2** on which a pallet anvil **3** is mounted for a vertical reciprocating movement. Pallet anvil **3** includes cross bars **4** and **5** joined at their ends by suitable connecting members **6** which are coupled by shock absorbing spring assemblies **7** to vertically movable links **8** by means of which the pallet receiver frame may be vertically reciprocated. Supported on the cross bars **4** and **5** are anvils **9** having resilient blocks **10** on their upper ends and atop which a pallet **11** removably may be supported.

Fixed to the slide frames **1** and **2** above the pallet anvil frame **3** is an open top and open bottom, metal mold box **12** the front bar **13** of which is provided with electrically conductive extensions **14** and **15**.

Mounted on slide frame members **1** and **2** for vertical movements independently of the pallet anvil frame **3** is a stripper frame **16** to the under surface of which is fixed a stripper head **17** having a plurality of shoes or feet **18** which are adapted to enter the mold box **12** and push or strip a formed block therefrom. As is conventional, stripper frame **16** initially is supported at a height above mold box **12** to enable a feed box (not shown) to pass between the stripper frame and the mold box to deliver concrete to the latter, but for the sake of convenience the stripper frame is disclosed in closer relationship to the mold box.

In the operation of the apparatus thus far described, a pallet **11** will be delivered to the pallet anvil **3** in proper position on the anvil, and the anvil will be elevated to a position in which the upper surface of the pallet bears against the lower surface of mold box **12** to close the bottom thereof. The feed box then will be positioned over the mold box and will deliver a predetermined quantity of concrete to said mold box, whereupon the feed box then will be retracted. Stripper frame **16** then will be lowered toward the box **12** and anvil **3**, and simultaneously the mold box will be vibrated by vibrating apparatus (not shown), so as to cause the concrete in the mold box to settle on the pallet and take the shape of

the mold. As the vibration proceeds and the head **17** continues to move relatively to the mold box, the stripper feet **18** will rest lightly upon the upper surface of the concrete in the mold box.

The movement of the stripper head **17** toward the anvil **3** continues until such time as the height of the block being formed in the mold is only slightly greater than the height desired. At this time, relative movement of the frame members **3** and **16** toward each other ceases, whereupon vibration of the mold box continues for a short time so as to avoid any compressive stress being placed on the block by the stripper head due to expansion of the blocks **10** following discontinuation of the vibration. The level or position above the upper surface of the pallet **11** at which the movement of the stripper head frame is discontinued is extremely important to the control of the block height, and apparatus constructed in accordance with the invention is operable to control such positioning of the stripper head frame with great accuracy.

Block height control mechanism is located adjacent opposite ends of anvil **3** and at opposite ends of the stripper head **16**. The height control mechanism at the left-hand end of the pallet receiver frame is designated generally by the reference character **20** and comprises a supporting block **21** fixed to the frame members **4** and **5** and on which is supported a hydraulic cylinder **22**. Within the cylinder **22** is a piston **23** to which is connected a piston rod **24** that extends through the upper end of the cylinder and terminates in an enlarged cylinder rod end or stop **25**. Between the cylinder **22** and the block **21** is a manifold plate **26** having a fluid passage therein in communication with the interior of the cylinder **22** and in communication with one end of a hose **27**, the opposite end of which is connected to a distributor block **28** that is fixed to the cross bar **4**. Supported on the plate **26** is a control solenoid **29**, the reciprocable plunger **30** of which is provided with a valve **31** that is capable of enabling and disabling the flow of fluid to and from the cylinder **22**.

The height control mechanism at the left-hand end of stripper head frame **16** is designated generally by reference character **33** and comprises a bracket **34** fixed to the frame **16** and in which is threadedly mounted a threaded upper height pin or stop **35** that is in axial alignment with the cylinder rod end **25**. Secured to the bracket **34** is a clamp **36** in which a support bar **37** may be clamped in a selected vertically adjusted position, said bar **37** being adjustable by means of an adjusting screw **38** which extends through an anchor plate **39**. At the lower end of the bar **37** is secured an actuator or sensing probe **40** formed of electrically conductive material. Preferably, the probe **40** comprises a spring wire wound into substantially conical form and terminating in a forwardly projecting end **41** that is adapted to engage the mold bar extension **14**. An electrical conductor **42** is connected between probe **40** and a junction box **43** which is mounted on a stationary frame member **44** and is connected to a suitable source of electrical energy.

At the right-hand end of stripper head frame members **3** and **16** are mounted units similar to the units **20** and **33**, respectively, and similar parts are identified by similar reference characters, followed by the suffix *a*. Hydraulic fluid is delivered to the cylinder **22***a* via a hose **45** that interconnects the manifold plate **26***a* and the distributor block **28**.

The construction and arrangement of the height control apparatus thus far described are such that the solenoids **29** and **29***a* normally are inactive or deenergized, thereby permitting free flow of hydraulic fluid into and out of the cylinders **22** and **22***a*. Upon engagement of sensing probes **40** and **40***a* with their respective mold bar extensions **14** and **15**, however, an electric circuit will be completed to each of the solenoids so as to energize the latter and close the valves associated therewith so as to

disable the discharge of hydraulic fluid from the respective cylinders **22** and **22***a*. Upon disengagement of the probes and the respective mold bar extensions, the electrical circuit to the solenoids is broken, whereupon the valves are retracted so as once again to enable free flow of fluid to and from the cylinders.

Hydraulic fluid is supplied to the distributor block **28** via a hose **46** that interconnects the block **28** and a reservoir tank **49** which is supported on a bracket **50** mounted on a frame member of the machine. A valve (not shown) is provided to permit or prevent the flow of fluid from the tank **49**.

The apparatus includes means designated generally by the reference character **53** for introducing air, under pressure, to the upper end of the tank **49** for normally applying a resilient force to the stops **25** and **25***a*. Such means comprises an inlet fitting **54** in communication with the interior of the tank **49** and which communicates with an air inlet **55** through a water separator **56** and a pressure regulator **57** that is provided with a manually operable bleed valve **58** and a pressure gauge **59**. The arrangement is such that air from a compressor (not shown) may be introduced to the upper end of the tank **49** and be maintained at a suitable pressure such as 60 p.s.i., so as constantly to exert a yieldable force on the oil in the tank which tends to discharge the oil from the tank into the cylinders **22** and **22***a*. When the solenoid controlled valves associated with the cylinders **22** and **22***a* are in their open positions, expansion of the air in the tank **49** displaces sufficient fluid from the latter to extend the piston rod ends **25** and **25***a* from their respective cylinders **22** and **22***a*, but the compressibility of the air in the tank **49** enables the rod ends **25** and **25***a* to be retracted into the associated cylinders.

When the block height control mechanism is conditioned for operation at the beginning of a block molding cycle, the valves controlled by the solenoids **29**, **29***a* will be open and the tank **49** will contain a quantity of hydrulic fluid and a head of compressed air. The rod ends **25** and **25***a*, therefore, will be extended from their respective cylinders a sufficient distance to be engaged by the respective upper pins **35**, **35***a* during relative movement of the stripper head frame **16** toward the mold box **12** in the manner previously described.

As the stripper head frame moves downwardly, the upper pins **35** and **35***a* will engage the rod ends **25** and **25***a*, respectively, and displace them downwardly, thus causing their pistons to discharge fluid from the cylinders **22** and **22***a* into the tank **49** and compress the air contained in the latter. As the stripper head frame continues to move downwardly, then end **41** of the sensing probe **40** will engage the mold bar extension **14**, whereupon a circuit to solenoid **29** will be completed so as to energize the solenoid and move valve **31** to its closed position. Closing of valve **31** will disable any further discharge of fluid from the cylinder **22**, whereupon the remaining fluid in that cylinder and the piston rod **24** constitute a rigid stop precluding further movement of the upper pin **35** downwardly.

Engagement of the end **41***a* of the sensing probe **40***a* with the extension **15** will effect energization of the solenoid **29***a* and closing of the valve **31***a* thereby converting the fluid remaining in the cylinder **22***a* and the rod end **25***a* to a rigid link and precluding further downward movement of the rod end **35***a*. The energization of the solenoids **29** and **29***a* may occur simultaneously or at different times.

The sensing probes **40** and **40***a* will be so adjusted that they engage their respective extensions **14** and **15** at a predetermined level above the upper surface of the pallet **11** so as always to terminate downward movement of the stripper head frame **16** at the same distance of the stripper shoes **18** above the pallet **11**, regardless of the thickness of the pallet and regardless of wear of the rods, **25**, **35** and **25***a* and **35***a*, thereby assuring uniform height.

Engagement of the sensing probes **40** and **40***a* with the extensions **14** and **15** effects closing of switches **61** and **62** to activate a timing relay **60** which, upon timing out, opens a switch **63** controlling the driving motor **64** of a vibrating mechanism. Thus, as is conventional, vibration of the mold box **12** continues for a short time following termination of movement of stripper head frame **16** toward the mold box so as to avoid subjecting the blocks being formed to compressive stresses.

Following termination of the vibration of the mold box, the frames **3** and **16** may be moved as a unit relatively to the mold box **12** so as to strip the block from the mold. In the disclosed embodiment, the members **3** and **16** move downwardly relative to the mold box **12** so as to discharge the molded block from the bottom of the mold box. It will be understood, however, that it would be possible to hold the frames **3** and **16** stationary, and effect movement of the mold box. In any event, relative movement of mold and stripper head frames **3** and **16** is utilized to effect removal of the block from the mold.

The resilience of the sensing probes **40** and **40***a* is an important characteristic of the invention since it enables them to yield without breaking during block stripping operations while continuing to maintain the solenoids energized.

Following the stripping of the block from the mold, the stripper head frame **16** will be moved upwardly, whereupon the sensing probes **40** and **40***a* will be disengaged from the extensions **14** and **15**, respectively. The circuits to the solenoids **29** and **29***a* thus will be broken, causing the valves **31** and **31***a* to move to their open positions. The head of compressed air in the tank **49** then will be able to expand and force hydraulic fluid into the cylinders **22** and **22***a* so as once again to extend the rod members **25** and **25***a* to positions of readiness for another cycle of operation. The height to which the rod ends **25** and **25***a* are extended is such as to insure their engagement by the upper pins **35** and **35***a*, respectively, well in advance of the engagement of the sensing probes with the mold box extensions.

This disclosure is intended to be illustrative of a presently preferred embodiment of the invention rather than definitive thereof. The invention is defined in the claims.

What is claimed is:

1. In a block molding machine including a mold box having an open top and an open bottom against which a pallet supported on a first frame member may seat, and including a stripper head supported on a second frame member for movement into the open top of said mold box, the combination of first and second stop means supported on the respective frame members and engageable with one another in response to movement of said head toward said mold box; resilient force applying means acting on one of said stop means and enabling movement thereof relative to the other of said stop means in response to engagement of said first and second stop means; control means operable to rigidify said force applying means and prevent relative movement of said first and second stop means; actuating means connected to said control means for operating the latter; and means mounting said actuating means for engagement with and actuation by said mold in response to movement of said head a predetermined distance toward said mold box.

2. The apparatus set forth in claim **1** wherein said actuating means comprises a spring member.

3. The apparatus set forth in claim **1** wherein said force applying means comprises pressure fluid means.

4. The apparatus set forth in claim **3** wherein said pressure fluid means comprises combined hydraulic and pneumatic means.

5. The apparatus set forth in claim **1** wherein said force applying means comprises hydraulic fluid means maintained under compressed air pressure.

6. In a block molding machine having a first frame member and a second frame member, said frame members being relatively movable toward one another, the combination of apparatus for terminating relative movement of said frame members toward one another, said apparatus comprising first stop means carried by one of said members; second stop means; means mounting said second stop means in a position to engage said first stop means in response to relative movement of said members toward one another; resilient force applying means acting on at least one of said stop means and enabling movement of said one of said stop means relative to the other of said stop means in response to engagement of said first and second stop means; control means operable to rigidify said force applying means and prevent relative movement of said first and second stop means; and actuating means connected to said control means for operating the latter in response to relative movement of said members toward one another to a position in which said members are spaced a predetermined distance apart.

7. The apparatus set forth in claim **6** wherein said actuating means comprises a spring member.

8. The apparatus set forth in claim **6** wherein said force applying means comprises pressure fluid means.

9. The apparatus set forth in claim **8** wherein said pressure fluid means comprises combined hydraulic and pneumatic means.

10. The apparatus set forth in claim **6** wherein said force applying means comprises hydraulic fluid means maintained under compressed air pressure.

11. The construction set forth in claim **6** wherein said members are arranged one above the other and wherein said one of said stop means is carried by the upper of said members.

12. The apparatus set forth in claim **11** wherein said force applying means biases the other of said stop means in a direction toward said one of said stop means.

References Cited

UNITED STATES PATENTS

3,310,854 3/1967 Zevely ---------- 25—45

J. SPENCER OVERHOLSER, Primary Examiner

D. W. JONES, Assistant Examiner

U.S. Cl. X.R.

25—55, 120