Dec. 21, 1954 D. M. VAN ORNUM ET AL 2,697,263

MACHINE FOR MAKING CEMENTITIOUS BLOCKS

Filed Oct. 18, 1948

5 Sheets-Sheet 1

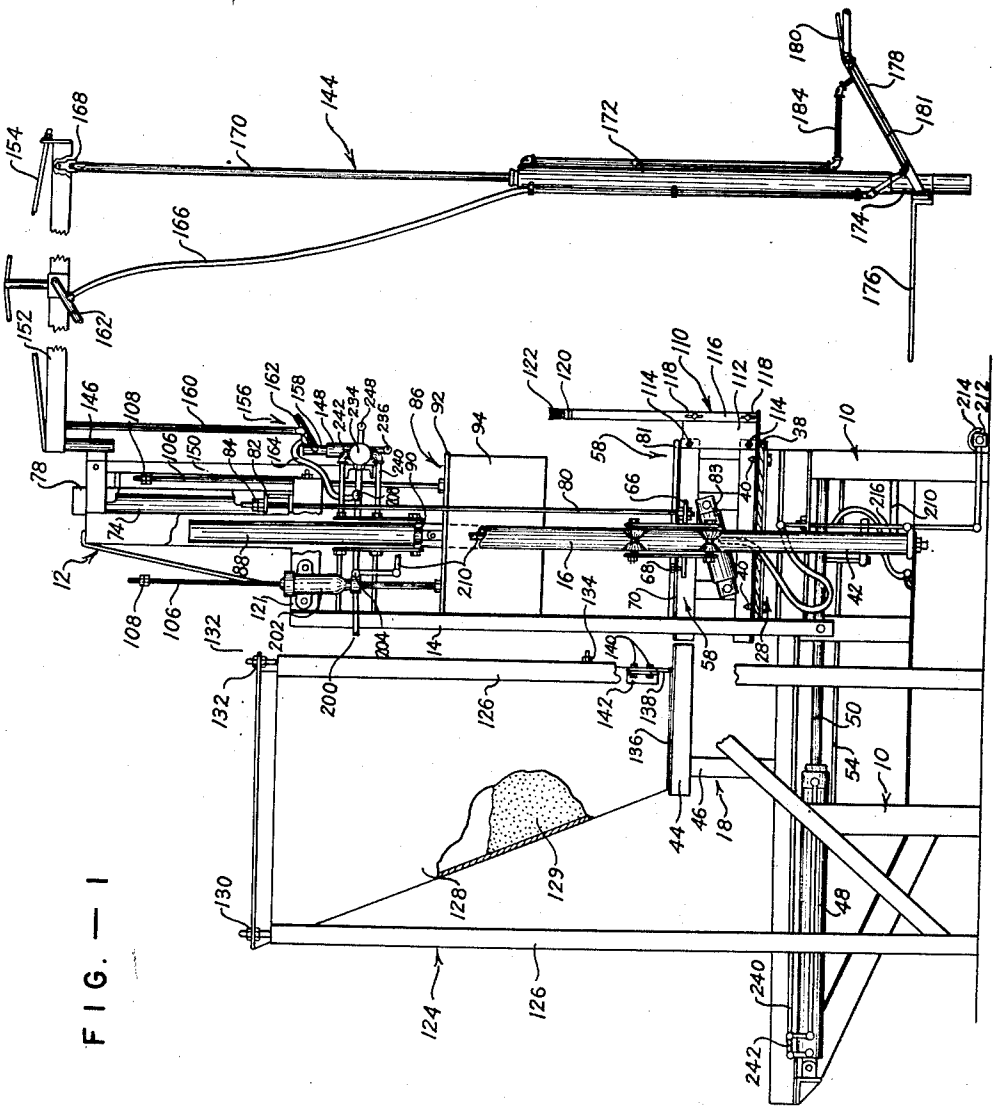


FIG. — 1

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5 Sheets-Sheet 2

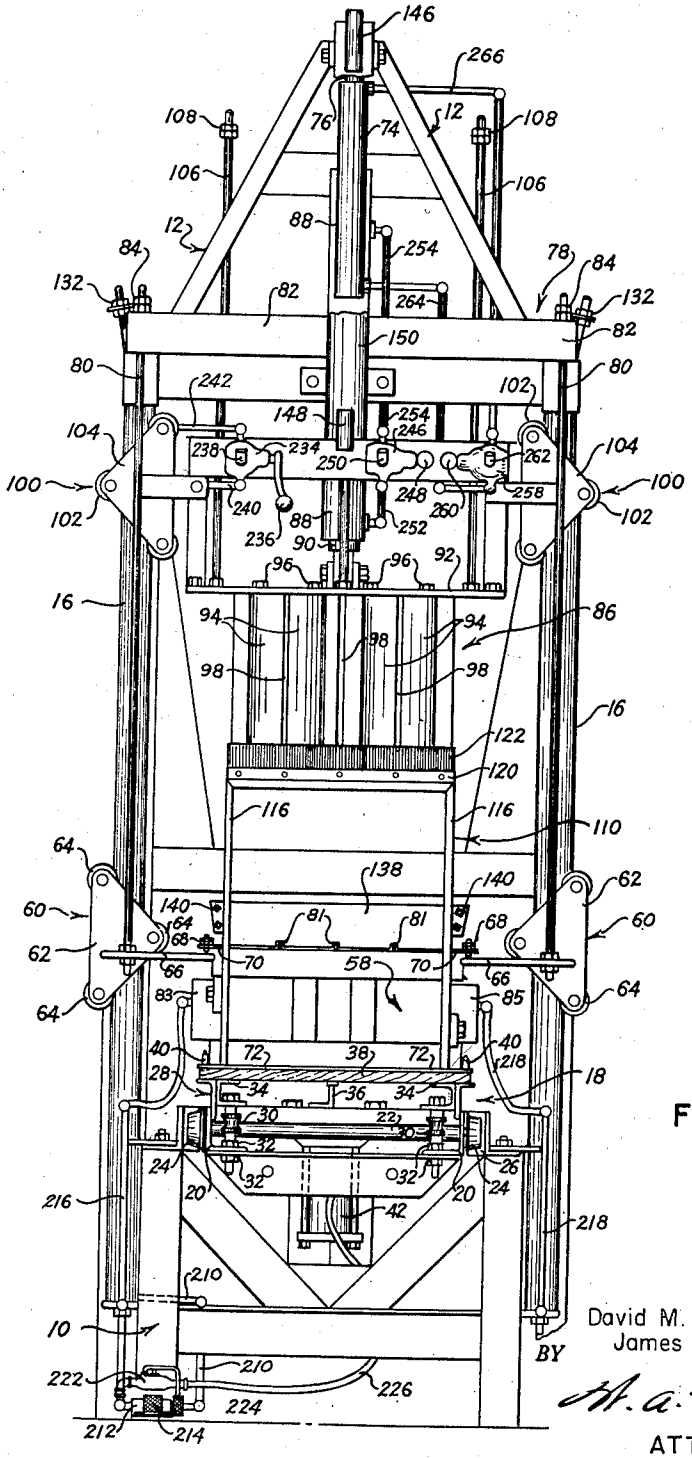


FIG. — 2

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5 Sheets-Sheet 3

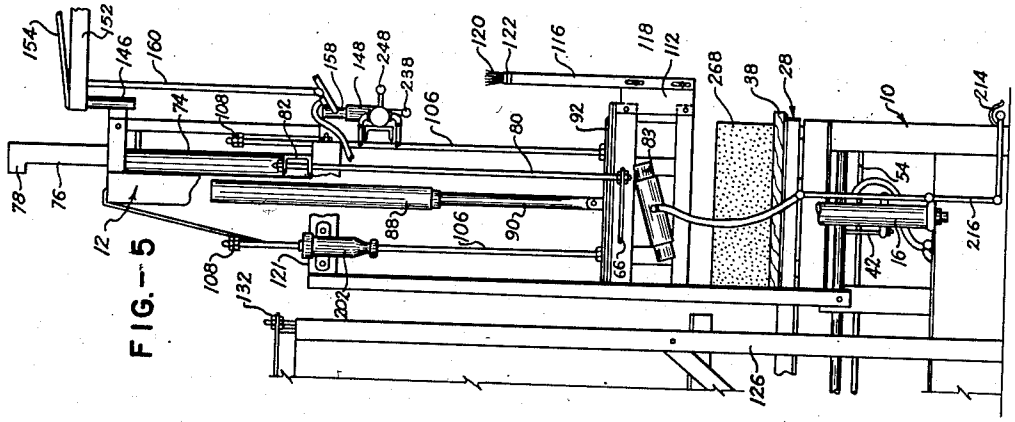


FIG. — 5

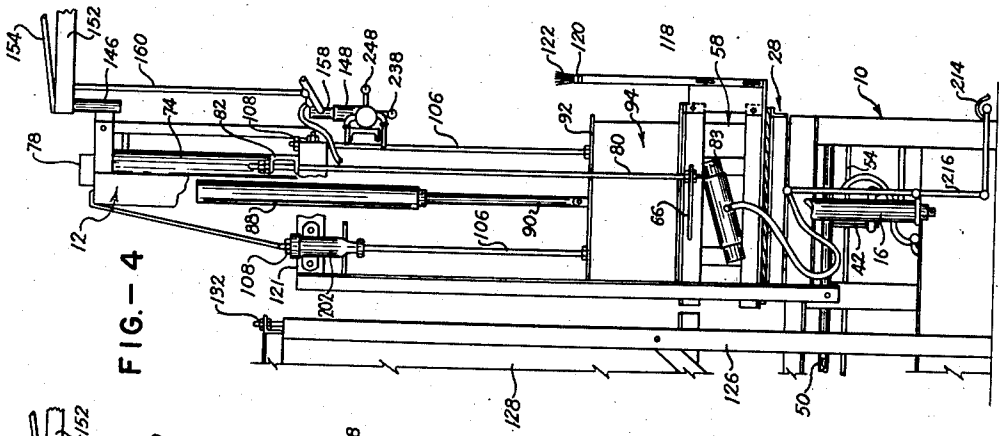


FIG. — 4

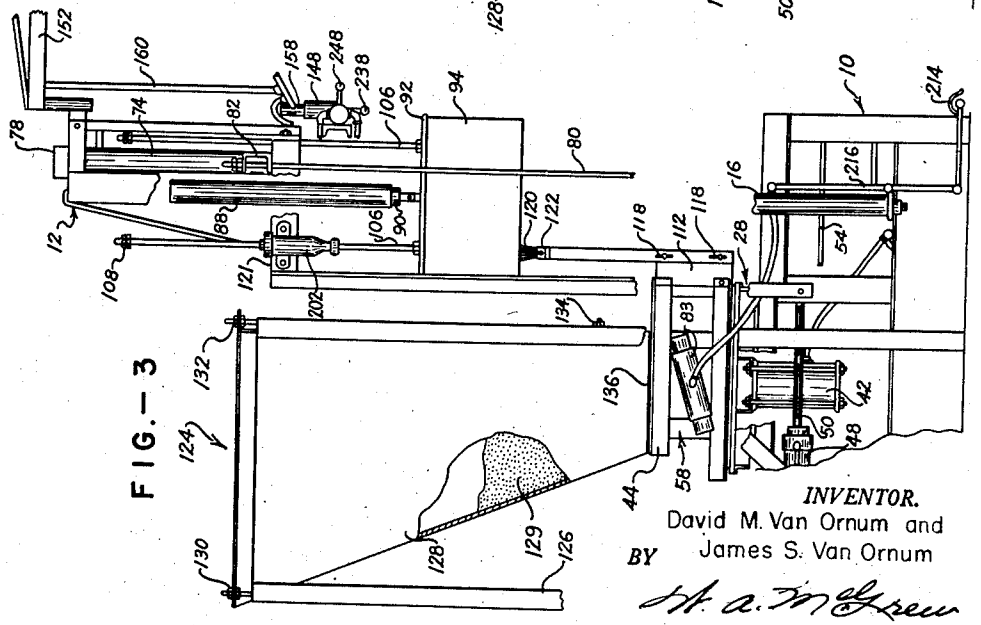


FIG. — 3

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MACHINE FOR MAKING CEMENTITIOUS BLOCKS

Filed Oct. 18, 1948

5 Sheets-Sheet 4

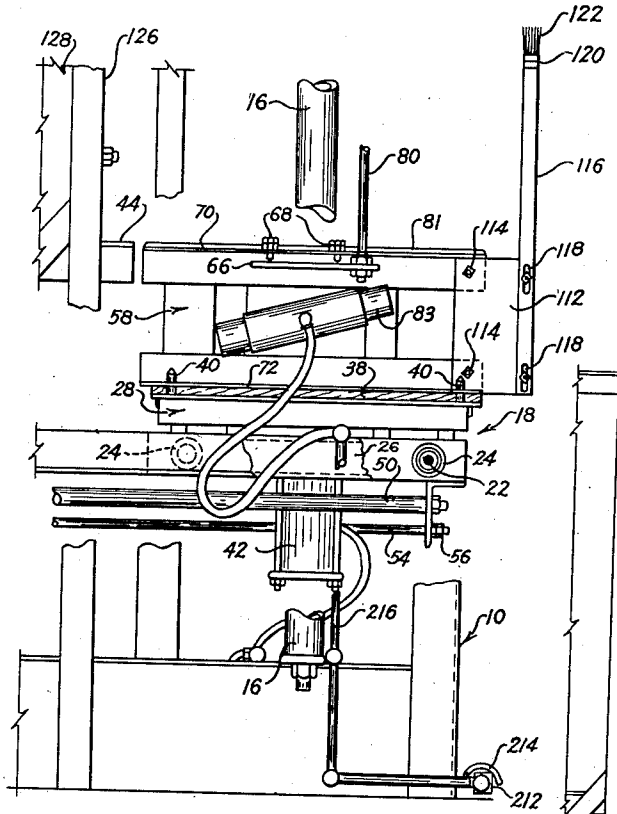


FIG.—7

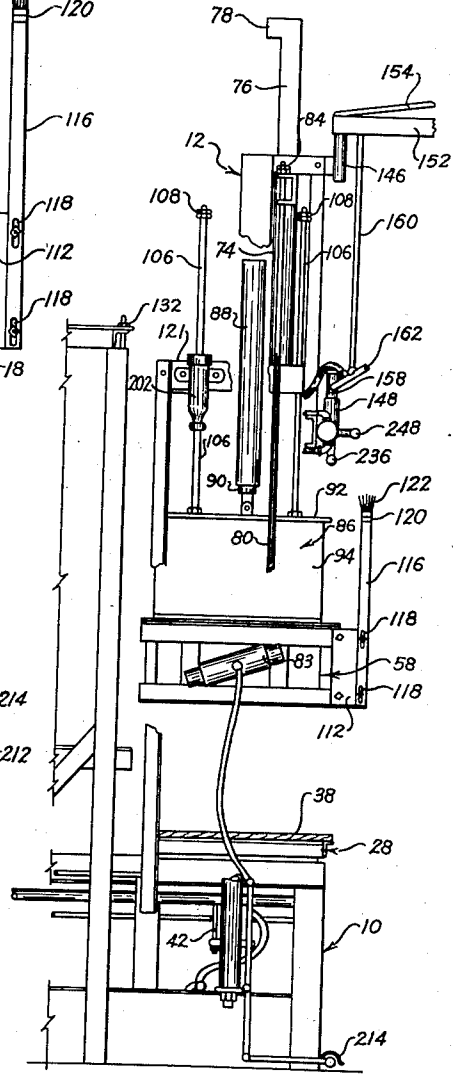


FIG.—6

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MACHINE FOR MAKING CEMENTITIOUS BLOCKS

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5 Sheets-Sheet 5

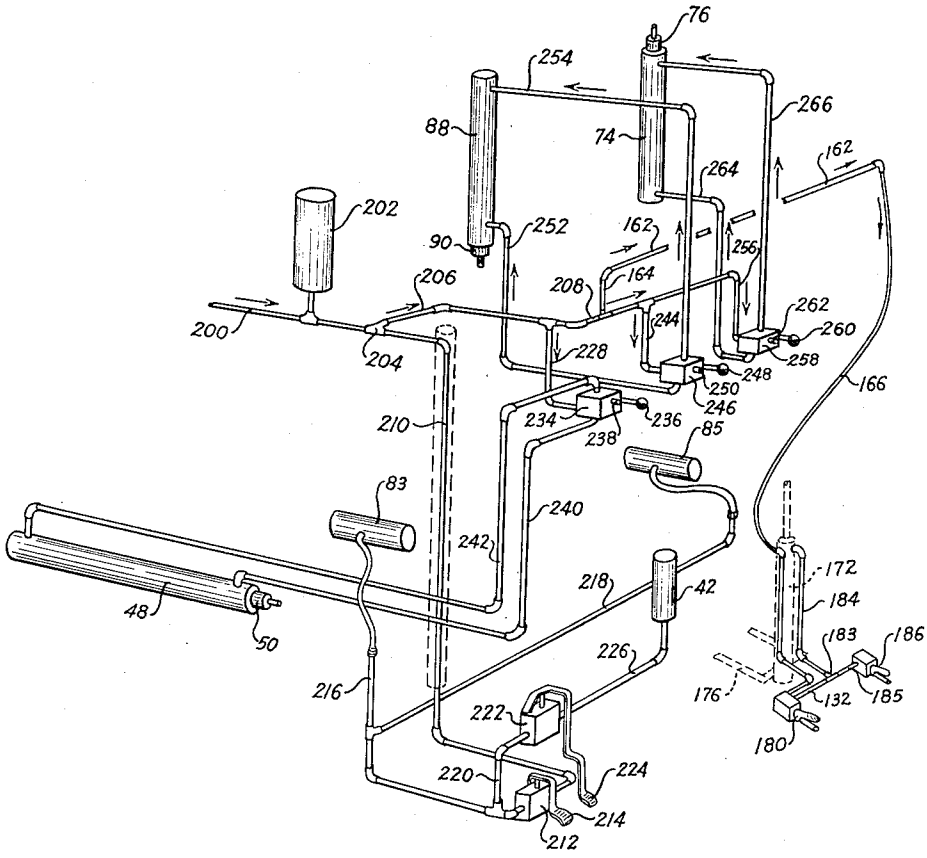


FIG. — 8

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United States Patent Office 2,697,263 Patented Dec. 21, 1954

2,697,263

MACHINE FOR MAKING CEMENTITIOUS BLOCKS

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Application October 18, 1948, Serial No. 55,212

3 Claims. (Cl. 25—41)

This invention relates to machines for producing molded products of plastic materials such as concrete building blocks, insulating blocks, wall tiles and other analagous products.

In concrete block-making machines wherein the blocks are formed in a mold box, a presser head is commonly used to compact the cementitious material and force the block from the mold in some cases accompanied by vibration to aid in compacting. This frequently results in destruction of the block or deformation with a resulting variation in dimensions.

A primary object of this invention is to provide a machine for molding improved cementitious blocks of uniform dimensions, density and texture. The resulting blocks are further distinguished by a lack of voids, smooth plane surfaces and clean sharp corners.

Another object of this invention is the provision of a machine for molding cementitious blocks wherein the blocks are formed in a mold box with vibration and relatively light pressure from a spudding head above the mold box and the blocks are stripped from the mold box primarily by vibration with the spudding head serving to maintain accurately the vertical dimensions.

A further object of the invention is to provide an improved machine of the character described wherein vibration in substantially vertical and horizontal planes is utilized in forming the blocks and vibration in a substantially horizontal plane only is utilized for stripping the blocks from the mold.

A still further object of the invention is the provision of a machine of the class described, designed and arranged for convenience of operation, maximum production and general efficiency.

Other objects and advantages of the invention will be apparent from the following detailed description and from the accompanying drawings illustrating one preferred form of the invention, in which:

Fig. 1 is a side elevation with parts broken away showing the mold box resting on the pallet perch assembly and the spudding head in the extreme upper position.

Fig. 2 is a front elevation with the parts as shown in Fig. 1.

Fig. 3 is a fragmentary side elevation showing the mold box under the hopper for filling.

Fig. 4 is a fragmentary side elevation showing the spudding head resting on the material in the mold box at the lower limit of its travel.

Fig. 5 is a fragmentary side elevation showing the mold box raised and the stripped blocks resting on the pallet.

Fig. 6 is a fragmentary side elevation showing the spudding head and mold box in their extreme upper positions and a new pallet in position.

Fig. 7 is an enlarged view of the mold box and carriage with parts broken away.

Fig. 8 is a schematic diagram of the piping, control valves, vibrators and operating cylinders.

Referring to the drawings in detail the numeral **10** indicates the main frame. Spaced above the main frame **10** is the head frame **12** supported by the vertical head frame brace **14** and the cylindrical head masts **16**.

Horizontal carriage assembly

A horizontal carriage assembly **18** (Figs. 1, 2 and 7) is mounted for horizontal longitudinal movement on the main frame **10**. The horizontal carriage comprises frame members **20** through which extends shaft **22** having mounted thereon rollers **24**. Channels **26** mounted longitudinally on main frame **10** form a guide for rollers **24**.

A pallet perch **28** is mounted on the forward end of carriage **18** by flexible supports **30** secured to frame members **20**. The pallet perch can be adjusted vertically by nuts **32**. Flanges **34** and center rest **36** provide a support for the removable pallet **38**. Pins **40** secured to flanges **34** serve to align the mold box in a manner to be described subsequently.

A vertical vibrator **42** is secured directly to the pallet perch **28** as shown more clearly in Fig. 3. The flexible supports **30** minimize transmittal of vibration to the main frame **10**.

A carriage table **44** is secured to the rearward end of carriage **18** by uprights **46**.

A horizontal cylinder **48** actuates the carriage **18**, the piston rod **50** being secured to a flange **52** on the bottom of the carriage **18**. Horizontal travel adjustment rods **54** are secured to main frame **10** at one end and extend through flange **52** with nuts **56** adjacent the other end to limit horizontal travel forward and align the pallet perch **28** with the mold box.

Mold box assembly

A mold box **58** is moved vertically by a pair of carriage assemblies **60** which comprise side plates **62** having rollers **64** therebetween engaging the head masts **16**. A horizontal lifting plate **66** is secured to each pair of side plates **62** and engages adjusting screws **68** which extend through the upper flanges **70** on the mold box **58**. The lower flanges **72** have holes (not shown) which are aligned with pins **40** and serve to align the mold box **58** and the pallet perch **28** when the mold box **58** is lowered onto the pallet **38**. The carriage assemblies **60** are actuated vertically by a cylinder **74** having a piston rod **76** secured to a yoke **78**. Adjustable lifting rods **80** at one end extend through opposite ends of cross bar **82** on yoke **78** and at the other ends are secured to lifting plates **66**. The vertical travel of the mold box carriage assembly is limited in a downward direction by adjustment of nuts **84** on rods **80**. Adjusting screws **68** are set so that the mold box comes to rest on the pallet perch just prior to the end of the movement of the carriage-assemblies **60** and lifting plates **66**, and a slight clearance is provided between the lower ends of adjusting screws **68** and the lifting plate **66**. This allows free horizontal movement of the mold box **58** on the horizontal carriage-assembly. A plurality of cores and portion plates (not shown) may be provided in the mold box **58** to form a plurality of blocks of any desired shape. These are held in position in the mold box by means of core bars **81**.

On opposite sides of the mold box are mounted a pair of substantially horizontal vibrators **83** and **85**. While one horizontal vibrator could be used in the preferred embodiment shown the two vibrators are inclined slightly at opposite angles to eliminate resonance. The vibrator **83** is inclined upwardly and forwardly, while the vibrator **85** is inclined downwardly and forwardly.

Spudding head assembly

A spudding head assembly **86** is mounted for vertical movement by a cylinder **88** which has a cylinder rod **90** connected to the spudding head plate **92**. Interchangeable spuds **94** are adapted to be secured to the head plate **92** by bolts **96** and are shaped to conform substantially in cross section to the section of the blocks being formed except for the spaces **98** which provide for the upward movement of core bars **81**.

A pair of carriage assemblies **100** comprising rollers **102** mounted for rotation between plates **104** engage the head mast **16** and are connected to the spudding head plate **92** to guide the vertical movement of the spudding head assembly.

Adjusting rods **106** extend vertically from the head plate **92** through holes in cross members (not shown) on the head frame **12** and have nuts **108** which are adapted to adjustably limit the downward movement of the spudding head assembly **86** by engagement with head frame **12**. This adjustment controls the height of the formed block with extreme accuracy in a manner to be described later in more detail.

Spud wiper assembly

A spud wiper assembly **110** is mounted on the forward end of the mold box **58** by means of a pair of plates **112** bolted to the mold box at **114**. A pair of vertical arms **116** slotted at **118** are bolted to the plates **112** and support a transverse wiper element **120** preferably having bristles **122** along the upper edge. The vertical arms **116** are adjusted by means of slots **118** so that the bristles **122** contact and wipe the lower surfaces of spuds **94** during horizontal movement of the mold box **58**.

Hopper assembly

The hopper assembly **124** consists of a separate framework **126** on which the hopper **128** is adjustably mounted by means of adjusting screws **130**, **132** and **134**. The hopper **128** is adjusted so that the lower edge **136** is parallel and spaced slightly above the upper surfaces of table **44** and mold box **58**.

An interchangeable strike-off plate **138** is bolted at **140** to brackets **142** which may be secured to the sides of hopper **128** by welding or other suitable means. The hopper may be filled with a suitable cementitious mixture **129** by any conventional loading or feeding means (not shown).

Offbearer fork assembly

An offbearer fork assembly **144** (Fig. 1) is rotatably mounted in pivots **146** and **148** which are rigidly mounted on an upright **150** of head frame **12**.

The offbearer boom **152** is mounted in pivot **146** and extends outwardly supported by brace **154**. A Y shaped member **156** formed of tubular material is set in post **158** which is rotatably mounted in pivot **148**. A vertical leg **160** and a diagonal leg **162** extend upwardly to further support boom **152**. Tubular leg **162** also serves as a conduit between a supply line **164** and a flexible hose **166**.

A universal joint **168** mounted on the outer end of boom **152** is connected to one end of a piston rod **170**. The other end of rod **170** is connected to a piston (not shown) operably mounted in cylinder **172**.

Sleeve **174** on which are rigidly mounted the offbearer fork **176** and handle **178** is adjustably bolted on the cylinder **172**. As shown more clearly in Fig. 8 a control valve **180** mounted on the handle **178** has its inlet **181** connected to flexible hose **166** and its one outlet **182** connected through a T **183** to line **184** to the upper end of cylinder **172** to raise the offbearer fork **176**. The T **183** also leads through line **185** to an exhaust valve **186** for lowering the offbearer fork **176**.

Piping and controls

The piping and controls for the cylinders and vibrators is best shown in the schematic diagram of Fig. 8.

Any suitable fluid under pressure such as compressed air is admitted through line **200** and a suitable lubricant is mixed therewith in an oiler **202**. The supply line branches at **204**, one line **206** going to a header **208** and the other line **210** passing downwardly through one head mast **16** and thence to control valve **212**.

Control valve **212** is operated by a foot pedal **214** which when depressed allows air to go directly to the horizontal vibrators **83** and **85** through lines **216** and **218** respectively. A third line **220** is connected to the inlet of a control valve **222** operated by a foot pedal **224**. When pedal **224** is depressed simultaneously with foot pedal **214** air passes through line **226** to the vertical vibrator **42**.

Header **208** supplies air through line **228** to control valve **234** which has a control handle **236**, an exhaust line **238**, a line **240** going to the forward end of horizontal cylinder **48** and a line **242** going to the after end of horizontal cylinder **48**.

Header **208** also supplies air through line **244** to control valve **246** which has a control handle **248**, an exhaust line **250**, a line **252** going to the lower end of spudding head cylinder **88**, and a line **254** going to the upper end of spudding head cylinder **88**.

Another line **256** from header **208** supplies air to control valve **258** which has a control handle **260**, an exhaust line **262**, a line **264** going to the lower end of mold box vertical cylinder **74**, and line **266** going to the upper end of mold box vertical cylinder **76**.

Line **164** from header **208** is connected to conduit **162** and through control valve **180** operates offbearer cylinder **172** as previously described.

Operation

In the operation of the machine, a pallet **38** is first placed on the pallet perch **28** while the machine is in the final rest position shown in Fig. 6.

The first step in the operation is to lower the mold box **58** onto the pallet **38** and pallet perch assembly **28** in the position shown in Figs. 1 and 2 by manual operation of control knob **260** actuating rod **76** in cylinder **74**. A short blast of vibration will assure proper seating of the mold box.

The second step in the operation, assuming that the hopper **128** has been filled with a suitable cementitious mixture, is to move the horizontal carriage assembly **18** carrying mold box **58** rearwardly until the mold box is under the hopper as shown in Fig. 3. The horizontal carriage is actuated by manual operation of control handle **236** in one direction moving piston **50** forwardly in cylinder **48**. During this movement the bristles **122** engage the lower surface of spuds **94** cleaning off any material adhering thereto.

While the mold box **58** is under the hopper **128** the control handle **236** is moved successively in opposite directions for a brief interval causing the mold box to reciprocate under the hopper, and both foot pedals **214** and **224** are depressed simultaneously for brief intervals to cause a short burst of vibration by both horizontal vibrators **83** and **85**, and the vertical vibrator **42**. The action of the vibrators and reciprocation of the mold box serves to compact the material and assist free flow of the cementitious material from the hopper into the mold box.

The third step in the operation when the molds are full is to move the horizontal carriage assembly carrying filled mold box **58** back to the position shown in Figs. 1 and 2 by operation of control handle 236 in the opposite direction.

The fourth step is to lower the spudding head assembly **86** by operation of control handle **248** causing piston rod **90** to move downwardly in cylinder **88**. When the spuds **94** are in contact with the material in the mold box both foot pedals **214** and **224** are again depressed for brief intervals causing short bursts of vibration by horizontal vibrators **83** and **85** and vertical vibrator **42**. This action is continued until the adjusting nuts **108** on the vertical adjusting rods **106** have seated on the head frame **121** as shown in Fig. 4. By stopping the vibration immediately when the nuts **108** touch the head frame **12** the height dimension of the block is maintained accurately and blocks of uniform dimensions and density will result.

The fifth step is to raise the mold box **58** by operation of control handle **260** while simultaneously operating the horizontal vibrators only by depressing foot pedal **214**. This will strip the block **268** cleanly from the mold box **58** without deformation or destruction of the block.

When the block **268** is stripped and the upper surface of mold box **58** is mated with the lower surface of spudding head plate **92** leaving the formed block resting on the pallet **38** as shown in Fig. 5, the mold box will stop in its upward movement until the control handle **248** is also moved in the other direction.

This is the sixth step which will cause the mold box **58** and spudding head **86** to move upwardly together until the mold box reaches the upper limit of its movement. The spudding head will then continue its movement upwardly out of the mold box until it too has reached its upper limit as shown in Fig. 6. This is the final or rest position.

In the seventh and last step the off-bearer fork assembly **144** is manually shifted by handles **178** and the control **180** is operated to raise cylinder **172** and bring the fork **176** into position for insertion of the fork under pallet **38**. The fork is raised sufficiently to lift the pallet **38** carrying blocks **268** off the pallet perch assembly **28**. The offbearer fork assembly **144** is then swung away from the machine and the pallet and blocks are deposited on any suitable support such as a truck by lowering the cylinder **172** through manipulation of control **180**.

It is thus seen that a machine has been provided which carries out the objects of this invention in a novel manner and an improved method of making cementitious blocks has also been disclosed.

What we claim and desire to secure by letters patent is:

1. In a machine of the class described a first carriage mounted for horizontal movement between a forward

and a rearward position, a pallet perch flexibly mounted at the forward end of said first carriage, an air pressure operated vertical vibrator attached directly to the pallet perch, and a horizontal table mounted at the rearward end of said first carriage, a second carriage mounted for vertical movement, a mold box arranged for vertical movement by said second carriage between an upper position and a lower position resting on said pallet perch while said first carriage is in its forward position, a material supply hopper mounted above said table in the forward position of said first carriage, said mold box being also arranged for horizontal movement on said flexibly mounted pallet perch from said lower position to a rearward position below said hopper, said horizontal table being adapted to receive said mold box at predetermined times.

2. In a machine of the class described a first carriage mounted for horizontal movement between a forward and a rearward position, a pallet perch flexibly mounted at the forward end of said first carriage, an air pressure operated vertical vibrator attached directly to the pallet perch for vibrating the same, and a horizontal table mounted at the rearward end of said first carriage, a second carriage mounted for vertical movement, a mold box arranged for vertical movement by said second carriage between an upper position and a lower position resting on said pallet perch while said first carriage is in its forward position, a material supply hopper mounted above said table in the forward position of said first carriage, said mold box being also arranged for horizontal movement on said flexibly mounted pallet perch from said lower position to a rearward position below said hopper, and a spudding head mounted above said mold box for vertical movement relative thereto, said horizontal table being adapted to receive said mold box at predetermined times.

3. In a machine for forming building blocks, a first

carriage mounted for horizontal movement between a forward and a rearward position, a pallet perch flexibly mounted at the forward end of said first carriage and a horizontal table mounted at the rearward end of said first carriage, a second carriage mounted for vertical movement, a rectangular mold box arranged for vertical movement by said second carriage between an upper position and a lower position resting on said pallet perch while said first carriage is in its forward position, a materal supply hopper mounted above said table in the forward position of said first carriage, said mold box being also arranged for horizonal movement on said pallet perch from said lower position to a rearward position below said hopper, and a spudding head mounted above said mold box for vertical movement relative thereto, a vertical air pressure operated vibrator mounted on said pallet perch and a substantially horizontal vibrator mounted on each side of said rectangular mold box.

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