July 3, 1962 M. E. GATES 3,041,701

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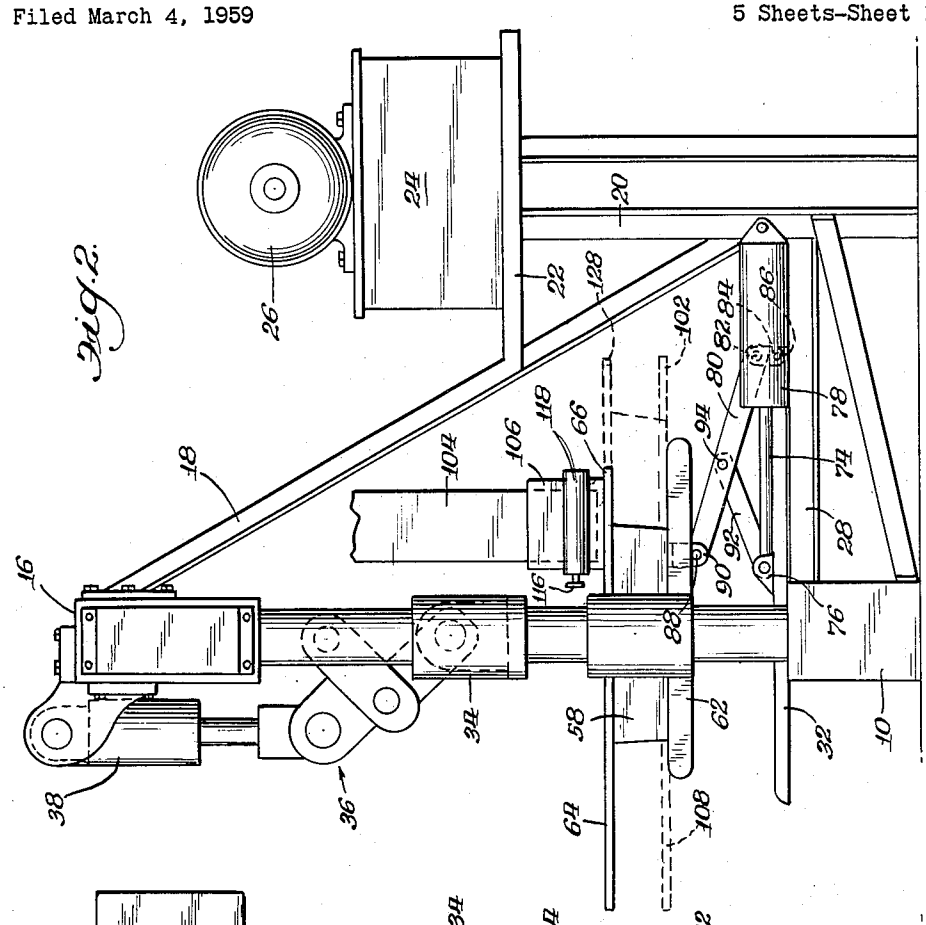

Fig. 2.

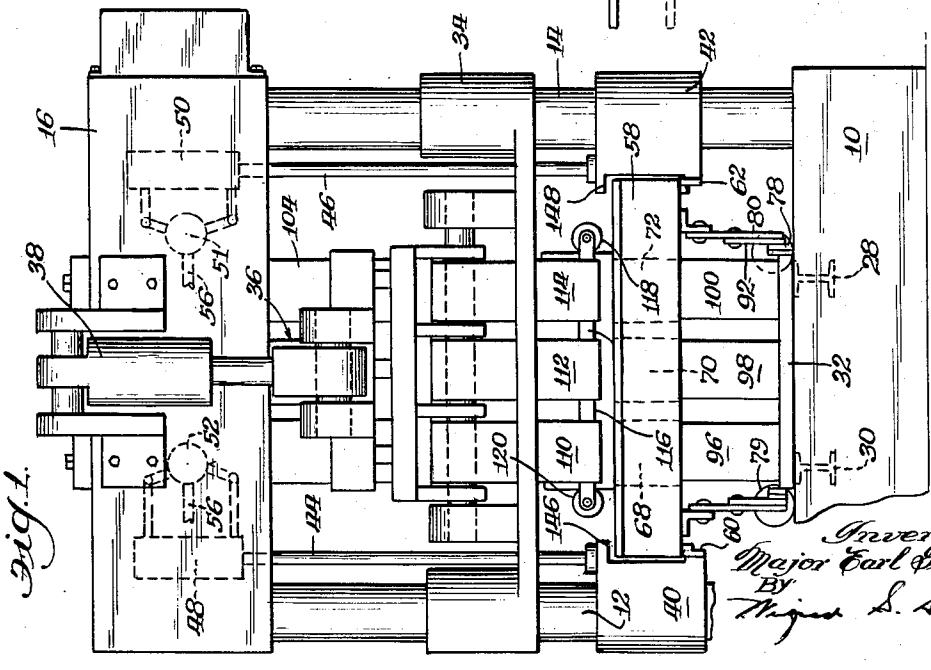

Fig. 1.

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Fig. 3.

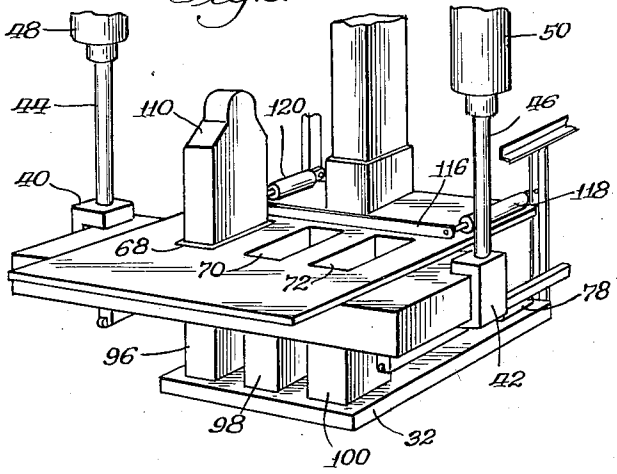



Fig. 4.

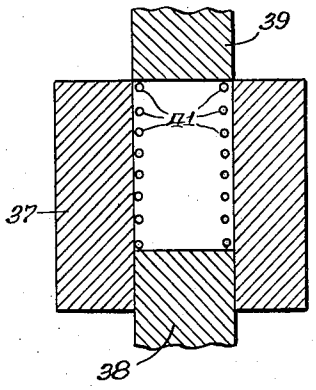



Fig. 6.

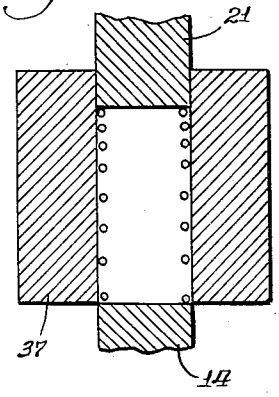



Fig. 5.

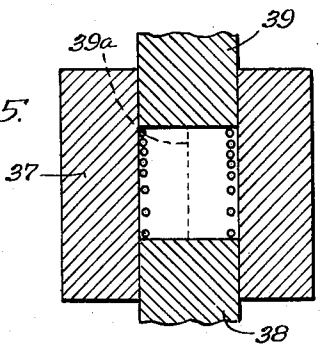



Fig. 9.

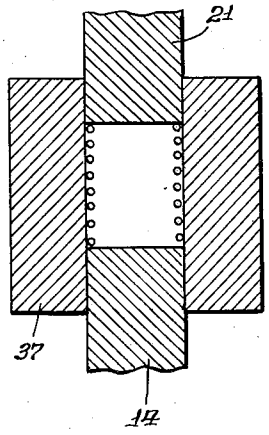



Fig. 7.

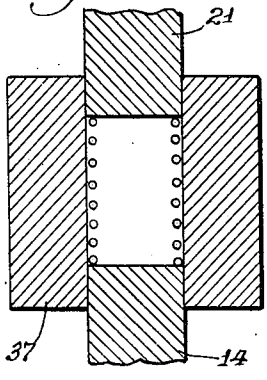
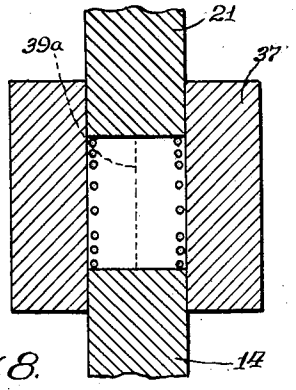



Fig. 8.

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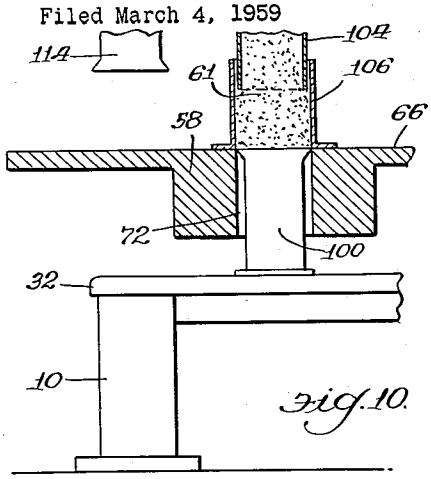


Fig. 10.

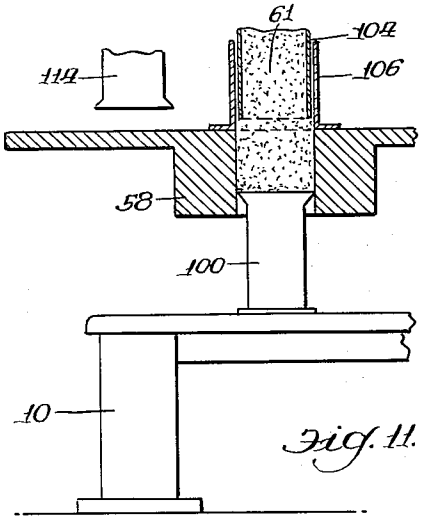


Fig. 11.

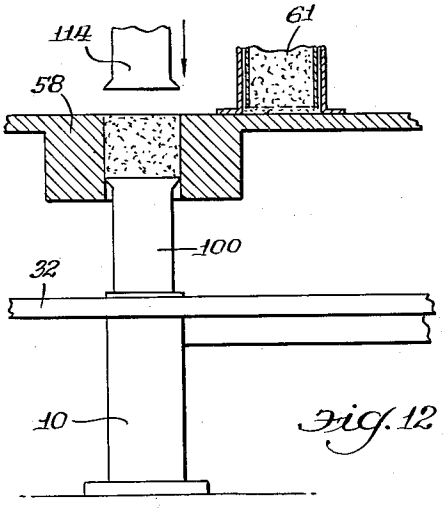


Fig. 12

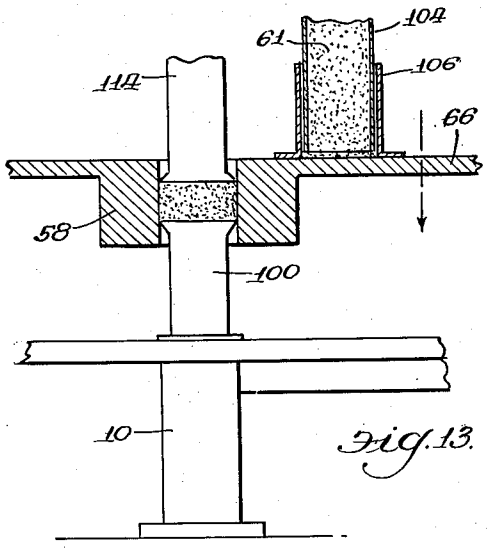


Fig. 13.

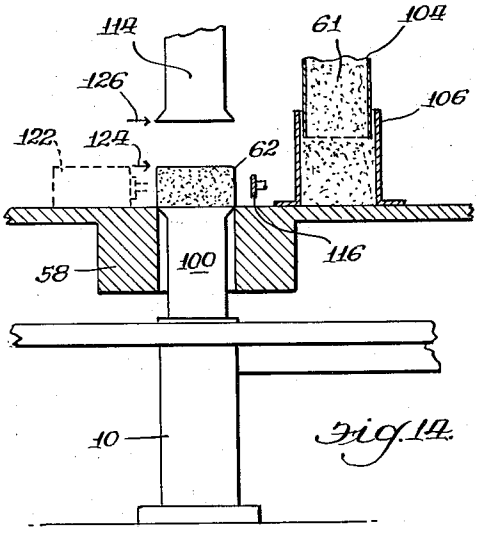


Fig. 14.

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Fig. 15.

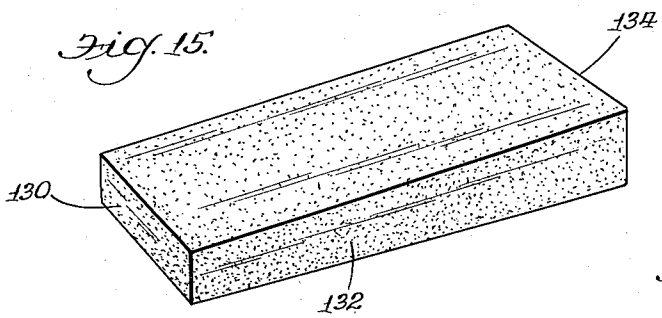



Fig. 16.

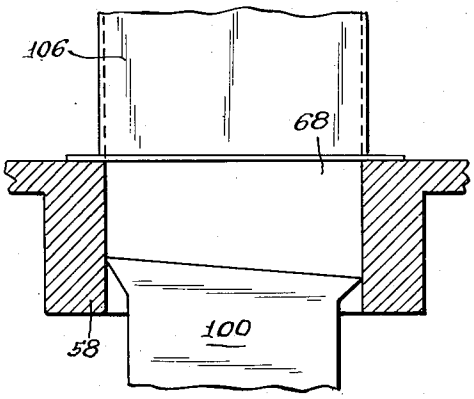



Fig. 17.

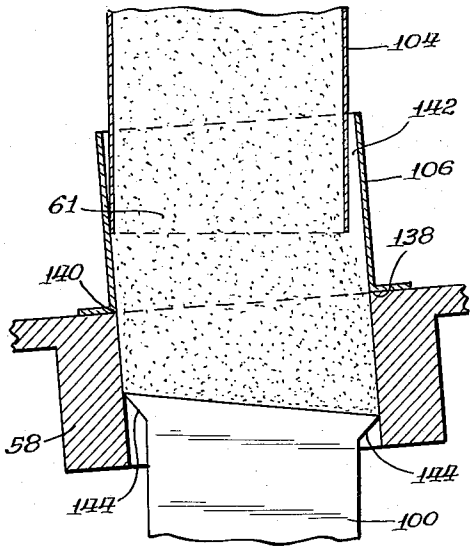



Fig. 18.

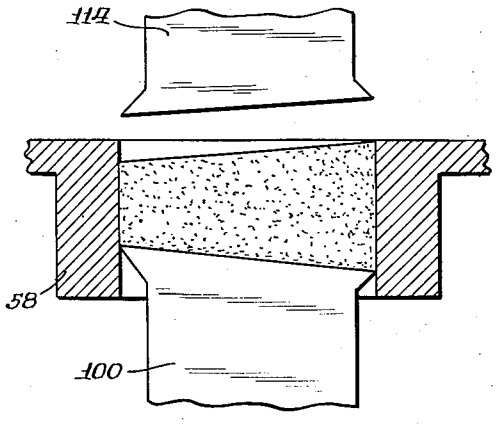
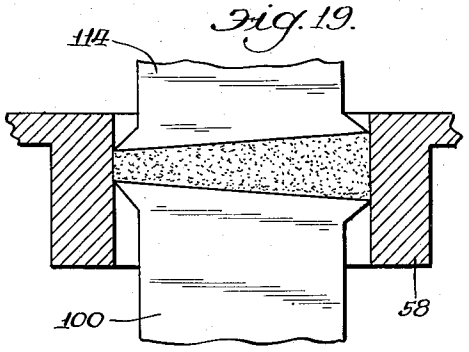



Fig. 19.

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July 3, 1962 M. E. GATES 3,041,701

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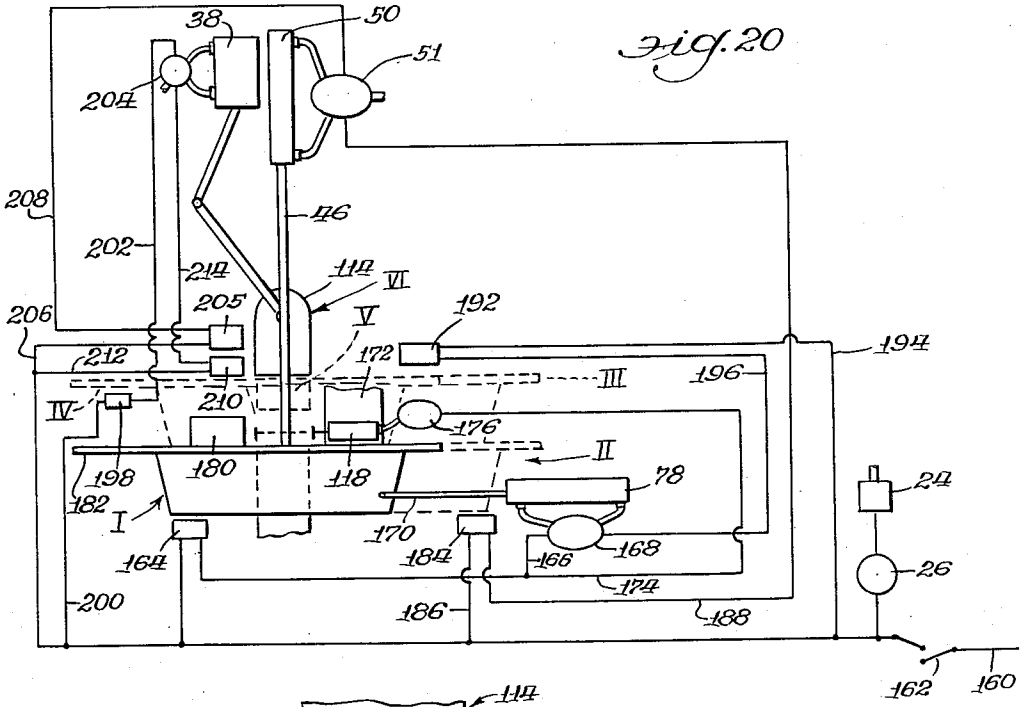


Fig. 20

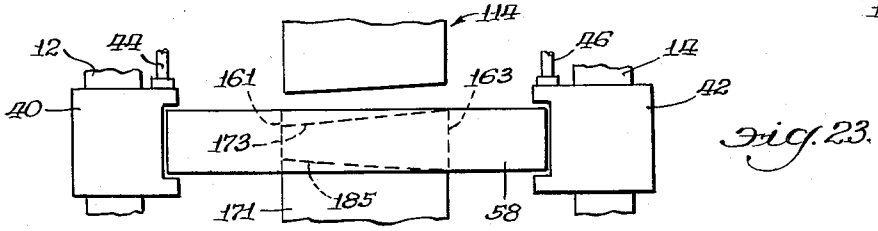


Fig. 23.

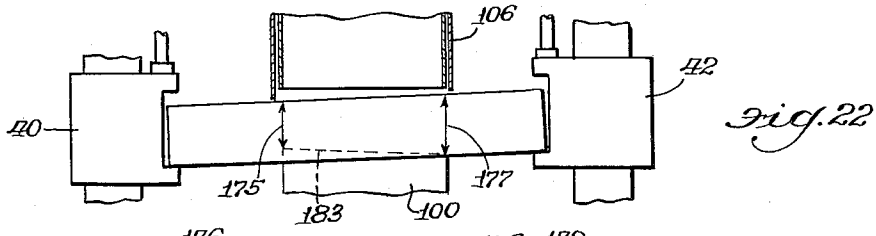


Fig. 22

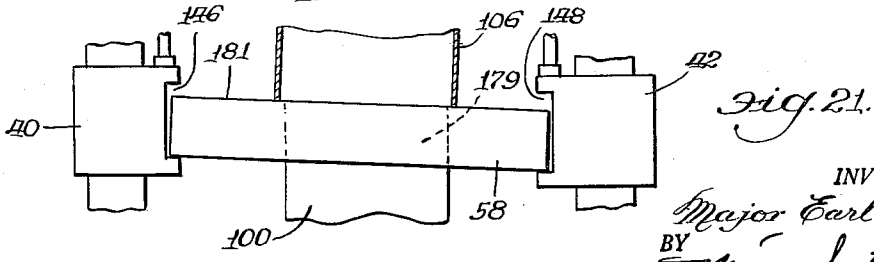


Fig. 21.

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United States Patent Office 3,041,701 Patented July 3, 1962



3,041,701

# BRICK PRESS

Major Earl Gates, 773 Vista Grande, Los Altos, Calif.

Filed Mar. 4, 1959, Ser. No. 797,291
10 Claims. (Cl. 25—60)

This invention relates to a brick press, and particularly to one for pressing refractory brick. Refractory brick are commonly pressed from a mix composed of granulated mtaerial, including some material having binding qualities for green strength. The components are hard and within limits, of various sizes. The press is also useful for making brick where the components are less refractory. It also relates to a method of filling a press cavity so as to produce a brick of irregular thickness but uniform density.

The first object of this invention is to provide a press for making brick of uniform density. In explanation, referring to FIGURES 4 and 5, applicant shows schematically an old method of pressing, for example, a clay brick. Here, the lower ram 38 and the mold 37 are fixed with respect to each other during the pressing operation. When the upper ram descends, the ingredients of the brick are compressed as indicated in FIGURE 5. If the circles 41 in FIGURE 4 show the loose ingredients in the cavity as equally spaced, the descent of the ram 39 will compress them at the top but because of friction with the walls of the mold 37, the pressure will be decreasingly effective along the walls toward the bottom. The density down the center line of the brick indicated by the dotted line 39*a* in FIGURES 5 and 8 may be reasonably uniform. The material at the bottom will be less compacted and the bottom edges will more easily spall than will those at the top. This defect was in part cured by moving the lower ram as well as the upper. Referring to FIGURES 6, 7 and 8, the upper ram 21 descends, compressing the components as indicated in FIGURE 6, and this may either be followed by or be simultaneous with the raising of the lower ram 14. This produces the component distribution of the brick shown in FIGURE 8. Toward the center of the sides of the brick, the material is less dense and no amount of drying or burning will cure this weakness. The object of this invention is to produce the brick shown in FIGURE 9 in which the components are substantially equally compressed particularly along their side walls throughout the entire thickness of the brick.

The second object of this invention is to provide a press for making a brick of trapezoidal or wedge section which has a uniform density. Specifically, a common refractory brick for the roofs of open hearth furnaces has dimensions 18 inches long, 6 inches wide, and 3 inches thick at one end and 2½ inches to 2¾ inches thick at the other end. Commonly, both opposed faces are tapered but oppositely with respect to a central plane through the brick. These brick operate at high temperatures, close to their fusion point. Uniformity of density is, therefore, of great importance. The brick press disclosed herein shows a means of filling a cavity so that the loose fill, before pressing, has the tapered shape of the ultimate brick. A feature of this invention which effects both the first and second objects is a power controlled, horizontally movable mold box which can be tilted at a selected angle for loading purposes.

The third principal object of this invention is to provide a press in which the movable parts are comparatively light, necessitating the use of a much smaller source of power. This is a major object because applicant is able to press a brick with a press motor and pump of only 15 H.P. at a speed of ten brick a minute, whereas in the past the press required to produce the same brick



was operated by a motor of 75 H.P. and only four to five bricks were produced in a minute.

The problem is to reduce the stroke of the ram. The stroke of the ram is determined by the depth of the mold box cavity to be filled with loose material and the depth of a loading box for filling the cavity. Where one wishes to produce a pressed brick which is three inches thick, the loose material at the time the cavity is filled will be from four and one-half to five inches deep. This means that the stroke of the ram must be two inches plus something more to provide satisfactory clearance of the top of the mold box. This is usually about one-half inch. Without more the stroke of the ram must be two and one-half inches. The ram, however, is directly above the cavity of the mold box and if the clearance is only one-half inch when the five-inch cavity is empty, there is no way of introducing the granulated material. At present, the presses have a mold box filler which moves across the top of the mold box and drops the mix into the cavity. The mold box filler should have a depth equal to that of the cavity in order to maintain homogenity of the mix. In short, the mold box filler is a cavity itself which moves above the empty mold box beneath the ram. It follows that the ram must be five inches higher than the top of the empty mold box. This means a minimum stroke of seven and one-half inches. Actually, the present-day presses have a total stroke of seven to ten inches. The power stroke, however, is only two and one-half inches long and the presses are so designed that the lower ram is carried on a vertically movable pressing frame which provides the five-inch clearance desired for loading. The power stroke of the ram remains comparatively short. It is apparent that the pressing frame supports the lower rams during the pressing operation and must be very heavy. Also, it must be moved vertically in order to strip the brick from the cavity. The present presses, whether hydraulic or mechanical, require a 75 H.P. motor for effecting the complete cycle of the machine, and because it is necessary to move not only the upper ram but the pressing frame, the machine can be operated at only about four to five cycles per minute.

The feature of this invention is a mold box which is moved laterally of the ram to a point beneath a filler chute, thereby eliminating the mold box filler, and moved vertically around the lower rams to strip the brick. By eliminating the mold box filler, five inches of stroke is eliminated, and by moving the mold box downwardly around the lower rams to strip the bricks, applicant has eliminated vertical movement of the pressing frame, with the result that a comparatively small motor and pump can function the two and one-half inch power stroke and comparatively light cylinders can be used to move the comparatively light mold box either vertically or horizontally.

Another object of this invention is to load the mold with loose material which, however, has been partially compressed. Assuming for the moment a mold box having a five-inch depth, and with the mold box at rest, if one pours into the mold box granulated material until the material is flush with its edges, that material will contain a selected amount of air. If one shakes the mold box for a few seconds, the material will settle as much as half an inch in the case of certain refractory mixes. The effect of this is to make it possible to reduce the stroke of the ram because the fill is more dense and therefore the fill is less deep.

One of the features of the present invention is the filling of the mold box with material which is already partly compressed by vibration and therefore contains less air. As will appear, the raw material in the chute down which

it is descending is comparatively well compressed and applicant instead of pouring the bottom contents of the chute into the mold box moves the mold box up around the lower portion of the contents of the chute. Since the lower contents are already in part compressed by vibration and to that extent free of air, the mold box receives a charge which is substantially more dense than it would be if the contents were poured into the mold box. Such pouring picks up additional air and components of the mixture tend to bridge themselves until vibration occurs.

A further object of this invention is to provide a method of assuring uniform density of a brick composed of flowable granulated materials. The major feature of this invention is the suspension of a mold box having open bottom cavities from two pistons which are controlled independently of whatever else may be taking place in the brick-making operation, i.e., pressing the brick or filling the cavity. Thus, when the upper ram is pressing the brick, the mold box may be moving downwardly with the ram, or it may be moving oppositely to the ram, with the result as will be hereinafter explained, applicant obtains the idea uniform density of brick shown in FIGURE 9. Similarly, because the mold box is controlled by the two pistons operated independently, it can be tilted during the filling operation to give a fill having the cross section of the ultimate brick, and it may be tilted at the moment of stripping the brick so that the top of the lower ram will be parallel to the top of the moldbox.

These and such other objects as may hereinafter appear are attained in the embodiment of the invention shown in the accompanying drawings, wherein:

FIGURE 1 is a front elevation of applicant's press;

FIGURE 2 is a side elevation thereof;

FIGURE 3 is a perspective view of the working parts;

FIGURES 4 and 5 are schematic illustrations, showing density distribution of the brick components where the lower ram and the mold box are fixed with respect to each other;

FIGURES 6, 7 and 8 are schematic illustrations showing low density at the opposite side walls of a brick where the mold box is fixed and both the upper and lower rams either simultaneously or successively compress the mix.

FIGURE 9 schematically shows the density of a brick produced by applicant's press;

FIGURES 10 through 14 show schematically in side elevation and cross section the steps of movement of applicant's floating mold box in making a brick;

FIGURE 15 is a perspective view of a tapered silica brick which is commonly used in roofs of open hearth steel furnaces;

FIGURES 16 through 19 are schematic views in side cross section showing the steps of obtaining a tapered fill in a mold box by means of applicant's press;

FIGURE 20 is a schematic wiring diagram for purposes of showing operability only of the piston sequence to produce the operations of either FIGURES 10 through 14 or FIGURES 16 through 19; and

FIGURES 21, 22 and 23 are schematic illustrations of three positions of the mold box viewed from the front in pressing and stripping the brick from the cavity.

The press is shown in FIGURES 1 and 2, and its essential operating elements in a perspective sketch of FIGURE 3. Referring to these three figures, the frame is an upright, rectangular member consisting of a solid metallic block **10** which rests on the floor. In opposite ends of this block **10** are rigidly mounted two upright shafts **12** and **14**. On the top of these shafts is mounted a heavy casting **16**. This frame is held in upright position by two stays such as **18** extending rearwardly from the casting **16** down to two upright angle irons such as **20** which are cross braced. A pair of angle irons such as **22** are mounted as shown in FIGURE 2 on the brace **18** and the upright **20** and these support an oil reservoir tank **24** and a motor driven pump **26** for operating hydraulic cylinders. The uprights **20** are held in spaced relationship



to the front frame by I-beams **28** and **30**. The top of these I-beams **28** and **30** lie in the plane of the top of the block **10** and provide a sliding surface for a slide or carriage **32**.

Slideably mounted on the two shafts **12** and **14** is a plunger carriage **34** which is suspended from a toggle **36** operated by a piston and oil cylinder **38** suspended from the cross member **16**. The construction of the toggle need not be described in detail as it is substantially identical with equipment presently in use. It is important to notice, however, that the piston raises only the carriage **34** whereas in existing presses the entire pressing frame which carries the lower rams **96**, **98** and **100** must be raised. Applicant's pump **26** is operated by a comparatively small electric motor, 15 H.P., as compared to the 75 H.P. electric motor now commonly in use. Moreover, with the comparatively short stroke of the carriage **34**, the press can be cycled up to ten times a minute whereas existing hydraulic presses cycle at about five times a minute. Depending below the carriage **34** are three rams **110**, **112** and **114**.

Mounted on the shafts **12** and **14** are two slides **40** and **42** which are respectively suspended from piston rods **44** and **46** functioned by cylinders **48** and **50**, which are mounted in a cavity in the top member **16**. These cylinders may be operated positively in each direction and are independently controlled by valves **51** and **52** described hereinafter. The oil is supplied through pressure lines such as **56** from the pump **26**. The cylinders **48** and **50** are functioned together or independently by the valves **51** and **52**. Mounted on the inner face of the slide **40** is a guideway **60** and on the inner face of the slide **42** is a guideway **60** and on the inner face of the slide **42** is a guideway **62**. Mounted for forward and backward horizontal movement on the guideways **60** and **62** is a mold box **58**. This mold box comprises a heavy casting having formed either integrally or separately a delivery table **64**, a rear table **66** and three open bottom brick cavities **68**, **70** and **72**. The mold box, therefore, can move vertically in the slides **40** and **42** in response to the action of the cylinders **48** and **50**.

As heretofore stated, mounted on top of the block **10** and the I-beams **28** and **30**, and merely resting thereon is the slide **32**. This slide, referring to FIGURE 2, can be reciprocated forwardly or backwardly by a piston rod **74** connected to a bracket **76** actuated by a hydraulic cylinder **78** controlled by a solenoid, not shown. A link **80** is pivotally anchored at **82** to a short link **84** pivotally connected at **86** to the slide **32**. The other end of the link **80** is pivotally connected at **88** to a bracket **90** mounted on the rear bottom portion of the mold box **58**. The link **80** is partially controlled by a link **92** connecting the bracket **76** pivotally to the link **80** at the pin **94**. This linkage provides a modified straight-line motion so as to maintain alignment of the mold box cavities with the rams. Mounted on the slide **32** are three fixed blocks or rams **96**, **98** and **100** which are in vertical alignment with the cavities **68**, **70** and **72** respectively at all times, and normally their upper surfaces are just inside the bottom of the cavities. The tops of these blocks **96**, **98** and **100** constitute the bottoms of the cavities.

By moving the piston **74** to the right, both the slide **32** and the mold box **58** with the blocks **96**, **98** and **100**, may be moved from either forward position, solid line or **108** in FIGURE 2, to either rear position **128** or **102**. By lowering the pistons **44** and **46**, the mold box may be dropped to level **108**. The action of piston **74** is independent of the action of the pistons **44** and **46** so that the mold box **58** can be positioned at any desirable point within the stroke limits of the pistons.

The operation of this press in making a standard parallelepiped brick can be best appreciated by examining the schematic FIGURES 10 through 14. These figures show the steps of a complete cycle starting with the filling of the cavities in the mold box **58**. FIGURE 10 shows step

1 with the mold box in its lower rear position, that is, the dotted-line position 102 of FIGURE 2. The top of the heavy blocks or lower rams 96, 98 and 100 are lying flush with the top of the mold box 58. The three sleeves such as 106 are in continuous engagement with the top of the rear table 66 of the mold box. The material in the sleeve is comparatively compacted not only because of the weight of the material from a bin (not shown) several feet directly above, but because the machine vibrates and settles the material during the pressing cycle.

FIGURE 11 shows step 2 wherein the mold box has been raised to its upper position, that is position 128 shown in FIGURE 2. By this movement, the material does not move. Only the sleeve 106 moves, telescoping itself around the chute 104. This action provides a second advantage in this press, namely, adjustability of the depth of the cavity to be filled. By changing the stroke of the pistons 48 and 50, see FIGURE 1, the mold box can be raised to any selected height. Assuming that the mix for a one-inch thick brick requires a two-inch fill, it can be seen that by altering the upward stroke of the mold box 58, one can obtain a two-inch fill. The depth of the mold box, and the cavities, therefore, is determined by the thickest brick that a given plant desires to turn out. This adjustability moreover is important in compensating for different densities of material fill. The physical characteristics of the granules in the fill vary with the raw material. Clays, for example, contain different amounts of kaolin and the grinding process may not produce a mix from one clay that has the same praticle size and ability to compact itself as particles from another clay. On the other hand, a given run of material from the hopper delivering to the chute 104 is reasonably uniform. The operator at the beginning of the run can measure the thickness of the completed pressed brick and adjust the stroke of the cylinders 48 and 50 until he obtains the desired thickness of the finished product. He is merely varying the depth of the fill in the cavity.

FIGURE 12 shows step 3. The piston 78 has now moved the mold box 58 and the slide 32 forwardly so that the cavities now lie beneath the rams 110, 112 and 114. The material 61 in the chute remains stationary, resting upon rear table 66. Thereupon, the toggle assembly 36 is functioned and the brick pressing step is performed as shown in FIGURE 13. The rams such as 114 are then retracted as shown in FIGURE 14 and simultaneously the piston rods 44 and 46 force the mold box 58 to its lower position, thereby bringing the surface of the mold box flush with the top of the blocks 96, 98 and 100. This exposes the finished brick. Also, during this operation, the sleeves such as 106 followed the rear table 66 down permitting the material 61 to descend. In descending it did not lose much of its compactness because the descent was comparatively slow and the press continued to vibrate so as to restore the compactness of the material in the lower part of the chute 104.

Thereupon, the pusher 116 is actuated by the two air driven pistons 118 and 120 which are mounted on the sleves 106 so as to push the brick to the dotted-line position 122. The cycle commencing with FIGURE 10 is repeated. The total stroke of the plungers is short, indicated by the space between the arrows 124 and 126 in FIGURE 14.

One movement of the mold box has not been described on the compression stroke. As the particles become compressed as illustrated in FIGURE 5, frictional resistance against the upper part of the cavity would cause the mold box itself to move downwardly thereby causing the lower block 100 to exert pressure on the lower particles so as to produce the result shown in FIGURE 9. This was effected because as the ram came down, the valves 51 and 52 were controlled so that the mold box could move downwardly with respect to plunger 100. If desired, during pressing operation, the valves 51 and 52 may be functioned so as to raise or lower the mold box which will partially break the seal at the walls of the cavity and release air.

In FIGURES 15 through 19, applicant has shown schematically the method of making a tapered brick from a tapered fill. In FIGURE 15, there is shown a tapered brick having an end 130 perhaps one-half inch less in thickness than the end 134 and with both the top surface and the bottom surface tapered. There is also a tapered brick in which only one surface is sloped with respect to the ends. In FIGURE 16, the mold box 58 with the ram near the bottom is shown beneath a chute which could be a mold box filler or some other means for filling the cavity. It is shown empty. In FIGURE 17, the fill is entering the cavity with the mold box canted, so that the fill along the dotted line between the points 138 and 140 is sloped. When the mold box moved from beneath the chute 104, the forward edge of the sleeve 106 cuts off the fill in the cavity along the plane of the top of the mold box 58. Applicant has shown this in connection with his own press, but it will be appreciated that this could be done in other ways. In FIGURE 18, applicant shows the mold box with the cavity beneath the upper ram 114, but importantly, the mold box 58 has now been levelled off so that the trapezoidal fill is now clearly seen, and the cavity is aligned with the top plunger. Thereupon, the upper ram 114 descends and presses the trapezoidal brick as shown in FIGURE 19.

Applicant will now describe how his press makes the brick shown in FIGURE 15. Referring to FIGURES 21, 22 and 23, a mold box 58 has a single cavity whose length extends transversely of the width of the mold box. Referring to FIGURE 21, the mold box is shown canted and the top of the ram 100 lies in the plane 181 of the top of the mold box. This is the lower, forward position 108 of FIGURE 2, or the lower, rear position 102 of FIGURE 2. Assuming that one is in the lower, rear position 102, the slides 40 and 42 raise the mold box underneath the sleeve 106 as illustrated in FIGURE 22, that is, the slide 42 rises a greater distance than the slide 40. The top of the ram 100 is indicated by the dotted-line 183 and the cavity is tapered so that the depth of the fill is greater between the arrows 177 than between the arrows 175. The mold box is then moved forward, and the front, lower edge of the sleeve 106 cuts off the top of the fill level with the top of the mold box. The mold box moves into the forward, upper position shown in solid line in FIGURE 2, and as illustrated in FIGURE 23, ready for the upper plunger 114 to descend. At this moment, the mold box is level and the trapezoidal fill is defined by the dotted lines 173 and 185.

This ability to tilt the mold box has great value in correcting differences in character of the fill on opposite sides of the chute. Referring to FIGURE 1, the chutes 104 may be fed by a single chute or it may be a single wide chute all the way down to the top of the mold box table, and experience shows that the character of the mix at one side may be different from the character of the mix at the other side, with the result that to obtain a brick of as uniform density as possible, it is desirable to fill the cavity more deeply at one side than at the other of the press. Thus, with the multiple cavity of FIGURE 1, if the depth of fill were kept the same in all three cavities, the brick on the right side might be more dense than the brick on the left side. Where the press is a mechanical press, or where the pressure is applied hydraulically, one might get a brick on the right side thicker than the brick on the left side. It is evident that by raising the mold box on the left side at the time of fill that one can place a little more mix in the left-hand cavity and compensate for this difference in the character of the mix.

In FIGURE 20, applicant presents a schemaic wiring diagram superimposed on the schematic drawing of the operating parts for the purpose of showing the cycling of the machine. The view is from the side of the machine

similar to FIGURE 2. There are just six basic positions of the working parts, four of the mold box, and two of the plunger.

Position I is the mold box in its forward, lower position, at which position the mold is stripped and the brick ejected;

Position II is the rear, lower position;

Position III is the rear, upper position in which the mold cavity is filled with granulated material;

Position IV is the forward, upper position with the cavity beneath the ram;

Position V indicates the lower position of the ram during a pressing operation; and

Position VI is the upper position of the ram. The mold box follows a rectangular, counterclockwise course.

To effect this movement of the parts, many mechanical means could be devised. Applicant effects all of them in the embodiment disclosed by means of two mold box horizontal pistons, such as **78**, two mold box vertical pistons, such as **50**, two brick ejector pistons such as **118**, and one toggle piston **38**. The actuation of these pistons could be directed by a master control operating through switches controlling the valves on each piston. However, the system used is based upon the movements of the mold box, which as it ends one movement will mechanically throw a switch which will start it on its next movement. These switches are located at appropriate points along the rectangular, counterclockwise path of the mold box and it is evident that they can be located at various places and still obtain the same result. Applicant, therefore, has positioned them schematically around the path in FIGURE 20 so that the operation can be more readily understood.

The negative side of the power line will not be shown. Numeral **160** is the hot line, and when the switch **162** is closed, the motor **26** establishes pressure and provides liquid pressure to cylinders **38**, **50** and **78**. Assuming that at the moment the switch **162** is closed, the mold box is in the solid-line position in FIGURE 20, that is, position I. The rearward switch **164** is closed and the line **166** actuates the mold box horizontal valve **168** so as to move the piston **170** to the right, thereby moving the mold box toward the rear and beneath the chute **172** carrying the granulated material. Simultaneously, the line **174** is energized which actuates the ejector valve **176** which causes the pusher **118** to push the brick **180** forwardly onto the table **182**. This cylinder **118** is operated by air and the valve is such that the pusher goes forwardly and returns immediately after the mold box reaches position II.

When the mold box **58** reaches its rearmost position, that is, position II, the rearward switch **164** opens and the up switch **184** is closed. The switch is connected to the hot line by conductor **186**. When it closes, the conductor **188** is energized and the mold box vertical valve **51** moves the piston **46** upwardly, thereby raising the mold box.

When the mold box reaches the upper, rear position, that is, position III, the up switch **186** remains closed, but the forward switch **192** is now closed, and thereby connects the hot conductor **194** to the conductor **196** which actuates the mold box horizontal valve **168** in the opposite direction, thereby moving the mold box forwardly to position IV.

When the mold box reaches position IV, it mechanically closes toggle switch **198** which connects that hot line **200** through the conductor **202** to the toggle valve **204** which causes the ram **114** to descend. As the ram descends, it closes the down switch **205** which connects the hot conductor **206** to **208**, and this controls the mold box vertical valve **51** and permits the movement of the mold box to be controlled, so as to achieve results shown in FIGURE 9 rather than those of FIGURE 8. At the same time during this movement, the up switch **184** is opened. When the ram reaches the bottom of its stroke, it closes plunger switch **210**. This connects the hot line **212** to the conductor **214** to the other side of the toggle valve **204** and raises the ram **114**. Closing switch **210** also depresses the mold box to position I, thereby stripping the brick from the cavity.

It will be seen that no matter where the press is stopped in its cycle, it will resume its cycle the moment the switch **162** is closed.

There are certain interlock and safety devices in the circuit, which need not be described here. Importantly, the pistons **78** and **79** work together as do the ejection pistons **118** and **119**. In the making of regular shape brick, the pistons **48** and **50** also work together, but they are independently controlled. In other words, there is a valve **52** for piston **48** corresponding to the valve **51** for piston **50**. There is an up switch for the piston **48** corresponding to the up switch **184** for the piston **50**. These four switches can be mounted on the frame at different levels so that they can cause one side of the mold box to rise higher than the other side. This makes possible the automatic forming of the tapered brick. It is important that the top of the bottom ram **100**, whether making tapered brick or rectangular brick, be in the plane of the top of the mold box in position I so that the brick may be instantly cleared by the ejector. Where the lower ram has a sloped face as shown in FIGURES 16–19, this alignment of the top of the ram with the plane of the top of the mold box is attained by tilting the mold box. It is evident that applicant can adjust the stroke of either piston **44** or **46**, see FIGURE 1, as desired by simply setting the vertical position of the switches such as **184**.

The advantages of the positively controlled vertically and horizontally movable mold box number three. Firstly, during the pressing operation, referring to FIGURE 9, applicant is able to move the mold box **37** up and down under the action of the cylinders **48** and **50**, above in FIGURE 3, as the ram **21** goes down. In short, he can frictionally move all of the particles rubbing against the side walls of the cavity so as to get the result shown in FIGURE 9. This result will depend in part upon the particular mix, but the mold box **37** may or may not follow the downward movement of the ram. This ability to move the mold box relative to the mix in either direction during the pressing operation also assists in the release of air along the walls of the cavity.

The second advantage of the positive control of the mold box enables the applicant to strip the brick by moving the mold box alone downwardly with respect to the lower rams. This leaves the lower rams at all times in a given horizontal position and during the pressing operation they are resting on the block **10**. This method of stripping the brick enables the applicant to completely dispense with raising or lowering the whole pressing frame.

The third advantage derives during the filling of the mold box cavities. One side of the mold box may be raised higher than the other side so that applicant can obtain a sloped fill which will have a variable cross section similar to the finished brick. This produces a brick of uniform density. Additionally, this ability to independently raise the opposite sides of the mold box makes it possible to compensate for different density of fill flowing down the particular feed chute. Finally, the ability to adjust the switches so as to very exactly control the level of the mold box makes it possible for a workman to quickly compensate for variations in density of the fill so that applying the invention on a hydraulic press, he can produce bricks of uniform density.

Having thus described his invention, what applicant claims is:

1. A press of the character described for shaping bulk material comprising in combination a mold box open at top and bottom, relatively moving upper and lower rams adapted respectively to enter the open top and bottom of the mold cavity to compress material therein, said lower ram adapted to close the bottom of the mold, a

mold filling chute of substantially the same section as the mold cavity and laterally offset from the operating axis of said rams, means for reciprocating said mold and lower ram back and forth laterally from a position in alignment with said rams to one in alignment with said chute, means for raising said mold when in alignment with said chute for filling the mold, means for maintaining operative engagement of mold and chute during filling of the mold, and means for lowering said mold relative to said lower ram on completion of said compressing operation, whereby said mold is filled by an upward movement and the compressed material is ejected by a lowering movement of said mold.

2. The press of claim 1 wherein the filling chute has means for maintaining contact between chute and mold during filling and has a terminal element surrounding a column of material in the chute which moves up with the rising movement of the mold to permit the latter material to pass into said mold as the latter rises.

3. The press of claim 1 wherein the filling chute is of substantially the same section as the mold and holds a column of material of the same section as the mold so that said material is substantially undisturbed as it passes in partially compacted condition into said rising mold.

4. The press of claim 1 wherein the filling chute has a telescoping terminal sleeve of substantially the same section as the mold and holds a column of material of the same section as the mold so that as the mold rises the said sleeve also rises and the material therein passes undisturbed into said mold.

5. A press of the character described comprising in combination a movable mold having therein a mold cavity open at top and bottom, upper and lower rams adapted to enter said cavity to compress material therein, said lower ram closing the bottom of said mold, a filling chute offset from said rams for filling the mold cavity, means for moving said mold and lower ram laterally from a position in register with said chute to one in register with said rams, and vice versa, means for relatively moving the lower ram and mold so that at the beginning of the mold filling operation the lower ram is substantially flush with the top of the mold, means for moving said mold upwardly during the filling operation, and means for controlling the degree of upward movement to adjust the depth of fill of said mold.

6. A press of the character described comprising in combination a mold having a mold cavity open at the top and bottom, mechanism for compressing material in the mold including a lower ram adapted to enter and close the bottom of the mold, a mold filling chute laterally offset from said ram for supplying material to said mold and having substantially the same cross-section as the mold cavity, means for moving said mold and lower ram laterally from a position in register with said chute to a position in register with said ram means for moving said mold so that said lower ram is substantially flush with the top of the mold at the beginning of the mold filling operation, and means for raising said mold when in register with said chute for filling said mold from said chute.

7. A press of the character described comprising in combination a mold having a mold cavity therein open at the top and bottom to receive material to be compressed, means for supporting said mold so that the latter may be tilted from the horizontal, pressing mechanism including an upper ram adapted to enter the open top of the cavity, and a lower ram adapted to enter and close the bottom of said cavity, mold filling means adapted to register with the open top of the mold cavity to introduce material therein, means for relatively moving mold and mold filling means to align the latter with the mold cavity for filling and mechanism for actuating said mold supporting means to tilt said mold from the horizontal and relative to said lower ram when in register with said mold filling means to vary the effective mold depth, from one side to the other of said mold, thereby to obtain a non-uniform filling of said mold from one side to the other, said actuating mechanism having means to restore the mold to horizontal position during the pressing operation.

8. The press of claim 7 wherein the mold cavity extends laterally of the mold and the tilting mechanism tilts said mold laterally from the horizontal to obtain a non-uniform filling of the mold laterally of the mold cavity.

9. The press of claim 7 wherein each side of the mold is supported by a hydraulic piston and cylinder having means for operating them independently thereby to tilt the mold during the filling operation.

10. The press of claim 7 wherein the mold filling means is laterally offset from the ram and means are provided for moving the mold laterally into operative relation with the mold filling means.

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