

[54] **MULTIPLE-SECTION MOLDING PRESS**

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[51] Int. Cl. B30b 7/02, B30b 15/16, B29g 7/02

[58] Field of Search 425/333, 339, 340, 425/341, 455, 394, 397, 234, 145

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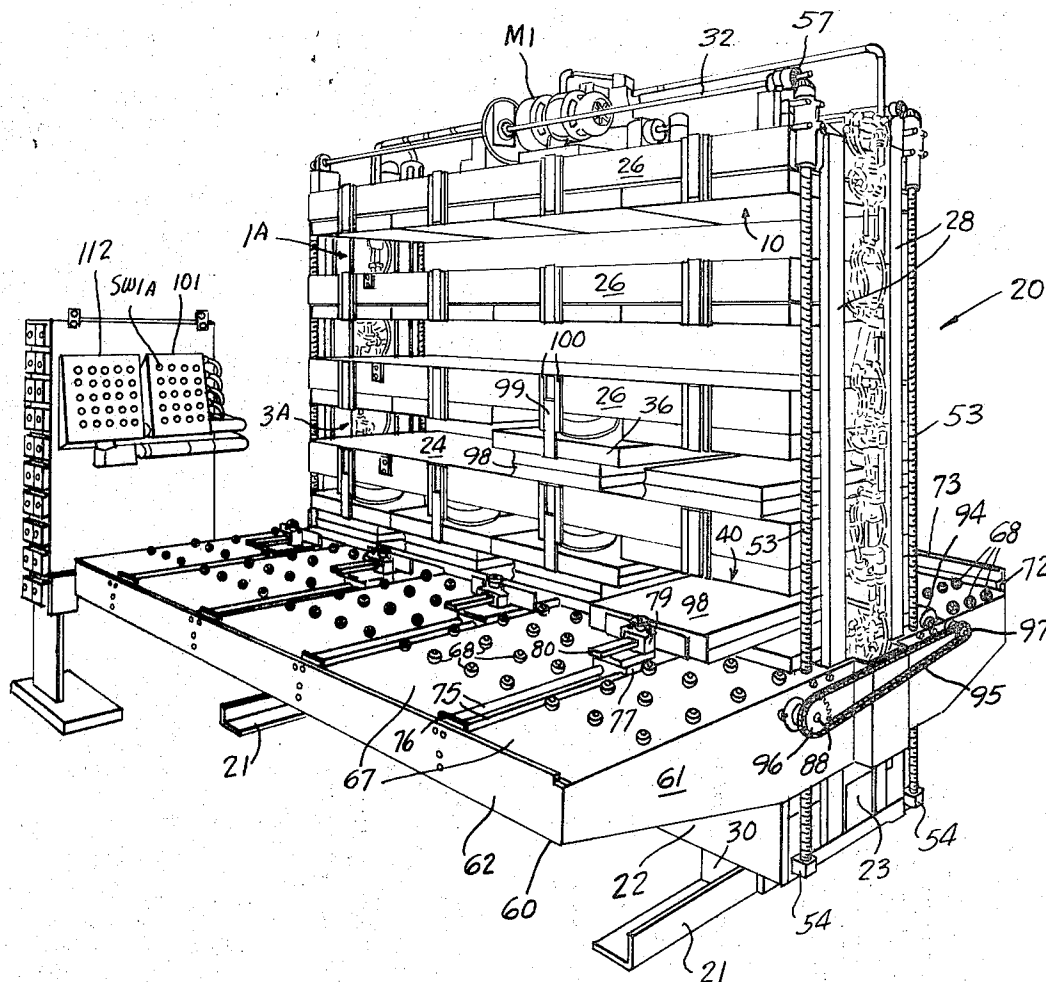
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[57] **ABSTRACT**

A multiple-section molding press having molding press sections arranged in aligned vertical and horizontal rows. Each section has a fluid pressure-operated platen. A vertically movable horizontal elevator platform member is adapted to receive box molds from a conveyor, and the box molds can be moved along the platform member so as to be manually positioned adjacent any of the vertical rows of press sections. A bank of illuminated control switches is provided for the sections. The elevator platform is provided with pushers and ejection devices aligned with the respective vertical rows. Automatic vertical positioning circuits are provided for the platform member, as well as press cycling circuits, operating in response to the actuation of a selected illuminated control switch to place a mold box at the level corresponding to the selected illuminated switch. The associated pusher automatically moves the mold box into press position and simultaneously ejects a previously compressed mold box therefrom onto the discharge side of the platform so that it is engaged by the associated ejection device. The platform returns to conveyor level. A respective timer is provided to control the action of each of the press sections and to indicate completion of a press cycle.

26 Claims, 9 Drawing Figures



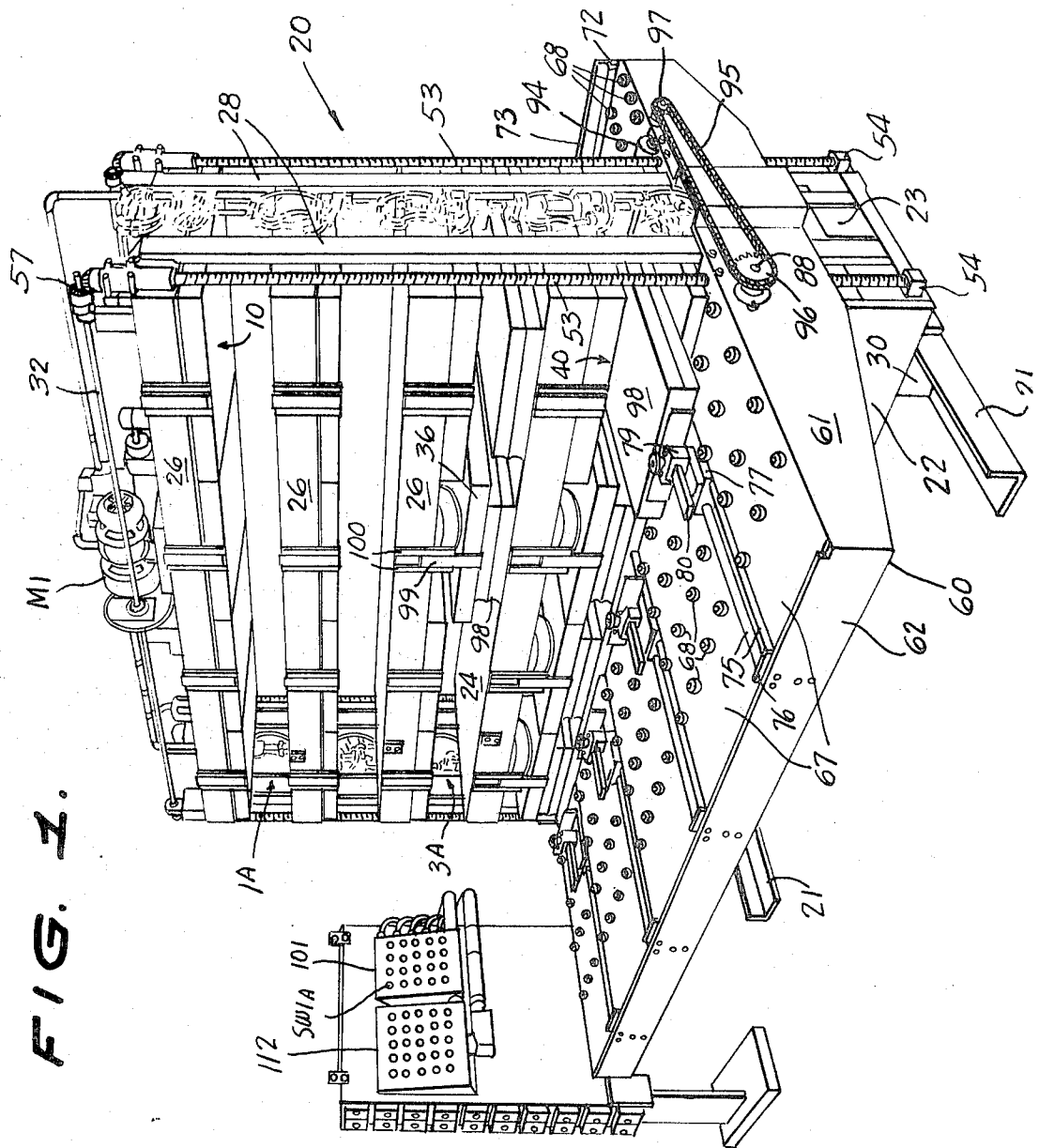


FIG. 2.

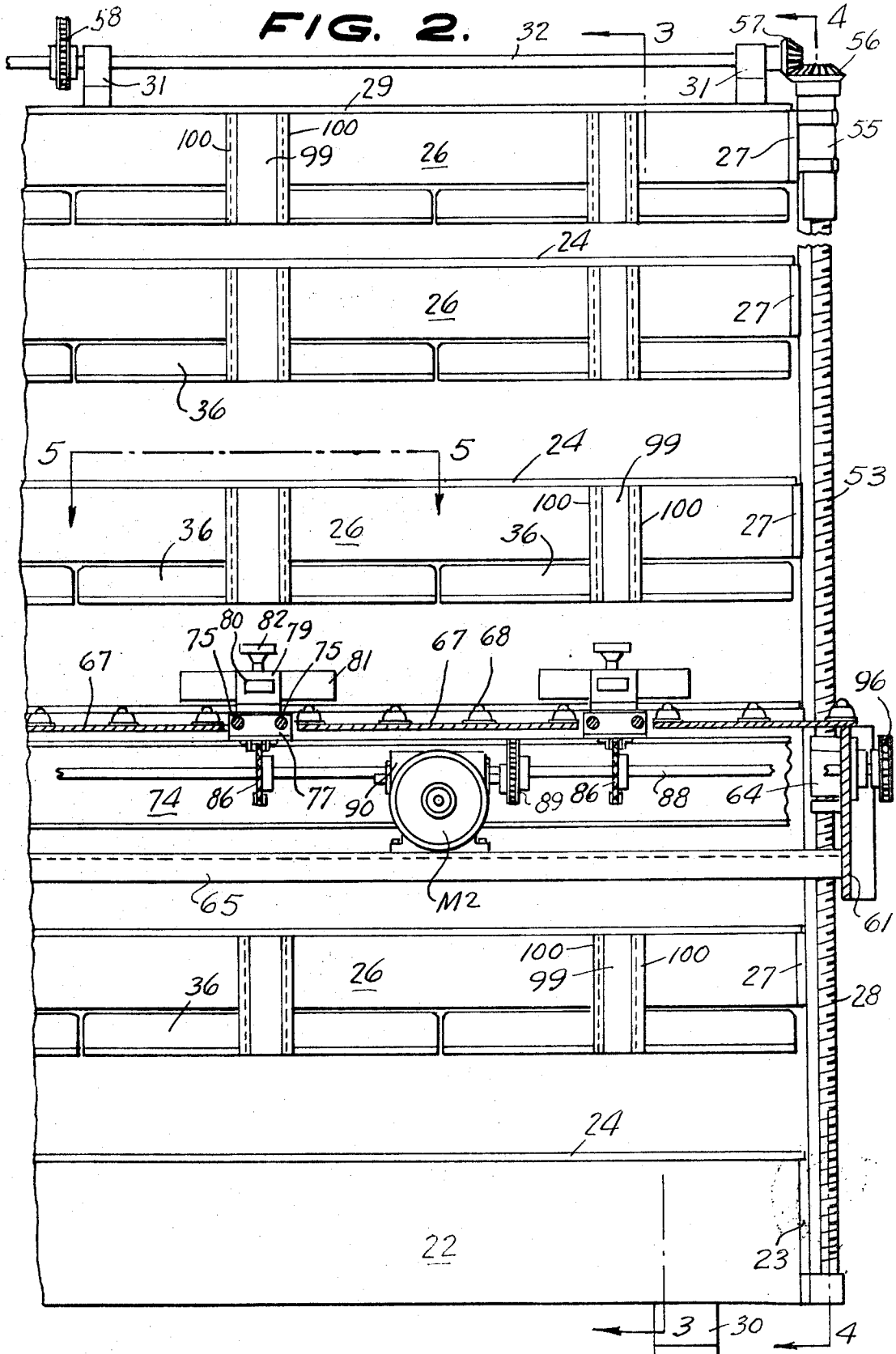


FIG. 3.

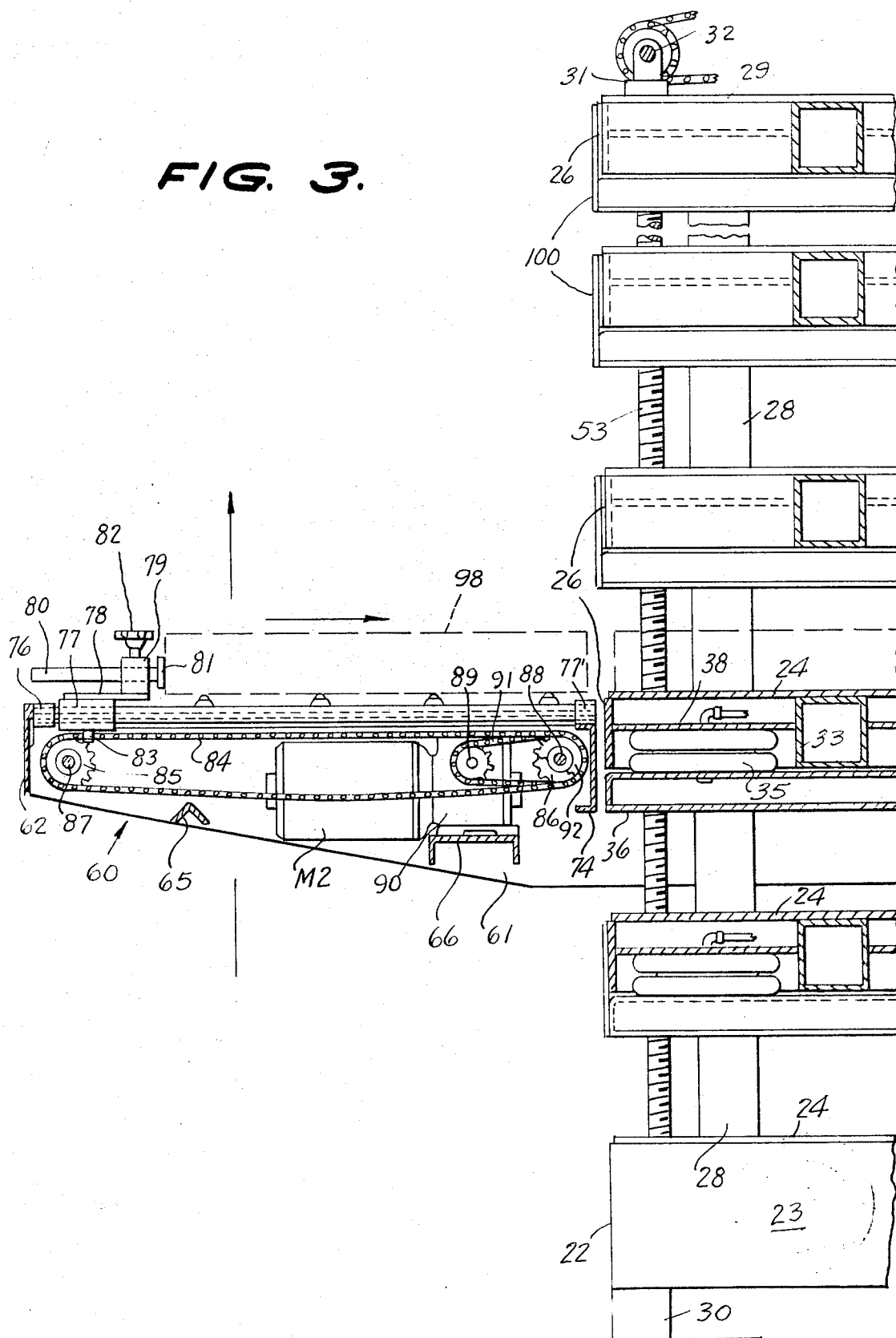
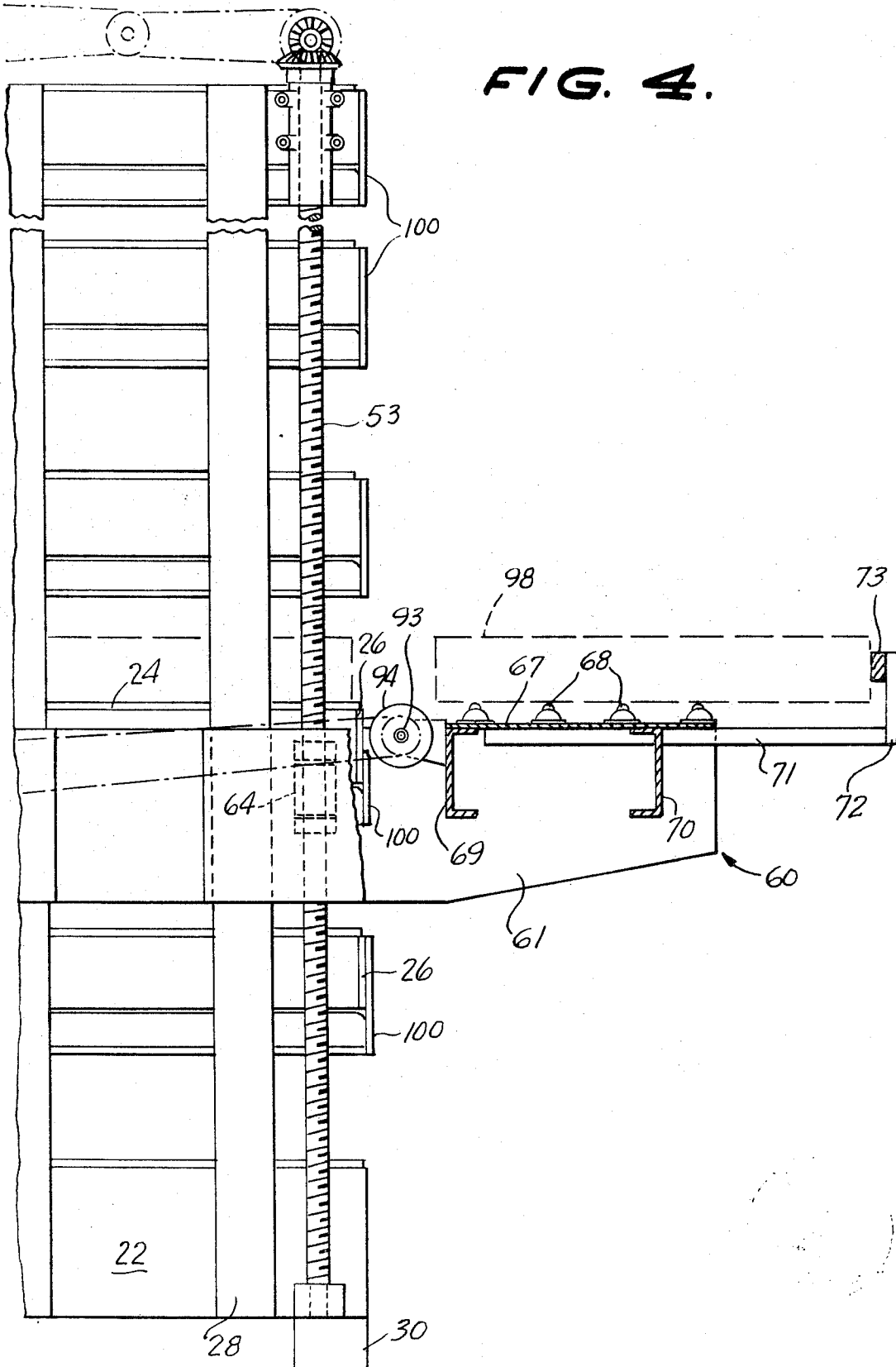


FIG. 4.



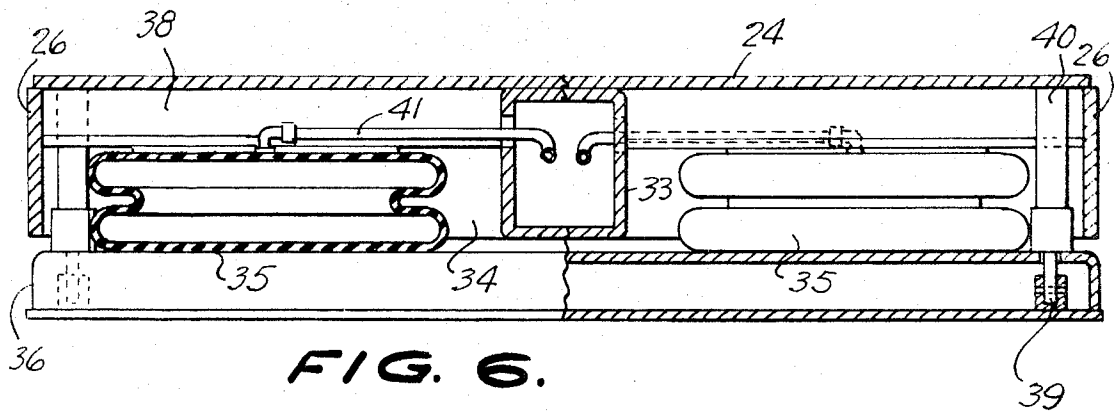
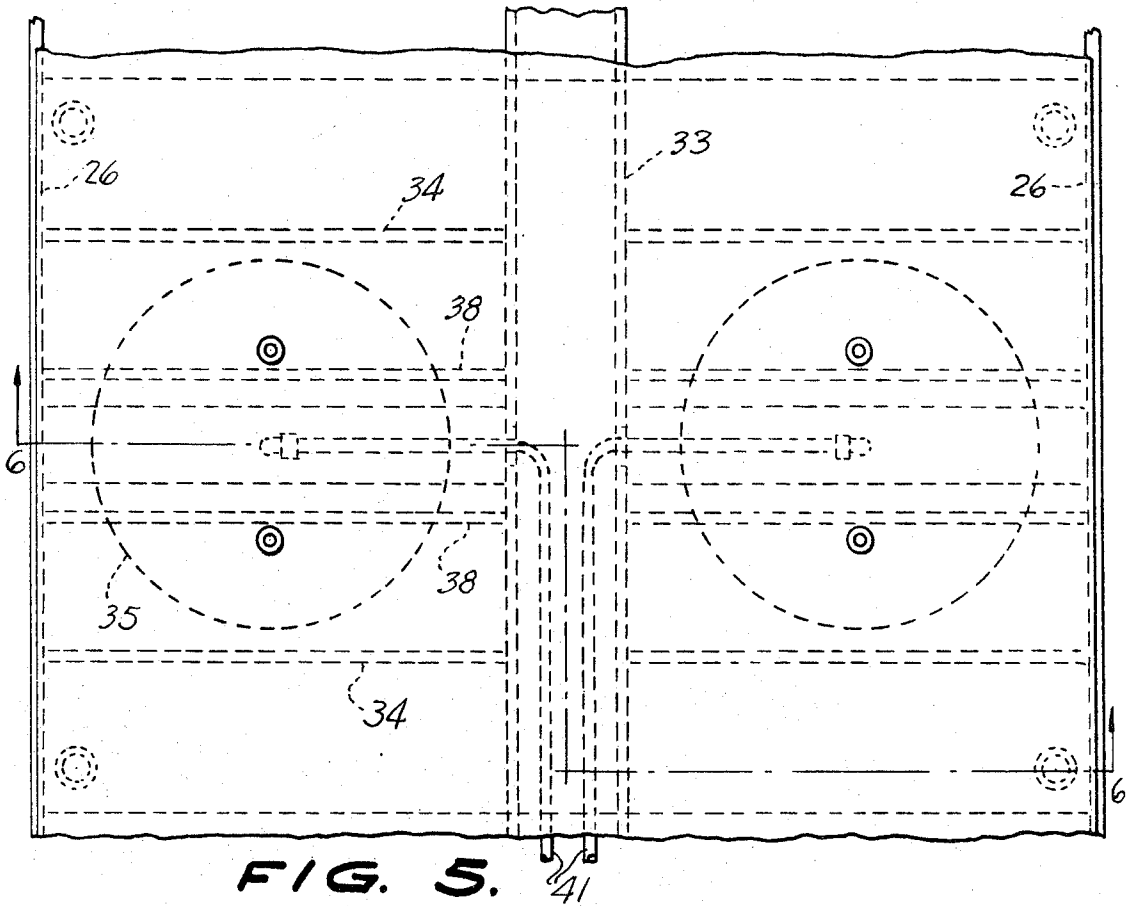
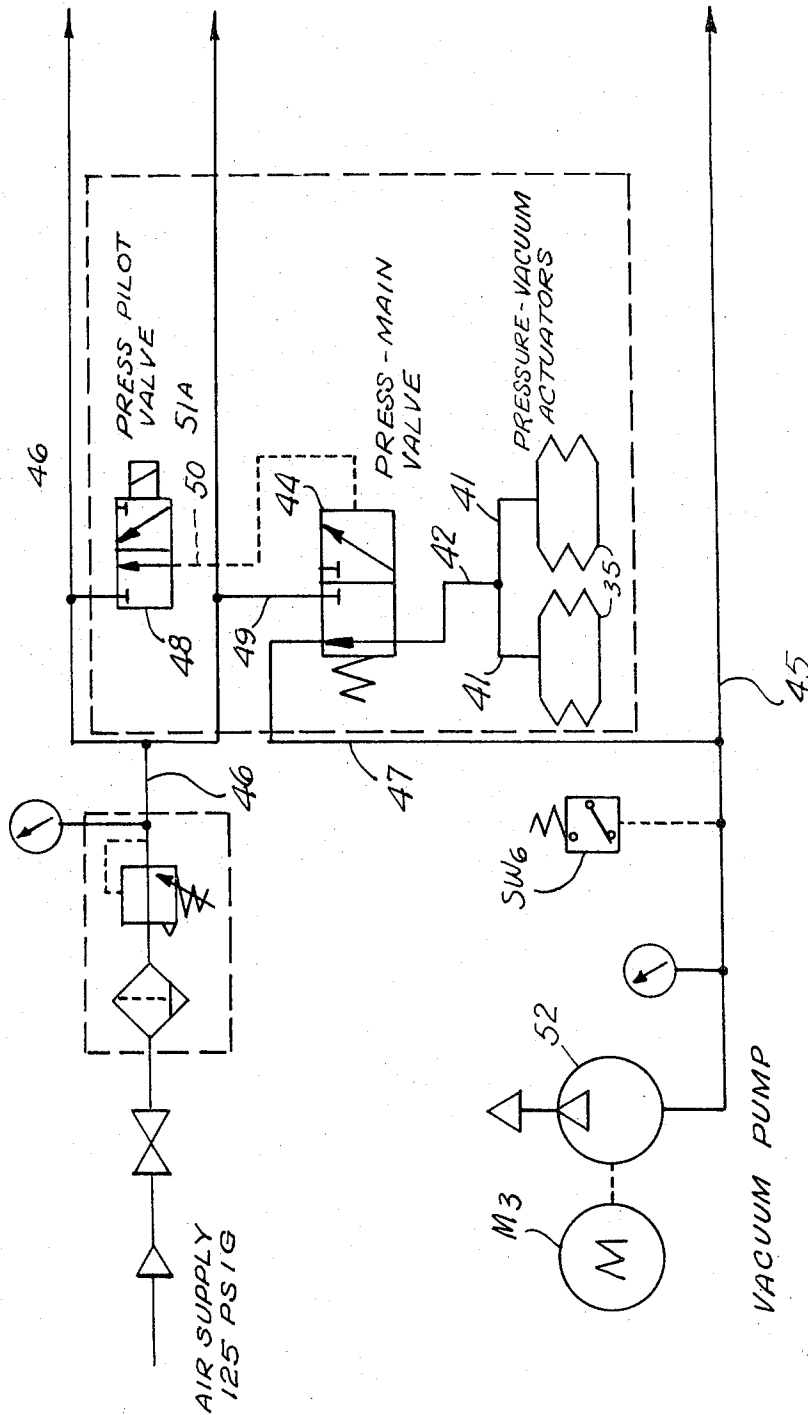
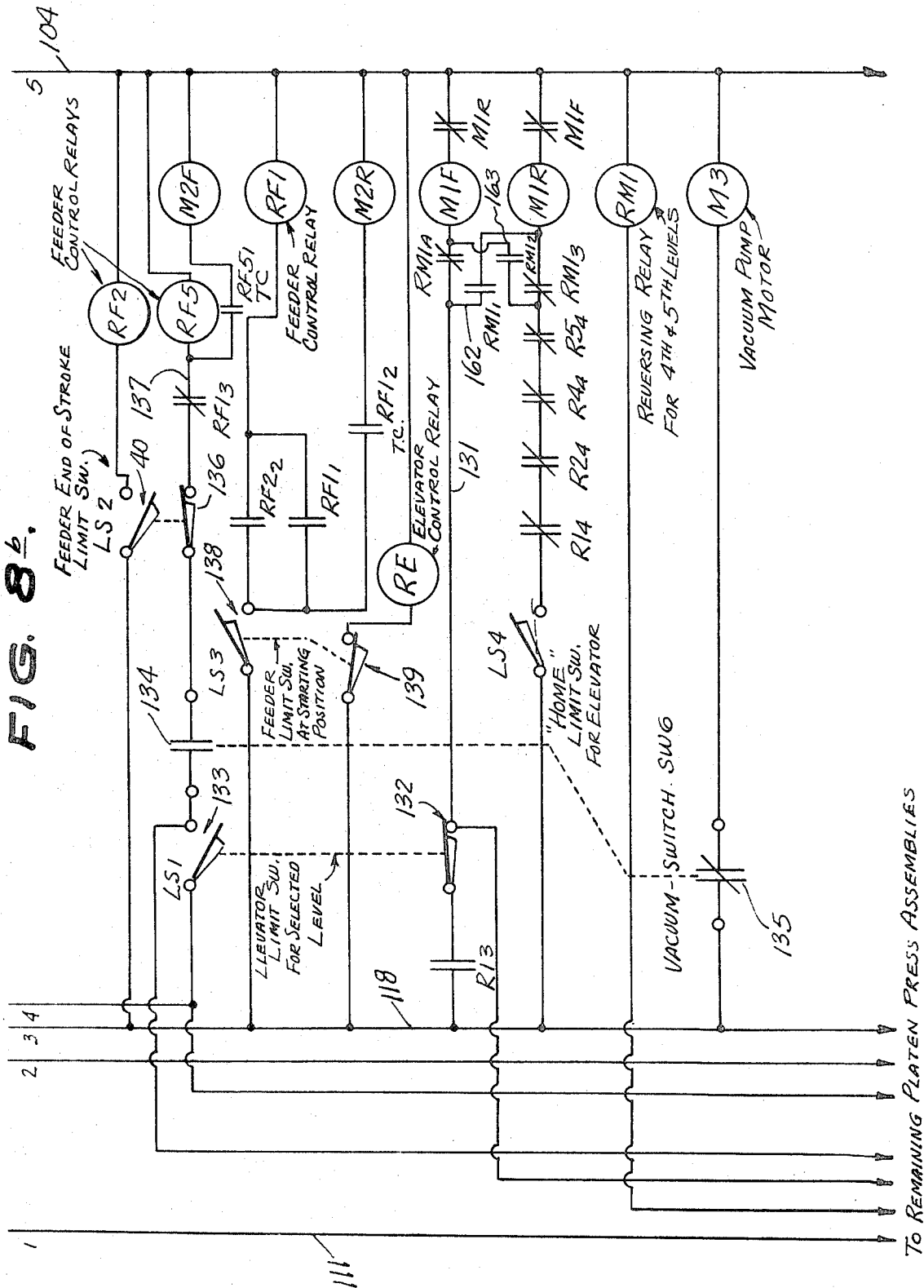


FIG. 7.





MULTIPLE-SECTION MOLDING PRESS

This invention relates to pressure molding devices, and more particularly to improvements in multiple-platen presses for use in molding plastic parts.

A main object of the invention is to provide a novel and improved multiple-section platen press which is relatively simple in construction, which has a high capacity, and which is highly automated.

A further object of the invention is to provide an improved multiple-section platen press for making plastic foam castings and for making various other types of plastic castings having sizable face areas relative to depth, the improved press being relatively compact in size, being reliable in operation, having a high capacity, and employing platen parts actuated by the alternate use of pressure and vacuum, the vacuum being employed to raise the associated platen to permit instant movement of a mold box thereunder and the simultaneous ejection of a previously compressed mold box, the arrangement being such as to require a minimum amount of vertical space, whereby a relatively large number of molding press sections may be incorporated in a given machine employed in a room of average ceiling height.

A still further object of the invention is to provide an improved multiple-section platen press having elevator means for transferring mold boxes to the proper height to be inserted beneath an available platen, the elevator arrangement being such that it returns automatically to normal conveyor height, so that mold boxes can be supplied from a feed conveyor by simply rolling the mold boxes onto the elevator platform where the mold boxes can be properly positioned for feeding beneath available platens, and whereby processed mold boxes can be conveniently moved onto a receiving conveyor for further processing.

A still further object of the invention is to provide an improved multiple-section molding press employing molding press sections of the pressure-vacuum pod type, the sections being arranged in aligned vertical and horizontal rows, and automatic elevator means being provided to automatically place a mold box at the proper level corresponding to an available molding press section, the elevator member automatically returning to normal conveyor height, thereby greatly facilitating the supply of mold boxes to the apparatus and the removal of compressed mold boxes therefrom, the apparatus providing a considerable saving in labor in the handling of the mold boxes and providing a relatively high capacity for processing mold boxes there-through because of its time-economizing features.

Further objects of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIG. 1 is a perspective view showing a typical multiple-section molding press assembly constructed in accordance with the present invention;

FIG. 2 is an enlarged fragmentary front elevational view, partly in vertical cross-section, of the right side portion of the multiple-section molding press assembly shown in FIG. 1;

FIG. 3 is a fragmentary transverse vertical cross-sectional view, taken substantially on the line 3—3 of FIG. 2, showing the front, or receiving, side of the multiple-section molding press;

FIG. 4 is a fragmentary transverse vertical cross-sectional view taken substantially on the line 4—4 of FIG. 2, showing the rear, or discharge, side of the multiple-section molding press of FIG. 1;

FIG. 5 is an enlarged fragmentary horizontal cross-sectional view taken substantially on the line 5-5 of FIG. 2;

FIG. 6 is a vertical cross-sectional view taken substantially on the line 6—6 of FIG. 5;

FIG. 7 is a partial schematic diagram showing the fluid circuit of one of the press sections of the multiple-section molding press of FIG. 1; and

FIGS. 8a and 8b together constitute an electrical wiring diagram showing the electrical connections of the electrical components associated with uppermost, left end press section of the multiple-section molding press of FIG. 1, and typifying the electrical circuits employed for all of the molding press sections of the assembly.

The rapidly growing field of foam castings as replacements for many wood parts or parts made of other relatively expensive materials calls for suitable apparatus for retaining the foam securely while the chemically-generated heat therein expands the foam to fill a mold box. If the casting has a substantial face area, relative to depth, this retention can often best be done by employing a platen press. A platen press is very satisfactory for this type of requirement because it may employ enough pods to attain suitable pressure, while allowing the platens to be relatively thin, with the pressure applied substantially uniformly over the platen surface. At the present time, it appears that a pressure of 20 to 30 lbs. per sq. inch on the mold box is adequate to resist the foaming action.

Where there is a requirement for a substantial volume of production, a corresponding large number of platen presses is required, and these must be employed in an organized manner in view of the fact that poured foam must be placed under pressure within about 1 min., the pouring time being only a few seconds, and whereas the curing time under pressure is of the order of several minutes. A prime purpose of the present invention is to provide an apparatus embodying a substantial number of individual platen press assemblies embodied in a compact assemblage with provision being made to take care of the necessary timing requirements of properly pouring, compressing and curing foam castings of the type above mentioned and insuring efficient utilization of the large number of platen press assemblies provided in the apparatus.

A unique characteristic of the present invention is the provision of vertically stacked individual platen press assemblies with an automatic elevator system to move mold boxes to the proper level corresponding to available platen press assemblies. Another unique feature of the present invention is the alternate use of pressure and vacuum in the pressure pods of the platen press assemblies. In each platen press assembly, vacuum is employed to raise the associated platen to thus permit instant movement of a mold box into the press assembly for subsequent compression by the platen. This feature enables the apparatus to occupy a minimum amount of vertical space, which is of considerable importance because a substantial number of rows are required to provide the necessary production capacity and this number is limited by ceiling height factors.

Another unique feature of the present invention is the location of the pressure pod elements within the

framework immediately above the platen. This feature provides a substantial reduction in vertical height requirements, as well as allowing suitable distribution of load carrying members within the framework of the apparatus so as to provide most efficient utilization of the framing and to minimize local deflections of its members.

Still another important and novel feature of the present invention is the provision of an elevator system which always returns automatically to the same elevation; namely, on the in feed side to the elevation corresponding to that of the input conveyor, thus enabling an operator to simply roll a newly filled mold box to the proper position, as indicated by a signal lamp on the control panel, whereas on the output side of the machine, the elevator automatically returns to the proper elevation which corresponds to that of the receiving conveyor on which a mold box containing a cured casting can be rolled onward in the plant for de-molding and further processing. A still further interesting and unique feature of the apparatus of the present invention is the ability of easily enlarging the machine so as to add additional platen press assemblies, add the required longer elevator screws, and easily reassemble the machine with its substantially increased production capacity.

As will be presently described, the use of the elevator member provides considerable economy in time and reduction in required physical labor. The elevator also is provided with powered pusher mechanisms which push the mold boxes into press positions in their associated platen press assemblies while at the same time starting finished molds out of the assemblies on the opposite side. The elevator portion of the apparatus is likewise provided with powered rollers which engage the emerging mold boxes and carry them out the remaining necessary distance on the exit side of the assembly. An out feed operator is then able to roll the mold boxes along the elevator in a longitudinal direction; namely, at right angles to the movement of the mold boxes into and out of the platen press assemblies. As above mentioned, the elevator automatically returns its "home" position. At this "home" elevation its surface registers with the plant conveyor and pouring station elevations. Also, in this "home" position the elevator registers with the elevation of one of the horizontal rows of platen press assemblies in the machine.

Referring to the drawings, 20 generally designates an improved multiple-section molding press constructed in accordance with the present invention. The assembly 20 is provided with an upstanding rigid framework having a pair of transversely extending supporting base angle bars 21,21. Perpendicularly secured to the bottom angle bars 21,21 is a rectangular box-shaped bottom frame structure comprising front and rear longitudinally extending vertical plates 22 connected by transversely extending vertical end plates 23 rigidly secured thereto. Rigidly secured on the top edges of the plates 22 and 23 is a horizontal support plate 24, employed as the mold box supporting plate for the lowermost horizontal row of platen press assemblies, presently to be described. The frame structure is provided at its top portion with a similar longitudinally-extending box-like structure comprising front and rear longitudinally extending vertical plate members 26 connected at their ends by transversely extending vertical plate members 27. A pair of vertical frame bars 28,28 are rigidly con-

nected at the top and bottom ends respectively to the transverse plate members 27 and 23 at the opposite ends of the main supporting frame. A horizontal top cover plate 29 is secured rigidly to the top edges of the plates 26 and 27 at the top portion of the main supporting frame. Depending bracket members 30 are rigidly secured to the opposite end portions of the bottom plate members 22 and are secured in the transverse angle bars 21.

The main supporting frame also includes a plurality of uniformly spaced rectangular box-like platforms similar to that defined by the top plate members 26, 27 and 29, said additional platforms being uniformly spaced between the top structure defined by said members 26, 27 and 29 and the bottom box-like rectangular fixed structure defined by the plate members 22, 23 and 24. Thus, the intermediate fixed horizontally extending platform structures comprise longitudinally extending front and rear vertical plate members 26 and transverse vertical end plate members 27, longitudinally extending horizontal plate members 24 being rigidly secured to the top edges of the plate members 26 and 27. The top horizontally extending plate member 29 is similar to the plate members 24 except that it is provided with upstanding bearing brackets 31 rotatably supporting a horizontal shaft 32 for a purpose presently to be described.

In the typical embodiment illustrated in the drawing and described herein, there are five box-like structures spaced above the bottom box structure, defining five horizontal press spaces. The box structures above each of said spaces are further provided with internal longitudinally extending rectangular central tubular members 33 rigidly secured at their top walls to the horizontal plate members 29 or 24 and rigidly secured at their opposite ends to the transverse plate members 27. Rigidly secured transversely between the front and rear vertical plate members 26 of each of the fixed box-like structures and the vertical front and rear walls of the tubular member 33 are transversely extending plate members 34 spaced to define respective rectangular enclosures for bellows-like pressure pods 35 secured to horizontal platen assemblies 36 presently to be described. In the typical embodiment described herein, four sets of enclosures are defined for each horizontal fixed frame portion and the bellows-like pod elements are arranged in pairs located respectively on opposite sides of the longitudinal tubular frame member 33 of each horizontal frame section, as shown in FIGS. 5 and 6. Each bellows-like pod member 35 is secured to and depends from a pair of spaced transversely extending angle bars 38,38 rigidly secured between the vertical walls of the central horizontal tubular frame member 33 and the longitudinally extending outer vertical plate members 26, as shown in FIGS. 5 and 6. Each platen member 36 is secured to and moved by the bottom walls of a pair of transversely aligned bellows-like pod members 35. As shown in FIGS. 2 and 6, the horizontal platen members 36 are generally rectangular in shape and are of hollow construction. The platen members are provided at their corners with upstanding vertical plunger elements 39 which slidably engage in depending vertical guide cylinders 40 rigidly secured to and depending from the horizontal top plate members 24 or 29, so as to accurately guide the horizontal platen members 36 for vertical movement.

The pressure pods 35 are of conventional construction, and may be similar to "Airstroke Actuators" manufactured by Firestone Industrial Rubber Products Company, Noblesville, Indiana.

The platen members 36 are lowered and raised by the respective expansion and contraction of their associated pressure pod members 35. Each set of pressure pod members 35,35, associated with a particular platen member 36, is connected by a respective conduit 41 to a supply conduit 42 (see FIG. 7), the conduits 41 extending through the central horizontal longitudinal hollow member 33. Conduit 42 may be communicatively connected to either a vacuum line 45 or a compressed air line 46 depending upon the condition of an associated main control valve 44 which is of the two-position type and which is connected between the pair of pods 35 and the lines 45 and 46 in the manner diagrammatically illustrated in FIG. 7. Thus, the main control valve 44 associated with each pair of bellows-like pod elements 35 is normally biased to a position such as that diagrammatically illustrated in FIG. 7 wherein the conduit 42 is connected through the valve and a conduit 47 to the vacuum line 45. Valve 44 is of the pressure-actuated type, and each valve 44 is controlled by a respective pilot valve 48 of the solenoid type. Thus, in the normally, deactivated, condition of main valve 44 the line 42 is connected to the vacuum line 47, as above mentioned. When the valve 44 is actuated the line 42 becomes connected to a conduit 49 which is in turn connected to the compressed air line 46. This occurs when the solenoid of the associated pilot valve 48 is energized, thereby connecting the conduit 50, shown in FIG. 7, to the pressure conduit 46. Thus, in a normal condition of the parts, the bellows members 35,35 are connected to the vacuum line 45 and are contracted, causing the platen member 36 to be elevated. When the solenoid of the associated pilot valve 48 becomes energized, compressed air is admitted to the associated main valve 44 through the line 50, and the supply line 42 for the pods 35,35 becomes connected to the compressed air supply conduit 49 by the action of valve 44, causing the pods 35,35 to expand and to exert downward force on the associated platen member 36, causing said platen to move downwardly through a mold box-compressing stroke.

From the above, it will be apparent that a pilot valve 48 is provided for each of the twenty platens 36 of the typical assembly illustrated in the drawings and described herein. The diagram of FIG. 7 illustrates the manner in which the pods members 35,35 of the extreme uppermost left platen member are connected to the main compressed air supply line 46 and vacuum line 45, and in this typical instance, the solenoid for the associated pilot valve 48 is identified as S1A. The pneumatically actuated components, shown in the dotted rectangle in FIG. 7 represent those required for each platen member 36, and it will be understood that corresponding assemblies are provided for each of the other nineteen platen members of the illustrated apparatus.

As shown in FIG. 7, vacuum is maintained in line 45 by a vacuum pump 52 driven by an electric motor M3. A vacuum sensing switch SW6, presently to be described, is connected to the vacuum line 45.

Elevator screws 53 are vertically journaled at the respective corners of the frame structure thus far described. Thus, the lower ends of the screws are rotatably supported in bearing brackets 54 rigidly secured

to the lower portion of the plate members 23 and the upper portions of the screws are rotatably supported in sleeved bearing brackets 55 secured to the transverse top end plate 27. The top ends of the screws 53 have bevelled gears 56 secured thereto, said bevelled gears being meshingly engaged by bevelled gears 57 provided on the ends of the shaft 32. Mounted on the intermediate portion of shaft 32 is a relatively large sprocket wheel 58 which is drivingly coupled by a sprocket chain to a smaller sprocket wheel on the shaft of a drive motor M1 of the reversible type. The motor M1 is suitably mounted on horizontal top plate 29. Motor M1 is operated in a conventional manner and the forward and reverse operation thereof occurs in response to energization respectively of coils M1F and M1R illustrated schematically in FIG. 8B.

It will be understood that a drive shaft 32 is provided at each side of the machine; namely, on the front side and on the rear side, and that each shaft 32 is coupled in a similar manner to the respective elevator screws 53,53 at its side of the machine. The rear driving shaft 32 is provided with a sprocket wheel 58 and is coupled by a sprocket chain to a smaller sprocket on the shaft of the motor M1 in the same manner as above described for the front elevator screws 53. Thus, when the motor M1 is energized, the screws 53 rotate simultaneously in the same direction, either forward or reverse, to provide elevation or lowering of the elevator assembly presently to be described.

The elevator assembly is designated generally at 60 and comprises a generally rectangular framework having transversely extending end plate members 61 whose front ends are rigidly connected by a longitudinally extending vertical plate member 62. The transversely extending end plate members 61 are located outwardly adjacent the vertical frame bars 28,28 at each end of the main frame of the machine, and are provided with internally threaded vertical sleeve members 64 rigidly secured to the plate members 61 and threadedly engaged with the elevator screws 53. A longitudinally extending angle bar 65 is employed to rigidly connect the transversely extending vertical end plates 61 at the lower marginal portions of said transversely extending plates at the front portion of the elevator assembly 60, and a longitudinally extending channel bar 66 is likewise employed to connect the lower portions of the plates 61 adjacent the stationary main frame of the machine, as shown in FIG. 3, to rigidify this portion of the elevator member. The rear portions of the transversely extending end plates 61 are rigidly connected by a pair of longitudinally extending spaced channel bars 69 and 70, as shown in FIG. 4. A plurality of spaced transversely extending angle bars 71 are secured to the undersides of the plate members 67 at the rear portion of the elevator member 60, the angle bars 71 projecting rearwardly from the plate members 67, as shown in FIG. 4, and having upstanding vertical bar members 72 secured to their rear ends. A longitudinally extending stop bar 73 is secured to the top portions of the forwardly facing surfaces of the bars 72 to define a stop means for limiting rearward movement of mold boxes ejected rearwardly from the platen press assemblies, as shown in dotted view in FIG. 4.

As shown in FIG. 3, a longitudinally extending channel bar 74 is secured vertically between the end plates 61 adjacent the vertical plane of the front wall plates

26 of the pod enclosures on the main frame of the machine.

As shown in FIG. 2, the adjacent transverse edges of elevator top plates 27 at the front portion of the elevator assembly 60 are spaced apart to define guide ways substantially centered with respect to the vertical rows of platen members 36. Rigidly secured in these guide ways are parallel pairs of transversely extending guide rods 75,75, the front ends of the rods being secured to brackets 76 rigidly secured to the upper marginal portion of front plate 62, and the rear ends of the guide rods 75 being secured to supporting blocks 77' which are in turn rigidly secured to the top flange of the longitudinally extending channel-shaped frame bar 74. Slidably mounted on the respective pairs of guide bars 75,75 are pusher carriage blocks 77 having horizontal flat bar members 78 rigidly secured to and projecting rightwardly therefrom, as viewed in FIG. 3. Rigidly secured on the rightward ends of the bar members 78, as viewed in FIG. 3, are clamping blocks 79 having horizontal slots in which are adjustably mounted horizontally extending pusher bars 80 which extend parallel to the guide rods 75 and which are provided at their rearward ends (right ends as viewed in FIG. 3) with mold box-engaging longitudinally extending vertical pusher plates 81, the bars 80 being adjustably clamped in the blocks 79 by the provision of manually operable clamping screw members 82 thread-edly engaged through the top walls of the slots in the blocks 79.

The carriage blocks 77 are provided with pairs of depending spaced bracket elements 83 which receive therebetween and are secured to the top runs of respective endless sprocket chains 84 which extend transversely and which are supported on respective idler sprockets 85 and 86 secured on longitudinal shafts 87 and 88 journaled between the end plates 61, the shaft 87 being located adjacent the front longitudinal wall plate 62 and the shaft 88 being located adjacent the longitudinally extending channel bar 74, as is clearly shown in FIG. 3. A pusher motor M2 provided with a reducing gear assembly 90 is mounted on the longitudinally extending channel bar 66 and has an output sprocket 89 drivingly coupled by a sprocket chain 91 to a sprocket 92 mounted on the shaft 88, whereby the motor M2, which is of the reversible type, is drivingly coupled to the carriage blocks 77 of the respective above-described pusher assemblies.

As shown in FIG. 4, a longitudinally extending shaft 93 is journaled between the upper portions of the plates 61 and secured on shaft 93 are a plurality of rollers 94, shaft 93 being located rearwardly adjacent the vertical plane of the rear wall plates 26 of the platen pod enclosures. The rollers 94 are located so that their top peripheral surface portions are substantially coplanar with the top plane of the upstanding mold conveyor assemblies 68, as is shown in FIG. 4. Shaft 93 is drivingly coupled to shaft 88 by a sprocket chain 95 which is meshingly engaged respectively with a drive sprocket 96 secured on the end of shaft 88 and a driven sprocket 97 secured on the end of shaft 93. Thus, the rollers 94 are simultaneously rotated in a clockwise direction, as viewed in FIG. 4, as the pusher carriage blocks 77 move rightwardly, as viewed in FIG. 3. Therefore, as a mold box, shown at 98 is pushed rightwardly by a pusher pad 81, as viewed in FIG. 3, it engages a previously processed mold box resting on a horizontal supporting plate 24 and pushes said previously processed

mold box rightwardly as viewed in FIG. 3 and as viewed in FIG. 4, so that it is engaged by a roller element 94 and propelled further rightwardly onto the spherical ball conveyor elements 68, its rightward movement being limited by its engagement with the stop bar 73, above described.

As shown in FIG. 1, the platen members 36 are constrained to move vertically by the provision of vertical guide means comprising upstanding vertically projecting guide bars 99 rigidly secured to the mid-portions of their front edges, said guide bars 99 being slidably received between and being contained between cooperating pairs of inwardly flanged vertical guide rails 100,100 vertically secured to the outside surfaces of the longitudinally extending wall plates 26 of the pod enclosures. Cooperating guide bars 99 and pairs of guide rails 100 are provided both on the front side and the rear side of each pod enclosure so that the associated platen member 36 is positively constrained to move vertically. This assures that parallelism will be maintained between the platen members 36 and the cooperating subjacent fixed supporting plate members 24.

In a generalized mode of operation of the machine, the elevator member 60 is normally positioned at a level so that it is flush with a mold box-feeding conveyor leading from a station at which the molds are filled. A filled mold box from said station is manually rolled onto the elevator 60 from said station, being supported on the transfer ball assemblies 68 and is manually moved into alignment with a vertical row of platen press assemblies containing a platen press assembly which is ready to be refilled. As will be presently described, an illuminated indicator on a control panel 101 informs the operator of the correct location in which to place the mold box to be processed. The operator then actuates a suitable control switch to bring the elevator member 60 to the proper level corresponding to the available platen press unit, after which the associated platen member 36 is elevated and the pusher mechanism is activated to push the new mold box into the platen press position and simultaneously cause the previously processed mold box to be ejected and moved to the rear portion of the elevator assembly in the manner above described; namely, by the action of a roller 94. The pusher member 77 is retracted and positive pressure is applied to the pod assembly containing the new mold box, whereby to apply molding pressure thereto, and the elevator member 60 is returned to its "home" position, flush with a receiving conveyor on which the previously processed mold box is moved, and at which the elevator is in the proper position to receive the next mold box to be processed from the feeder conveyor.

The above described general cycle of operation may be accomplished either by manual control of the electrical circuits associated with the respective operating motors, or by an automatic control circuit, presently to be described.

Thus, referring to FIGS. 8a and 8b, the apparatus is provided with a main supply transformer 102 having input terminals L1 and L2 which may be suitably connected to a source of energizing alternating current. The secondary winding 103 of transformer 102 has one terminal connected through series-connected normally closed protective motor overload switches XM1, XM2 and XM3 to a common supply wire 104. The remaining terminal of transformer secondary winding 103 is connected through a fuse 105 and a normally closed stop

switch SW5 to the stationary contact 106 of a two position selector switch SW4 having a pole 107 which may be moved either to a first position bridging contacts 106 and 108 or a second position bridging contact 109 and 110. The stationary contact 106 is connected to stationary contact 110.

A wire 111, associated with the various switches for providing manual operation of the elements of the machine, is connected to the stationary contact 109. When switch SW4 is placed in its "manual" position; namely, with the pole 107 in a dotted view position thereof shown in FIG. 8a, the wire 111 is connected to the secondary 103 of transformer 102, and the various operating components may be independently controlled through respective individual energizing circuits connected to wires 111 and 104 through respective manually operable control switches. Thus, the forward and reverse coils M1F and M1R of the elevator motor M1 may be independently controlled by employing a conventional reversing switch for selectively connecting these coils between the wires 111 and 104 so as to provide operation of the elevator member 60 in a desired direction. Likewise, the forward and reverse actuating coils M2F and M2R of the feeder motor M2 may be selectively controlled by a manually operated reversing switch in the same manner; namely, by providing a means for selectively connecting these coils between the wires 111 and 104, as desired. This provides manual control of both the elevator motor M1 and the feeder motor M2. In the same manner operated selector switches may be provided on a control panel 112 for energizing the respective timers employed to control the energization of the solenoids of the respective press pilot valve 48 associated with each of the pairs of pressure pods 35,35 of the respective platen press assemblies. Thus, manually operated energizing switches may be employed to selectively energize the solenoids of the pilot valves 48 to provide a timed press cycle. The manually controlled energizing circuits are not illustrated herein, since it is believed that these circuits are in themselves quite conventional and would be well known to anyone skilled in the art.

As will be presently described, the timers which are employed to control the duration of energization of the solenoids of the press pilot valves 48 are of a type which includes a signal lamp 128 which becomes energized simultaneously with the energization of the timer as it begins its timed period of operation. The timer MT employed in each platen press assembly is of a commercial type and may be similar to Model No. 125 manufactured by Eagle Signal Company, Inc., Baraboo, Wisconsin.

FIGS. 8a and 8b, taken together, represent the typical circuit arrangement required to operate one of the platen press assemblies automatically, for example, the uppermost left end platen press assembly of the 20-unit machine shown in FIG. 1. The control circuits for the other platen press assemblies are substantially identical to that illustrated in FIGS. 8a and 8b and are interconnected with the main components of the system in the same manner as illustrated in these figures. Thus, the uppermost left end press assembly in the machine of FIG. 1 is identified by the reference numeral 1A, and in the circuit description certain elements will be referred to this identifying symbol, while other elements in the circuit will be referred to corresponding identifying symbols relating to elements controlled by portions

of the circuit components of other press assemblies of the machine so as to provide required interlocks. Thus, a relay R1 is provided, this relay being associated with the uppermost level of platen press assemblies. A corresponding relay R2 is associated with the next subjacent level, etc., the relay for the lowest level being identified by R5. In the over-all system, alphabetical designations are employed to distinguish between different vertical rows of platen press assemblies; for example, A, B, C and D, reading from left to right in FIG. 1, and numerical indicia are used to distinguish between different levels proceeding downwardly from the uppermost level. For example, FIG. 1 illustrates a mold box 98 being pushed into the platen press assembly 4D; namely, the fourth platen press assembly from the top at the right end of the machine, as viewed in FIG. 1.

Certain portions of the circuit of FIGS. 8a and 8b are common to all the other platen press assembly circuits. For example, the vacuum switch SW6, connected in the manner shown in FIG. 8b will affect the circuits of the other platen press assemblies in the same manner as it affects the circuit of the platen press assembly 1A. The same is true with respect to the relay shown at R6, and the elements thereabove, including the "enable" switch SW3, the automatic-manual selector switch SW4 and the stop switch SW5.

With the switch SW4 in the full line position thereof shown in FIG. 8a; namely, with its pole 107 bridging the stationary contacts 106 and 108, it will be seen that the "enable" relay R6 becomes energized when the "enable" switch SW3 is operated to its dotted view position, and relay R6 will be held energized by the closure of its holding contacts R6₁. With all the elements in normal positions; namely, with no mold boxes in the platen press assemblies, this will illuminate all of the push button switches, which are of a type provided with illumination lamps 129, the lamps 129 being connected in the manner illustrated in FIG. 8a. Thus, the lamp 129 associated with switch SW1A has one terminal thereof connected to wire 104 and has its other terminal connected by a wire 113 to a stationary contact 3 of the associated timer MT. The contact 3 is connected by a wire 114 to a wire 115, which is in turn connected to a stationary contact 7 of timer MT, normally engaged by a pole 116 of the timer switch assembly, said pole having a terminal 6. Terminal 6 is connected by a wire 117 to a wire 118 which is connected to a stationary contact 119 of the push button switch SW1A. Contact 119 is connected through the contact R6₂ of relay R6 to a wire 120 which is connected to one of the contacts 121 of switch SW3, which in turn is connected to stationary contact 108 of the selector switch SW4. Therefore, lamp 129 becomes energized with the closure of the relay contacts R6₂ and remains energized until timer switch pole 116 disengages from contact 7.

It will be understood that in the normal starting condition of the press, the elevator member 60 is in its intermediate position; namely, at a position aligned with the third or middle horizontal row of platen press assemblies. As above explained, in this position the elevator member 60 is flush with the conveyor leading from the mold box-filling station, and therefore can receive a filled mold box therefrom. Assuming that the mold box is to be processed in platen press assembly 1A, the operator moves the filled mold box leftward on the elevator member 60 until it is aligned with the first vertical row of platen press assemblies; namely, that containing

the platen press assembly 1A. With the mold box in this position, the operator then actuates the illuminated push button switch SW1A. Switch SW1A is of the two pole type and has a first pole 122 bridgingly engageable with a pair of stationary contacts 119 and 123, and a second pole 124 bridgingly engageable with a pair of stationary contacts 125 and 126. When pole 122 bridges contacts 119 and 123, a platen relay R1A becomes energized, since the winding of this relay has one terminal thereof connected to wire 104 and the other terminal thereof connected by a wire 127 to contact 123. Relay R1A is held closed through a holding circuit including its contacts R1A₅, R1A₂ and R1A₃, which connect wire 127 to switch contact 119. Relay contacts R1A₂ are of the normally closed time opening type providing a time delay in opening after relay R1A becomes energized. The relay R1 for the first elevation is likewise energized by the actuation of switch SW1A, since the winding of this relay has one terminal thereof connected to supply wire 104 and the other terminal thereof connected by a wire 130 through normally closed timed-opening contacts R1₂ of this relay to the switch contact 126. As shown in FIG. 8a, the opposite stationary switch contact 125 is connected to the wire 118, which is in turn connected through contacts R6₂ to switch contact 108, as above described. Relay R1 is held energized for a period of time since the contacts R1₂ are of the timed opening type.

Energization of the relay R1 causes its contacts R1₃ (FIG. 8b) to close, which energizes the forward-driving motor coil M1F of the elevator motor M1 through a circuit including normally closed reverse coil interlocked contacts M1_R, the normally closed contacts RM1₄ of a motor-starter relay RM1, a wire 131, a set of normally closed limit switch contacts 132, and the relay contacts R1₃. From FIG. 8b it will be seen that the motor driving coil M1F is connected in this branch circuit between the power supply wires 104 and 118. The limit switch contacts 132 are normally closed and are part of a limit switch assembly LS1 having a second pair of contacts 133 which are normally open as shown in FIG. 8b. The limit switch LS1 is mounted on the frame of the machine in a position so that it becomes actuated by the elevator member 60 when the elevator reaches the uppermost level of platen press assemblies; namely, that containing the selected platen press assembly 1A.

As shown in FIG. 8b, the reverse motor driving coil M1R, for lowering the elevator assembly 60, has an energizing circuit connected between wires 118 and 104 which includes normally closed interlocked switch contacts M1_F which open when the forward motor driving coil M1F becomes energized. This energizing circuit also includes in series connection normally closed contacts RM1₃ of the starter relay RM1, normally closed interlock relay contacts R5₄, R4₄, R2₄, and R1₄, and a normally closed limit switch LS₄ located on the main frame of the machine in a position such that it is held open when the elevator member 60 is in its normal "home" position; namely, at the intermediate, or third, level of platen press assemblies.

The energization of the elevating coil M1F, by the circuit above described, causes the elevator member 60 to move upwardly, allowing limit switch LS4 to close, but the energizing circuit for reverse driving coil M1R remains open because contacts R1₄ of relay R1 are held open at this time.

When the elevator member 60 reaches its intended height, namely, the level of the selected platen press assembly 1A, it operates the limits which LS1, opening the contacts 132 and closing the contacts 133.

The opening of the contacts 132 de-energizes the forward motor driving coil M1F, causing the motor to stop and causing the elevator to stop at the intended level; namely, that corresponding to the platen press assembly 1A.

The vacuum responsive switch SW6 has a first set of normally open contacts 134 which close responsive to a predetermined degree of vacuum in the vacuum line 45. This degree of vacuum must be sufficient to cause the pods 35,35 of the selected platen press assembly to contract and elevate their associated platen member 36 sufficiently to permit the insertion of a mold box therebeneath. The vacuum responsive switch SW6 has another set of contacts 135 connected in the energizing circuit of the vacuum pump motor M3, the contacts 135 closing when the vacuum falls below a limiting level, so that the motor M3 is energized sufficiently to maintain the required degree of vacuum in the line 45.

Thus, with the required vacuum in line 45, when limit switch LS1 is actuated, closing its contacts 133, a relay RF5 becomes energized. As shown in FIG. 8b, the winding of the relay RF5 is connected between supply wire 104 and wire 118 through the normally closed contacts RF1₃ of a forward feeder control relay RF1, the normally closed contacts 136 of a limit switch LS2, the vacuum switch contacts 134, the contacts 133 of limit switch LS1, the relay contacts R1A₄ of relay R1A, the wire 115, timer contact 7, timer switch pole 116, timer terminal 6, and wire 117. This energizes the relay RF5. This relay has a set of slow closing contacts RF5₁ connected between a wire 137 and one terminal of the forward driving coil M2F of the feeder motor M2. As shown in FIG. 8b, the wire 137 is the same as that connected to one terminal of relay RF5 in the branch circuit above described. Thus, after the time period required to close contacts RF5₁, the forward driving motor coil M2F becomes energized in parallel with the winding of the relay RF5.

The elevator member 60 is provided with a limit switch LS3 which is normally engaged by the feeder mechanism, for example, the carriage member 77 so as to maintain the first set of its contacts 138 open and a second set of its contacts 139 closed. When the motor M2 becomes energized in the manner above described, the feeder mechanism is actuated so as to move the carriage member 77 and associated parts inwardly; namely, rightwardly as viewed in FIG. 3, which releases the limit switch LS3.

It will be noted that a relay RE has its winding connected between wires 104 and 118 through the limit switch contacts 139. When limit switch contacts 139 open responsive to the inward movement of the feeder carriage assembly, relay RE becomes de-energized. Relay RE has a set of contacts RE₁, and therefore these contacts close when relay RE becomes de-energized. It will be noted from FIG. 8a that the contacts RE₁ are in shunt with the timed-opening contacts R1₂ in the holding circuit of the relay R1. Thus, relay R1 continues to be energized during this phase of operation.

The contacts 138 of limit switch LS₃ close but do not have any effect at this point.

The feeder mechanism reaches the end of its stroke wherein the mold box 98 is pushed into the press space

beneath the associated platen member 36. The elevator member is provided with the limit switch LS2 located so as to be operated by the carriage assembly as it reaches the end of its stroke. Limit switch LS2 has respective sets of contacts 140 and 136, as shown in FIG. 8b, the contacts 136 being normally closed and the contacts 140 being normally open. When the feeder mechanism reaches the end of its inward stroke, the contacts 136 open and the contacts 140 close. The relay RF5 becomes de-energized, opening its contacts RF5₁, thereby de-energizing the forward motor drive coil M2F. This causes the feeder to stop its operation at this point. Thus, the contacts RF5₁ are of the slow closing type, so that there is a short time delay after relay RF5 becomes energized before the motor coil M2F becomes energized, but these contacts open immediately responsive to the de-energization of relay RF5.

The closure of the contacts 140 of limit switch LS2 energizes a relay RF2 whose winding is connected between wire 104 and wire 118 through the limit switch contacts 140, as shown in FIG. 8b.

The timer operating coil, shown at 141 in FIG. 8a has one terminal thereof connected to supply wire 104 and the other terminal thereof connected to timer terminal 1, which is in turn connected through normally open contacts RF2, of relay RF2 and through contacts R1A₃, of relay R1A to the switch stationary contact 119, and hence to supply wire 118. Hence, the closure of relay contacts RF2, causes the timer winding 141 to become energized and to initiate a timer cycle.

Since the contacts 138 of limit switch LS₃ are closed when the feeder carriage member 77 moves inwardly, the energization of the relay RF2 at the end of the inward feeding stroke causes its contacts RF2₂ to close and to energize a relay RF1 which is connected between wire 104 and 118 through said relay contacts and the limit switch contacts 138. A pair of holding contacts RF1₁, of relay RF1 also close, these contacts being connected across the relay contacts RF2₂, as shown in FIG. 8b, thereby holding relay RF1 energized. A short time thereafter, the timer contacts 6 and 8 are bridged by the timer switch pole 116, causing the solenoid S1A of the associated press pilot valve to be energized, since this connects said solenoid, shown at S1A in FIG. 8a, between wire 104 and wire 117. Similarly, the timer contacts 9 and 10 are bridged by another pole 142 of the timer switch assembly, which establishes a holding circuit for the timer winding 141 through the closed timer contacts 11 and 12 which, as shown in FIG. 8a are at this time bridged by a switch pole 143 of the timer switch assembly. Thus, with pole 142 in engagement with contact 10, the holding circuit for the timer winding 141 will comprise wire 104, a wire 144, the timer winding 141, the timer terminal 1, a wire 146 connected to the timer stationary switch contact 12, pole 143, a wire 147, switch contact 10, the pole 142, the timer terminal 9, and wire 117, which is connected to the other supply wire 118. The energization of the solenoid of press pilot valve S1A causes the associated pod elements 35,35 to become inflated, in the manner above described, and thereby causes the platen member 36 to move downwardly and exert pressure on the mold box. As will be apparent from FIG. 8b, the energization of the relay RF1 de-energizes the forward driving coil M2F of the feeder motor M2 by the opening of the relay contacts RF1₃. The relay RF1 has a set of slow

closing contacts RF1₂, which are connected in series with the reverse driving coil M2R in a circuit between wire 104 and limit switch contacts 138, so that after a short period of time subsequent to energization of relay RF1, the reverse driving coil M2R of the feeder motor M2 becomes energized and starts the feeder carriage member 77 back toward its "home" position. This releases limit switch LS2, causing contacts 140 to open and 136 to close, thereby de-energizing relay RF2, but no other change takes place in the system at this point since the relay RE remains de-energized, its contacts RE₁ remaining closed and thereby maintaining relay R1 energized. Relay contacts RF2₂ open due to the de-energization of relay RF2, but relay RF1 is held energized through its holding contacts RF1₁, and contacts 138 of limit switch LS3. The closure of limit switch contacts 136 does not effect any change since at this point the contacts RF1₃ of relay RF1 remain open.

The feeder carriage member 77 eventually returns to its leftward, or starting, position and trips limit switch LS3, closing the contacts 139 and opening the contacts 138. The closure of the contacts 139 energizes relay RE whose winding is connected between wires 104 and 118 through the limit switch contacts 139, as shown in FIG. 8b. This de-energizes the relay R1, since its holding circuit is opened by the opening of the contacts RE₁ of the relay RE, as shown in FIG. 8a. It will be seen from this figure that the holding circuit for the relay R1 comprises parallel-connected sets of relay contacts R1₂ and RE₁, together with a set of relay contacts R1₁ of the relay R1. The relay contacts R1₂, shown in FIG. 8a are of the timed opening type, so that after the relay R1 becomes energized, the contacts R1₂ open after a short time period, so that the resultant holding circuit then consists of the contacts RE₁ and the contacts R1₁ in series. Thus, the opening of the relay contacts RE₁ opens this holding circuit, causing relay R1 to drop out when limit switch LS3 is tripped as above described.

The opening of the contacts 138 of limit switch LS3 de-energizes the relay RF1, causing its contacts RF1₂ to open and thereby de-energize the reverse driving coil M2R of the feeder motor M2. The feeder motor thus stops leaving the carriage member 77 in its normal starting position, as shown in full line view in FIG. 3.

The de-energization of the relay R1 at this point causes its contacts R1₄, as shown in FIG. 8b to close. Since at this time the elevator member 60 is away from its normal position, the contacts of the limit switch LS4 are closed, namely, in the dotted position thereof shown in FIG. 8b, so that the energizing circuit for the reverse driving coil M1R of the elevator motor becomes completed, through the closed interlock contacts M1F, RM1₃, R5₄, R4₄, and R2₄. Elevator 60 then begins to descend, releasing limit switch LS1, causing its contacts 133 to open and its contacts 132 to close. However, no other change in the system occurs at this point, since contacts R1₃ of relay R1 are open. The opening of the limit switch contacts 133 likewise causes no further change in the system at this point, since the contacts RF5₁ of the relay RF5 are likewise open. When elevator 60 reaches its normal position; namely, its intermediate position above described wherein it is at the third level of the assembly, it trips limit switch LS4, causing it to open and thereby de-energizing the reverse driving coil M1R of the elevator motor M1, causing the elevator to stop in this position. The relay R1A has a timed-opening set of contacts R1A₂ which

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times out after a period of energization of relay R1A sufficiently long to allow the above described events, so that the relay R1A then drops out, allowing its other holding circuit contacts R1A₅ and R1A₃, as shown in FIG. 8a, to open, and also allowing another set of contacts thereof R1A₄, connected between wire 115 and contacts 133 of limit switch LS1 to open.

After a preset time interval, timer contacts 11 and 12 open by the disengagement of pole 143 from contacts 12, causing the timer to be reset. Pole 116 separates from contact 8, thereby opening contacts 6-8, thus de-energizing the solenoid S1A of the associated press pilot valve, allowing its main valve 44 to return to its normal position, as shown in FIG. 7, wherein the pods 35,35 are reconnected to the vacuum line 45. This releases the pressure on the mold box and elevates the associated platen member 36 therefrom. Shortly before this time, pole 116 engages contact 7, bridging the contact 6 and 7 and energizing the signal lamp 129 associated with the corresponding push button switch SW1A. Thus, this switch which is located on the panel assembly 101, becomes illuminated shortly before the end of the above described cycle, indicating that the mold box press unit 1A is available to receive another mold box to be processed in the machine.

As previously described, when a mold box is inserted by the action of the feeder assembly, above described, the previously processed mold box is pushed outwardly onto the rear portion of the elevator member being engaged by a roller member 94 in the manner above described, to move the mold box 98 onto the roller elements 68 and rearwardly into engagement with the stop strip 73. The ejected mold box may then be manually moved onwardly on the receiving conveyor for demolding and further processing.

As abovementioned, the illuminated switches on the control panel assembly 101 inform the operator as to the correct positions to place mold boxes to be processed on the elevator member 60. Thus, the illuminated switches represent the respective available molding spaces in the machine and the operator places a mold box to be processed in alignment with a vertical row of spaces corresponding to that of an illuminated switch on board 101, which will thereafter be operated to automatically insert the mold box into the indicated processing space. The timer may be so arranged as to illuminate the signal lamp 129 a short time prior to the preset press time required; for example, the amount of prior time allowed may be about two seconds more than the length of time required for the elevator to move the mold box to its intended insertion position. When the operator pushes the start button, such as the operating button of the switch SW1A, as above described, the above cycle of events takes place, the associated signal lamp 129 becoming de-energized when the platen timer coil 141 becomes energized, initiating the timer cycle. This occurs when pole 116 disengages from contact 7, disconnecting wire 114 from wire 117, as above described. As previously mentioned, each timer is provided with another signal lamp 128 connected in parallel with its operating coil 141, and becoming energizing simultaneously with the energization of said operating coil.

From the above description, it will be seen that when the machine is placed in the "automatic" mode of operation, by operating the switch SW4 to the position thereof shown in full line view in FIG. 8a, all move-

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ments are automatic except for the placement by the operator of the mold box in alignment with the vertical row of platen press assemblies containing the one in which the mold box is to be inserted. The operation of the elevator and feeder members is quite rapid, and in a typical embodiment of the invention, the maximum time that the elevator member 60 is away its "home" position was about 15 seconds.

As will be readily understood, when the mold box is to be placed at levels below the "home" position of the elevator member 60; for example, at the fourth or fifth level from the top, the response of the motor M1 which drives the elevator must be reversed as compared with that described above in connection with the placement of a mold box in the platen press space 1A. Thus, a reversing relay RM1 (see FIG. 8b) is provided which responds to the operation of any of the push buttons associated with the fourth or fifth levels. Thus, the winding of the relay RM1 is connected in an energizing circuit which includes parallel-connecting contacts of relays in the control circuits for the fourth and fifth level platen press assemblies corresponding to the relay R1A shown in FIG. 8a. Thus, operation of a push button associated with the fourth or fifth horizontal row of platen assemblies energizes a relay similar to the relay R1A, and closure of one of its contacts completes the energizing circuit for the relay RM1 and energizes same. As shown in FIG. 8b, the driving coils M1F and M1R have normal energizing circuits respectively containing normally closed contacts RM1₄ and RM1₃ of the relay RM1. Thus, energization of the relay opens these normal energizing circuits. Reversing connections are provided for energizing the drive coils M1F and M1R through respective reversing branch connections indicated respectively at 162 and 163. The reversing branch 162 contains a set of normally open contacts RM1₁ of the relay RM1 which close responsive to the energization of relay RM1 and thereby allow energization of the reverse drive coil M1R from the conductor 131 in place of the forward drive coil M1F. Similarly, the energization of the relay RM1 closes a set of normally closed contacts RM1₂ of relay RM1 connected in the reversing branch connection 163, allowing energization of the forward drive coil M1F in place of the reverse drive coil M1R. Thus, energization of relay RM1 provides a reversal of the connections for operating the motor drive coils M1F and M1R, required for moving the elevator member 60 to the fourth and fifth levels instead of to the first and second levels of platen press assemblies.

It will also be noted from FIG. 8b that the energizing circuits for the driving coils M1F and M1R contain respective normally closed interlock switch contacts shown at M1_R and M1_F. Contacts M1_R open responsive to the energization of the motor driving coil M1R thereby preventing energization of the motor drive M1F at this time. Similarly, the energization of the motor drive coil M1F opens the interlocked switch contacts M1_F, preventing energization of motor drive coil M1R. These interlocking sets of switch contacts prevent simultaneous energization of both motor drive coils. Similarly, the interlocking contact R1₄, R2₄, R4₄ and R5₄ are normally closed and are connected in the energizing circuit for the motor driving coil which is energized to return the elevator member 60 to its "home" position, along with the limit switch LS4. These interlocked switch contacts open responsive to the energiza-

tion of the relays corresponding to the relay R1 associated with the platen press assemblies of the first, second, fourth, and fifth levels. As shown in FIG. 8a, the relay R1 becomes energized responsive to the bridging of contacts 125 and 126 by the pole 154 when the switch SW1A is operated. Thus, the interlocked contacts R1₄, R2₄, R5₄ prevent any return movement of the elevator member 60 when any of the relays for the first, second, fourth and fifth levels is energized.

While the multiple molding press of the present invention has been above described specifically for handling mold boxes employed with foaming plastic materials, it is readily apparent that the press of the present invention can have application for other types of work pieces, such as various types of laminated glued wood objects including laminated table tops, cabinet walls, top panels, or the like. These parts may be carried on a board, or similar plate-like support into position in the press. The press system of the present invention is also applicable to other gluing operations where; for example, two or more flat panels are stacked, freshly glued, ready for pressing.

While a specific embodiment of an improved multiple molding press assembly has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

WHAT IS CLAIMED IS:

1. A multiple molding press assembly comprising up-standing frame means, a plurality of vertically spaced fixed horizontal work piece support elements on said frame means, respective horizontal platen members mounted on said frame means over said support elements, means to independently reciprocate said platen members, a horizontal work piece receiving member engaged on said frame means and being vertically movable thereon, said work piece receiving member having a horizontal front portion registrable with a selected horizontal work piece support element for feeding a work piece thereto for pressure processing and a horizontal rear portion simultaneously registering with the work piece support element for receiving a processed work piece therefrom, and means to selectively move the work piece receiving member vertically on said frame means to positions of registry with said horizontal work piece support elements.

2. The multiple molding press assembly of claim 1, and wherein the means to reciprocate said platen member comprises respective fluid pressure-operated driving members connected between the platen members and said frame means.

3. The multiple molding press assembly of claim 2, and respective positive and negative pressure fluid sources, and means for selectively connecting said positive and negative pressure fluid sources to said fluid pressure-operated driving members.

4. The multiple molding press assembly of claim 3, and wherein said driving members comprise flexible bellows members connected between the platen members and upwardly adjacent portions of said frame means.

5. The multiple molding press assembly of claim 4, and means normally connecting the bellow members to said negative pressure fluid source, said means for selectively connecting the sources to the bellows mem-

bers comprising reversing valve means interconnecting the bellows members with said pressure fluid sources.

6. The multiple molding press assembly of claim 5, and wherein said reversing valve means comprises respective main fluid pressure-operated valves connected between the fluid pressure sources and said bellows members and having ports normally connecting said negative fluid pressure source to said bellows members and other ports connecting the positive fluid pressure source to the bellows members responsive to operating fluid pressure applied to the main valves, and independently controlled pilot valve means operatively connected between the positive fluid pressure source and the main valves.

7. The multiple molding press assembly of claim 6, and wherein said pilot valve means comprise respective valves having operating solenoids, and means to selectively energize said solenoids.

8. The multiple molding press assembly of claim 7, and means to prevent energization of a selected solenoid unless the vertically movable work piece receiving member is at a level substantially registering with the corresponding work piece support element.

9. The multiple molding press assembly of claim 1, and transversely movable work piece-engageable feeder means on the front portion of the work piece receiving member.

10. The multiple molding press assembly of claim 9, and means to actuate said feeder means responsive to the positioning of said work piece receiving member at a selected position of registry with a horizontal work piece support element.

11. The multiple molding press assembly of claim 10, and means to move each platen member downwardly to press position responsive to actuation of said feeder means through a feeding stroke substantially sufficient to move a work piece beneath the platen member.

12. The multiple molding press assembly of claim 11, and means to maintain downward press force on the platen member for a timed period and to thereafter release the platen member.

13. The multiple molding press assembly of claim 12, and wherein said means to move each platen member downwardly to press position comprises an expansible bellows member connected between the platen member and an upwardly adjacent portion of said frame means, and means to admit pressure fluid into said bellows member responsive to the actuation of said feeder means through said feeding stroke.

14. The multiple molding press assembly of claim 13, and means to return said feeder means on said work piece receiving member after said feeder means reaches the end of said feeding stroke.

15. The multiple molding press assembly of claim 14, and wherein said work piece receiving member has a normal "home" position, and means to return said work piece receiving member to said "home" position at the end of the retraction stroke of said feeder means.

16. The multiple molding press assembly of claim 15, and wherein said normal "home" position of said work piece receiving member is substantially in registry with one of said horizontal work piece support elements.

17. The multiple molding press assembly of claim 16, and wherein at least three vertically spaced fixed horizontal work piece support elements are provided and said normal "home" position is in registry with an intermediate work piece support element.

18. The multiple molding press assembly of claim 1, and wherein the means to move said work piece receiving member vertically on said frame means comprises vertical screw means on said frame means and thread-
5 edly engaged with said work piece receiving member, and means to rotate said vertical screw means.

19. The multiple molding press assembly of claim 18, and wherein said screw means is journaled on said frame means and said means to rotate said vertical screw means comprises a reversible electric motor and
10 means drivingly coupling said electric motor to said vertical screw means.

20. The multiple molding press assembly of claim 1, and transversely movable workpiece-engageable feeder means on the front portion of the workpiece receiving
15 member, and wherein said transversely movable feeder means comprises transverse guide rail means on said workpiece receiving member, a workpiece engaging abutment member slidably mounted on said rail means, and drive means connected to said abutment member.

21. The multiple molding press assembly of claim 20, and wherein said last-named drive means comprises a reversible electric motor mounted on said workpiece
20 receiving member, and means drivingly connecting said last-named electric motor to said abutment member.

22. The multiple molding press assembly of claim 20, and horizontal drive roller means longitudinally jour-
25 naled on said rear portion of said workpiece receiving member for drivingly engaging a workpiece ejected rearwardly from beneath a platen member, and means drivingly coupling said roller means to said abutment member for actuation simultaneously therewith.

23. The multiple molding press assembly of claim 1, and wherein the means to reciprocate said platen mem-
30 bers comprises respective fluid pressure-operated driving members connected between the platen members and said frame means, respective positive and negative pressure fluid sources, means for selectively connecting said positive and negative pressure fluid sources to said fluid pressure-operated driving members, and means to
35 maintain the pressure of said negative pressure fluid

source between predetermined limits.

24. The multiple molding press assembly of claim 23, and wherein said negative pressure fluid source com-
prises a vacuum pump and a drive motor operatively connected to said pump, said last-named motor having
an energizing circuit including a pressure-responsive switch connected so as to respond to the output pres-
sure of said vacuum pump, said switch having auxiliary
contacts, transversely movable workpiece-engageable
feeder means on the front portion of the workpiece re-
ceiving member, and means to inhibit action of said
feeder means unless said auxiliary contacts are closed.

25. The multiple molding press assembly of claim 1, and transversely movable workpiece-engageable feeder
15 means on the front portion of the workpiece receiving member, means to actuate said feeder means respon-
sive to the positioning of said workpiece receiving member at a selected position of registry with a hori-
zontal workpiece support element, means to move each
platen member downwardly to press position respon-
sive to actuation of said feeder means through a feeding
stroke substantially sufficient to move a workpiece be-
neath the platen member, means to maintain down-
ward press force on the platen member for a timed pe-
riod and to thereafter release the platen member, indi-
cator means, and means to energize said indicator
means a short time prior to the end of said timed pe-
riod, whereby said workpiece receiving member may
be started toward said selected position of registry with
the horizontal workpiece support element.

26. A multiple molding press assembly comprising a
support, a plurality of vertically spaced independently
operable press units on said support, means to selec-
tively operate said press units, a workpiece elevator ad-
35 jacent said support adapted to receive a workpiece for
pressure processing, means to selectively move said el-
evator vertically into registry with said press units, and
means on the elevator to move a workpiece horizon-
tally into a press unit when it is in registry with said
40 press unit.

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