C. R BURKHARDT.

APPARATUS FOR MAKING CONCRETE SLABS.

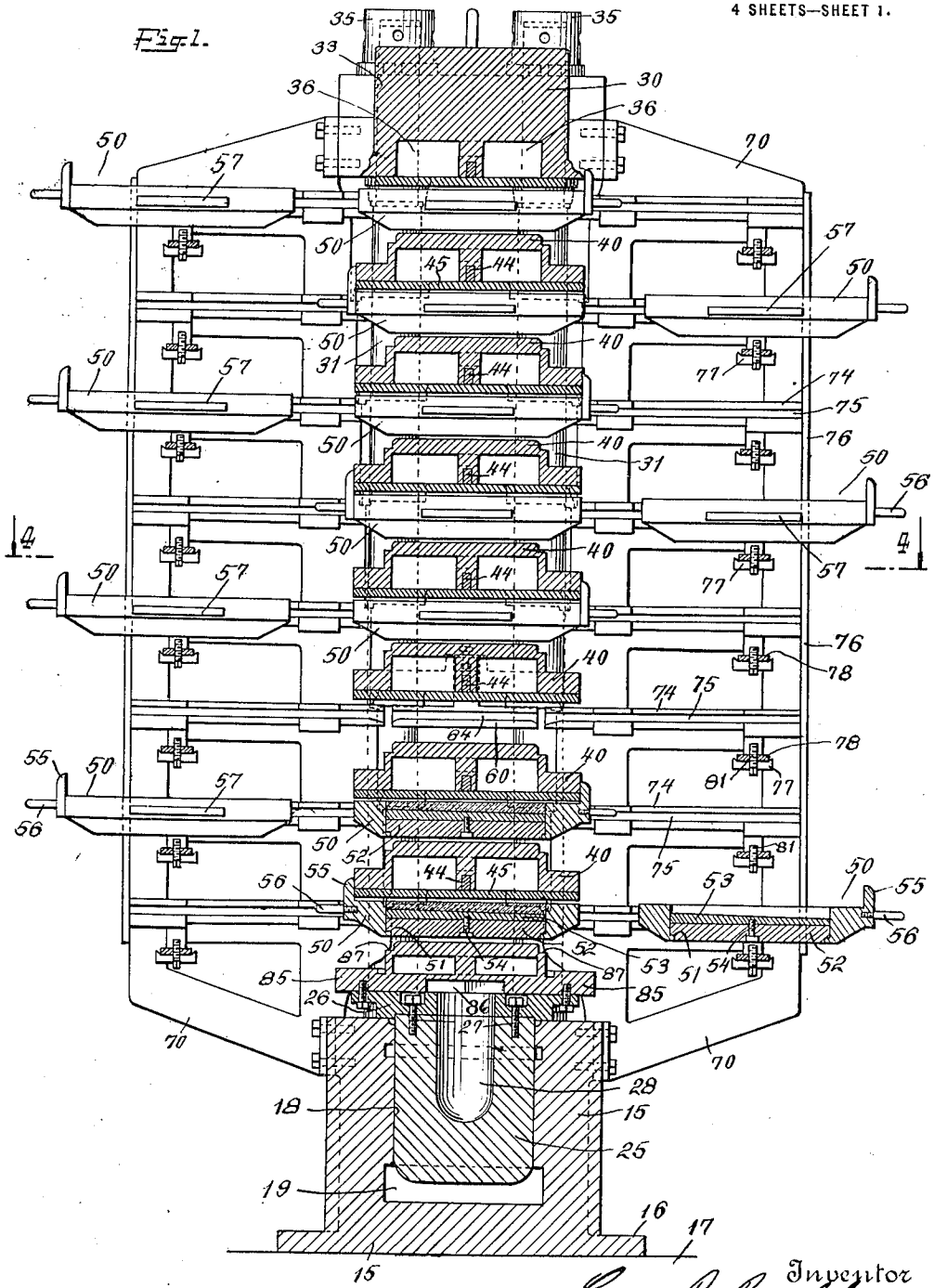
APPLICATION FILED JUNE 3, 1916

1,291,637.

Patented Jan. 14, 1919.

4 SHEETS—SHEET 1.

Fig. 1.



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4 SHEETS—SHEET 2.

Fig. 2.

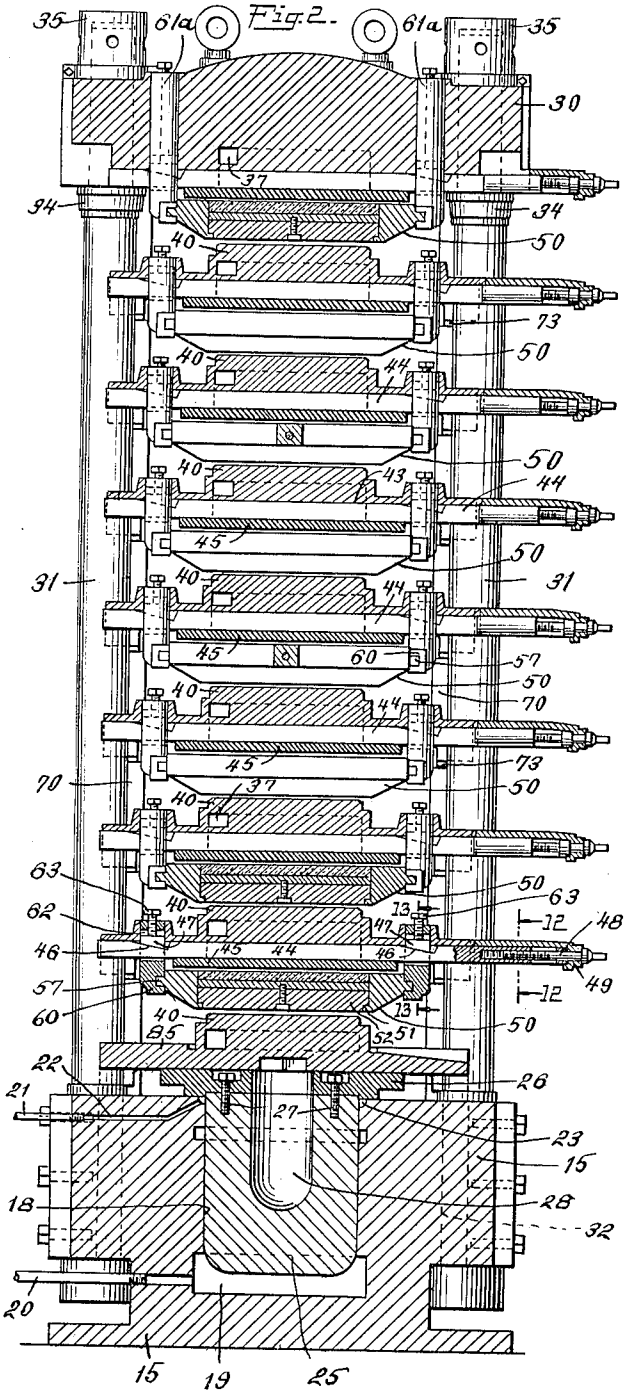


Fig. 11.

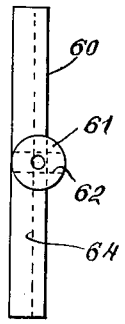


Fig. 12.

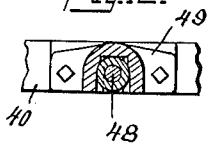
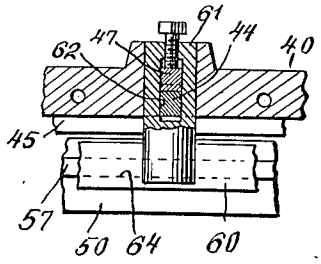


Fig. 13.



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4 SHEETS—SHEET 3.

Fig. 3.

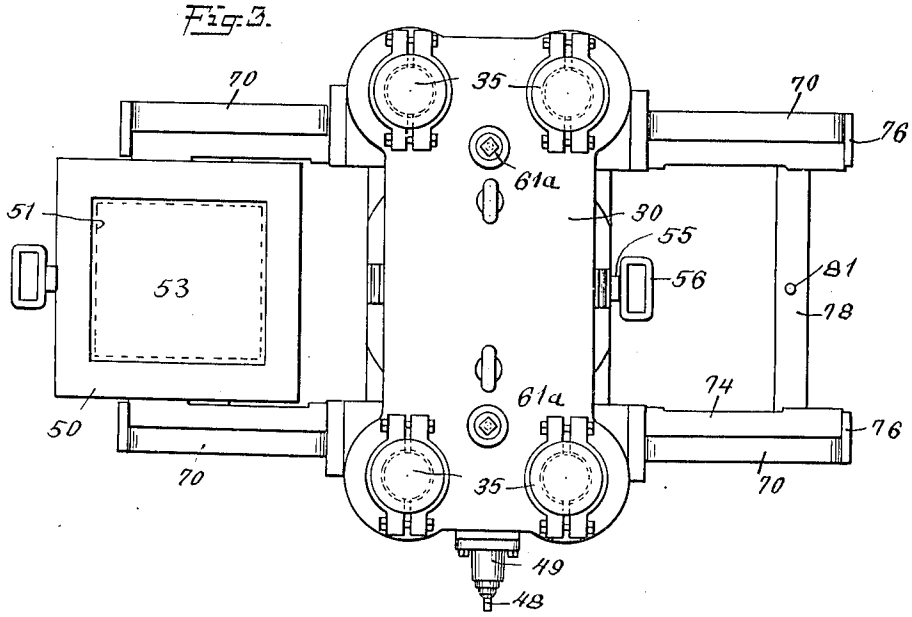


Fig. 4.

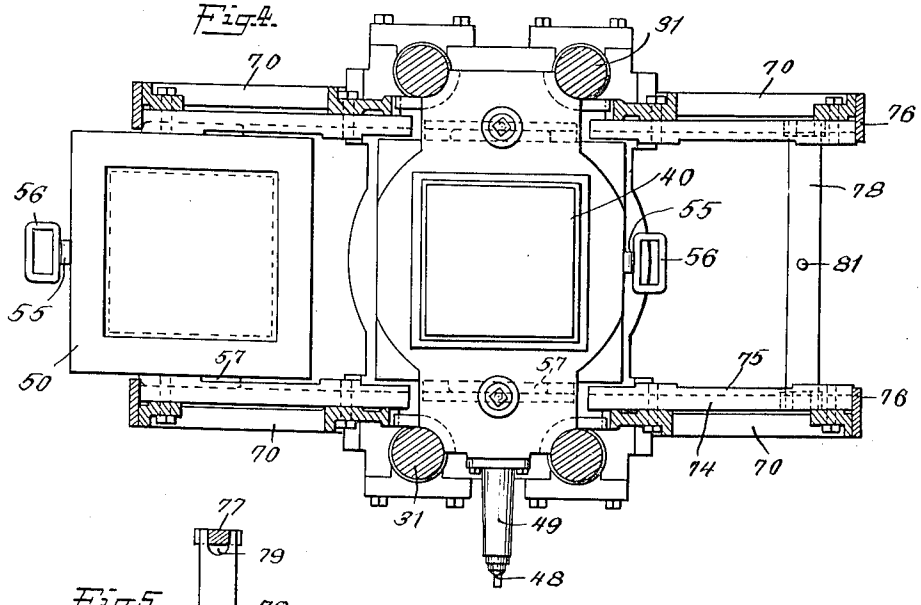
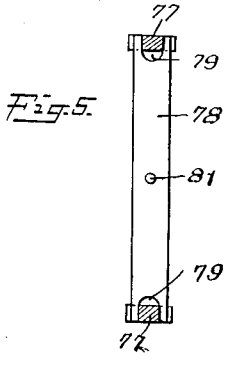


Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 6.

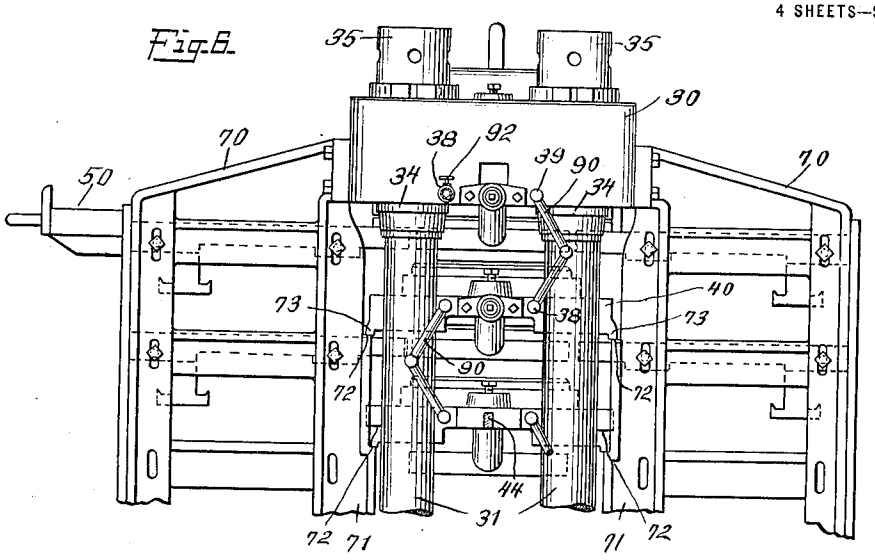


Fig. 7.

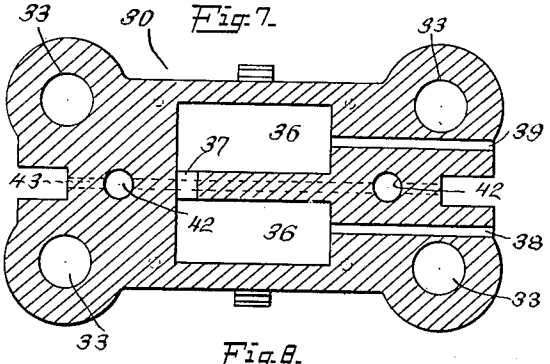


Fig. 9.

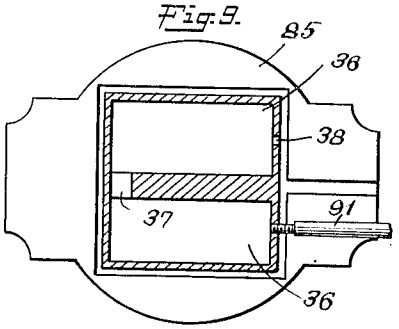


Fig. 8.

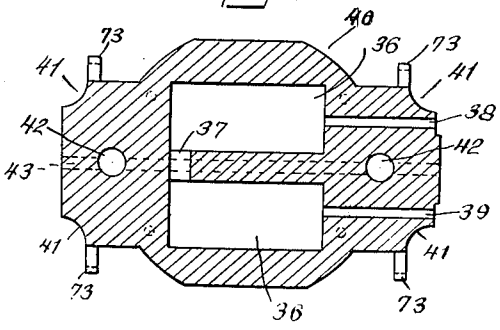
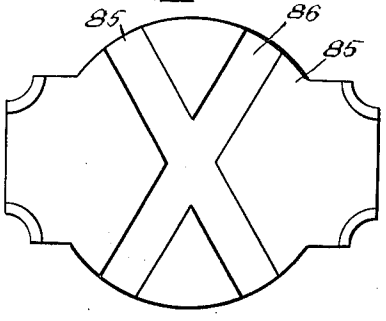


Fig. 10.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MAKING CONCRETE SLABS.

1,291,637. Specification of Letters Patent. Patented Jan. 14, 1919.

Application filed June 3, 1916. Serial No. 101,461.

To all whom it may concern:

Be it known that I, CURT R. BURKHARDT, a subject of the Emperor of Germany, (who will become a citizen of the United States on June 8, 1916,) and a resident of Teaneck, Bergen county, and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Making Concrete Slabs, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to apparatus for producing plates, slabs, tiles, shingles or like articles from hydraulic cement, sand and asbestos fiber, or from some other suitable concrete mixture. It has special reference to machines for manufacturing concrete shingles by the application of high pressure and heat.

One object of my invention is to provide a machine of the aforesaid character that shall be compact in construction, reliable in operation, and adapted for producing a plurality of shingles or other units at one time.

Another object is to provide a press having a stationary head, a plunger or piston, and a plurality of intermediate press heads adapted to be supported in spaced relation at fixed distances apart when the plunger is released and to be forced together when the plunger is actuated.

Still another object is to provide more than one set of molds and a plurality of mold racks on opposite sides of the press, whereby they are adapted to support one set of molds in position to be loaded while the other set is being subjected to the action of the press.

Another object is to heat the press members for the purpose of preventing the concrete from adhering thereto as the shingles or the like are made in the machine, without interfering with the operation of the movable press members.

Other objects and advantages of my invention will be set forth hereinafter and in order that my invention may be thoroughly understood I will now proceed to describe the same in the following specification and then point out the novel features thereof in appended claims.

Referring to the drawings:

Figure 1 is a sectional elevation of a press arranged and constructed in accordance with and constituting an embodiment of my invention. Certain of the molds are shown in elevation and others in section, some being filled and others empty, in order to clearly bring out the structure and operation of the press.

Fig. 2 is a sectional elevation at right angles to Fig. 1.

A plan view of the same machine is shown in Fig. 3; and

Fig. 4 is a sectional plan view, taken on the line 4—4 of Fig. 1.

One of the transverse bars which support a releasing stud, is shown on a larger scale in Fig. 5.

Fig. 6 is a front elevation of the upper part of the machine and illustrates the steam connections between the press heads.

Fig. 7 is a sectional plan view of the stationary press head located at the top of the machine.

Fig. 8 is a similar view of one of the intermediate press heads.

Fig. 9 is a sectional plan view of the press head which is attached to the plunger of the press; and

Fig. 10 is a bottom plan view of the same member.

Fig. 11 is a plan view showing one of the guide bars which are attached to the intermediate or floating press heads.

Figs. 12 and 13 are sectional details taken on the lines 12—12 and 13—13 of Fig. 2.

The embodiment of my invention which is illustrated in the drawings comprises a base 15, a plunger 25, a stationary press head 30 at the top, a plurality of intermediate press heads 40, two sets of molds 50, a mold support 60, and two sets of supporting racks.

The base.

The base 15 has a bottom flange 16 by which it may be bolted or otherwise secured to the floor or foundation indicated at 17. It is furthermore, provided with a cylindrical recess 18 which is adapted to receive the cylindrical plunger 25 and is enlarged into a chamber 19 at the bottom. The recess 18

constitutes a hydraulic cylinder, a fluid supply pipe being connected to the chamber 19 as clearly shown in Fig. 2. A drainage pipe 21 is connected through a port or passage 22 to an annular groove 23 at the mouth of the cylindrical opening 18.

The plunger 25 has a flange plate 26 attached to it by bolts 27 and is provided with a recess 28 which is adapted to contain cooling fluid. The flange plate is arranged to limit the downward movement of the plunger.

Stationary press head.

The press head 30 has the general form shown in the sectional plan of Fig. 7 and is securely held in position by a plurality of massive tie bolts or studs 31 which extend through recessed lugs 32 of the base 15 at their lower ends, and through holes 33 in the press head 30 at the top, the press head being securely clamped against collars or enlargements 34 of the bolts by means of cap nuts 35.

The press head 30 is further provided with recesses 36 constituting steam chambers which are interconnected by a port 37 and respectively communicate with admission and exhaust passages 38 and 39.

Intermediate press heads.

Each of the intermediate press heads 40 has the general form shown in Fig. 8, being provided with curved corner notches 41 to coöperate with the studs or tie bolts 31 which guide the head as it is moved up and down during the operation of the press. Each press head has recesses 36, a port 37, inlet and exhaust passages 38 and 39 corresponding to the stationary press head, and a pair of spaced holes 42 to receive a cylindrical projection 61 of the mold support 60. Furthermore, each press head, including the stationary press head 30, has a transverse slot or groove 43 in which a wedge-bar 44 is slidably mounted, the bar being held in position by a bottom plate 45 which is secured to the body of the press head, and forms a part of it. The relation of these parts is clearly shown in Figs. 1 and 2.

The slots 43 extend transversely through the cylindrical projections 61 of the mold supports which are provided with slots 62 to receive the wedge-bar 44. Each wedge-bar has two notches 46 near its respective ends having wedge or cam surfaces to coöperate with wedge blocks 47 which are set into the slots 62 which extend through tapped holes in the outer end of the cylindrical projections as clearly shown in Fig. 2.

The arrangement of parts is such that when the bars 44 are adjusted longitudinally, the supports 60 are elevated to force the molds 50 against the bottom plates 45 of the press heads 40.

The adjustment of the bars is effected by screws 48 which extend through suitable holes in brackets 49 and engage tapped holes in the outer ends of the bars 44. The brackets 49 are attached to the press heads 40 by bolts or other suitable means as indicated in Fig. 12.

The mold supports 60 for the stationary press head 30 are similar to those employed with the intermediate press heads except that the cylindrical projections are made longer on account of the thickness of the stationary press head. These projections are designated 61^A. Each of the press heads 40 is formed on the top to coöperate with the bottom plate of the mold as hereinafter explained.

Mold.

Each of the molds comprises a frame or hollow body having a flange 51 to support a removable bottom plate 52. In order to provide for the manufacture of shingles or tiles of different thicknesses, or of varying thicknesses from one edge to the other, I prefer to utilize a plate 53 which is secured to the bottom plate 52 by a bolt 54 and constitutes a form which determines the thickness and shape of the shingle or tile.

Each mold has an upwardly-extending projection or lug 55 and an outwardly-extending handle 56 on the same side. The lug is so placed that when the mold is moved into position in the press, the lug acts as a stop and engages the side of the press head, as shown in Fig. 1. The handle is adapted to be utilized for moving the mold into and out of the press.

The mold is provided with lateral projections or tongues 57 which engage grooves 64 in the supports and are guided thereby when it is in position in the press.

Supporting racks.

The above-described parts constitute an operative machine and one set of molds may be filled outside of the press while the other set is in the press. However, I prefer to provide racks in which the molds are adapted to be supported for filling when they are not between the press heads. The racks comprise four frames 70 which are secured near their respective ends to the base 15, and the stationary press head 30. Each of the frames has an inwardly-extending flange or projection 71 which is notched to constitute steps 72 and is engaged, as clearly shown in Fig. 6, by press head fingers or lugs 73.

The lowest intermediate press head 40 rests upon the bottom step 72 when the plunger 25 is released, and each successive press head above it rests upon the successive upper steps.

The arrangement of parts is such that when the plunger 25 is actuated, by admit-

ting hydraulic or other fluid pressure to the chamber 19 for example, the press heads are successively raised until they are all carried by the plunger and are finally subjected to high compression between the stationary press head 30 and the plunger.

A press head 85 which is shown in sectional plan in Fig. 9 and in bottom plan in Fig. 10, is secured to the flange plate 26 of the plunger. It has an upwardly-extending body having recesses 36 connected by a port 37, inlet and outlet passages 38 and 39 corresponding to the press heads 40 and the stationary press head 30.

Each of the press heads 40 and the press head 85 are formed to extend into the opening in the bottom of the mold above it so that the bottom plate 52 is forced upwardly and compresses the concrete mixture, with which the mold is filled, between the mold plate 53 and the bottom plate 45 of the head above.

The racks are further provided with stationary guide bars 74 having slots or grooves 75 constituting guideways to coöperate with the tongues 57 of the molds. The bars 74 are arranged in pairs and the frames 70 have flanges 76 which close the outer ends of the grooves 75 and constitute stops to limit the outward movement of the molds. As clearly shown in Fig. 1, when the molds are pulled outwardly by the handles 56 into position to be filled, the outer ends of the tongues 57 engage the flange 76, there is therefore no danger of accidentally pulling the mold out too far.

The bars 75 have downwardly-extending T-shaped projections 77 which are adapted to support transverse bars 78 having end notches 79 to provide forks as clearly shown in Fig. 5. Near the center of each bar 78 is a tapped hole through which extends a screw-threaded stud 81. The location of the T-shaped projections 77 and of the bars 78 are such that the studs 81 are almost directly under the centers of the removable bottom plates 52 of the molds. At least they are in position to exert an upward pressure upon the mold plate when the mold has been pulled out of the body of the press onto the rack.

Plunger press head.

As clearly shown in Fig. 10, the press head 85 which is attached to the flange plate 25 of the plunger, has diagonal slots 86 on its bottom surface, these slots being in communication with the chamber or recesses 28 of the plunger as indicated in Fig. 1. They are for the purpose of introducing cooling fluid such as air or water to the plunger.

The outlet port 39 of the stationary press head 30 is connected to the inlet port 38 of the press head 40, directly below it, by means of the flexible elbow steam pipe connection 90. The outlet 39 of this press head is similarly connected to the inlet passage of the press head below and so on, each of the press heads being in this way interconnected, the outlet port 39 of the press head 85 which is secured to the plunger being connected to a suitable exhaust pipe 91.

The arrangement of pipe connections is such as not to interfere with the operation of the press which will now be discussed.

Operation.

Assuming that the parts occupy substantially the positions shown in Figs. 1 and 2, and that the molds 50, which are carried by the press head supports, are filled with concrete mixture from which the slabs or shingles are to be made, a suitable wrench or key is first employed for turning the studs 48 so as to draw the wedge bars 44 to the right as shown in Fig. 2. The wedge surfaces 46 of the bars coöperate with the wedge blocks 47 and lift the supports 60 and the molds 50 which are carried thereby. Thus the concrete material in the molds is held in place under slight compression between the bottom plates 45 and the mold plates 53.

If hydraulic pressure is admitted through pipe 20, to the chamber 19 and the plunger forced upwardly, the face of the press head 85 will first engage the bottom plate 52 of the lowest mold 50 and will lift the press head 40 above, the concrete material in the mold being compressed somewhat by the weight of the press head which rests upon it.

Each successive mold and press head is raised until the entire series are borne by the plunger. The continued upward movement of the plunger very highly compresses the material in the several molds between the press head 85 and the stationary press head 30. The press head 85 has an edge notch forming a shoulder 87 which lifts the mold if the press is actuated when the mold is empty and may limit the relative movement between the press head and the mold so as to definitely determine the thickness of the product when the molds are filled, although I prefer to depend upon a measured quantity of material and predetermined pressure.

While the shingles or slabs are being subjected to very high pressure in the hydraulic press, the steam or other suitable heating fluid is admitted through a valve 92 and inlet opening 38 into chambers 36 of the stationary press head 30. The steam flows from this point through the heating chambers 36 of the several press heads and is finally discharged through the exhaust pipe 91. Thus the press heads are all heated to a predetermined temperature and the slabs or tiles are subjected to high temperature as well as high pressure. Such pressures and

temperatures are employed as to rapidly complete a plurality of tough shingles or tiles.

The heat applied in this way first dries the surface of the shingles or other concrete bodies which are being molded in the press and prevents the usual adhesion between the concrete and the mold plates with the result that the concrete bodies are easily removed from the press when completed.

The pressure may be continued for any desired length of time but with high temperatures and pressures a very short time is sufficient. When the tiles are complete and the fluid pressure in the chamber 19 is relieved, the plunger 25 falls to its original position and the several molds are supported by the steps 72 of the frame 70 where they are in position to be transferred from the supports 60 to the guide bars 74, the grooves 64 of the supports 60 being in alinement with the slots 75 of the guide bars as indicated in Fig. 1.

The molds are next pulled outwardly into the racks, and a key or a socket wrench is employed for turning the studs 81 to push the completed shingles or tiles upwardly out of the molds.

As soon as the molds containing the completed product are pulled out of the press into the racks, the other set of molds, which have been in the racks in position for filling, are immediately pushed into the press so that the press may again be actuated and the new set of shingles or tiles subjected to high pressure and heat while the set first completed are being removed from the molds and the molds again filled.

One set of molds on one side of the press may all be filled at one time while the molds on the other side are in the press, and vice versa, but I believe it is preferable to introduce successive molds alternately from the opposite sides, since by this means there are empty molds on each side of the press which are well spaced apart, and are in position to be filled with ease. For example, a man may be stationed on each side of the press for filling the molds and removing the completed ones.

The number of molds and press heads may obviously be increased indefinitely, the number employed being determined by the desired capacity of the machine, and the number of men which can economically be employed on the machine at one time, etc.

It is obvious that I depend upon the force of gravity for returning the molds and press heads to their initial positions and while I believe this is preferable, the press may obviously be rearranged to operate in other planes and in fact, it may be inverted provided springs or other suitable means are arranged to return the members to their initial positions after each operation.

The structure may be modified in various ways within the spirit and scope of my invention, and I intend that only such limitations be imposed as are indicated in the appended claims.

What I claim is:

1. A press comprising a pair of spaced press heads, means for actuating the press to move the heads one toward the other, an interposed floating press arranged to provide a plurality of compression spaces, mold holders adapted to be inserted in the compression spaces, and means for clamping the mold holders to close the molds and lock them in place before the press is actuated.

2. A press comprising a pair of spaced press heads, means for actuating the press to move the heads one toward the other, an interposed floating press head arranged to provide a plurality of compression spaces, molds for the press, and means for closing each mold and pressing it against the adjacent press head before the working pressure is applied.

3. A press comprising a pair of spaced press heads, means for actuating the press to move the heads one toward the other, an interposed floating press head arranged to provide a plurality of compression spaces, interposed molds in the spaces between press heads, mold holders for suspending each mold from the press head above, and means for clamping the mold in position independently of the press actuating means.

4. A press comprising a pair of spaced press heads, means for actuating the press to move the heads one toward the other, an interposed floating press head arranged to provide a plurality of compression spaces, interposed molds in the spaces between press heads, mold holders for suspending each mold from the press head above, and transverse bars for locking the molds and holding them closed.

5. A press comprising a pair of spaced press heads tending to separate, and adapted to be moved one toward the other, and an interposed floating press head adapted to provide a plurality of compression spaces, means for adjustably suspending molds from the adjacent press heads in the compression spaces, and bars for actuating the adjustable suspension means to close the molds and lock them in position in the press.

6. A press comprising a stationary press head, a movable press head below the stationary press head, interposed floating press heads adapted to provide a plurality of compression spaces, and means arranged to permit a free upward movement of the press heads for supporting the floating press heads in a plurality of spaced intermediate positions in the press when the movable press head is released.

7. A press comprising a stationary press

head, a movable press head below the stationary press head, interposed floating press heads adapted to provide a plurality of compression spaces, and stepped supports adapted to hold the floating press heads in predetermined intermediate positions in the press when the movable press head is released, the floating press heads being arranged to be lifted from their supports when the movable press head is actuated.

8. A press comprising a stationary base, a cylinder, a plunger in the cylinder, a movable press head attached to the plunger, a stationary press head spaced from the movable press head, an interposed floating press head, mold supports adjustably suspended from each of the upper press heads, and alternate stationary racks arranged in pairs and having guideways adapted to support molds in position to enter the mold supports from opposite sides of the press.

9. A press comprising a stationary base, a cylinder, a plunger in the cylinder, a movable press head attached to the plunger, a stationary press head spaced from the movable press head, an interposed floating press head, mold supports depending from each of the upper press heads, means for adjusting the supports to close the molds and securely hold them against the bottoms of the press heads above, and means for actuating the movable press head to compress the material in the molds.

10. A press comprising a stationary base, a cylinder, a plunger in the cylinder, a movable press head attached to the plunger, a stationary press head spaced from the movable press head, an interposed floating press head, mold supports comprising slotted bars having upwardly-extending substantially central projections depended in pairs from each of the upper press heads, means for securing the projections of the supports to the press heads and means for elevating the supports.

11. A press comprising a stationary base, a cylinder, a plunger in the cylinder, a movable press head attached to the plunger, a stationary press head spaced from the movable press head, an interposed floating press head, mold supports comprising slotted bars having upwardly-extending substantially central projections depended in pairs from each of the upper press heads, means for securing the projections of the supports to the press heads, molds adapted to be carried by the slotted supporting bars, and means for elevating the supports to preliminarily compress the material in the mold by clamping the mold to the bottom of the adjacent head.

12. A press comprising a stationary base, a cylinder, a plunger in the cylinder, a movable press head attached to the plunger, a stationary press head spaced from the movable press head, stationary frames having stepped notches and a plurality of interposed press heads adapted to be supported on the successive steps of the frames when the movable press head is released.

13. A hydraulic press comprising a base having a cylindrical recess to which compressed fluid is supplied, a plunger operating in said recess, a movable press head secured to the plunger, a stationary press head materially spaced from the movable press head, supporting frames secured to the base at one end, and to the stationary press head at the other, guide bars secured to said frames and constituting a plurality of racks, molds adapted to slide on said racks, a plurality of floating press heads interposed between the stationary and movable press heads, and means severally attached to the stationary and to the floating press heads, for supporting the molds in the press.

14. A hydraulic press comprising a base having a cylindrical recess to which compressed fluid is supplied, a plunger operating in said recess, a movable press head secured to the plunger, a stationary press head materially spaced from the movable press head, supporting frames secured to the base at one end, and to the stationary press head at the other, guide bars secured to said frames and constituting a plurality of racks, molds adapted to slide on said racks, a plurality of floating press heads interposed between the stationary and movable press heads, and supports severally secured to the stationary and floating press heads and adapted to coöperate with the guide bars of the frames to receive the molds therefrom.

15. A hydraulic press comprising a base having a cylindrical recess to which compressed fluid is supplied, a plunger operating in said recess, a movable press head secured to the plunger, a stationary press head materially spaced from the movable press head, supporting frames secured to the base at one end, and to the stationary press head at the other, guide bars secured to said frames and constituting a plurality of racks, molds adapted to slide on said racks, a plurality of floating press heads interposed between the stationary and movable press heads, wedge bars adjustably attached to the stationary and floating press heads and mold supports adjustably suspended from the wedge bars and adapted to coöperate with the stationary guide bars of the frames to permit the mold to be moved into and from the press, said wedge bars being arranged to elevate the supports and clamp the molds to the bottom of the press heads.

16. A press comprising a pair of spaced press heads, means for actuating the press to move the heads one toward the other, an interposed floating press head arranged to provide a plurality of compression spaces,

interposed molds in the spaces between press heads, mold holders for suspending each mold from the press head above, and transverse wedge bars for actuating the mold holders to lock the molds closed against the press head above, independently of the press actuating means.

17. A hydraulic press comprising a base having a cylindrical recess to which compressed fluid is supplied, a plunger operating in said recess, a movable press head secured to the plunger, a stationary press head materially spaced from the movable press head, supporting frames secured to the base at one end, and to the stationary press head at the other, guide bars secured to said frames and constituting a plurality of racks, molds adapted to slide on said racks, a plurality of floating press heads interposed between the stationary and movable press heads, and adjustable supports depending from the stationary and floating press heads and constituting guideways in alinement with the stationary guide bars of the rack.

18. A hydraulic press comprising a base having a cylindrical recess to which compressed fluid is supplied, a plunger operating in said recess, a movable press head secured to the plunger, a stationary press head materially spaced from the movable press head, supporting frames secured to the base at one end, and to the stationary press head at the other, guide bars secured to said frames and constituting a plurality of racks, molds adapted to slide on said racks, a plurality of floating press heads interposed between the stationary and movable press heads, adjustable supports depending from the stationary and floating press heads and constituting guideways in alinement with the stationary guide bars of the rack, and means for supplying heat to the press heads.

19. A hydraulic press comprising a base having a cylindrical recess to which compressed fluid is supplied, a plunger operating in said recess, a movable press head secured to the plunger, a stationary press head materially spaced from the movable press head, supporting frames secured to the base at one end, and to the stationary press head at the other, guide bars secured to said frames and constituting a plurality of racks, molds having removable bottom plates and adapted to slide in said guideways, supports depending from the stationary and floating press heads, means for supporting the press heads in spaced relation and in such position that the supports constitute guideways in alinement with the stationary guide bars, and means for pressing upwardly on the bottom of the mold plates when the molds are mounted in the racks.

20. A hydraulic press comprising a base having a cylindrical recess to which compressed fluid is supplied, a plunger operating in said recess, a movable press head secured to the plunger, a stationary press head materially spaced from the movable press head, supporting frames secured to the base at one end, and to the stationary press head at the other, guide bars secured to said frames and constituting a plurality of racks, molds having removable bottom plates and adapted to slide in said guideways, supports depending from the stationary and floating press heads, means for supporting the press heads in spaced relation and in such position that the supports constitute guideways in alinement with the stationary guide bars, transverse bars secured to the guide bars below the mold, and elevating screws associated with the transverse bars for forcing the bottom of the mold plate upwardly to remove the product when the mold is supported in the racks.

21. A press comprising a pair of spaced press heads, an interposed press head, a mold adapted to be supported in each compression space of the press and having an inwardly movable bottom adapted to coöperate with one of the adjacent press heads, each of said press heads having shoulders adapted to lift the mold when the bottom has been pushed inwardly to a predetermined extent.

22. A press comprising a pair of spaced press heads, an interposed press head, a mold adapted to be supported in each compression space of the press and having an inwardly movable bottom adapted to coöperate with one of the adjacent press heads, a mold plate removably attached to the bottom adapted to determine the mold space.

23. A press comprising a pair of spaced press heads, an interposed press head, a mold adapted to be supported in each compression space of the press and having an inwardly movable bottom adapted to coöperate with one of the adjacent heads, and a taper mold plate removably secured to the bottom.

24. A concrete molding press comprising a pair of spaced press heads, an interposed press head, means for supplying heat to each of the press heads to prevent the adhesion between the concrete and the press, a mold adapted to be supported in each compression space of the press, and means for closing each mold before the press is actuated by clamping it to one of the heated press heads above.

25. A press comprising a pair of spaced press heads adapted to be moved one toward the other, an interposed floating press head adapted to provide a plurality of compression spaces, mold holders for supporting a mold in each compression space, and means for actuating the holders to clamp the mold against the press head above.

26. A press comprising a pair of spaced press heads adapted to provide a compres-

sion space between them, means for actuating one of the heads, a mold for concrete having a movable bottom and open top adapted to be supported in said space, means for clamping the mold to the press head above before the press is actuated to close the top and prevent loss of solid material from the mold when pressure is applied, tending to move the heads together.

27. A press comprising a pair of spaced press heads, an interposed press head, a mold adapted to be supported in each compression space in the press and having an inwardly movable bottom adapted to coöperate with one of the adjacent press heads, each of said press heads having shoulders adapted to limit the inward movement of the bottom relative to the mold.

28. A press comprising a relatively stationary horizontal press head above, a movable press head below, means for actuating the movable press head, a mold having an upwardly movable bottom, and means for clamping the mold when full of plastic material against the surface of the press head above before the press is actuated.

In witness whereof, I have hereunto set my hand, this 31st day of May, 1916.

CURT R. BURKHARDT.