

Aug. 5, 1924.

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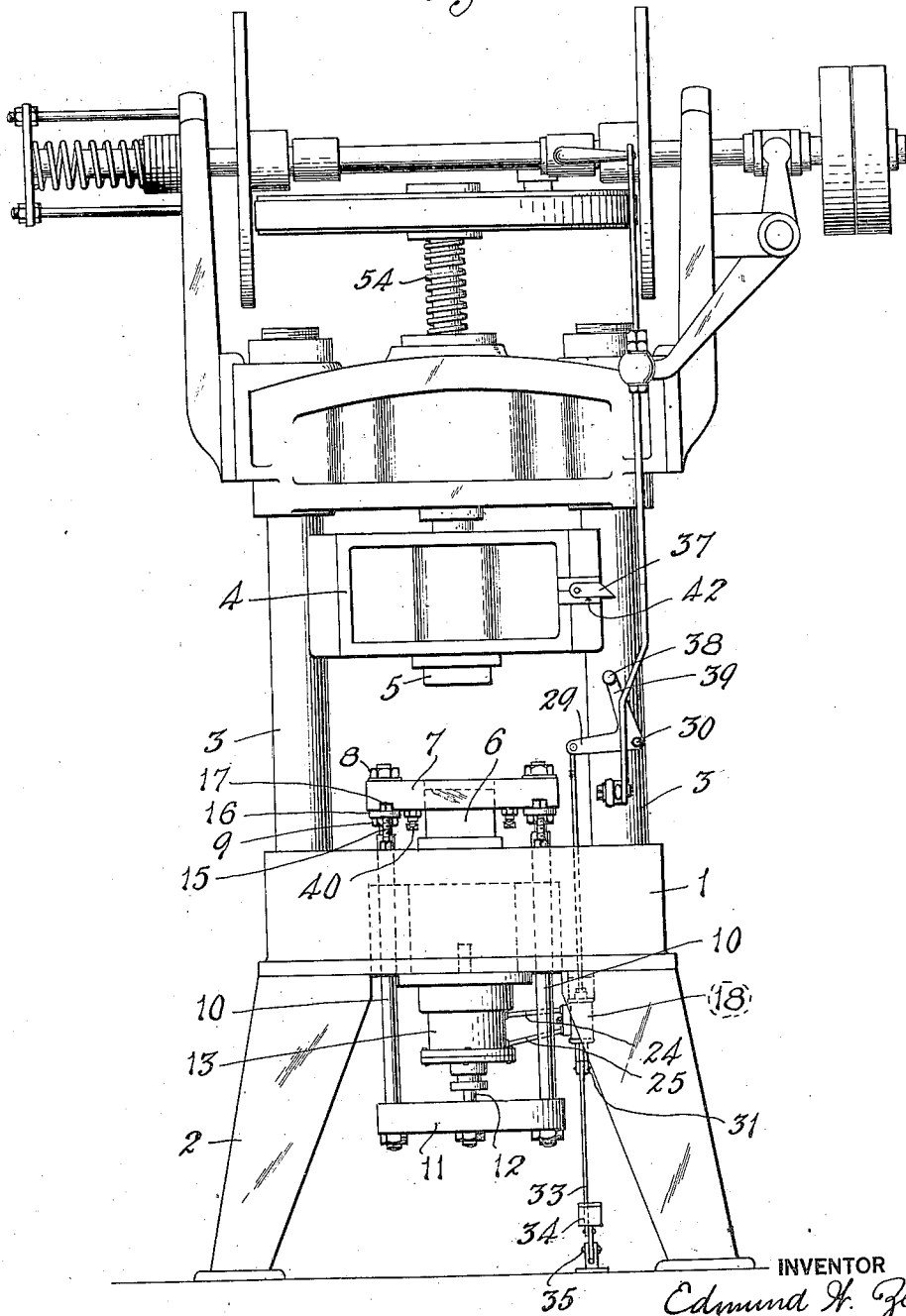
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TILE PRESS

Filed June 18, 1921

4 Sheets-Sheet 1

Fig. 1



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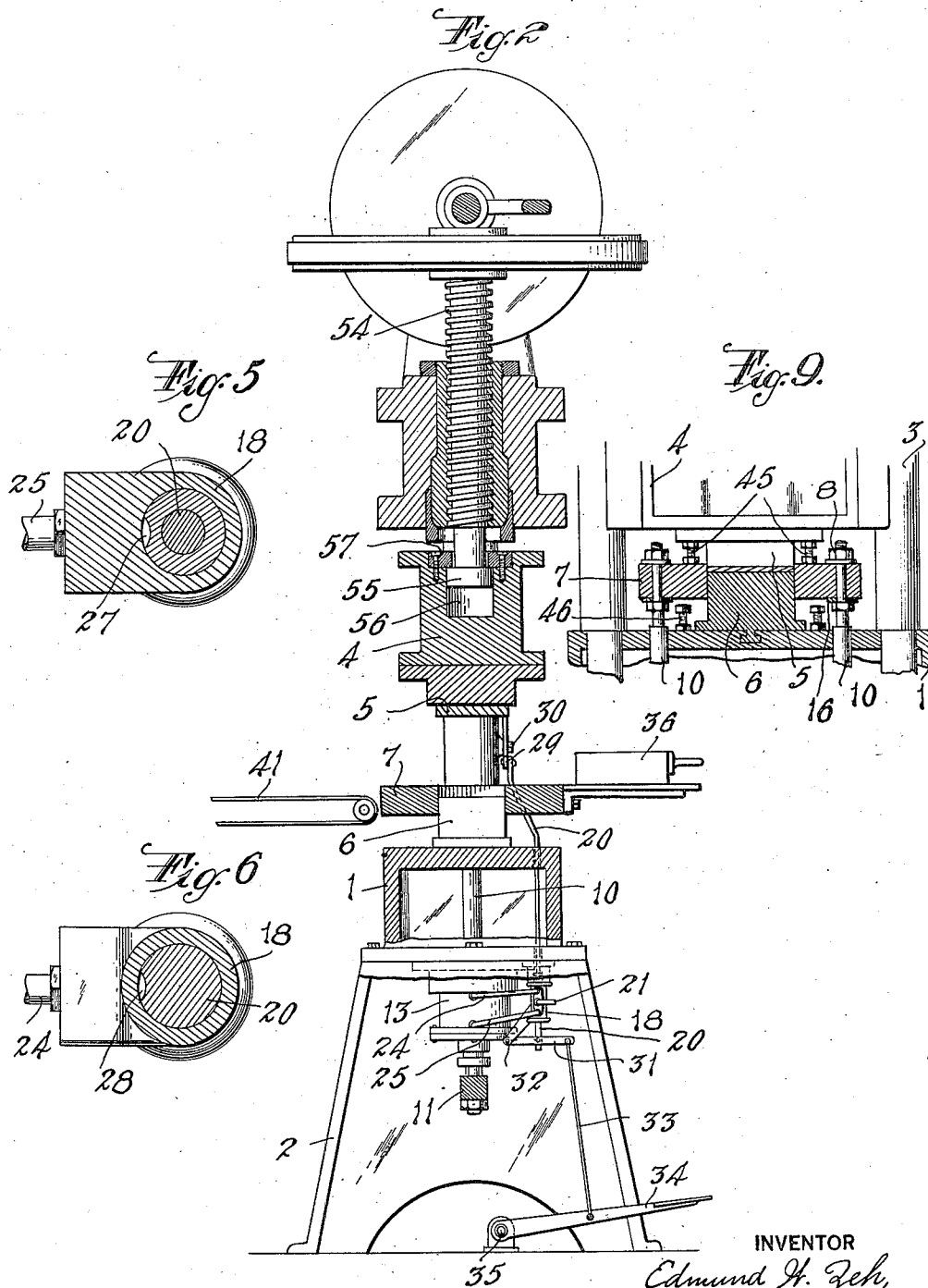
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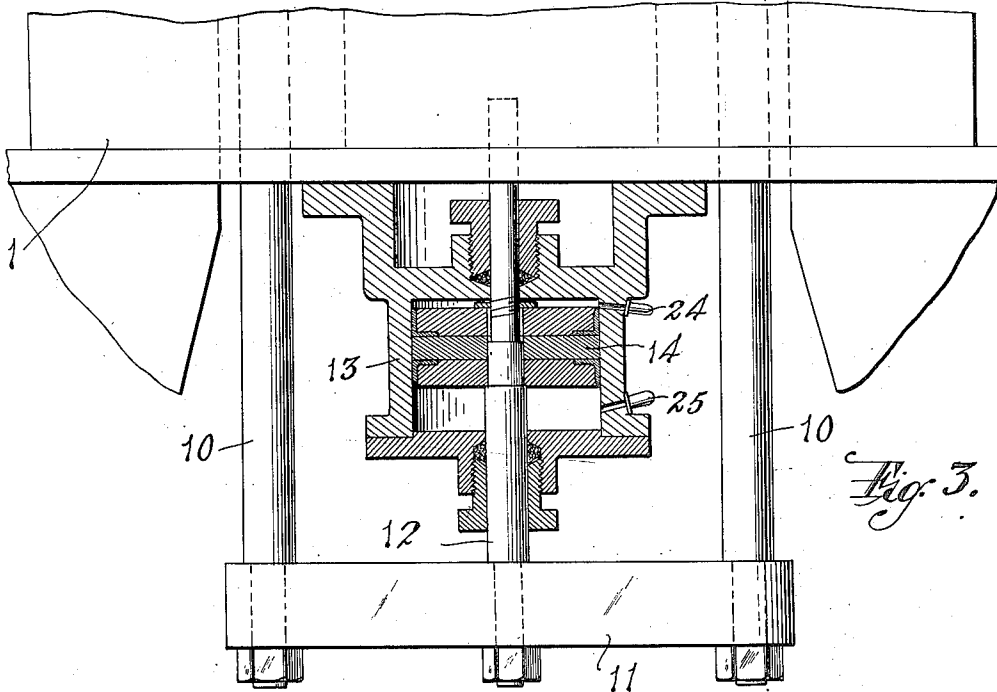


Fig. 3.

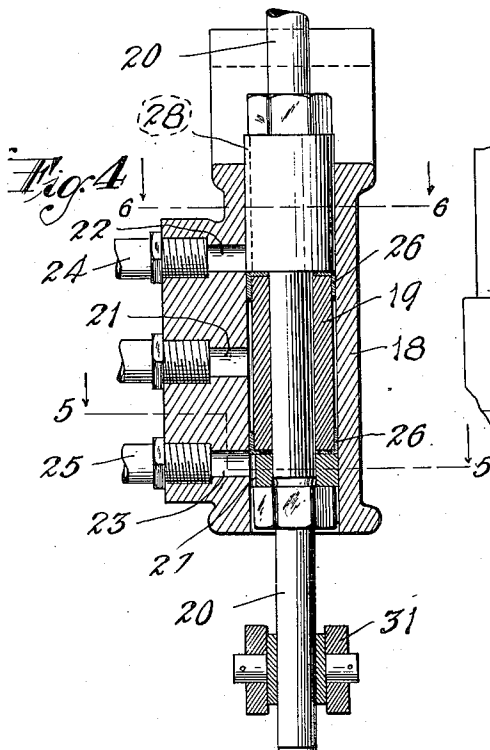


Fig. 4.

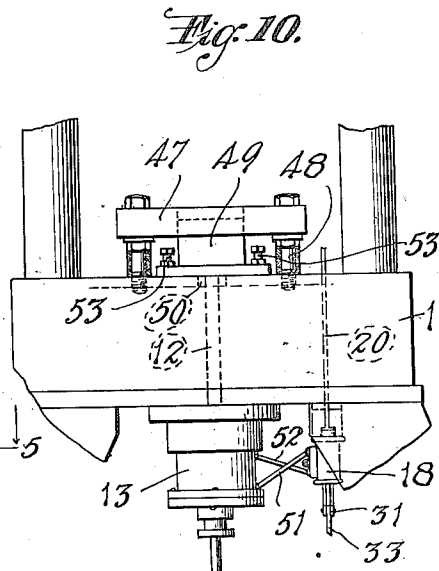


Fig. 10.

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4 Sheets-Sheet 4

Fig. 7.

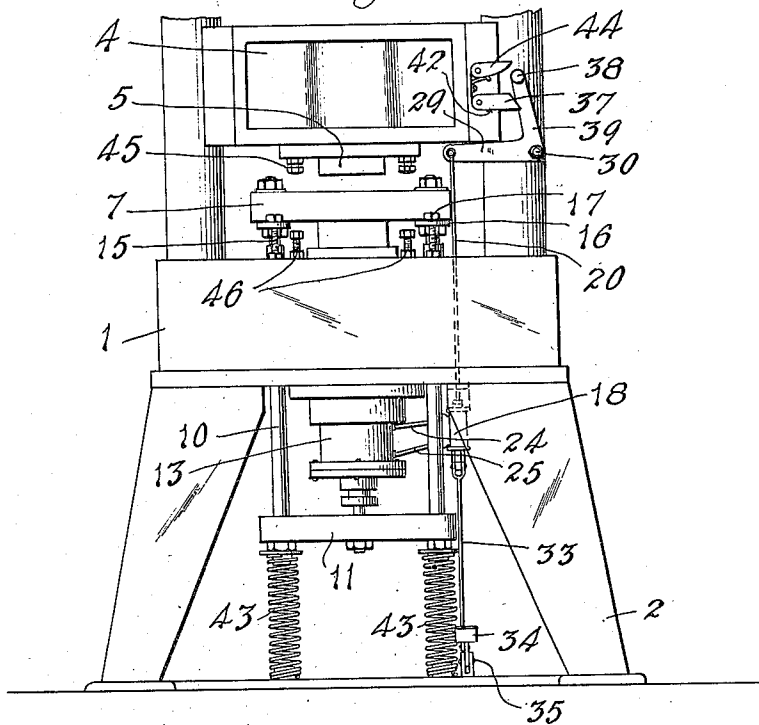
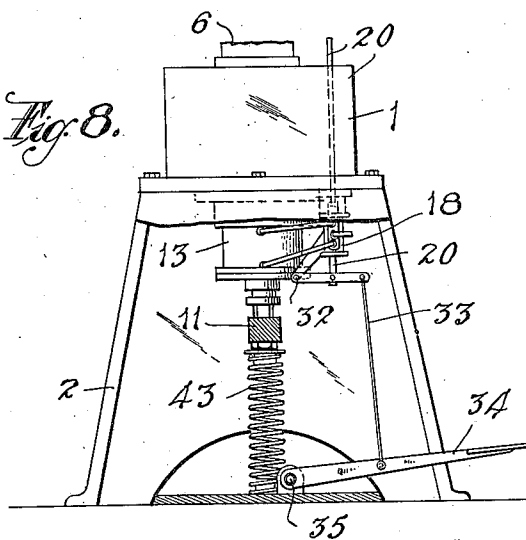


Fig. 8.



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UNITED STATES PATENT OFFICE.

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TILE PRESS.

Application filed June 18, 1921. Serial No. 478,509.

To all whom it may concern:

Be it known that I, EDMUND W. ZEH, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Tile Presses, of which the following is a specification.

This invention relates particularly to tile presses in which an upper die cooperates with a lower die comprising a central portion and a frame around said central portion, said frame and central portion being relatively movable, and cooperating to form a receptacle or cavity for the material to be pressed into tile.

There are three methods commonly used for pressing tile each differing in the time and character of the cooperation of the upper die and the lower die and the relative movement of the parts of the lower die in the formation of a tile. One method which is used to produce wall tiles consists in the utilization of a stationary central portion or post for the lower die surrounded by a frame slidable longitudinally thereof which is adapted to be positioned with its top above the top of the said central portion to form a die cavity to receive the material of which the tile is to be formed. The frame is held in this position while the upper die in the form of a plunger is forced into the die cavity to press the material, after which the upper die is raised and the frame lowered to bring its top flush with the top of the central portion to remove the tile. Another method consists in the use of the same die apparatus with the frame and post initially positioned as in the first method. As the upper die descends it enters the die cavity only a slight amount and then forces the frame downwardly with itself to press the tile, after which the upper die is raised and the frame moved further downwardly by other means to bring its top flush with the top of the central portion to remove the tile. The third method commonly used to make emery wheels consists in the use of a stationary frame and a movable central portion or post, the said post being initially positioned with its top below the top of the frame to form the cavity. The upper die

enters the cavity as in the first-mentioned method to press the tile, after which the said upper die is raised and the central portion of the lower die raised to bring its top flush with the top of the frame to remove the tile.

The objects of my invention are to provide improved power means for producing the said relative movements of the frame and central portion of the lower die; to provide automatic means controlled by the movement of the upper die for lowering the lower die frame and raising the central portion of the lower die to remove the tile; to provide pneumatic power means for producing said relative movements of the parts of the lower die; to thus provide a cylinder and piston construction connected with said lower die frame or the central part of the lower die and improved valve means for admitting and releasing fluid pressure to and from said cylinder and piston; to provide such a construction in which the valve means is automatically actuated by movement of the upper die, and to obtain other results and advantages as may be brought out by the following description.

Referring to the accompanying drawings, in which like numerals of reference indicate the same parts throughout the several views,

Figure 1 is a front elevation of a tile press constructed in accordance with my invention;

Figure 2 is a transverse vertical sectional view through the same, portions being shown in side elevation;

Figure 3 is an enlarged vertical sectional view through the cylinder and piston for actuating the parts of the lower die;

Figure 4 is an enlarged transverse vertical sectional view through the valve for controlling the movement of the piston shown in Figure 3;

Figure 5 is a horizontal sectional view taken on the line 5—5 of Figure 4;

Figure 6 is a similar view taken on the line 6—6 of Figure 4;

Figure 7 is a fragmentary front elevation of the lower portion of the press showing a modified construction;

Figure 8 is a side elevation of the con-

struction shown in Figure 7, portions being broken away;

Figure 9 is a fragmentary sectional view through the lower die shown in Figure 7 showing the upper die pressing a tile within the same, and

Figure 10 is a fragmentary side elevation of the lower die and bed of the press showing a modified construction.

Figures 1-6 inclusive illustrate an embodiment of my invention for carrying out the first of the above mentioned methods of pressing tile, the reference character 1 designating the bed of the press supported upon suitable legs 2. Upon said bed are spaced uprights 3, 3, between which slides a head 4 carrying the upper die 5. The lower die comprises a central portion or post 6 fixed upon the bed 1 of the press, and a frame 7 surrounding said central portion and fitting slidably thereon to move vertically longitudinally thereof. I have shown dies adapted to make one square tile at a time, but it will be understood by those skilled in the art that the shape and the number of tiles made at one time may be varied as desired.

The frame 7 is fixed, as by nuts 8, 9, upon the upper ends of supporting rods 10, 10, which extend slidably downward through spaced guideways at the top and bottom of the bed 1 below said bed, the lower ends of said rods being connected by a cross-head 11. A piston rod 12 is fixedly connected to said cross-head substantially centrally between the rods 10, the piston rod passing through a cylinder 13 secured to the bottom of the bed 1 and being connected to a piston 14 slidable in said cylinder. The frame 7 is held in its normal upper position with its top above the top of the central portion 6 by means of fluid pressure beneath the piston 14, the upward movement of the frame being limited by suitable stops, such as the bolts 15 on opposite sides of each of the supporting rods 10, the said bolts being fast in the top of the bed 1 and projecting up through plates 16 secured to the frame and provided each with a head 17 above said plate. As shown, the plates 16 are on the supporting rods 10, between the frame and one of its clamping nuts 8 and 9, preferably the lower one, and each plate is parallel to the adjacent side of the frame so that its ends project beyond the side of the frame to receive the bolts 15. Said bolts screw into the bed 1 so that they are adjustable in height to determine the uppermost position of the frame as desired, lock nuts being provided on said bolts to make them fast when adjusted. It will be understood that the uppermost position of the frame is such that it extends above the central fixed portion 6 of the lower

die so as to form therewith a mold or chamber for the "dust" or material to be compressed into tile, as shown in Figure 2.

The supply of fluid pressure to the cylinder 13 is controlled by a valve 18 vertically arranged and secured to the bottom of the bed 1 of the press. The valve comprises a piston 19 vertically reciprocable within the valve casing and provided with a stem or rod 20 projecting through opposite ends of the casing. The casing is provided substantially centrally of its length with an inlet port 21, and upon opposite sides of said port 21 with ports 22 and 23 connected respectively by pipes 24 and 25 to the upper and lower ends of the cylinder 13. The piston is provided with suitable packing members 26 and is of a length just sufficient to extend between the ports 22 and 23, as shown in Figure 4. The lower end of the valve is provided outwardly of the packing 26 with an exhaust port 27, and the upper end of the valve is provided with a similar exhaust port 28. The upper end of the valve stem or rod 20 projects through the bed 1 of the press and is connected to one arm 29 of a bell crank lever pivotally connected at 30 to one of the uprights 3 of the press, while the lower end of the rod 20 is pivotally connected to a substantially horizontal lever 31 intermediate its ends, one end of said lever being pivotally connected at 32 to an arm on the valve casing, and the other end of said lever being connected by a link 33 to a foot lever 34 intermediate its ends, which is pivotally connected at one end as at 36 to the support for the press.

In the operation of the machine the "dust" or material to be pressed into a tile is deposited in the die cavity of the lower die by a dust box 36, and the valve piston 19 is in position to admit fluid pressure into the lower end of the cylinder 13 to maintain the frame 7 in uppermost position. The head 4 of the press then descends to force the upper die or plunger 5 into the die cavity of the lower die to press the tile. The upper die 5 is then raised, and in its ascent a pawl 37 pivoted on the head 4 engages an outwardly projecting stud 38 on the other arm 39 of the bell crank lever thereby raising the valve piston 19 to allow the fluid pressure beneath the piston to exhaust through the port 27 and at the same time admit fluid pressure to the top of the piston so as to lower the die frame 7 to bring its top flush with the top of the central portion 6 of the lower die. The speed of this movement of the die frame can be easily regulated by means of a needle valve (not shown) in the fluid pressure supply pipe. This downward movement of the die frame is limited by suitable stops 40 which are shown as set

screws adapted to engage the top of the bed 1. The tile is then pushed from the central portion 6 of the lower die by the dust box 36 onto a suitable conveyor 41. The operator then steps upon the treadle 34 to pull the valve piston 19 downwardly to exhaust the fluid pressure at the top of the piston and admit fluid pressure to the bottom thereof to again raise the die frame 7 to its initial position. The operation above described is then repeated to form another tile. The pawl 37 on the head 4 is so pivoted that on the descent of the head the pawl rides over the stud 38 on the bell crank lever without affecting the same, but on the ascent of the head 4 the pawl engages a shoulder 42 so as to force the arm 39 of the bell crank lever outwardly.

Figures 7-9 inclusive illustrate a modified construction of the press which is adapted to perform the second of the above described methods of pressing tile. In this form of the invention the lower die frame 7 is counter-balanced by springs 43 interposed between the cross-head 11 and the base of the press. In this form of the invention the upper die 5 on its descent only slightly enters the die cavity in the lower die, the said upper die forcing the die frame 7 downwardly with itself to compress the material in the die cavity. To form a tile the die cavity is filled as above described and the head 4 moved downwardly. The die frame 7 is held in its uppermost position by fluid pressure under the piston 14, and as the head 4 descends a pawl 44 pivotally mounted on the head engages the stud 38 on the bell crank lever to move the valve 19 to release the fluid pressure under the piston. The upper die 5 slightly enters the die cavity, the extent of this entry being limited by suitable stops 45 shown in the form of set screws which engage the top of the die frame 7. The die frame is counter-balanced by the springs 43, and as the lower die 5 descends it forces the die frame 7 downwardly against the action of the springs 43 into the position shown in Figure 9. The upper die is then raised, and in ascending the pawl 37 thereon engages the stud 38 on the bell crank lever to admit fluid pressure on the top of the piston 14. This pulls the die frame 7 downwardly with its top flush with the top of the central portion 6 of the die, so that the tile may be pushed therefrom by the dust box 36 as above described. This downward movement of the die frame 7 may be limited as above described by the set screws 40, or similar set screws 46 may be mounted in the bed of the press. The operator then steps upon the treadle 34 to actuate the valve 19 so as to release the fluid pressure from the top of the piston and admit fluid pressure at the bottom thereof to force the die frame upwardly into

normal position. It will be understood that the pawl 44 actuates the bell crank lever only a sufficient amount to release the fluid pressure beneath the piston 14, but if necessary to prevent the springs 43 from forcing the die frame 7 upwardly on the ascent of the upper die, the pawl 44 may be so arranged as to admit a small amount of fluid pressure on the top of the piston to counteract the action of the springs 43.

In Figure 10 I have shown the press modified to perform the third of the above-mentioned methods. In this form of the invention the lower die frame 47 is fixed on the bed 1 in any suitable manner as by means of bolts 48. The central portion 49 of the die is vertically movable through the frame 47, and to provide automatic actuation of the central portion 49 I may connect the same to the upper end of the piston rod 12 which passes through an opening 50 in the top of the bed 1. It will be observed that in this form of the invention the fluid pressure in the cylinder 13 must be such as to normally hold the central portion 49 in its lowermost position, as shown in Figure 10. For this purpose I reverse the pipes 24 and 25 from the valve 18 so that the pipe 51 from the port 22 connects with the lower portion of the cylinder, while the pipe 52 from the port 23 connects with the upper end of the cylinder. The valve piston 19 is normally in position to admit fluid pressure to the top of the piston 14 so as to hold the central portion 49 of the die in its lowermost position against the bed 1. In forming the tile the "dust" is placed in the die cavity as above described, and the upper die 5 is lowered and forced into the die cavity to press the tile. As the upper die ascends the pawl 37 engages the stud 38 on the bell crank lever to raise the valve piston 19 so as to release the fluid pressure from the top of the piston and admit the same to the under side thereof. The fluid pressure thus forces the central portion 49 of the lower die upwardly to bring its top flush with the top of the die frame 47 so that the tile can be pushed therefrom by the dust box. This upward movement of the central portion 49 is regulated by suitable stops 53 which are shown in the form of set screws secured to the central portion 49 and adapted to engage the under side of the die frame 47. After the tile is removed the operator steps upon the treadle 34 to pull the die piston downwardly so as to release the fluid pressure from beneath the piston 14 and admit fluid pressure to the top thereof so as to pull the portion 49 of the die downwardly into normal position.

The upper die 5 of my improved tile press can be reciprocated by any suitable means, although I have shown the head 4 which carries it secured to the screw 54 of a percussion screw press of a suitable and well-

known type adapted to be operated by power. It has been found that two blows upon the "dust" or material being formed into a tile are desirable to properly compress the same and expel the air, and, as the upper die must not be withdrawn from the frame of the lower die for the second blow, I have provided means by which the said screw 54 can move independently of the upper die and far enough to withdraw upwardly after the first blow and descend upon the upper die with a second blow. Referring to Figure 2 it will be seen that I have provided the screw 54 with an enlarged head 55 which lies in a cylindrical socket 56 in the cross head 4 and is held against withdrawal by a keeper plate 57. The screw 54 thus has a limited movement independent of the head, and for the second blow the screw is withdrawn for not more than this limited distance and then brought down again against the bottom of the socket 56. This enables a second blow to be struck without breaking the "seal" formed by the upper die with the frame 7, and yet said upper die can be moved up and down with respect to the lower die, when desired, as usual.

While I have shown and described several possible embodiments of my invention, it will be understood that this is mainly for the purpose of illustrating the principles thereof and that many modifications and changes can be made in the detail construction of the press without departing from the spirit or scope of the invention. For instance, electromagnetic means might be utilized in place of the cylinder and piston 13 and 14, an electromagnet having a movable core being substituted for the cylinder and piston with the movable core connected to the cross-head 11, as is the piston rod 12. An electric switch could be substituted for the valve 18 and actuated in substantially the same manner by means of the bell crank and treadle 34, as above described. Therefore, I do not desire to be understood as limiting myself in the construction and use of my invention except as required by the following claims when construed in the light of the prior art.

Having thus described the invention, what I claim is:

1. In a tile press, the combination of relatively movable die members adapted to cooperate to form a die cavity to receive material to be compressed, means cooperating with said die members to compress said material, power mechanism for producing relative movement of said die members in both directions, means actuated by said compressing means for controlling operation of said power means to produce relative movement of said members in one direction, and manually operated means for controlling operation of said power means to produce relative

movement of said die members in the other direction.

2. In a tile press, the combination of relatively movable die members adapted to cooperate to form a die cavity to receive material to be compressed, means cooperating with said die members to compress said material, power mechanism for producing relative movement of said die members in both directions, means actuated by said compressing means for controlling operation of said power means in one direction, and manually operated means for controlling operation of said power means in the other direction, actuation of said manually operated means returning the said automatic means to normal position.

3. In a tile press, the combination of relatively movable die members adapted to cooperate in one relation to form a die cavity to receive material to be compressed into a tile and in another relation permit removal of the tile, means cooperating with said die members and movable into and out of said cavity to compress said material, power mechanism for moving said die members into both of said relations, and means actuated by movement of said compressing means out of said die cavity to control said power mechanism to move said die members into said second-mentioned relation.

4. In a tile press, the combination of relatively movable die members adapted to cooperate in one relation to form a die cavity to receive material to be compressed into a tile and in another relation permit removal of the tile, means cooperating with said die members and movable into and out of said cavity to compress said material, power mechanism for moving said die members into both of said relations, means actuated by movement of said compressing means out of said die cavity to control said power mechanism to move said die members into said second-mentioned relation, and manually actuated means to control said power mechanism to move said die members into said first-mentioned relation.

5. In a tile press, the combination of relatively movable die members adapted to cooperate in one relation to form a die cavity to receive material to be compressed in a tile and in another relation permit removal of the tile, means cooperating with said die members and movable into and out of said cavity to compress said material, fluid pressure mechanism for moving said die members into both of said relations, valve means for controlling said fluid pressure mechanism, and means actuated by movement of said compressing means out of said die cavity to actuate said valve means so that said fluid pressure mechanism moves said die members into said second-mentioned relation.

6. In a tile press, the combination of relatively movable die members adapted to cooperate to form a die cavity to receive material to be compressed, means cooperating with said die members to compress said material, fluid pressure mechanism for producing relative movement of said die members, valve means for controlling said fluid pressure mechanism, automatic means actuated by said compressing means for operating said valve means to cause movement of said fluid pressure mechanism in one direction, and manually operable means for actuating said valve means to cause movement of said fluid pressure mechanism in the opposite direction.

7. In a tile press, the combination of relatively movable die members adapted to cooperate to form a die cavity to receive material to be compressed, means cooperating with said die members to compress the said material, power mechanism for producing relative movement of said die members, means for controlling said power mechanism, a bell crank lever having one arm thereof connected to said control means and the other arm adapted to be engaged by said compressing means to actuate said control means to cause relative movement of said die members in one direction, and manually operable means for actuating said control means to cause relative movement of said die members in the opposite direction.

8. In a tile press, the combination of relatively movable die members adapted to cooperate to form a die cavity to receive material to be compressed, means cooperating with said die members to compress the said material, power mechanism for producing relative movement of said die members, means for controlling said power mechanism, a bell crank lever having one arm thereof connected to said control means and the other arm adapted to be engaged by said compressing means to actuate said control means to cause relative movement of said die members in one direction, and manually operable means for actuating said control means to cause relative movement of said die members in the opposite direction, said manually operable means also returning said bell crank to its initial position to be engaged by said pressing means.

9. In a tile press, the combination of relatively movable die members adapted to cooperate to form a die cavity to receive material to be compressed, means cooperating with said die members and movable into and out of said cavity to compress said material, power mechanism for producing relative movement of said die members in both directions, controlling mechanism for said power mechanism, means for actuating said controlling mechanism to cause said power mechanism to produce relative movement

of said die members in one direction and hold them against movement in the other direction, and means controlled by movement of said compressing means into said die cavity for actuating said controlling mechanism to release said die members, said last-mentioned means being actuated by said compressing means upon movement thereof out of said cavity to cause said power mechanism to produce relative movement of said die members in said other direction.

10. In a tile press, the combination of relatively movable die members adapted to cooperate to form a die cavity to receive material to be compressed, means cooperating with said die members and movable into and out of said cavity to compress said material, power mechanism for producing relative movement of said die members in both directions, controlling mechanism for said power mechanism, manually operated means for actuating said controlling mechanism to cause said power mechanism to produce relative movement of said die members in one direction and hold them against movement in the other direction, and means controlled by movement of said compressing means into said die cavity for actuating said controlling mechanism to release said die members, said last-mentioned means being actuated by said compressing means upon movement thereof out of said cavity to cause said power mechanism to produce relative movement of said die members in said other direction, said manually operated means returning said last-mentioned means to its normal position after each actuation.

11. In a tile press, the combination of relatively movable die members adapted to cooperate in one relation to form a die cavity to receive material to be compressed into a tile and in another relation permit removal of the tile, means cooperating with said die members and movable into and out of said cavity to compress said material, a double-acting cylinder and piston device for moving said die members into both of said relations, a slide valve adapted to control movement of said cylinder and piston device, a bell crank lever having one arm connected to said slide valve and the other arm adapted to be engaged by said compressing means as the latter moves out of said cavity to actuate said valve to cause relative movement of said die members into said second-mentioned relation, and a manually operable lever connected to said slide valve to actuate the latter to cause movement of said die members into said first-mentioned relation.

12. In a tile press, the combination of relatively movable die members adapted to cooperate to form a die cavity to receive material to be compressed, means cooperating with said die members and movable into and out of said cavity to compress said material,

power mechanism for producing relative movement of said die members in both directions, controlling mechanism for said power mechanism, means for actuating said controlling mechanism to cause said power mechanism to produce relative movement of said die members in one direction and hold them against movement in the other directions, and means actuated by engagement by said compressing means as the latter moves out of said die cavity for actuating said controlling mechanism to release said die members and simultaneously cause said power mechanism to produce relative movement of said die members in said other direction. 10

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