

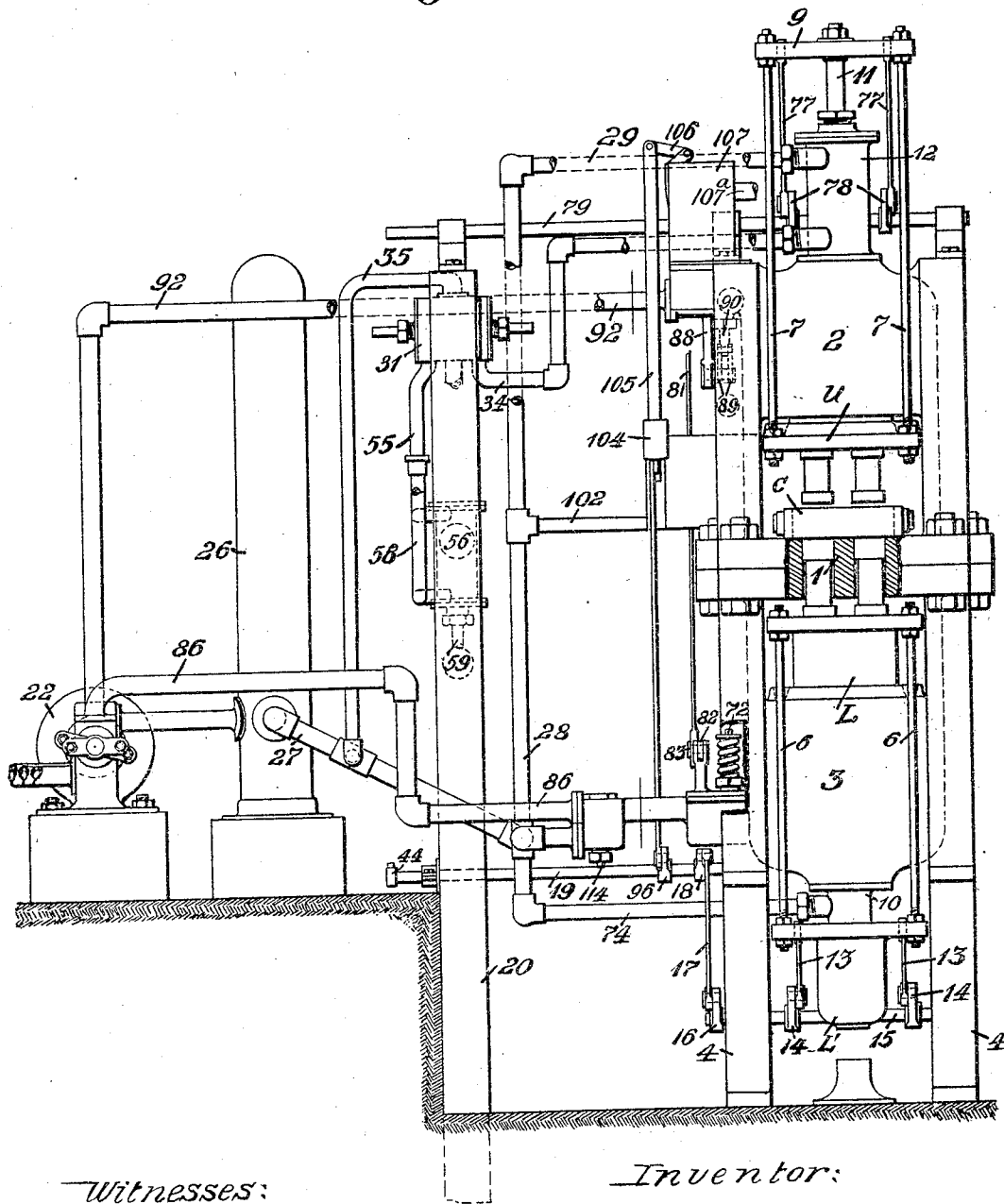
No. 794,822.

PATENTED JULY 18, 1905.

V. THEN.
BRICK PRESS.
APPLICATION FILED AUG. 26, 1904.

8 SHEETS—SHEET 1.

Fig. 1.



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8 SHEETS—SHEET 2.

Fig. 2.

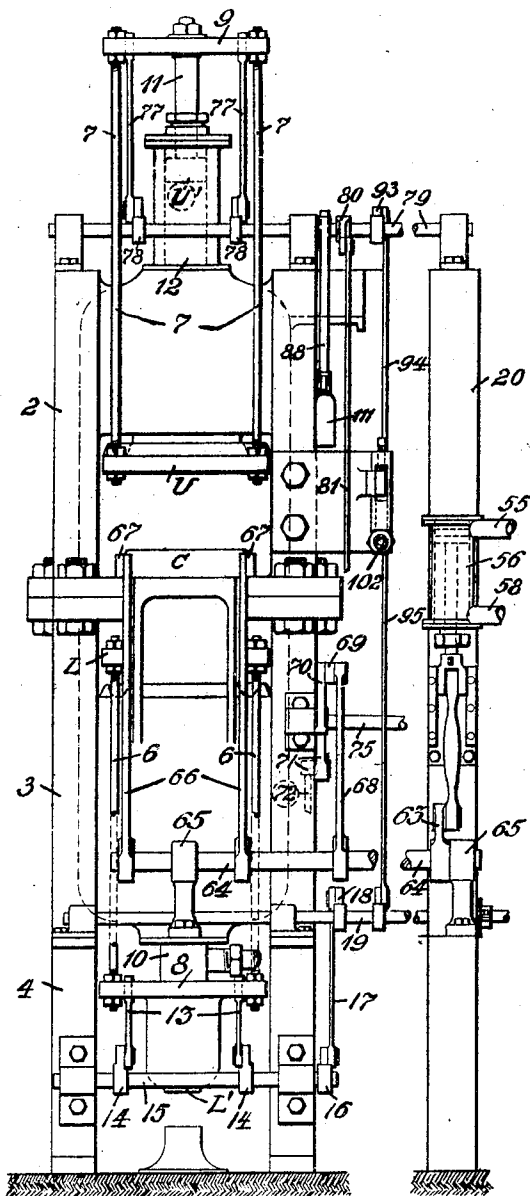
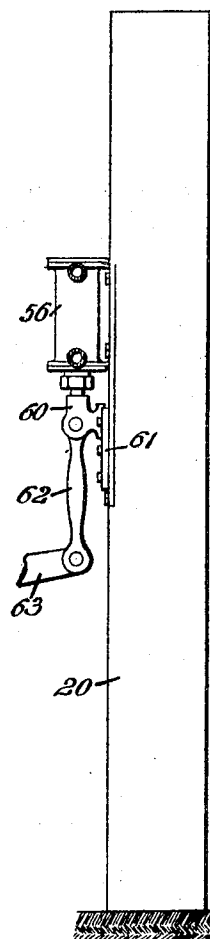


Fig. 3.



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8 SHEETS—SHEET 4.

Fig. 5.

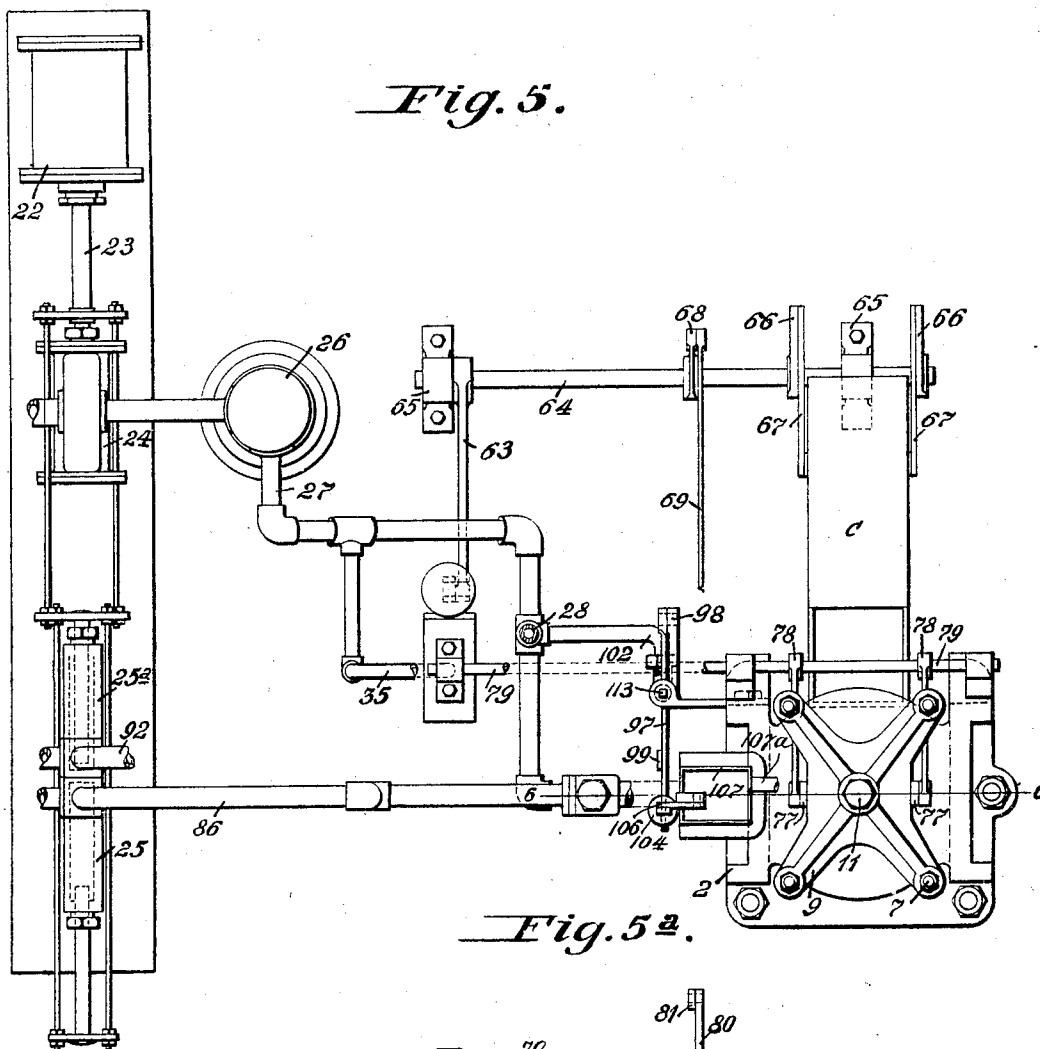
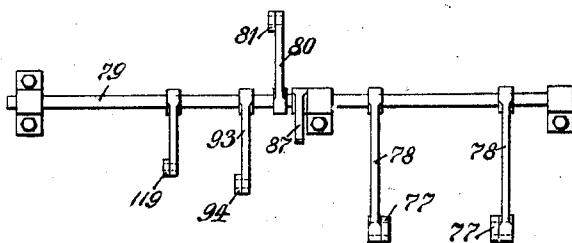


Fig. 5a.



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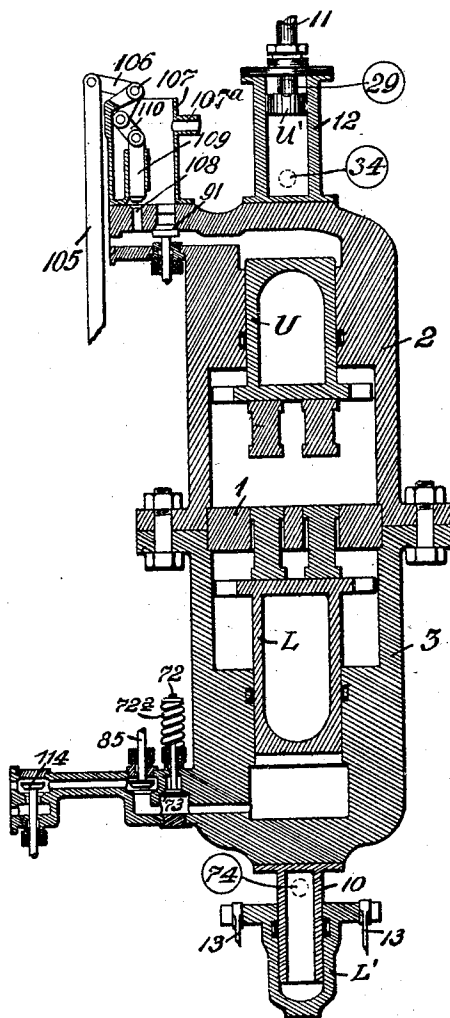
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Fig. 6.



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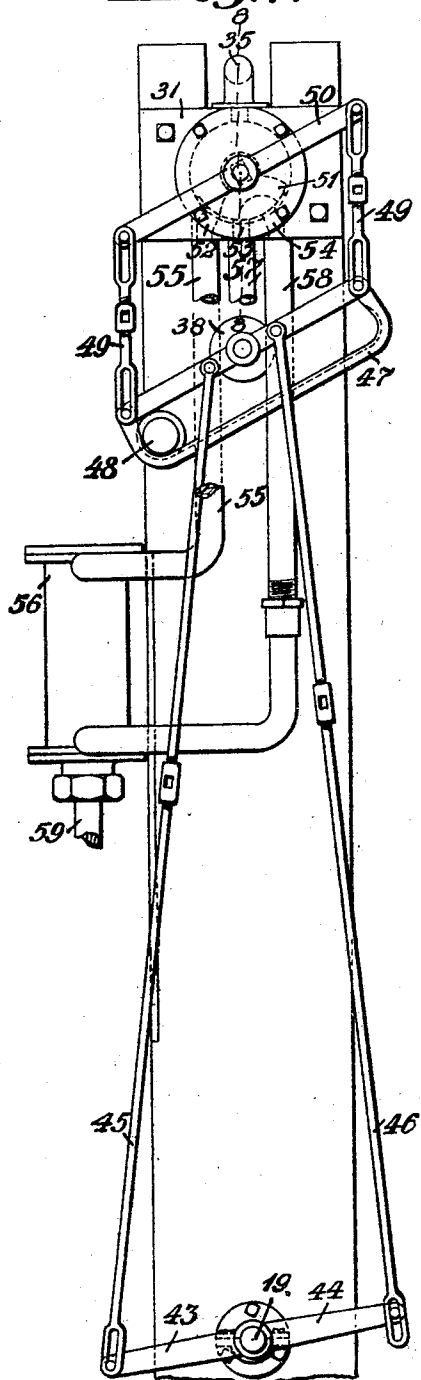
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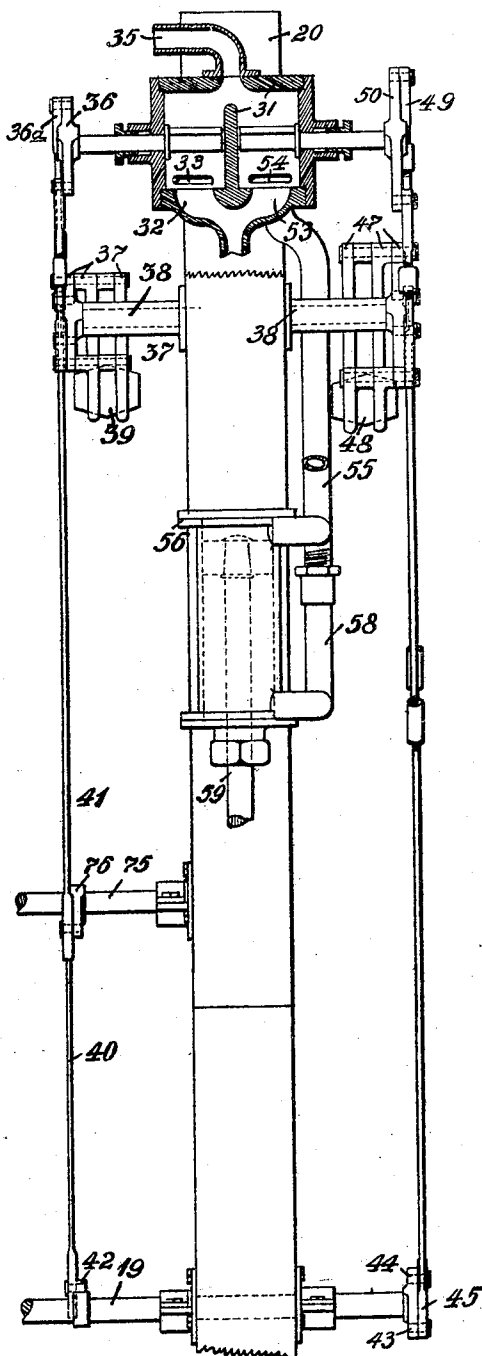
Fig. 7.



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Fig. 8.



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8 SHEETS—SHEET 7.

Fig. 9.

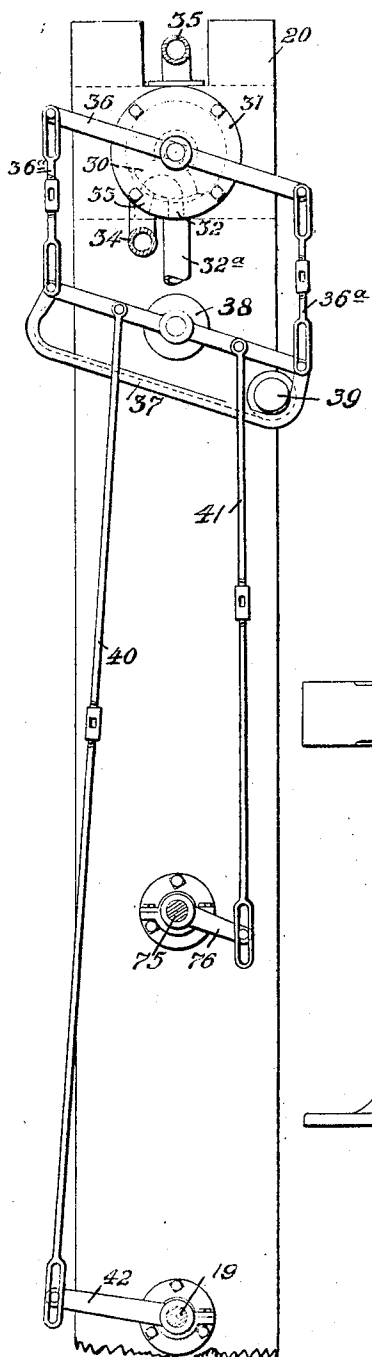


Fig. 10.

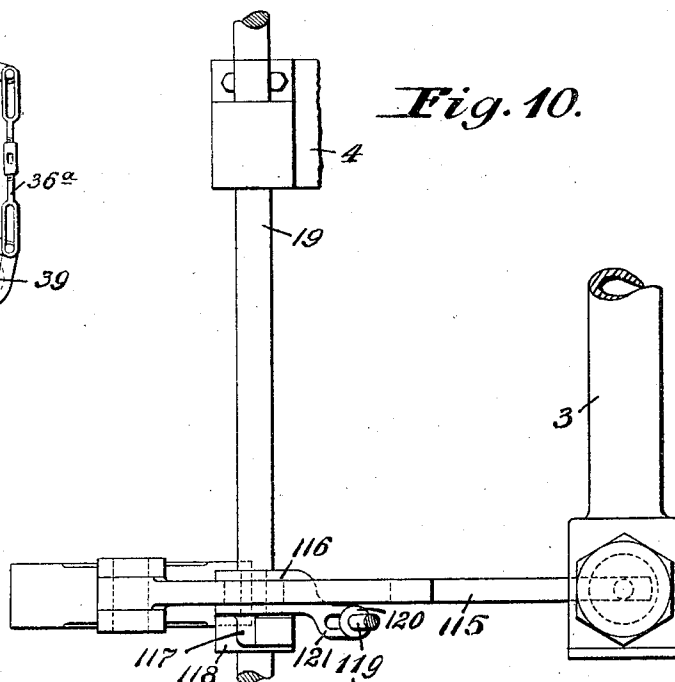
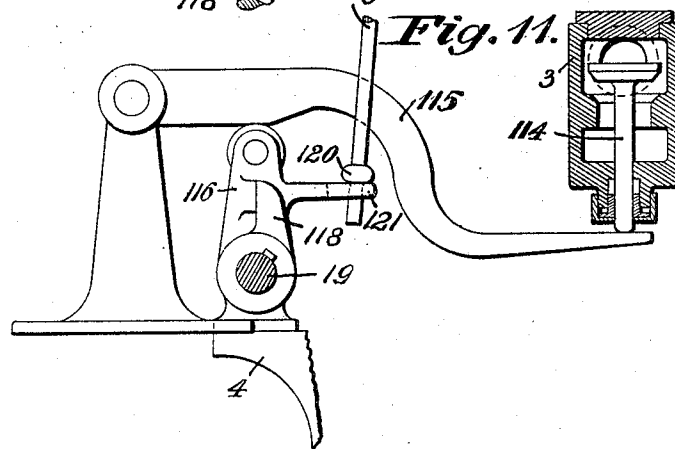


Fig. 11.



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8 SHEETS—SHEET 8.

Fig. 12.

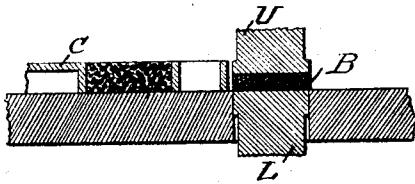


Fig. 16.

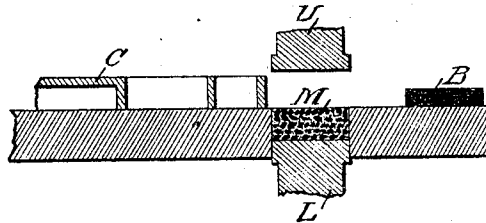


Fig. 13.

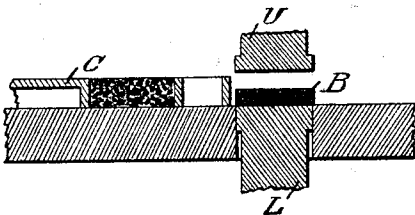


Fig. 17.

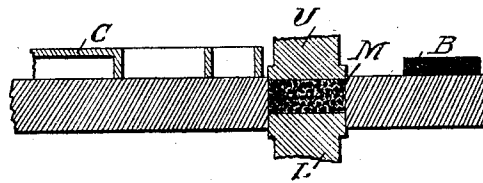


Fig. 14.

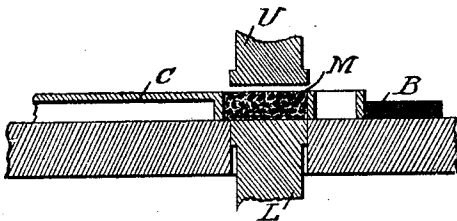


Fig. 18.

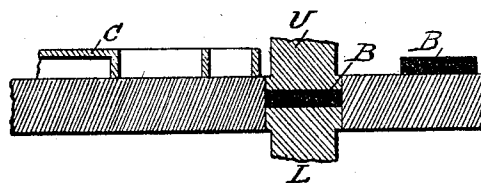


Fig. 15.

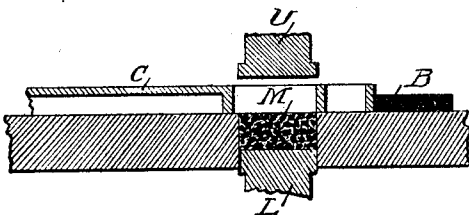
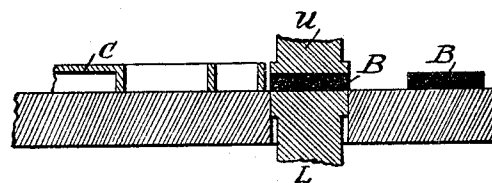


Fig. 19.



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UNITED STATES PATENT OFFICE.

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BRICK-PRESS.

SPECIFICATION forming part of Letters Patent No. 794,822, dated July 18, 1905.

Application filed August 26, 1904. Serial No. 222,286.

To all whom it may concern:

Be it known that I, VALENTINE THEN, a citizen of the United States, residing in the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Brick-Presses, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevational view of my improved hydraulic brick-press, the mechanism for operating the valves for the charger and upper ram being omitted to more clearly show the remaining parts. Fig. 2 is a rear elevational view of the press proper. Fig. 3 is a side elevational view of the cylinder which operates the charger. Fig. 4 is a side elevational view of the press proper as seen from the left in Fig. 1, the pump, reservoir, and post being omitted to more clearly show the press and its coöperating levers. Figs. 4^a and 4^b are detail views. Fig. 5 is a top plan view. Fig. 5^a is a detail view of the rock-shaft and its connected rock-arms operated by the lower ram. Fig. 6 is a sectional view of the press proper, said view being taken on the line 6 6 of Fig. 5. Fig. 7 is a detail view showing the valve mechanism used for controlling the valve which controls the admission and exhaust of pressure to the charger-cylinder. Fig. 8 is a similar view of said parts as seen at right angles, the valve-casing being shown in section on the line 8 8 of Fig. 7. Fig. 9 is a view illustrating the valve mechanism which actuates the valve controlling the movement of the upper ram. Fig. 10 is an enlarged top plan view of the mechanism for controlling the valve identified with the lower ram. Fig. 11 is a side elevational view of said mechanism; and Figs. 12 to 19, inclusive, are diagrammatic views illustrating the different positions of the rams and the charger-box in the cycle of operations followed in making a brick.

This invention relates to a new and useful improvement in hydraulic brick-presses, the object being to simplify the construction of presses of this character, and by the novel ar-

range of parts hereinafter to be described to so time and control the movement of the several parts that each will be actuated positively and in proper time with relation to another part.

With these objects in view the invention consists in the construction, arrangement, and combination of the several parts, all as will be hereinafter described, and afterward pointed out in the claims.

Before starting in with a description of the detailed parts of my improved press I will briefly describe the essential features and the principle of operation, referring in this connection to the diagrammatic views illustrated in Figs. 12 to 19. For purposes of identification I have marked the brick with the letter B, the lower ram with the letter L, the upper ram with the letter U, the charger-box with the letter C, and the mold-cavity with the letter M. Assuming that the parts are in the position shown in Fig. 12, in which the brick has been raised out of the mold-box by the lower ram, the upper ram being carried upwardly by this movement, the lower ram upon reaching its upper limit of movement will through appropriate devices admit pressure to raise the upper ram away from the brick, as shown in Fig. 13. The lower ram will also, upon reaching the upper limit of its movement, admit pressure, which will cause the charger to move inwardly between the rams, forcing the formed brick to one side, as shown in Fig. 14. When the charger reaches the inner limit of its movement through appropriate mechanism, pressure under the lower ram is exhausted, and said lower ram descends, permitting the clay in the charger to fill the mold-box, as shown in Fig. 15. When the lower ram reaches the lower extremity of its movement, it in turn operates a valve which controls pressure and causes the charger to be withdrawn, as shown in Fig. 16. Upon reaching its outer limit the charger in turn sets in operation valve mechanism which admits pressure to the upper ram and causes said upper ram to descend, as shown in Fig. 17. When the upper ram has descended and entered the mold-cavity, as

shown in Fig. 17, it in turn sets in operation certain mechanism whereby valves are thrown to admit excessive pressure to both the upper and lower rams, causing them to move toward each other and compress the brick to the required thickness. Certain devices are connected to the upper and lower rams, so that when said rams approach each other to within a predetermined distance, irrespective of the part of the mold they may occupy at the time of reaching this predetermined approach, certain devices are thrown into operation which will release pressure from the upper ram, and the preponderating pressure on the lower ram will cause the same to lift the brick and the upper ram to the position shown in Fig. 19, which is the same as that shown in Fig. 12. Upon reaching this position the lower ram will admit pressure to cause the upper ram to move upwardly and the charger to start inwardly, as described with respect to Fig. 12.

In describing the several parts of my improved brick-press I will endeavor to follow as closely as possible the movements depicted in Figs. 12 to 19, specifying the mechanism set into action by the rams and the charger and how that mechanism in the nature of a valve mechanism will admit or exhaust pressure to actuate the next part to be operated in its proper order and time.

Referring now to Fig. 12, it will be recalled that when the lower ram reaches the upper extremity of its movement it will actuate certain valve mechanism whereby the upper ram is elevated—that is, carried out of the way of the charger when the charger is started inwardly.

Referring to Figs. 1 and 6, it will be seen that the mold-cavities M—there being preferably two of such cavities—are formed in a mold-plate 1, which is clamped or secured in position between two castings 2 and 3. The upper casting 2 is bored to receive the upper ram U, which is provided with two heads or plungers in line with the mold-cavities. The lower casting 3 is also bored to receive the lower ram L, which is provided with two plungers operating in the mold-cavities. The plungers on the lower ram L never leave the mold-cavities, while those on the upper ram U are in their operation lifted or elevated so as to permit the charger-box C to move inwardly to deposit clay in the mold-cavities. Castings 2 and 3 are bolted together and casting 3 is mounted upon supporting-frames 4 in the form of castings, as shown in Figs. 1 and 4. Each ram-head (see Figs. 1 and 5) is extended laterally so as to provide a connection for rods 6 and 7. These rods extend along the sides of the cylinders 2 and 3 and are connected to spider-plates 8 and 9, respectively. To the spider-plate 8 is connected a cylinder L', in which operates a plunger 10, fixed to the lower end of casting 3. Thus

when pressure is admitted between the lower end of cylinder L' and the plunger 10 it acts to depress the cylinder L', and said cylinder being connected to the lower ram L will depress said lower ram. The cylinder L' thus constitutes a secondary lower ram in tandem with the main lower ram. The cross-head 9, to which the rods 7 are connected, also carries a piston-rod 11, on the lower end of which is a piston-head U', operating in a cylinder 12. This piston U' constitutes a secondary upper ram and is connected to the main upper ram by the rods 7, the secondary upper ram U' being connected in tandem to the main upper ram. The positions of the parts in Figs. 1 to 6, inclusive, correspond to the positions of the parts shown in Fig. 13. The secondary lower ram, or, rather, the movable part thereof comprising the cylinder L', has connected to it links 13, which links are pivotally connected to rock-arms 14, mounted on a shaft 15, journaled in suitable boxes secured to the castings 4. An arm 16 is mounted on the rock-shaft 15, said arm being connected by a link 17 to an arm 18, arranged on a shaft 19. Shaft 19 (see Fig. 4) is mounted in a box arranged on a bracket extension of the casting 4 and also in a box arranged on the post 20. The above construction insures a coincident operation of the shafts 15 and 19, and the purpose of the link and rock-arm construction described is to locate the shaft 19 above the ground, the castings 4 being located in a pit. Thus when the lower ram goes down the shaft 19 will be rocked to the right and when the lower ram goes up the shaft 19 will be rocked to the left.

Referring now to Fig. 6, it will be observed that the cylinder 12 is provided with two ports, one above and the other below the piston-head U'. The pressure above the piston-head U' is constant, while the pressure below the piston-head is intermittent. On account of the differential area of the upper and lower faces of the piston-head U' it will be obvious that pressure on the lower face of the piston will be a preponderating pressure and move the piston upwardly, as against the resisting but less pressure on the upper face of said piston, and, further, that when the pressure beneath the piston is exhausted the constant pressure on top of the piston will preponderate and force the piston downwardly. Pressure is obtained in the following manner: 21 (see Figs. 1 and 5) indicates a base, on which is mounted a steam-cylinder 22. There are appropriate valves for admitting and exhausting steam into the end of this cylinder similar to the well-known structure of an ordinary steam-pump. I have not deemed it necessary to illustrate these valves, as their construction and operation are well understood. The piston-rod 23 of this cylinder operates a series of plungers in cylinders 24 and 25, said plungers being arranged in

tandem and mounted in suitable cross-heads connected by rods to the piston-rod 23, as clearly shown in Fig. 5. The cylinder 24 is what may be designated as a "low-pressure" pump for supplying a reservoir 26. From this reservoir pressure is conducted, through pipes 27, 28, and 29, to the cylinder 12 and on top of the piston U'. Thus the tendency of this pressure is to force the upper ram downwardly, and this tendency is overcome by a preponderating pressure on the under side of piston U', which preponderating pressure is controlled by a valve 30, (see Fig. 9,) mounted in a valve-casing 31, arranged in the upper end of post 20. The valve 30 (see Figs. 7, 8, and 9) is arranged in one end of the casing 31 and coöperates with two ports 32 and 33, the last-mentioned port being connected by a pipe 34 (see Fig. 1) to the lower end of cylinder 12. Pressure is admitted to the valve-casing 31 through a pipe 35, which is connected to the pipe 27, (see Fig. 1,) so that the reservoir-pressure is contained within the valve-casing 31. The spindle of valve 30 is provided with a lever 36, (see Fig. 9,) the ends of which are connected by slotted links 36^a to a cradle 37, pivotally mounted upon the post at 38. This cradle practically forms a raceway for a movable weight 39. Connected to the cradle 37 are rods 40 and 41. In the position of the valve shown in Fig. 9 the upper ram is down—that is, pressure beneath the piston U' is exhausted through pipe 34, port 33, valve-chamber, and out through the exhaust-port 32, whence it is conducted off to a suitable receptacle by the exhaust-pipe 32^a. When, however, the upper ram reaches the upper limit of movement, the shaft 19 will rotate toward the left in the positions of the parts shown in Fig. 9 and move its arm 42 downwardly. Arm 42 is provided with a pin operating in a slot in the lower end of the rod 40, and the parts are so constructed that the arm 42 will engage the lower end of the slot in rod 40 and tilt the cradle past a horizontal position, so that the weight 39 will move from the right-hand end of the cradle to the left-hand end of the cradle. This movement of the weight will actuate the valve farther than the positive movement communicated thereto through the medium of the arm 42 and the rod 40, and as soon as the valve is thrown communication is broken between the ports 32 and 33 and port 33 is opened to the live pressure in the valve-casing entering through the pipe 35. This live pressure enters under the piston-head U' and raises the upper ram U.

I stated in connection with the movement of the lower ram that upon reaching the limit of its upward movement it also set in operation certain valve mechanism which resulted in the charger moving inwardly. I now direct attention to Figs. 7 and 8, where it will be observed with respect to the shaft 19 that said shaft has arms 43 and 44, the ends of

said arms being provided with pins operating in slots in the ends of rods 45 and 46, similar to the connection between the slotted rod 40 and the arm 42. The shaft 19 in the position shown in Fig. 7 will be rocked to the right as the lower ram approaches the upper limit of its movement, and this movement will cause the arm 43 to depress the rod 45 and to depress the left-hand end of the cradle 47 until its weight 48 rolls past the center and carries the cradle beyond the positive movement resulting from the direct connection of arm 43 and rod 45. This cradle is connected by links 49 to the ends of a lever 50, mounted on the spindle of the valve 51, which valve is arranged in the end of the valve-casing 31 opposite to that in which the valve 30 is located. Valve 51 coöperates with three ports 52, 53, and 54. Port 52 is connected by a pipe 55 to the upper end of a cylinder 56, which for purposes of distinction I will call the "charger-cylinder." Port 53 is an exhaust-port and discharges into a pipe 57 leading off to some suitable receptacle or tank, and port 54 is connected by a pipe 58 to the lower end of the charger-cylinder. The charger-cylinder contains a piston whose rod 59 is connected to a cross-head 60, (see Fig. 3,) mounted in guideways 61 on the post 20. To this cross-head is connected a link 62, in turn connected to a rock-arm 63, mounted on a rock-shaft 64. This shaft 64 is mounted in a chair-bearing 65. Shaft 64 carries two rock-arms 66, which are connected by links 67 to the sides of the charger-box C. (See Fig. 5.)

Referring now to Fig. 7, when the arm 43 is depressed to rock the cradle 47 valve 51 will be moved to establish communication between the live-pressure pipe 35 in the valve-casing 31 through the pipe 55 to the cylinder 56 on top of the piston head on rod 59, which results in causing said piston-rod to descend. The descent of the piston-rod will depress the cross-head 60, link 62, and arm 63, and rock the shaft 64 so that its arms 66 move inwardly and through their links 67 will move the charger inwardly over the mold-cavities.

It will be seen from the above that when the lower ram approaches the upper limit of its movement it sets into operation the mechanism above described, which results in causing the upper ram to move upwardly and the charger to move inwardly. Coincident with the inward movement of the charger valve 51 establishes communication between the space in cylinder 56 beneath the piston-head on rod 59 and the exhaust-pipe 57, the pressure passing back through pipe 58, port 54, through the valve-chamber, and out the exhaust-port 53 into the exhaust-pipe 57. When the above has been accomplished, the parts are in the positions shown in Fig. 14. The inward movement of the charger, as stated before, causes the lower ram to descend for

the purposes of permitting the clay to fill the mold-box, as shown in Fig. 15. I will now describe how this is done.

Referring to Fig. 4, it will be observed that the rock-shaft 64 carries an arm 68, which is connected by a slotted link 69 to a bell-crank lever 70. As arm 68 moves to the right in Fig. 4, its slot will permit considerable lost motion, the end of the slot engaging the pin on the bell-crank lever 70 just before the charger-box reaches the inner limit of its movement. Bell-crank lever 70 is thus rocked and by the cam-surface on its inwardly-extending member operates a second bell-crank lever 71, which depresses a valve-stem 72. This valve-stem 72 depresses a valve 73, which controls the exhaust of the pressure from under the lower ram. (See Fig. 6.) When this pressure is taken from under the lower ram, said ram is permitted to descend, the constant pressure between the plunger 10 and the cylinder L' forcing the same downwardly. Plunger 10 is made hollow and is connected by a pipe 74 to the pipe 27, heading from the reservoir heretofore described. When the lower ram approaches the lower extremity of its movement, as shown in Fig. 16, it causes the charger to be withdrawn, and this is accomplished through the connections which rock the rod 19, the arm 44 on said rod 19 cooperating with the slot in the lower end of rod 46 and throwing the valve 51, so as to establish communication between ports 52 and 53 (to exhaust the pressure from on top of the charger-piston) and open port 54 to admit pressure to the lower end of the charger-cylinder and under the charger-piston. When the charger reaches the outer limit of its movement, it sets in operation certain valve mechanism which exhausts pressure from under the secondary upper ram and causes said upper ram to descend, as shown in Fig. 17. This is accomplished by means of the rod 75, on which the bell-crank 70 is mounted. As the charger moves outwardly the slot in link 69 will engage the pin of the bell-crank 70 and release the bell-crank 70 and its controlled valve 73, closing the exhaust from beneath the lower ram. At the same time this rod 75, which is extended outwardly and finds a bearing in post 20, (see Fig. 9,) depresses an arm 76, carried thereby, which arm is provided with a pin operating in a slot in the lower end of rod 41, connected to the cradle 37. The cradle will by the pressure of this arm 76 be moved to the position shown in Fig. 9, in which event valve 30 closes communication between the live pressure in the valve-casing 31 and the chamber under the piston U' and establishes communication between said chamber under the piston U' and the exhaust-pipe 32^a. The upper ram being thus relieved of the sustaining power of pressure under the piston U' will descend, the constant pressure above the

piston U' assisting in this operation. When the upper ram has descended and entered the mold-cavity, as shown in Fig. 17, it in turn sets in operation certain mechanism whereby excessive pressure is admitted to both the upper and lower rams, causing them to move toward each other and compress the brick to the required thickness.

Referring to Figs. 1 and 4, it will be seen that the head 9 carries links 77, which are connected by arms 78 to a rock-shaft 79. Extending outwardly from this rock-shaft is an arm 80, connected by a rod 81, having a slot in its lower end, to a lever 82. This lever 82 is pivoted at 83 and is connected by a link 84 to a valve-stem 85. The descent of the upper ram effects the opening movement of the valve 85, and pressure from the high-pressure cylinders 25 is admitted beneath the lower ram by means of a pipe 86. (See Fig. 1.)

Pressure is admitted to the upper ram U by means of an arm 87, mounted on the rock-shaft 79, which arm 87 engages one member of a bell-crank lever 88, the other end of said bell-crank lever being connected by links 89 to a valve-stem 90, on which is arranged a valve 91. Valve 91 controls the admission of pressure from a pipe 92, also leading from the high-pressure pump-cylinder 25^a. The cylinders 25 and 25^a of this high-pressure pump act as two single-acting pumps for the upper and lower rams—that is, the plunger in cylinder 25 forces pressure through the pipe 86 under the lower ram, and as the plunger in this cylinder is recovering the plunger in cylinder 25^a moves inwardly and forces pressure through the pipe 92 above the upper ram. These high pressures alternately applied to the upper and lower rams impart intermittent movements to said rams, which I deem very important in that were the high pressures constantly applied to these rams the brick would where some clays are used be porous, because of the fact that the confined air will not be given time nor an opportunity to escape. By my arrangement of alternately admitting high pressures to the upper and lower rams these rams approach each other and stop, so that active pressure is exerted on opposite faces of the brick at different times. This alternate application of active pressure gives any air in the clay a better opportunity to escape, and consequently a more solid brick is produced.

I stated in the preface to my description that certain devices are connected to the upper and lower rams, so that when said rams approach each other to within a predetermined distance, irrespective of the part of the mold they may occupy at the time of reaching this predetermined approach, certain devices are thrown into operation which will release pressure from the upper ram, and the preponderating pressure on the lower ram will cause the

same to lift the brick by the lower ram to the position shown in Fig. 19, which is the same as that shown in Fig. 12.

Referring now to Fig. 4, it will be seen that 5 rock-shaft 79 is provided with an arm 93, from which depends a bar 94. The lower end of this bar is provided with a cam-face coöperating with the cam-face on the upper end of a bar 95, carried by an arm 96, mounted 10 on the rock-shaft 19. At the point of coöperation of the cam-faces of these bars 94 and 95 is arranged a lever 97, pivoted at 98, said lever having a lateral projection 99, against which the upper end of bar 95 is guided, bar 15 94 being held against bar 95 by means of a spring 100. It will be noted that the lower end of bar 94 is provided with a finger-like projection 94^a, which rests against the upper end of bar 95 when the rams are separated a 20 greater distance apart than is required for the thickness of the brick being made. Whenever the rams approach each other under the alternating heavy pressures above described, the cam-faces of bars 94 and 95 coöperate with 25 each other and bar 95 forces the end of bar 94 to the left, as shown in Fig. 4. This movement of bar 94 to the left removes a shoulder 94^b which had when the rams were widely separated been in the path of the lateral projection 99 and prevented the lever 97 from 30 rising so that said lever 97 may upon the lateral displacement of the bar 94 and its shoulder 94^b be raised. 102 indicates a pipe connected with the constant-pressure pipe 28, (in communication with the reservoir,) which 35 pipe admits constant pressure under a plunger 103, bearing at its upper end against the under side of lever 97. This plunger 103 is the equivalent of a spring in that its energy 40 is constantly exerted to lift the lever 97. It will be observed that the upper ram and its rod 94, in engagement with the projection 99 on lever 97, may descend, and the shoulder 94^b will force the lever 97 to descend, the plunger 45 103 holding the lever 97 in position and making it sensitive to every movement of the upper ram. The rod 95 being connected to the lower ram is also sensitive to every movement 50 of the lower ram, and whenever the upper and lower rams approach each other a predetermined distance apart, or, in other words, whenever the brick is compressed to the desired thickness—say to two and three-eighths 55 inches—then at that time the arms 94 and 95 will have moved toward each other in such position that the shoulder 94^b will be thrown off of the projection 99 and lever 97 will be raised by its plunger 103. The elevation of lever 97 will cause said lever to engage a 60 weight 104 in its path, which weight is suspended by a rod 105. (See Fig. 6.) This rod is connected to a bell-crank lever 106, pivoted to the upper edge of the tank 107. This tank has communication with the chamber above 65 the upper ram through a port 108, which port

is controlled by a valve 109. A link 110 connects the valve 109 to the bell-crank 106, and when the rod 105 is raised the valve 109 is likewise raised and the upper ram is instantly 70 relieved of pressure, the water above said upper ram backing through the port 108 into the tank 107. This water is not lost, but is merely stored in the tank until the upper ram descends. Valve 109 acts as a pilot-valve and also 75 by relieving the pressure above the upper ram relieves the pressure from under the valve 91, so that said valve 91 can be easily operated to permit a flow of greater volume into the tank 107 from the chamber above the upper ram. 80 When the upper ram is relieved of pressure, the lower ram continues to ascend and carry with it the brick which has been formed, together with the upper ram. As the upper ram goes up the arm 87 presses the bell-crank lever 88 to the right, Fig. 4, and a weight 85 111, connected to an arm 112, extending from said bell-crank lever, is raised. This movement will force the valve 91 from its seat and open communication between the high-pressure pump-cylinder 25^a and the tank 107, as 90 shown in Fig. 4, said tank being provided with an overflow-pipe 107^a to carry off the excess water. The parts are now in the positions shown in Fig. 12, and the lower ram will upon approaching the upper limit of its 95 movement admit, through mechanism heretofore described, pressure under the piston U' and force the upper ram upwardly to the full limit of its stroke. A set-screw 113 limits the upward movement of arm 97, and the elevation of the upper ram to its highest position places the shoulder 94^b over the projection 99 and engages the upper ram, with the lever 97 in readiness for another operation. 100 The upward movement of the lower ram also reverses the valve 51 and admits pressure on top of the charger-piston, so that the charger will start on its inward stroke. Upon reaching its inner position it is necessary for the high pressure under the lower ram to be 110 relieved, and this is effected by releasing the valve 72, heretofore described, a spring 72^a, surrounding the stem thereof, forcing said valve to its closed position. When the lower ram is raised, the valve 85 is opened. 115

The high pressure from cylinder 25 must be given a chance to escape; otherwise the high-pressure pump would be pumping against valve 85, which is closed. I propose 120 just before valve 85 is closed to open a valve 114, which controls a by-pass from the pipe 86 and places the high-pressure cylinder 25 in communication with the reservoir. This valve 114 is designed to be held open by a lever 115, (see Figs. 10 and 11,) said lever having a cam- 125 face with which coöperates a roller on an arm 116. This arm is loosely mounted on the shaft 19 and carries a projection 117, which is designed to be engaged by a tappet 118, keyed to the shaft 19. It will be remembered 130

that shaft 19 is rocked by the movement of the lower ram, and when the upper ram reaches the limit of its upward movement the tappet 118 moves the roller of arm 116 under the cam-face of lever 115, so as to hold the valve 114 open. Valve 114 remains open—that is, the arm 116 remains in a vertical position—from the time that the upper ram places it in a vertical position until the lower ram descends. Arms 116, even after the lower ram descends, still hold the valve 114 open until the charger is withdrawn. Then, as before described, the outward movement of the charger causes the upper ram to descend, and when the upper ram descends and enters the mold, as shown in Fig. 17, a rod 119, which is carried by the upper ram and which is provided with a collar 120, has its collar strike a projection 121 on the arm 116, through which projection the lower end of the rod 119 passes and is guided, this action resulting in the arm 116 being moved laterally out of the way of the cam on the arm 115 and permitting the valve 114 to close. When this by-pass is closed, the high pressure will be forced past the valve 85 under the lower ram. The descent of the upper ram moves the arm 87 away from the bell-crank lever 88, and the weight 112 is permitted to descend and raise the valve 91 to its seat. It will be observed in this connection that the valve 85 is open slightly in advance of the closing of valve 114, so as to avoid the necessity of opening the valve 85 against high pressure and the possible breakage due to the pumping of high pressure (when the by-pass is closed) on top of the valve 85.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In a brick-machine, the combination with fluid-actuated upper and lower rams, a valve, valve-controlling mechanism operated by said upper ram to admit successive excessive pressure impulses alternately to both the lower and upper rams, causing them to move toward each other step by step to compress the clay brick to the required thickness; substantially as described.

2. In a brick-machine, the combination with fluid-actuated upper and lower rams, means for admitting successive pressure impulses alternately to said rams, a valve for relieving the upper ram of its actuating-pressure impulses, and means connected to both the upper and lower rams and to said valve whereby when the rams approach each other to within a predetermined distance the said valve is operated to relieve the pressure above the upper ram, continued pressure impulses being permitted to the lower ram causing the same to lift the brick and the upper ram; substantially as described.

3. In a brick-machine, the combination with a cylinder, a ram mounted in said cylinder,

plungers carried by said ram, an auxiliary cylinder mounted in alinement with said ram, a piston in said auxiliary cylinder, a connection between the piston in said auxiliary cylinder and said ram, a pilot-valve 109 and a main valve 91 for relieving the pressure from above the ram, a valve 30 for admitting pressure to said auxiliary cylinder to lift said ram when the valves 109 and 91 are open; substantially as described.

4. In a brick-press, the combination with fluid-actuated upper and lower rams, a charger, a fluid-actuated piston for operating said charger, a cylinder in which said piston is mounted, a valve for controlling the admission and exhaust of pressure to and from the ends of said cylinder, means to actuate said valve when said lower ram approaches the limits of its movement, a valve 73 for controlling the exhaust of pressure under the lower ram, a valve 114 controlling a by-pass to divert the pressure from under the lower ram means operated by the charger for operating said valve and means operated by the upper and lower rams for respectively opening and closing the valves 114 and 73; substantially as described.

5. In a brick-machine, the combination with fluid-actuated upper and lower rams, a charger, a fluid-actuated piston for operating the charger, a cylinder in which said piston is mounted, a valve for admitting and exhausting pressure to and from the ends of said cylinder, valves 85 and 72 for respectively admitting and exhausting pressure to and from the lower ram, means operated by the charger for operating said valves and a valve 114 for diverting pressure from the lower ram while the valve 85 is closed, said valve 114 being opened by the lower ram and closed by the upper ram; substantially as described.

6. In a brick-machine, the combination with fluid-actuated upper and lower rams, means for generating a series of pressure impulses which successively exert their influence upon said rams alternately, and valve mechanism for controlling said impulses to said rams; substantially as described.

7. In a brick-machine, the combination with fluid-actuated upper and lower rams, means for generating a series of pressure impulses which successively exert their influence upon said rams alternately, valve mechanism for controlling said impulses to said rams, and means for relieving the upper ram from said pressure impulses when the brick is compressed to the desired thickness; substantially as described.

8. In a brick-machine, the combination with fluid-actuated upper and lower rams, of two single-acting pumps whose plungers are connected to move in unison to alternately displace or force the water from the pump-cylinders to the upper and lower rams respectively, whereby said upper and lower rams move toward each other step by step under

the influence of said impulses, means for relieving the upper ram from said pressure impulses received from one of said single-acting pumps, and means for diverting the pressure impulses from the lower ram received from the other of said single-acting pumps, and storing the same in a suitable reservoir; substantially as described.

9. In a brick-machine, the combination with fluid-actuated upper and lower rams, two single-acting plungers operating alternately to force pressure above and below said rams respectively, to force them together step by step, and means carried by said rams whereby when they approach each other a predetermined distance the pressure from above the upper ram is relieved so as to permit the preponderating pressure on the lower ram to force the lower ram upwardly, and other means whereby when the upper ram approaches the upper extremity of its movement the pressure therebeneath is diverted; substantially as described.

10. In a brick-machine, the combination with fluid-actuated upper and lower rams, bars carried by said rams and having contiguous cam-faces designed to engage when said rams approach each other, whereby one of said bars is laterally displaced, a lever which is normally held depressed by the bar capable of being displaced, means for forcing said lever upwardly when released from the said bar, and a valve operated by said lever, when released, to relieve pressure from the upper ram; substantially as described.

11. In a brick-machine, the combination with fluid-actuated upper and lower rams, bars 94 and 95 connected thereto respectively and provided with cam-faces on their contiguous ends, a lever having a guide projection normally in engagement with the lower end of bar 94, means for forcing said lever upwardly when released, and a valve which is operated by the released bar to relieve the pressure from the upper ram; substantially as described.

12. In a brick-press, the combination with

fluid-actuated upper and lower rams, secondary upper and lower rams connected in tandem with the first-mentioned rams respectively, a reservoir containing relatively low pressure fluid and connected so as to admit constant-pressure fluid above the secondary upper ram and beneath the secondary lower ram, a pump for forcing pressure fluid into said reservoir, independent single-acting pumps for the upper and lower rams respectively, which pumps are operated alternately to force said relatively high pressure fluid from said independent single-acting pumps above and below the upper and lower rams respectively, and valve mechanisms for controlling said pressure fluid; substantially as described.

13. In a brick-machine, the combination with fluid-actuated upper and lower rams, secondary upper and lower rams connected in tandem with the main upper and lower rams respectively, a reservoir containing relatively low pressure fluid which is constantly admitted above the secondary upper ram and below the secondary lower ram, valve mechanism for controlling the admission and exhaust of said relatively low pressure fluid to and from the chamber beneath the secondary upper ram, independent single-acting plungers for delivering relatively high pressure fluid above and below the upper and lower rams alternately so as to move them step by step toward each other, a valve for relieving this high-pressure fluid from above the upper ram, a valve for diverting the high-pressure fluid from the lower ram and sending it into the low-pressure-fluid reservoir, and means for operating said valves; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 22d day of August, 1904.

VALENTINE THEN.

Witnesses:

LENORE WILSON,
GEORGE BAKEWELL.