(No Model.) 2 Sheets—Sheet 1.

S. E. McGREGORY & J. J. KOCH.

HYDRAULIC BRICK MACHINE.

No. 332,814. Patented Dec. 22, 1885.

Fig. 1.

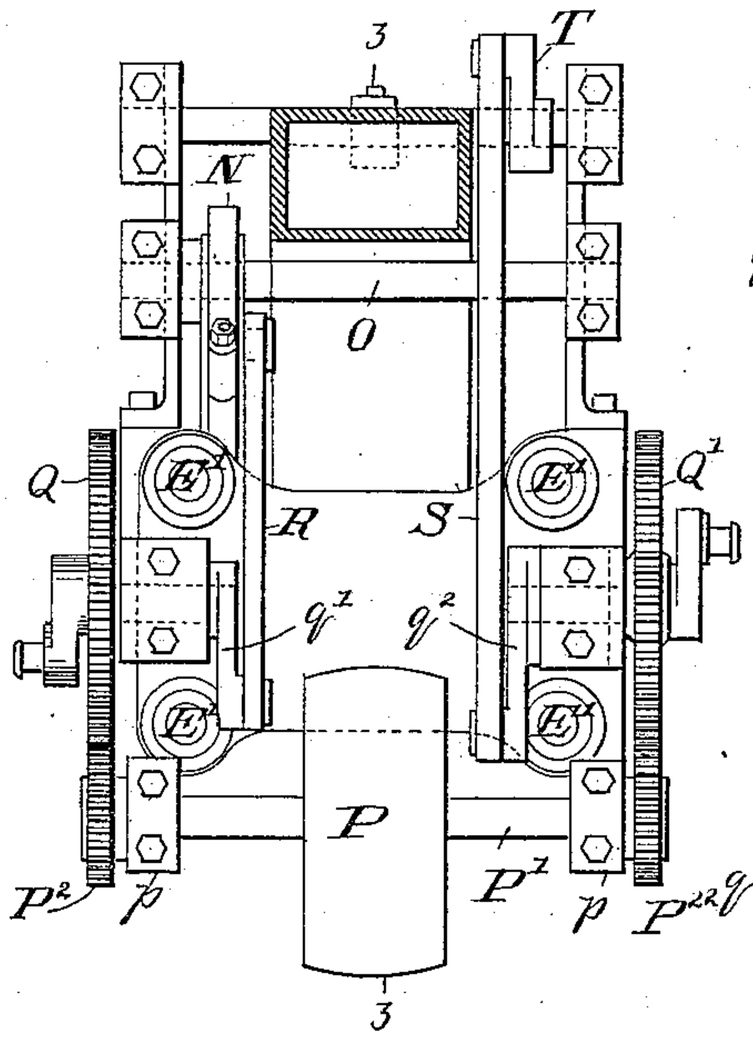

Fig. 2.

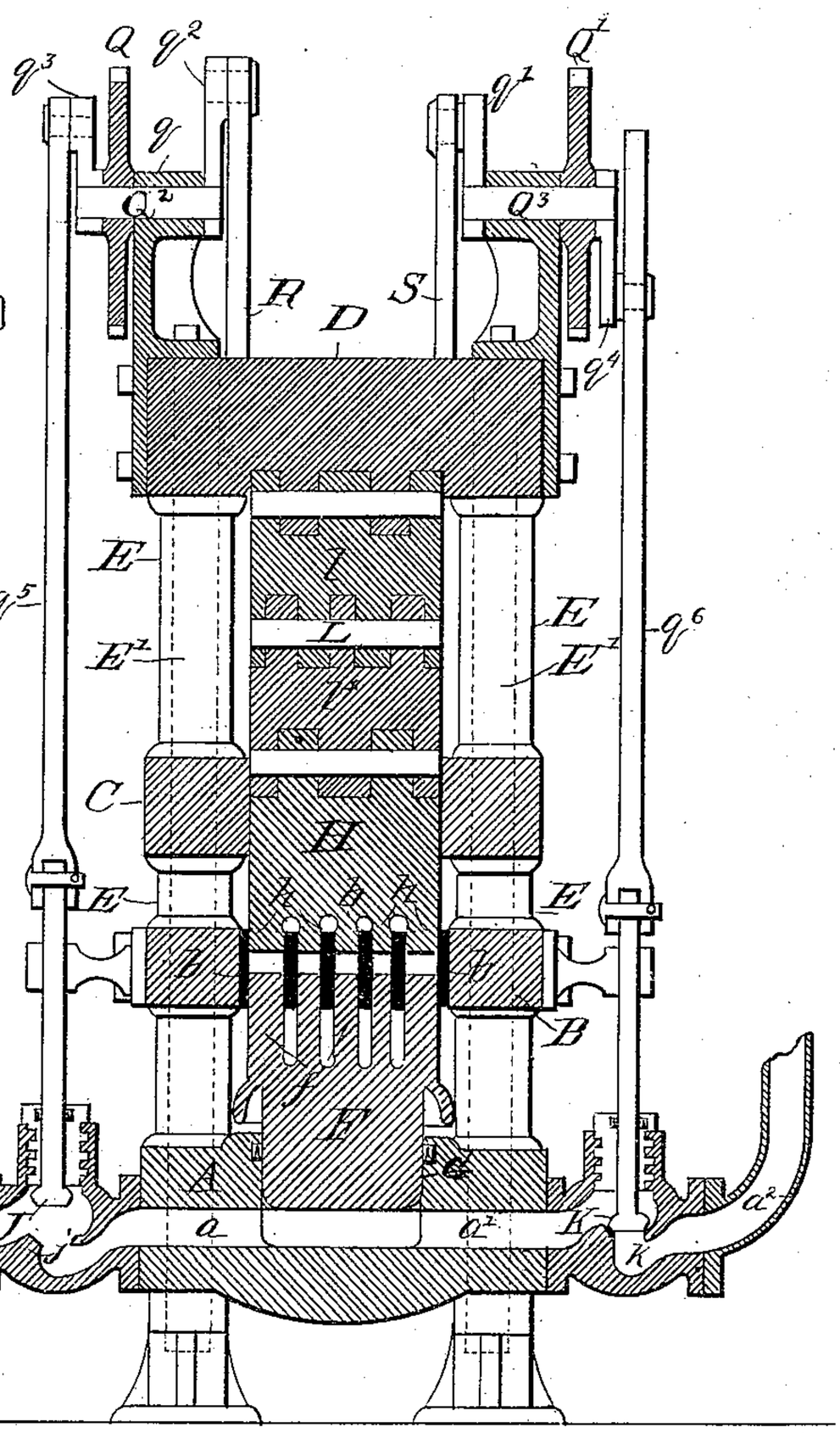

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Fig. 4.

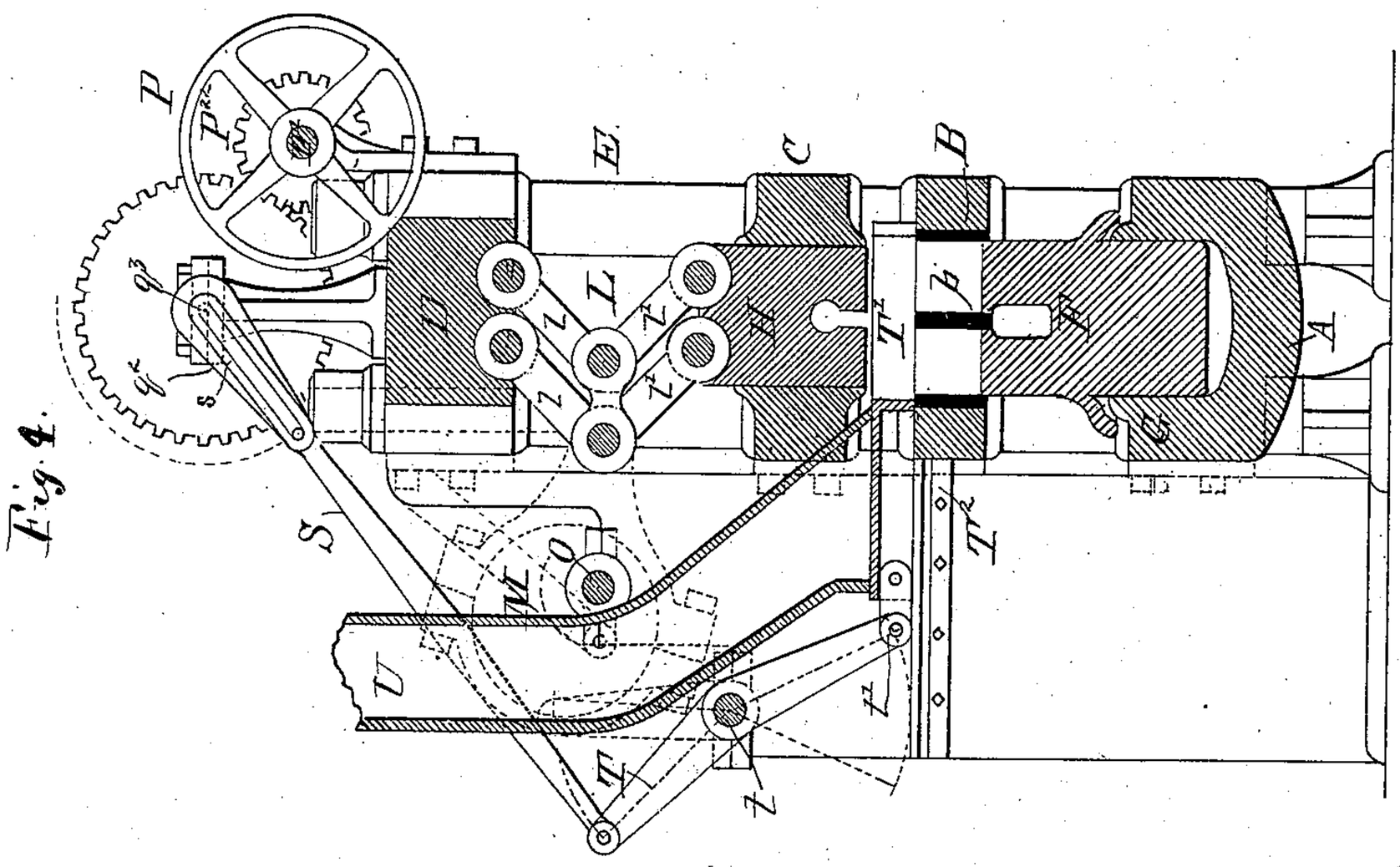
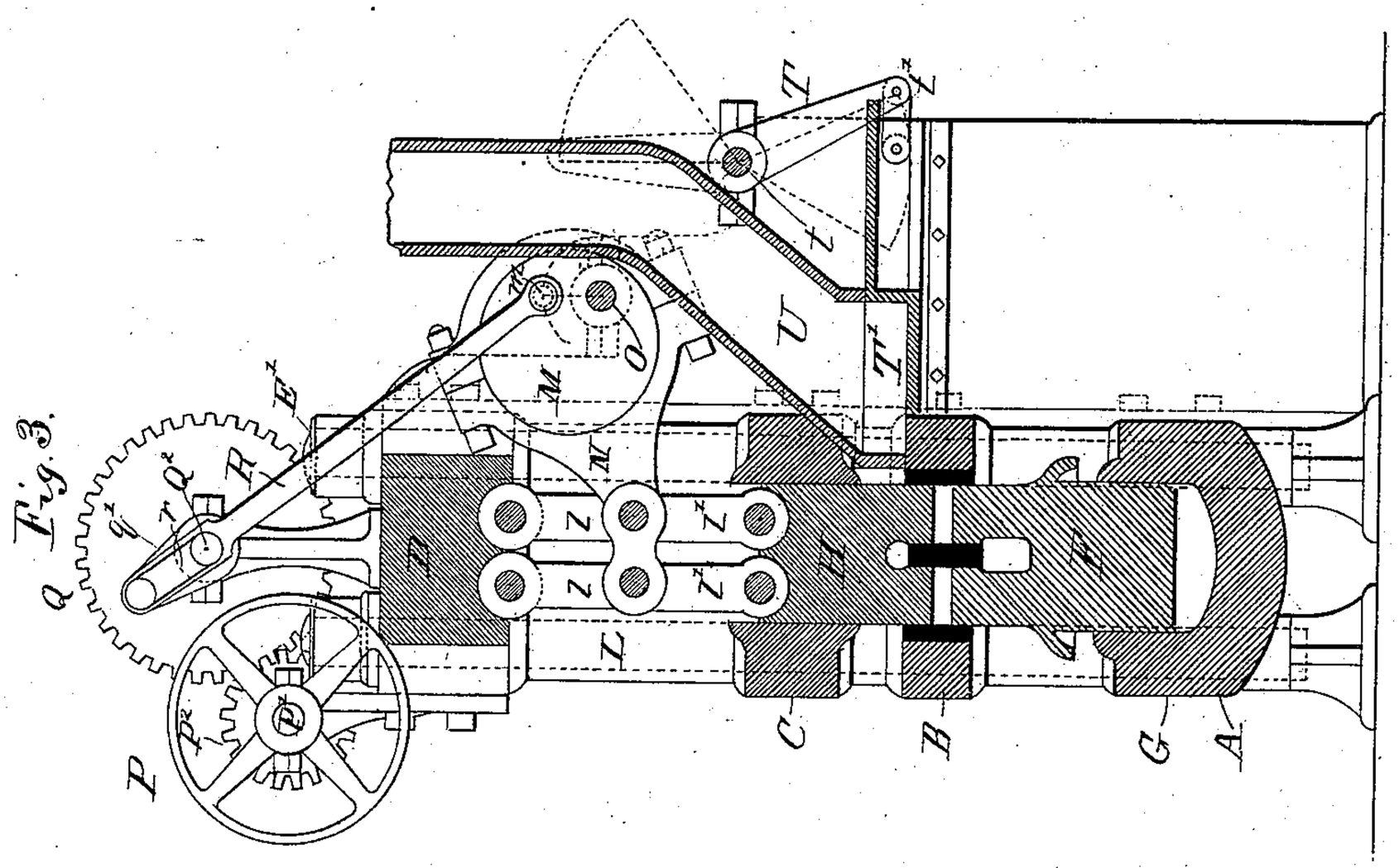


Fig. 3.



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UNITED STATES PATENT OFFICE.

SAMUEL E. McGREGORY AND JULIUS J. KOCH, OF ST. LOUIS, MISSOURI.

HYDRAULIC BRICK-MACHINE.

SPECIFICATION forming part of Letters Patent No. 332,814, dated December 22, 1885.

Application filed March 9, 1885. Serial No. 158,246. (No model.)

To all whom it may concern:

Be it known that we, SAMUEL E. McGREGORY and JULIUS J. KOCH, residents of St. Louis, Missouri, have jointly made a new and useful Improvement in Hydraulic Brick-Machines, of which the following is a full, clear, and exact description.

In making bricks by the dry-clay process it is desirable to apply the pressure to the clay from opposite sides thereof. It is further desirable, at least in imparting the final pressure to the clay, to employ an excessive pressure, such as hydraulic pressure. On the other hand, the mechanism necessary in applying hydraulic pressure to both the upper and the lower plunger of the press is so complicated as to be exceedingly objectionable. The press, for instance, constructed under E. Rogers's patent is so intricate in construction, as well as so elaborate, and so labyrinthine in its operation, as not only to preclude its use by any but persons of large means, but also to necessitate an experience with it of great length in order to operate it with reasonable success. In consequence of this there are but very few presses in use in which both of the plungers are operated by hydraulic pressure. Again, if both plungers are operated by mechanical means this difficulty is experienced: clay-banks are usually composed of strata of clay of different qualities, one stratum having more sand, pebbles, &c., than another. Under the same pressure the clay from one stratum will therefore be compressed more or less than the clay from another stratum. Thus four and one-half inches of fine clay can be compressed to two and three-eighths inches; but if the clay contains fifty per centum of sand it cannot be compressed to that extent without changing the pressure. Now, in all presses in which the plungers are operated by positive mechanical means the plungers travel a certain distance—that is, the plunger mechanism is adjusted to compress a certain amount of a certain kind of clay to a certain extent. With such adjustment, if clay containing more sand is taken into the mold, the parts are bound to break, for the plungers must make their appointed strokes; but at the same time the sandy clay cannot yield to them. The mechanism at some point therefore must give way. Stated briefly, if the work is to be accomplished with an all-hydraulic press a very expensive complicated mechanism is required; if with an all-mechanical press, the mechanism is exposed to frequent disastrous strains, and at best is unequal to the task, for to obtain the desired result with dry clay it is not only essential that an extreme pressure (obtainable in practice only with hydraulic power) must be employed, but also one that is virtually inelastic. It must be a standard pressure readily and uniformly produced upon the clay. Therefore if it is attempted to secure such a pressure with steam-power the effort will fail, because the pressure needed—four thousand pounds to the square inch—cannot be obtained by means of a steam-power acting directly upon the press-plunger without employing a steam-cylinder so large—say ten feet in diameter for a plunger pressing ten bricks at a time—as not to be practicable, and if a system of leverage is interposed between the steam-piston and the press-plunger (something which in effect categorizes the device in the class of all mechanical presses) the difficulty still remains that the force acting upon the piston, and hence upon the press-plunger and the clay, is elastic, variable, and yielding. With a steam-pressure bricks cannot be pressed equally. This fact is taken advantage of in such a press as is shown in Nagle's patent, No. 205,569, and designed for making concrete paving-blocks, which it is expressly stated by the patentee are not intended to be of uniform thickness, and to that end steam-power is employed in operating the plunger. The steam is not only elastic, but also variable in its pressure, and hence the blocks are ever varying in thickness. Building-bricks, especially front or face bricks, on the other hand, must be of uniform thickness, and to that end a positive unyielding unvaried pressure must be employed. To obviate the difficulties named, to provide a press of adequate capacity, to provide a press in which the pressure can be automatically arrested at a certain resistance, to furnish means by which the initial pressure can be more rapidly imparted to the clay than in an all-hydraulic press, and at the same time a press in which the benefit of hydraulic power in giving the final pressure to the clay is retained, and, further, to provide a machine which is comparatively simple in

its construction and operation and capable of being used by workmen of ordinary skill, is our present aim, which is carried out as follows: In the place of two plungers actuated by hydraulic power, but one of the plungers is so actuated. The first pressure is produced by some mechanical power—such as a cam, eccentric, pulley, lever, or toggle applied to one of the plungers—and the pressing of the clay is completed by means of hydraulic power applied to the other of the plungers.

The annexed drawings, making part of the specification, exhibit a desirable form of the improved machine. Many of the details of the press are omitted, as they are not essential to an understanding of the improvement.

Figure 1 is a plan. Fig. 2 is a central vertical section. The view includes the hydraulic pump, which is mainly in side elevation. Fig. 3 is a vertical section at right angles to that of Fig. 2, and being on the line 3 3 of Fig. 1; and Fig. 4 is a section on the same line, 3 3, of Fig. 1, but looking in the opposite direction, and showing the parts as when the plungers are opened apart.

The same letters of reference denote the same parts.

The machine, saving as it is modified by the improvement in question, is constructed in the usual manner.

The frame-work of the press consists, substantially, of the base-plate A, the mold-frame B, the upper plunger-guide, C, and the top plate, D, clamped together by means of the hollow posts E and the bolts E′. The lower plunger, F, which of the two plungers is the preferable one to be actuated by the hydraulic power, works in the cylinder G, which is attached to or made part of the base-plate A. The upper plunger, H, works in the guide C. The lower plunger is divided into sub-plungers *f f*, which form movable bottoms for the molds *b b*, and which in the upward movement of the lower plunger move upward in the molds. The upper plunger is similarly divided into sub-plungers *h h*, which in the downward movement of that plunger pass downward into the molds. The sub-plungers *f* and *h* thus respectively form the bottoms and the tops of the molds as the clay is being pressed.

I represents a suitable hydraulic pump for operating the lower plunger. The water is delivered from the pump through the passage *i* into the passage *a* in the base-plate, and thence into the cylinder G. The inlet-valve J, which is adapted to seat at *j*, controls the delivery of the water into the cylinder. The water when discharged from the cylinder flows through the passage *a′* into the outlet a^2. The discharge is regulated by means of the exhaust-valve K, which is adapted to seat at *k*. The introduction of the water causes the lower plunger to rise in the cylinder, and when the water is exhausted the plunger falls from gravity. The upper plunger is moved upward and downward in the guide C by means of the toggle L, eccentric M, and strap N. The eccentric is attached to the shaft O. The upper arms, *l*, of the toggle, at their upper ends, are jointed to the top plate, D, and the lower arms, *l′*, at their lower ends, are jointed to the upper plunger.

The power for operating the upper plunger is applied to the pulley P upon the shaft P′, which is journaled in bearings *p* upon the press-frame, and is also provided with the pinions P^2 P^{22}. These pinions respectively engage with the gears Q Q′, which in turn are respectively attached to the shafts Q^2 Q^3, that are journaled in the bearings *q*. The shaft Q^2 is provided with the crank *q′*. A rod, R, slotted at *r*, engages with the crank, and leads thence to a wrist-pin, *m*, on the eccentric M. The rotation of the shaft Q^2 by this means causes the eccentric to oscillate on its bearing and operate the toggle and upper plunger. Owing to the slotted connection of the rod R with the crank *q′*, the eccentric is stationary at intervals, and the parts are so adjusted that the eccentric is at rest as the final pressure is being exerted by the lower plunger, which position is exhibited in Fig. 3. The shaft Q^3 is provided with the crank q^2, which engages in the slot *s* of the rod S, which in turn leads to the charger-lever T. This last-named part is pivoted at *t*, and it is by means of the link *t′* connected with the charger T′. The rotation of the shaft Q^3 causes the lever T to oscillate on its bearing, and the charger in consequence is moved upon the table T^2 to and fro, as indicated by its two positions. (Shown, respectively, in Figs. 3 and 4.) The charger in the position of Fig. 3 receives the clay from the hopper U, and when it is in the position of Fig. 4 the clay falls from the charger into the molds. The charger is adapted to be moved at the proper intervals of time, and by reason of the slotted connection of the rod S with the crank q^2 the charger is at rest at the ends of its stroke. The shafts Q^2 Q^3 are also and respectively provided with the cranks q^3 q^4, which in turn are respectively, and by means of the jointed rods q^5 q^6, respectively, connected with the valves J K. The rotation of the shafts Q^2 Q^3, therefore, and at the proper times, effects the seating and the unseating of the valves. When the molds are filled with the clay, the upper plunger is raised, the lower plunger is lowered, the inlet-valve is closed, and the exhaust-valve is opened. The eccentric then acts to straighten the toggle and force the upper plunger downward into the molds, and the initial pressing of the clay is thereby accomplished. The inlet-valve then opens and the exhaust-valve closes. The hydraulic pressure is now exerted upon the lower plunger, and the final pressure is imparted to the clay. The upper plunger is then withdrawn. Meanwhile the hydraulic pressure continues upon the lower plunger, which continues to rise, and the now finished bricks are ejected from the molds. The charger moves forward, pushes the brick onto a suitable table, and

delivers another lot of clay into the molds. The inlet-valve closes, and the exhaust-valve opens, allowing the lower plunger to drop in the cylinder, and sufficiently for the molds to be filled.

As previously in effect stated, we do not desire to be confined to any special mechanical means for operating the upper plunger. The means exhibited we consider the most preferable. The mechanism is both simple and effective for the purpose in view, and also more rapid in its operation than an hydraulic mechanism. The clay is also, so far as the first pressing thereof is concerned, as well compacted as if by means of hydraulic pressure. The final set, however, cannot as well be obtained as by means of hydraulic pressure.

We are aware that brick-machines have heretofore been used in which the upper plunger has been operated by hydraulic power to perform the whole pressing operation, while the lower plunger has been operated by a mechanical power, after the brick has been formed, to eject it; also, that steam-power has been used directly to give a final pressure. We do not claim such constructions.

The advantage which our present machine possesses over such constructions is chiefly that it combines the rapidity of mechanical pressing during the main part of the operation with an easily-regulated, positive, and inelastic pressure of great power at the close of said operation. Moreover, we have arranged a pause upon the dead-center in the mechanical devices at the time when the hydraulic pressure is applied, by which the heavy strain of the latter pressure is sustained by the mechanical devices in their most advantageous position. The lost motion necessary for such pause of one plunger while the other operates is obtained with much convenience by the use of the two different kinds of powers in combination.

We claim—

1. The combination, with the brick-molds and the plungers, of a mechanical power for operating one of said plungers rapidly to press the clay and a hydraulic power for subsequently operating the other plunger to give a final and heavy pressure, substantially as set forth.

2. The combination, with the brick-molds and the plungers, of a mechanical power for operating one of said plungers rapidly to press the clay and a hydraulic power for subsequently operating the other plunger to give a final and heavy pressure, the mechanical power having a pause upon the dead-center at the time said hydraulic power gives the final heavy pressure, substantially as set forth.

3. The combination, in a brick or tile press, of the lower hydraulic plunger, F, the molds *b*, the upper plunger, H, and the toggle L, substantially as described.

4. In a brick or tile press, the combination of the shaft Q^2, the crank q', the slotted rod R, the eccentric M, the shaft O, the strap N, the toggle L, and the plunger H, substantially as and for the purpose described.

5. The combination of the shafts O P Q^2 Q^3, the pinions P^2 P^{22}, the gears Q Q′, the cranks q' q^2, the slotted rods R S, the eccentric M, the strap N, the toggle L, the plunger H, the lever T, and the charger T′, substantially as described.

6. The combination of the shafts Q^2 Q^3, the cranks q^3 q^4, the rods q^5 q^6, and the valves J K, substantially as described.

7. A brick or tile press in which the bricks or tiles are pressed by means of two plungers or platens moving toward each other and pressing the clay upon opposite sides thereof, respectively, one of said plungers or platens being actuated rapidly by a toggle or other mechanical power and the other of said plungers or platens being attached to or made part of an hydraulic press, substantially as and for the purpose described.

Witness our hands.

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JULIUS J. KOCH.

Witnesses:

C. D. MOODY,
J. W. HOKE.