(No Model.) 5 Sheets—Sheet 1.

F. S. BALDWIN.

HYDRAULIC BRICK MACHINE.

No. 342,061. Patented May 18, 1886.

Fig. 1.

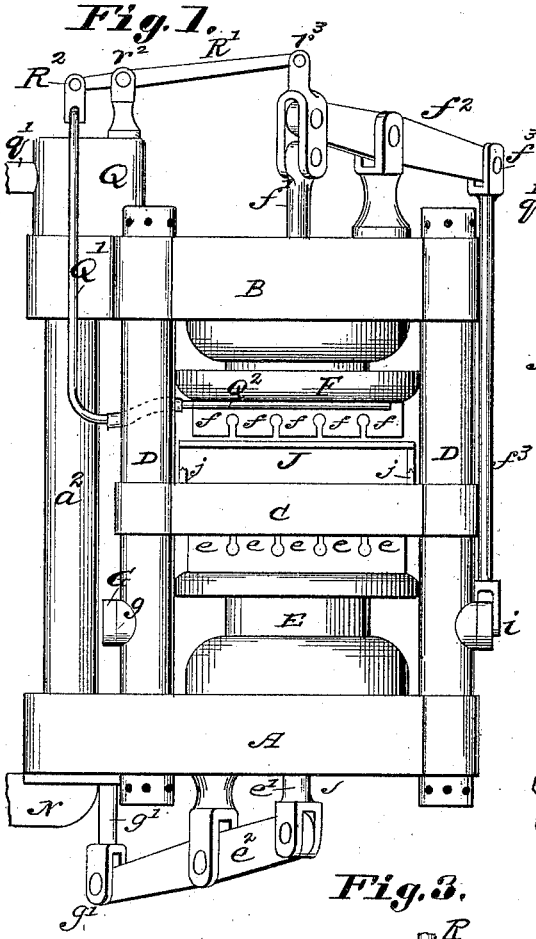


Fig. 2.

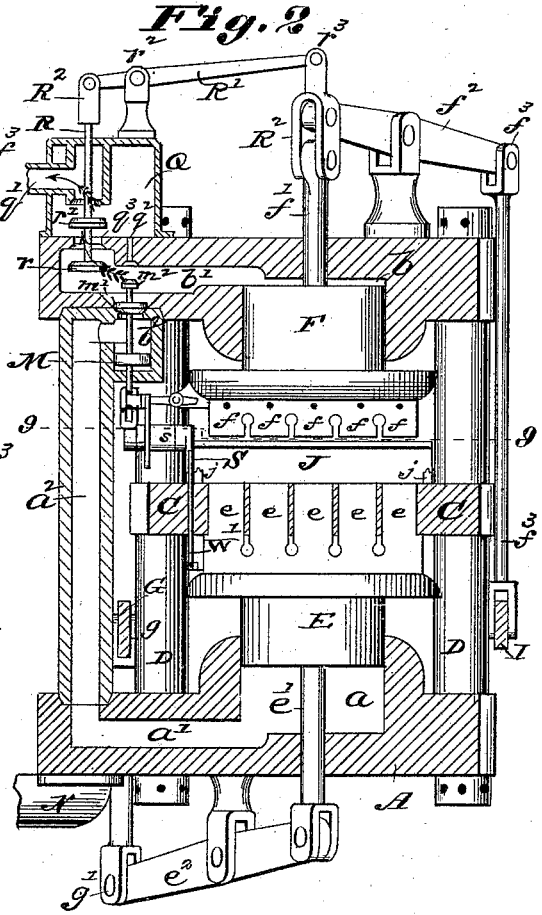


Fig. 3.

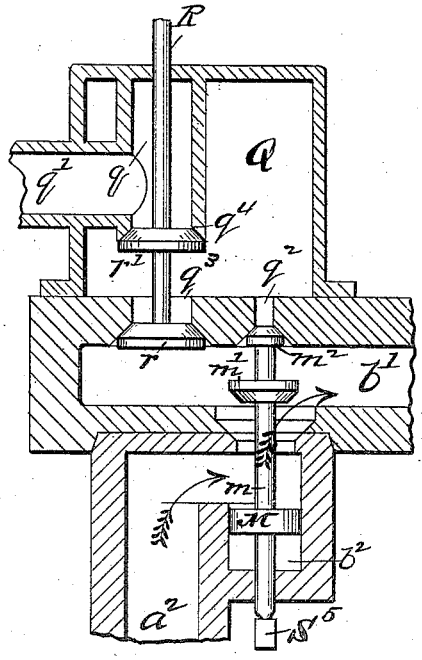


Fig. 4.

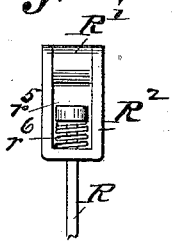
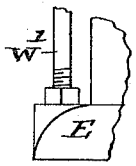


Fig. 17.



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F. S. BALDWIN.

HYDRAULIC BRICK MACHINE.

No. 342,061. Patented May 18, 1886.

Fig. 5.

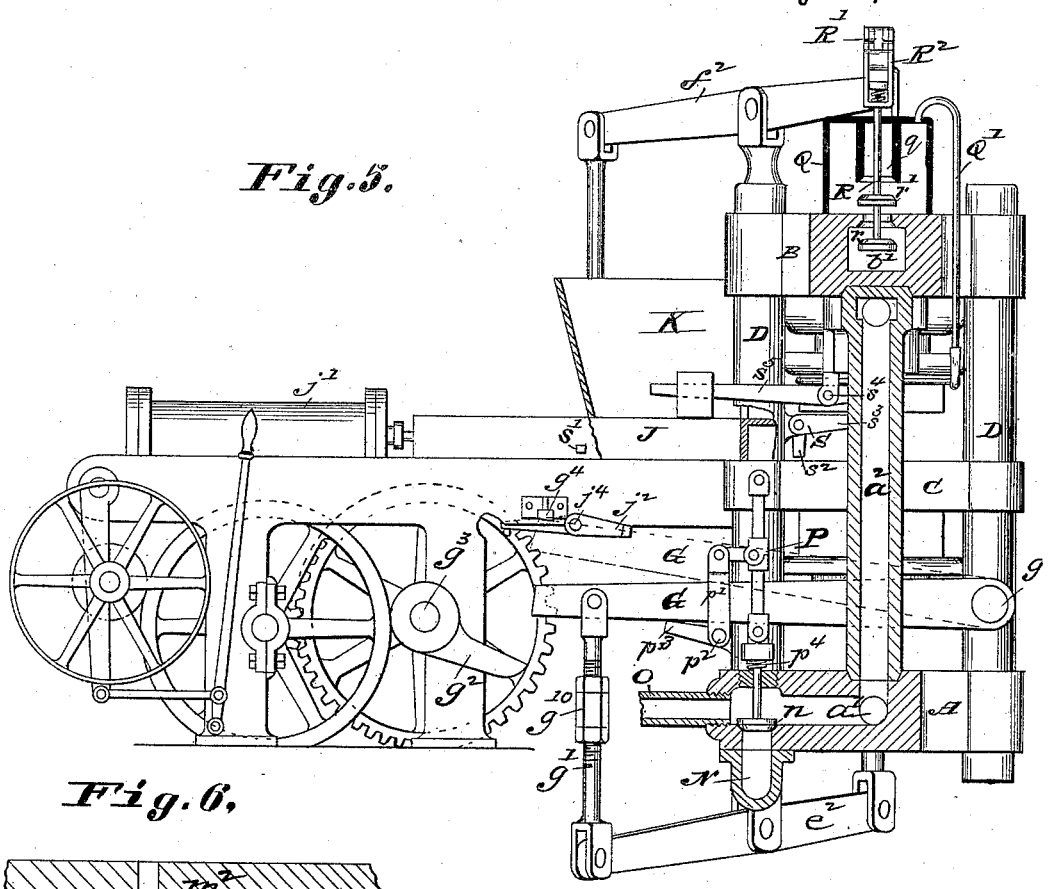


Fig. 6.

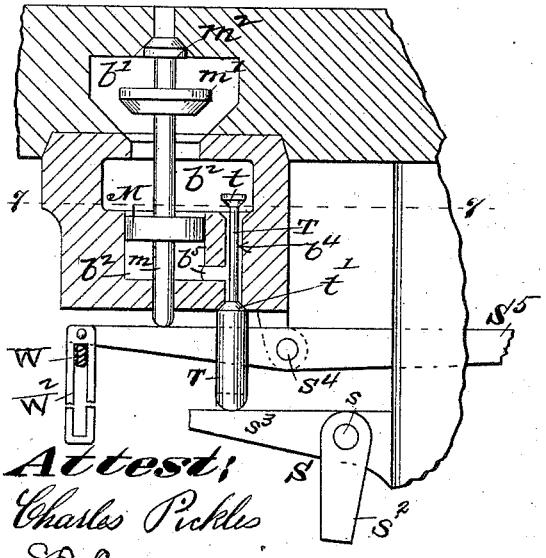
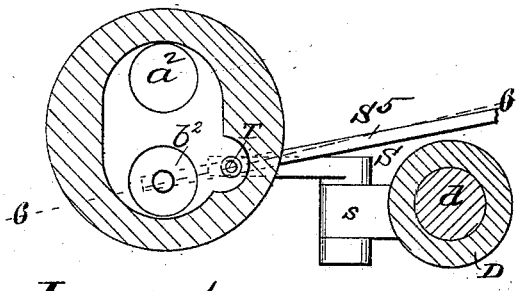


Fig. 7.



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HYDRAULIC BRICK MACHINE.

No. 342,061. Patented May 18, 1886.

Fig. 8.

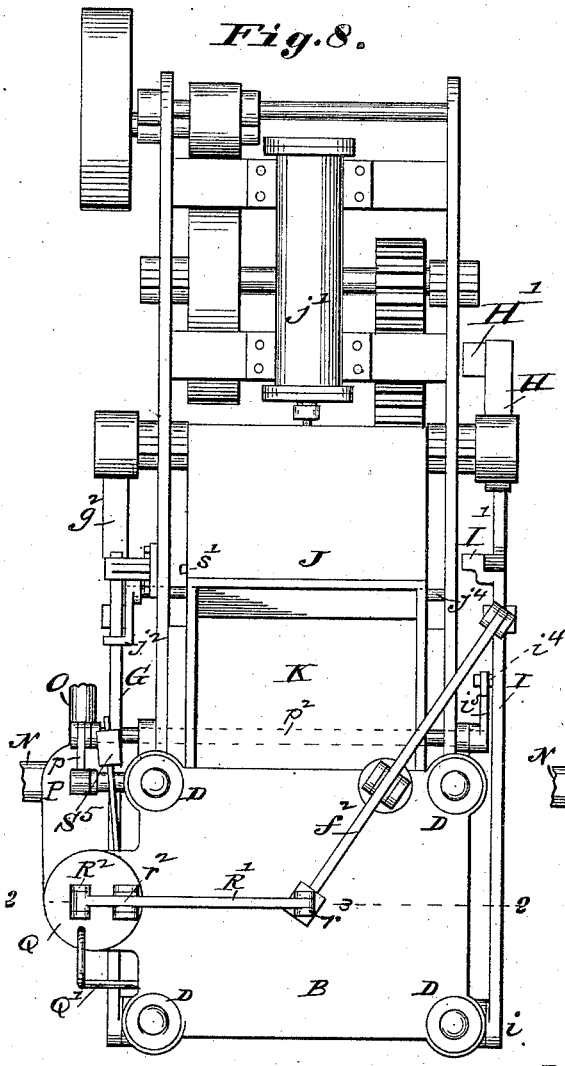


Fig. 9.

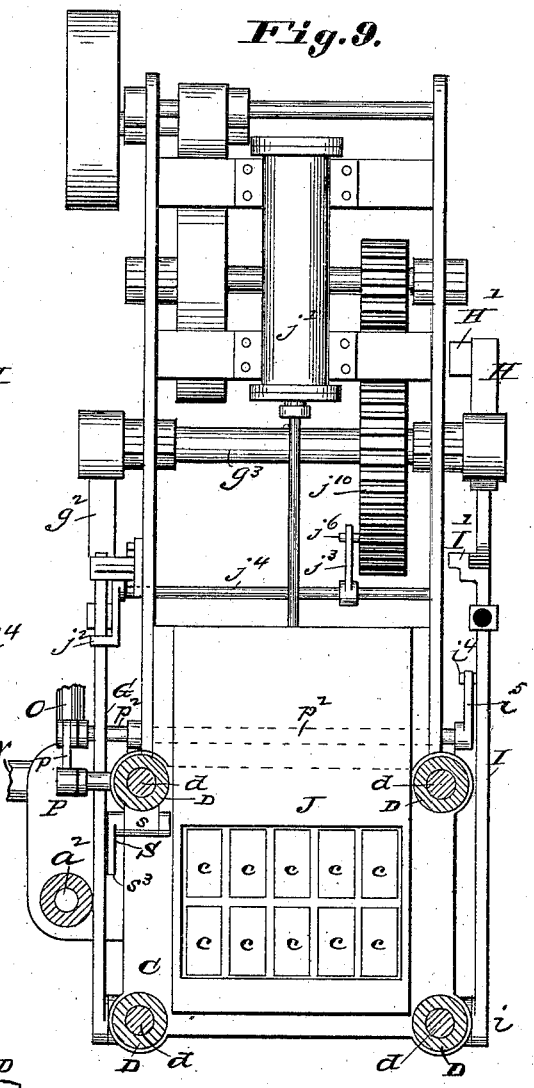
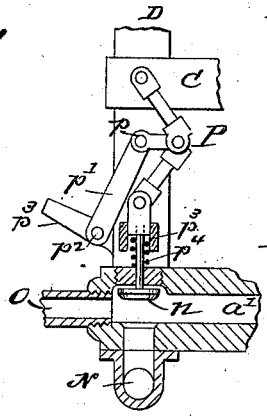


Fig. 10.



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HYDRAULIC BRICK MACHINE.

No. 342,061. Patented May 18, 1886.

Fig. 11.

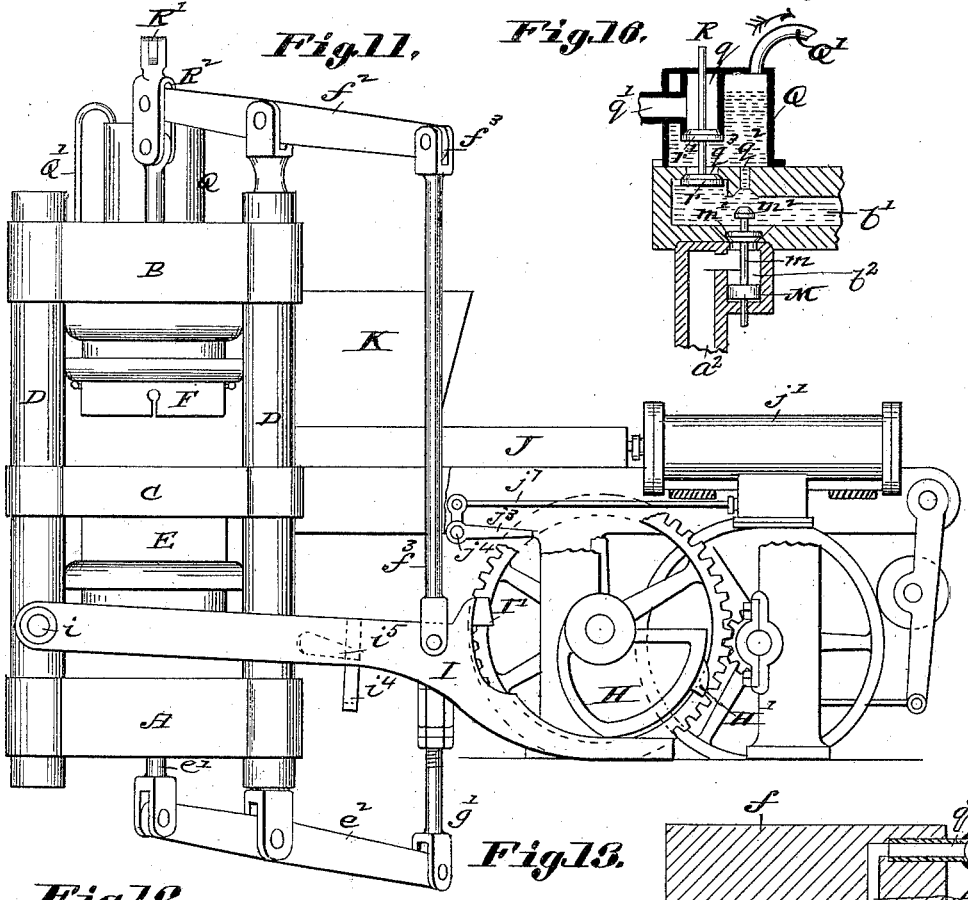


Fig. 16.

Fig. 13.

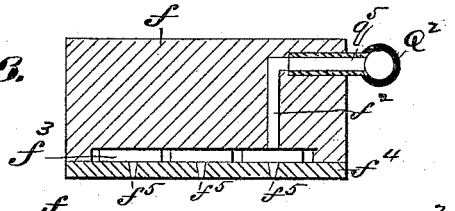


Fig. 12.

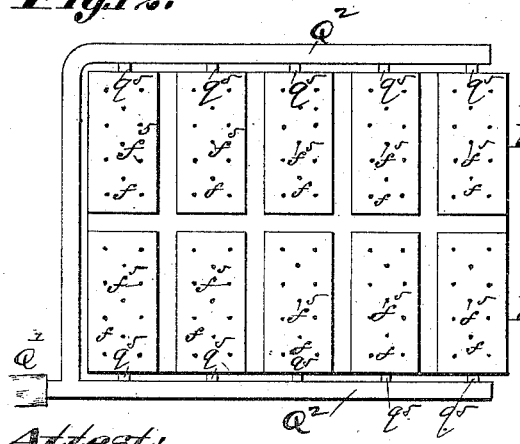


Fig. 14.

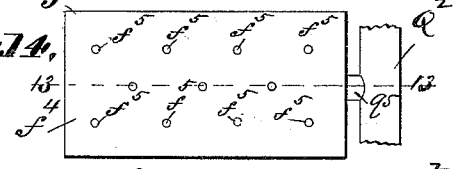
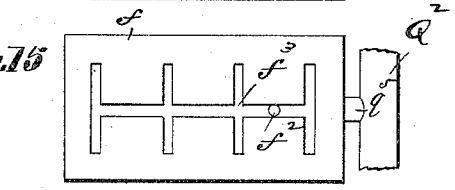


Fig. 15.



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(No Model.) 5 Sheets—Sheet 5.

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HYDRAULIC BRICK MACHINE.

No. 342,061. Patented May 18, 1886.

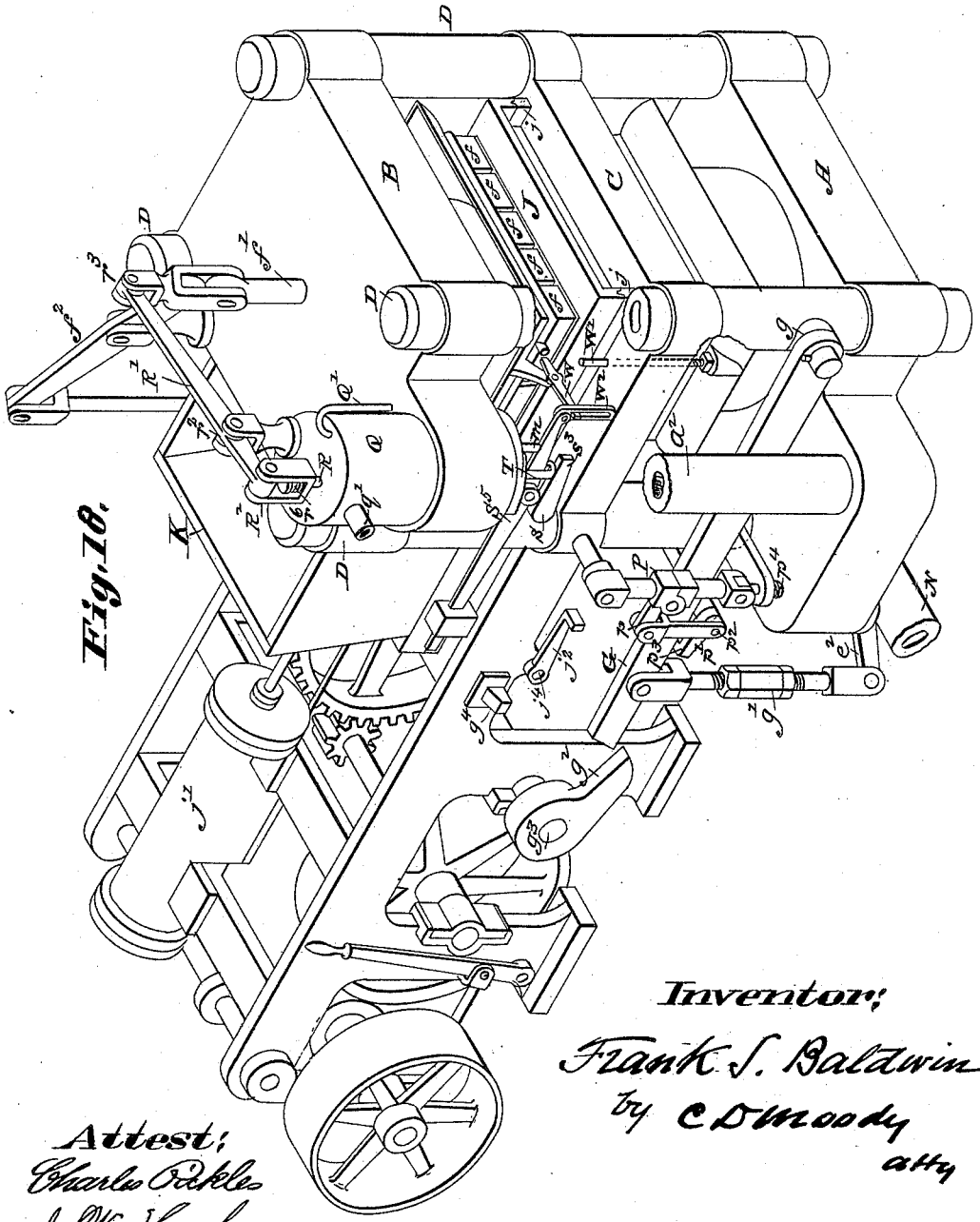

Fig. 18.

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UNITED STATES PATENT OFFICE.

FRANK S. BALDWIN, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE HYDRAULIC PRESS BRICK COMPANY, OF SAME PLACE.

HYDRAULIC BRICK-MACHINE.

SPECIFICATION forming part of Letters Patent No. 342,061, dated May 18, 1886.

Application filed May 17, 1884. Renewed April 23, 1886. Serial No. 199,970. (No model.)

To all whom it may concern:

Be it known that I, FRANK S. BALDWIN, of St. Louis, Missouri, have made a new and useful Improvement in Hydraulic Brick-Machines, of which the following is a full, clear, and exact description, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a front elevation; Fig. 2, a vertical section on the line 2 2 of Fig. 8; Fig. 3, a vertical section, on an enlarged scale, upon the line 2 2 of Fig. 8; Fig. 4, a detail, being an elevation of the upper end of the upper valve-stem of Fig. 3; Fig. 5, a side elevation, partly in section, and being the side opposite to that exhibited in Fig. 11; Fig. 6, a vertical section, upon an enlarged scale, on the line 6 6 of Fig. 7; Fig. 7, a horizontal section on the line 7 7 of Fig. 6; Fig. 8, a plan of the machine; Fig. 9, a horizontal section taken on the line 9 9 of Fig. 2; Fig. 10, a detail, upon an enlarged scale, showing the toggle used in operating the low-pressure valve; Fig. 11, a side elevation of the machine, being the side opposite to that exhibited in Fig. 5; Fig. 12, a bottom view of the upper plunger; Fig. 13, a vertical section on the line 13 13 of Fig. 14; Fig. 14, a bottom view of one of the sub-plungers of the upper plunger; Fig. 15, a bottom view of a sub-plunger, the facing-plate being removed; Fig. 16, a detail, being a vertical section of the air-chamber and the parts immediately therewith connected; Fig. 17, an elevation of the lower end of the tripping-rod used in operating the valves t t', and Fig. 18 a view in perspective of the machine.

The same letters of reference denote the same parts.

The present invention is an improvement in hydraulic brick-machines, such as exhibited in Letters Patent No. 15,778.

The improvement relates to the mode of operating the press-plungers; to the mode of operating the water-valves which supply the water to the plungers; to the means for separating the brick when pressed from the upper plunger, and to various details hereinafter described, and designated in the claims.

The frame-work of the press proper consists, mainly, of the base-plate A, the top plate, B, and the intermediate mold-frame, C, clamped together by means of the hollow posts D D D D and the bolts d d d d.

In the plates A B, respectively, are the plunger-chambers a b.

E represents the lower plunger and F the upper plunger.

The frame C is the mold-frame, the cells c c c c, Fig. 9, being the mold in which the bricks are formed.

The lower plunger, E, is divided into sub-plungers e e e e, which form movable bottoms for the molds, and which, in the upward movement of that plunger, move upward in the molds c c c c, and the upper plunger is also divided into sub-plungers f f, which, in the downward movement of that plunger, pass downward into the molds c c c c from above, and these sub-plungers, e f, respectively form the bottoms and tops of the molds as the bricks are formed.

The plungers E F are respectively provided with the rods e' f', which in turn are respectively jointed to the levers e^2 f^2. The plungers are closed toward each other by hydraulic pressure, but are withdrawn from each other mainly by means of the levers e^2 f^2, respectively, and as follows:

G, Figs. 1, 2, 5, 8, 9, represents a lever pivoted to the frame of the machine at g. Its free end is connected with the lever e^2 by means of the link g', Figs. 1, 2, 5. This lever is actuated by a cam, g^2, Figs. 5, 8, 9, upon the shaft g^3, Figs. 5, 9. As the cam is rotated the free end of the lever G is lifted, causing the lower plunger, E, to be withdrawn downward in the molds. A stop, g^4, Fig. 5, limits the upward movement of the lever. The shaft g^3, at its other end, upon the opposite side of the machine, is provided with another cam, H, Figs. 8, 9, 11, whose function is to operate the lever I, Figs. 8, 9, 11. This last-named lever is journaled to the press-frame at i, Figs. 1, 8, 9, 11, and its free end, by means of the connecting-rod f^3, Figs. 1, 2, 11, is connected with the lever f^2 of the upper plunger, F. The rotation of the cam H causes the free end of the lever I to be pressed downward and the upper plunger, F, to be withdrawn upward from the molds.

J, Figs. 5, 8, 9, represents the charger for supplying the clay to the molds. It slides

upon the ways *j j*, Figs. 1 and 2. It is actuated by the piston of the water-cylinder *j'*, Figs. 5, 8, 9, 11, which is suitably connected with the charger. The charger is pushed from beneath the hopper K, Figs. 5, 8, 11, carrying and delivering the clay into the molds *c c*, after which the charger is returned into its original position beneath the hopper. The valve of the cylinder *j'* is actuated by the levers $j^2 j^3$, Figs. 5, 9, upon the rock-shaft j^4, Fig. 9, as hereinafter more particularly described.

The water is supplied to the chambers *a b* through the passages *a' b'*, respectively, Figs. 2, 5. These passages are connected by means of the side pipe, a^2, Figs. 2, 3, 5, 9. At its upper end the side pipe, a^2, communicates with a side passage, b^2, Figs. 2, 3, 6, 7. The piston M, Figs. 2, 3, 6, 16, upon the rod *m*, works upward and downward in the passage b^2. The piston-rod *m* is provided with the valves $m' m^2$, Figs. 2, 3, 6, 16. The passage *a'* is also connected with the low and high pressure pumps by means of the pipes N O, Figs. 1, 2, 5, 8, 9, 10, respectively. The pipes are supplied in the customary manner with safety-valves and air-chambers, which parts, together with the pumps, are not exhibited in the drawings, as their construction is familiar. The opening connecting the passage *a'* with the low-pressure pipe is supplied with a valve, *n*, Figs. 5, 10, which is adapted to be opened by the water-pressure in the pipe, and to be closed by means of the toggle P, Figs. 5, 10. The toggle is operated by means of the link *p*, the arm *p'* forming a bell-crank lever and the rock-shaft p^2. The stem of the valve *n* works loosely in the sliding rod p^3, Fig. 10, of the toggle—that is, the valve can drop without the action of the toggle. The rod p^3 is upheld by the action of the spring p^4, Figs. 5, 10.

Q, Figs. 1, 2, 3, 16, represents an air and water chamber. It is secured to the frame of the machine at its top, and above or in the vicinity of the passage *b'*, which is opened and closed by the valve m^2. Within the chamber is the compartment *q*, out of which leads the overflow-pipe *q'*, Figs. 2, 3, 16. This overflow-pipe leads to a water-tank, (not shown,) which supplies the pumps. The chamber Q is connected with the water-passage *b'* by means of the two openings $q^2 q^3$, Figs. 3, 16. The small opening, q^2, is opened and closed by the action of the valve m^2—that is, when the piston M is raised in the passage b^2 the opening q^2 into the chamber Q is closed, and when the piston M is lowered the opening q^2 is opened. The larger opening q^3 from the passage *b'* into the chamber Q and the inlet q^4 into the compartment *q* can be closed by the valves *r r'*, respectively, upon the valve-rod R, Figs. 2, 3, which passes upward through the compartment *q* through the top of the chamber Q and connects with the lever R', Figs. 1, 2, 5, 8, 11. This last-named lever is pivoted at r^2, Figs. 1, 2, and at the other end, r^3, Figs. 1, 2, is jointed to the rod *f'* of the upper plunger, F.

The yoke R^2, Figs. 1, 2, 4, 5, which connects the lever R' with the stem R, is secured to the stem, as shown more distinctly in Fig. 4, the stem being adapted to slide upward and downward through the lower end of the yoke, and being provided with a head, r^5, Fig. 4, between which and the lower end of the yoke a spring, r^6, is arranged. This enables the yoke to slide freely upon the stem to a limited extent, and this in turn allows of the upper plunger, F, moving upward and downward a portion of its stroke before it acts to open or close the valves *r r'*, and when these valves are closed by the downward movement of the plunger F the spring r^6 prevents the valves *r r'* from being strained.

An air-pipe, Q', Figs. 1, 5, 8, leads from the chamber Q to the pipes Q^2, Figs. 1, 12, 13, 14, 15, of the upper plunger, F. This part of the construction is shown more distinctly in Figs. 12, 13, 14, 15. The pipe passes around the upper plunger, F, and by means of the branches q^5 is connected with the air-passages f^2 in the sub-plungers *f*, Fig. 13. These passages f^2 extend through the sub-plungers into the recesses f^3 in the bottom of the sub-plunger, and beneath the recess is a facing-plate, f^4, perforated at $f^5 f^5$. By this means air can be delivered from the chamber Q into the recesses $f^3 f^3$ in the sub-plungers *f f*, and afterward forced through the perforations $f^5 f^5$.

S, Figs. 2, 5, 9, 6, 7, represents what may be termed a "bell-crank lever," pivoted at *s* to one of the uprights of the frame. It is adapted to be moved upon its pivot by means of a lug, *s'*, Figs. 5, 8, upon the charger—that is, as the charger moves forward over the molds the lug *s'* encounters the lower end of the arm s^2 of the lever, causing the arm s^3 of the lever to be lifted.

The weighted lever S^5, Figs. 3, 5, 6, 7, is pivoted to the machine-frame at s^4. Its shorter end bears upward against the lower end of the piston-rod *m*, Figs. 3, 6.

A small passage, b^4, Fig. 6, serves to connect the pipe b^2 both above and below the piston M with the outer air—that is, the passage b^4 extends from without into the passage b^2, and above the upward limit of the stroke of the piston M, and opposite the lower limit of the piston-stroke, a branch passage, b^5, leads from the passage b^4 into the chamber in which the piston M works.

T, Fig. 6, represents a valve-stem, provided with the valves *t t'*, for the purpose of opening and closing the upper and lower ends of the passage b^4. The stem T below the lower valve, *t'*, is slotted longitudinally, through which slot the lever S^5 passes, and beyond the valve-stem bears upward against the piston-rod *m*. When the charger comes forward, filling the molds with clay, the lug *s'* strikes the arm s^2 of the bell-crank S, elevating the arm s^3, thus lifting the valve-stem T, closing the valve *t'*, opening the valve *t*. This allows the water to flow down b^4 through b^5 to beneath the piston M, balancing the latter.

The weighted lever S^5 then acts and lifts the valve-stem m, opening m' and closing m^2, as in Figs. 3, 6. This lets the pressure off the lower plunger, the water flowing past the valve m' into the chamber Q and out the overflow-pipe q'. As the lower plunger drops the upper plunger is upheld by the cam H, acting on the lever I, Fig. 11, and until the charger is withdrawn from beneath the upper plunger. The cam g^2 acts similarly on the lever G during the dropping of the plunger E. The pressure from both sides of the piston M is thereby equalized, and the water-pressure acts to close the valve m^2 and open the valve m'. When the pressure in the passage b^2 increases sufficiently to overcome the weight on the lever S^5, the weighted end of that lever rises, and the valve t' is opened and the valve t is closed. The pressure now being cut off from beneath the piston, the piston M is forced downward in its chamber, and by reason of its larger area, it operates to open the valve m^2 and to close the valve m', and thereby operating to cut off the pressure from the upper plunger, F. As the charger J is moved forward toward the mold, the lug s' acts upon the bell-crank lever S, and the valve-stem T is lifted, closing the valve t' and opening the valve t. The pressure upon both sides of the piston M is again equalized, and the piston is again raised by the upward pressure of the valve m' and aided by the weighted lever S^5.

The operation of the machine is as follows: The charger J is moved forward, carrying the clay from the hopper to above the molds $c\,c$ in the mold-frame. The valve m' being opened, as above described, the water flows from beneath the lower plunger, E, through the passages $a'\,a^2\,b^2\,b'$ into the chamber Q, and thence through the overflow-pipe into the tank. The relative position of the valves $m'\,m^2\,r\,r'$ at this stage of the operation is not shown in the drawings. The lower plunger, E, then falls by its own weight, and the molds $c\,c$ are filled with the clay. The movement of the lower plunger is accelerated by the cam g^2, acting upon the lever G. As this last-named lever is thrown upward it strikes the arm j^2 upon the rock-shaft j^4. This causes the valve of the charger-cylinder j' to be reversed and the charger j to be returned to its original position. The upper plunger, F, has meanwhile been retained in this position by means of the cam H and the lever I, and is now forced downward by means of the auxiliary cam H', which acts upon the lug I'. As the upper plunger, F, reaches the lower limit of its stroke, the valves $r\,r'$ are closed by the action of the lever R', as shown in Fig. 3. As the lever I is thrown upward the strap i^4, with which the lever is provided, acts to lift the arm p^5, Figs. 11, 9, 8, upon the rock-shaft p^2, Figs. 5, 10, 11, 18, and the toggle P is tripped, releasing the valve n. The water now flows through both the high and low pressure pumps into the chambers $a\,b$, forcing the plungers E F toward each other, and thereby compressing the clay in the molds $c\,c$. When the pressure in the chambers $a\,b$ equals that in the low pressure pipe the safety-valve in the last-named pipe lifts and allows the water to flow off. The pressure from the high-pressure pipe acts to close the valve n and the pressure in the chambers A B rapidly rises, imparting the final pressure to the clay in the molds $c\,c\,c$. When the water pressure in the passage b^2 acting on the valve t overbalances the weighted lever S^5, the piston M descends, opening the valve m^2 and closing the valve m'. The pressure being now removed from the upper plunger, F, that plunger is forced upward by the action of the lower plunger, E—that is, the lower plunger presses upward upon the bricks within the molds $c\,c$ and the pressure is transmitted to the upper plunger, F. As the upper plunger, F, is forced upward the water in the plunger-chamber b is forced backward and upward into the air and water chamber Q, Fig. 16, the water entering the latter through the small opening q^2, Fig. 3. Meanwhile the valves $r\,r'$ remain closed, the yoke R^2, Fig. 4, sliding downward upon the rod R. As the plunger F continues to ascend the water rises in the chamber Q. This position is shown in Fig. 16. The water rising in the chamber Q compresses the air in the upper part thereof, and to a degree corresponding to the relative capacity of the chamber b and the chamber Q, thus causing the air to be forced through the pipe Q' into the pipes Q^2 into the air-passages f^2 f^3 of the sub-plungers in the upper plunger, F, and to be discharged through the perforations f^5 in the facing-plate f^4 of the plunger F. The effect of this discharge of air is, as described, to prevent the bricks from adhering to the upper plunger and from being sucked up with the plunger as it rises. As the lower plunger, E, approaches the upward limit of its stroke, and its sub-plungers are being brought flush with the tops of the molds $c\,c$, the lever G descends and encounters the arm p^3, which is connected with the toggle P. This holds the valve n seated in the low-pressure pipe, and to cut off the supply of water therefrom. Meanwhile the cam H has forced the lever I downward, causing the upper plunger, F, to be lifted, as in Fig. 11. As the plungers leave the molded bricks the arm R' acts upon the valve-stem R, and causes the valves $r\,r'$ to be opened. The air-pressure is now removed from the chamber Q and the water flows readily from the upper plunger-chamber into the chamber Q and passes out through the overflow-pipe q', Fig. 2. As the upper plunger is raised to the extreme limit of its stroke by means of its cam H the charger-cylinder valve is again reversed by means of the pin j^6, Fig. 9, upon the spur-wheel, j^{10}, striking the arm j^3 on the rock-shaft j^4, and reversing the valve-rod j^7 of the cylinder j', and the charger J is again pushed forward, shoving the previously-formed bricks onto a suitable table in front of the machine and bringing a new lot of clay to the molds $c\,c\,c$. As the lower plunger, E, reaches its

lowest point the lever G strikes the tappet j^2 upon the rock-shaft j^4, causing the piston in the cylinder j' to reverse and withdraw the charger. The cam H is provided with an auxiliary cam, H', Figs. 8, 9, 11, which acts on the extension or lug I' of the lever I, as soon as the cam H passes the lever I, and expedites the downward movement of the upper plunger, F. As soon as the upper plunger, F, reaches its lower limit it acts, through the lever R' R^2, to lift the stem R, Figs. 2, 3. This closes the valves r r' and directs the water-pressure upon both plungers F and E.

The improvement also relates to the provision for limiting the approach to each other of the two plungers for the purpose thereby of obtaining brick of uniform size. The means adopted for this purpose are preferably as follows: W' represents a rod which is attached to the lower plunger, E, Figs. 2, 17, 18. The rod is also made adjustable vertically, as indicated in Fig. 17. As the lower plunger rises the upper end of the rod W' encounters the inner end of a lever, W. The outer end of the lever W in consequence is moved downward in a yoke, W^2, which is pivoted to the outer end of the lever S^5. The lever S^5 in consequence is drawn downward. This in turn draws the stem D downward, and the valve t closes. The piston M in consequence becomes unbalanced and the valve m' closes, and the pressure on the upper plunger ceases, and the plunger F is arrested in its movement.

It is often desirable to deliver a larger amount of clay into the molds. To this end the part g', which connects the lever e^2 with the lever G, is made by such means as the swivel g^{10}, Fig. 5, to be lengthened or shortened. By suitably operating the swivel g^{10}, so as to shorten the link G', more clay is delivered into the molds, and by lengthening the link G', a smaller amount of clay is delivered into the mold.

I am aware that in the construction shown in Letters Patent No. 15,778, two pumps with the mechanism for working the same under different pressures are employed. I do not therefore lay claim thereto; nor do I claim the means shown in a subsequent patent, No. 143,188, for closing the communication between the upper plunger-cylinder and the exhaust-chamber—namely, a tripple valve on a single stem—for I employ two double valves upon separate stems and working in separate chambers, and which also effect the opening and closing of the overflow-pipe in the air-chamber; nor do I claim the means shown in said last-named patent for removing the pressure upon the upper plunger when a certain pressure is attained—namely, an auxiliary water-engine which acts to forcibly withdraw the valve—for I use a balanced valve, by means of which the pressure, after attaining a certain point, becomes automatically equalized. The means for holding the upper plunger down upon the bricks also differ in the two constructions, an auxiliary engine being used in the one, and a lever operated by a cam-shaft being used in the other. The same differences occur in the operation of the lower plunger. The means shown in said last-named patent for operating the charger-piston—namely, the complicated system of mechanism understood only by referring to said patent—are also not the same as that employed in the present construction—namely, tappets upon a rock-shaft; also for limiting the upward movement of the lower plunger said patentee uses a screw, whereas, in the present construction an adjustable link is employed. I also broadly disclaim the two mechanisms respectively set forth in Letters Patent No. 182,481, and Letters Patent No. 195,169, for neither of said mechanisms (saving that portion shown in said Leters Patent No. 15,778) nor any part thereof do I employ or need to employ in the present brick-machine.

I claim—

1. The combination of the charger J, having the lug s', the bell-crank lever S, and the stem T, substantially as described.

2. The combination of the bell-crank lever S, the stem T, having the valves t t', and the passages b^2 b^4 b^5, substantially as described.

3. The combination of the stem T, having the valves t t', the stem m, having the piston M, and the passages b^2 b^4 b^5, substantially as described.

4. The combination of the stem m with the stem T, for the purpose of moving the lever S^5 downward, substantially as described.

5. The combination, as described, of the passages b' b^2 b^4 b^5, the stem m, the valves m' m^2, the piston M, and the stem T, having the valves t' t.

6. The combination of the lever W, the rod W', the yoke W^2, and the lever S^5, as described.

7. The combination, as described, of the passages a^2 b' b^2 b^4 b^5, the stem m, having the piston M, the valves m' m^2, and the stem T, having the valves t' t.

8. The combination of the air-chamber Q, having the compartment q, the passage b', the rod R, having the valves r r', the lever R', the plunger F, and the rod f, substantially as described.

9. The combination of the chamber Q, having the compartment q, the passage b', the stem R, having the valves r r', the lever R', the yoke R^2, the spring r^6, the plunger F, and the rod f, substantially as described.

10. The combination of the chamber Q, having the compartment q, the passage b', and the rod R, having the valves r r', as and for the purpose described.

11. The combination of the passage b', the passage q^2, the chamber Q, and the valve m^2, as and for the purpose described.

12. The combination of the passages b b', the chamber Q, the passage q^2, the pipes Q' Q^2, and the plunger F, having the air-passages, as and for the purpose described.

13. The combination of the lever I, the shaft

g^3, the cam H, the rod f^3, the rod f^2, and the plunger F, as described.

14. The combination of the shaft g^3, the cams H H′, the lever I, having the lug I′, the rod f^3, the lever f^2, and the plunger F, as described.

15. The combination of the gear j^{10}, the pin j^6, the arm j^5, the shaft j^4, the cylinder j', and the valve-rod j^7, as described.

16. The combination of the lever G, the link g', the lever e^2, the shaft g^5, the cam g^2, and the plunger E, as described.

17. The combination of the plunger E, the lever e^2, the link g', the swivel g^{10}, the lever G, and the stop g^4, as described.

18. The combination of the lever G, the arm j^2, the shaft j^4, the arm j^5, and the valve-stem j^7, as described.

19. The combination of the toggle P, the valve n, the lever I, the lever G, and the spring p^4, as described.

20. The combination of the toggle P, the lever G, the link p', the arm p^3, and the shaft p^2, as described.

21. The combination of the lever I, the lug i^4, the arm i^5, the shaft p^2, the link p', and the toggle P, as described.

22. The combination of the toggle P, the spring p^4, the valve n, the passage a', and the pipe N, as described.

FRANK S. BALDWIN.

Witnesses:
CHAS. D. MOODY,
CORA E. HUNT.