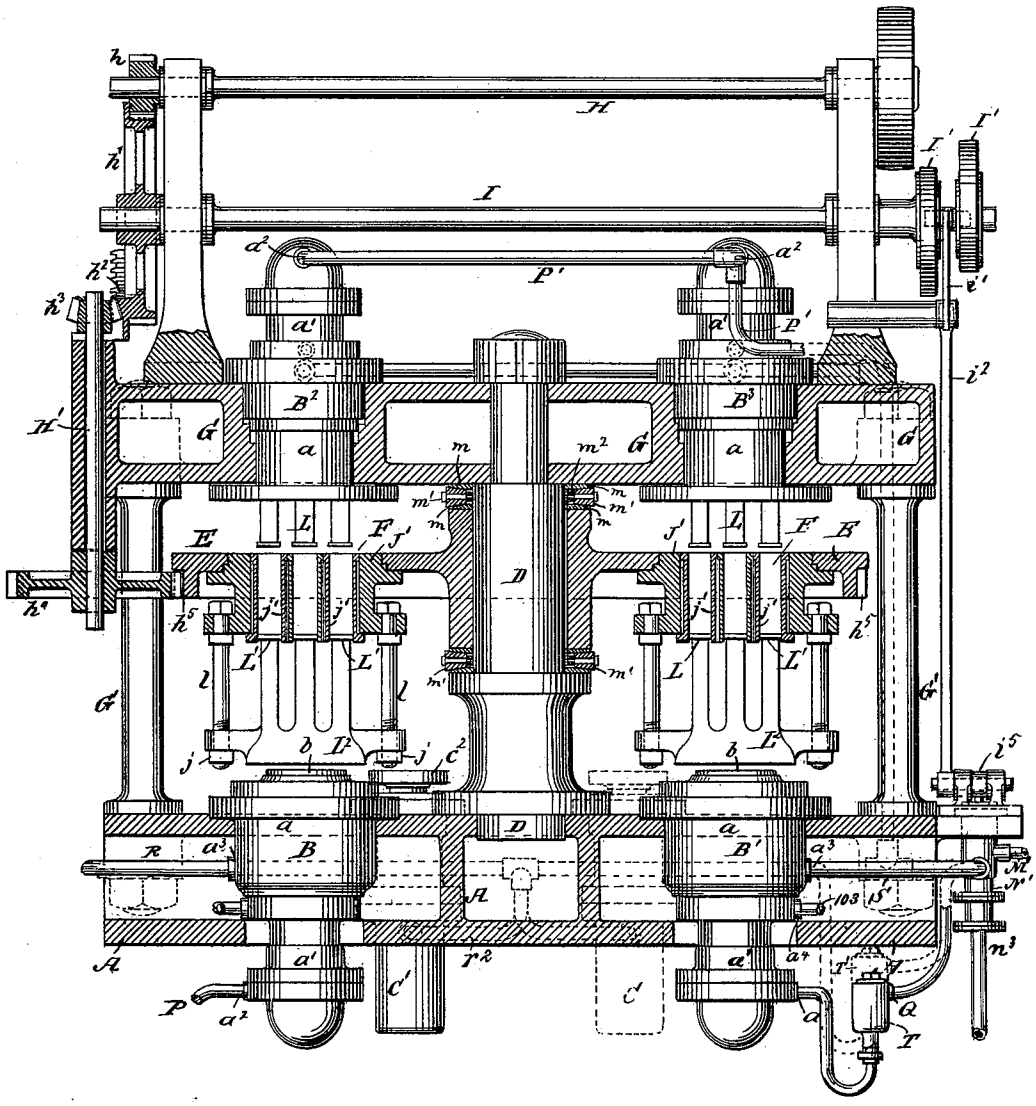
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H. VON MITZLAFF.

HYDRAULIC PRESS.

No. 394,527. Patented Dec. 11, 1888.

Fig. 1.



WITNESSES:

Edward Wolff.
William Miller.

INVENTOR:

Hermann von Mitzlaff.

BY Paul Santwood & Hauff

ATTORNEYS.

N. PETERS, Photo-Lithographer, Washington, D. C.

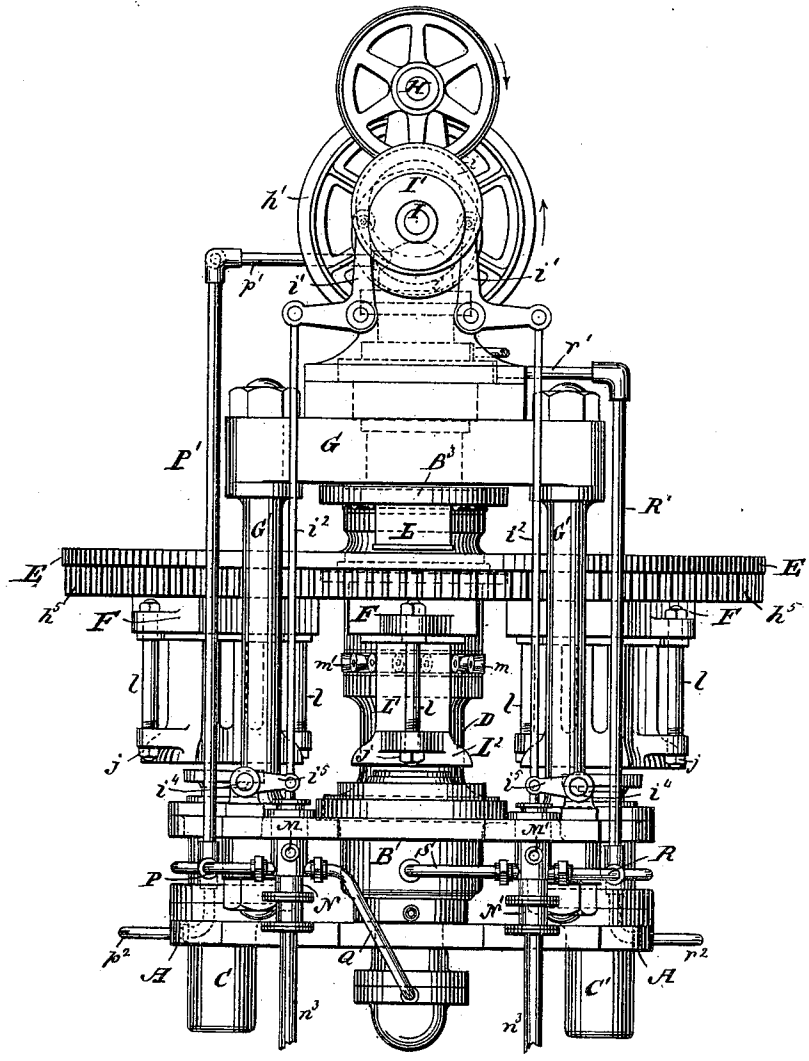
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HYDRAULIC PRESS.

No. 394,527. Patented Dec. 11, 1888.

Fig. 2.



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Fig. 3.

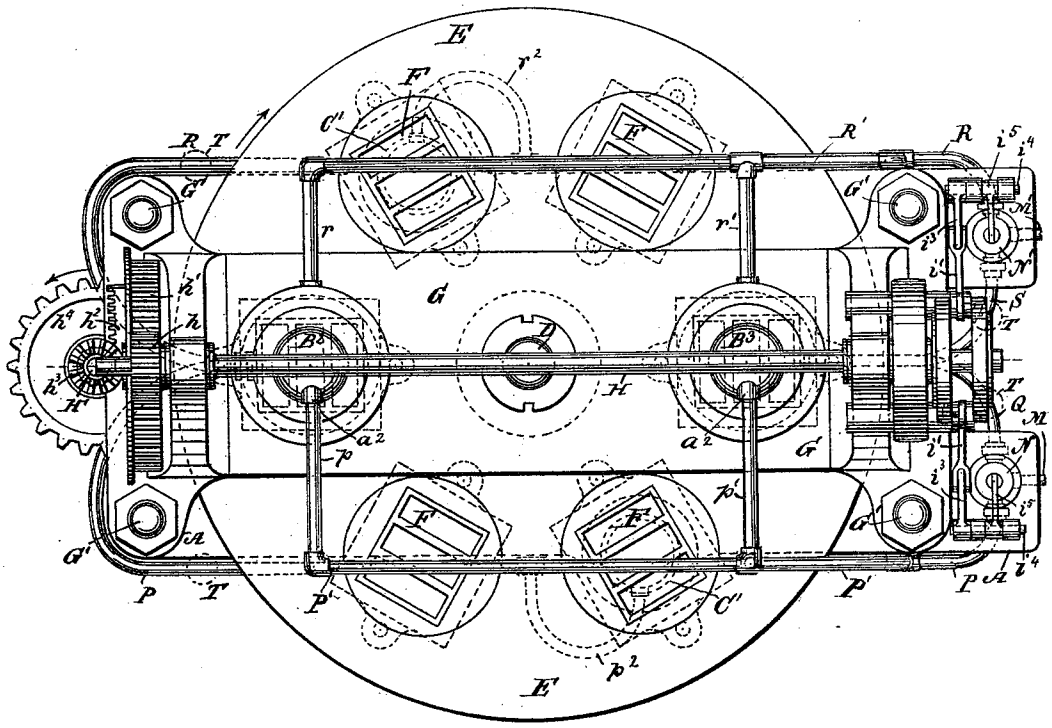


Fig. 4.

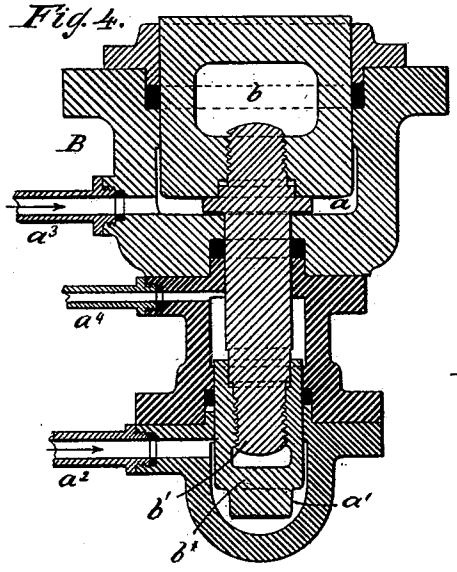
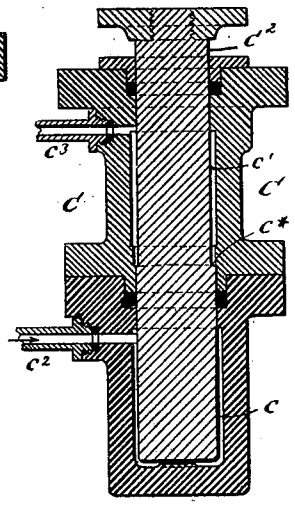


Fig. 5.



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No. 394,527. Patented Dec. 11, 1888.

Fig. 6.

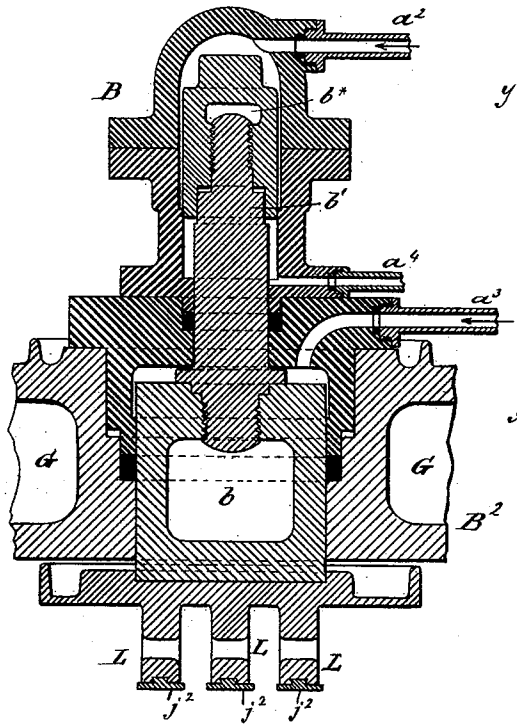


Fig. 7.

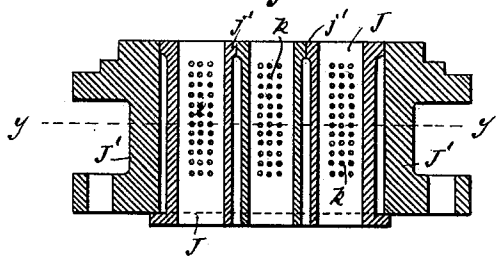


Fig. 8.

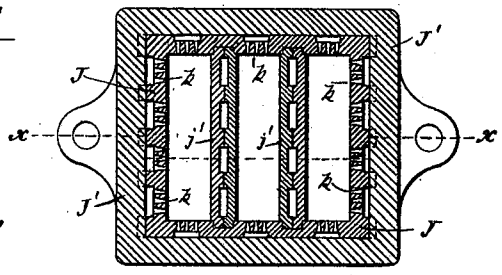


Fig. 9.

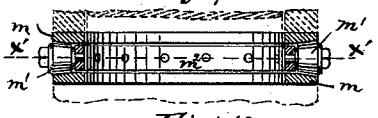


Fig. 10.

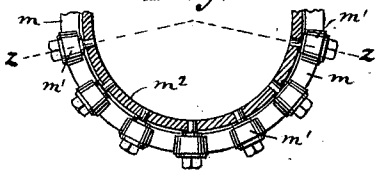


Fig. 11.

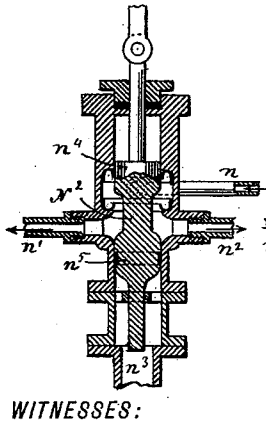


Fig. 12.

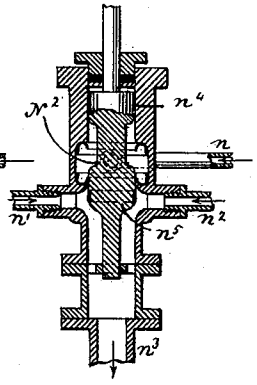


Fig. 13.

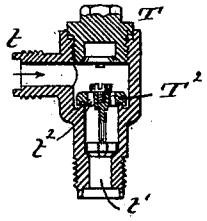


Fig. 14.



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UNITED STATES PATENT OFFICE.

HERMANN VON MITZLAFF, OF POTSDAM, PRUSSIA, GERMANY.

HYDRAULIC PRESS.

SPECIFICATION forming part of Letters Patent No. 394,527, dated December 11, 1888.

Application filed May 19, 1887. Serial No. 238,759. (No model.) Patented in Germany July 16, 1886, No. 40,807.

To all whom it may concern:

Be it known that I, HERMANN VON MITZLAFF, a citizen of the German Empire, residing at Potsdam, in the Kingdom of Prussia and German Empire, have invented new and useful Improvements in Hydraulic Presses, (for which I have obtained Letters Patent in Germany, No. 40,807, July 16, 1886,) of which the following is a specification.

My invention consists in an improved hydraulic press, the novel features of which are fully pointed out in the following specification and claims, and illustrated in the accompanying drawings, in which—

Figure 1 represents a sectional side elevation. Fig. 2 is an end elevation. Fig. 3 is a plan or top view. Fig. 4 is a vertical central section of a lower press-cylinder and its plunger, drawn to a larger scale than the preceding figures. Fig. 5 is a similar section of an ejector. Fig. 6 is a vertical central section of an upper press-cylinder. Fig. 7 is a vertical section in the plane x x, Fig. 8, of a mold. Fig. 8 is a horizontal section of the same in the plane y y, Fig. 7. Fig. 9 is a vertical section in the plane z z, Fig. 10, of a detail part. Fig. 10 is a section in the plane x' x', Fig. 9. Fig. 11 is a vertical central section of a supply-valve with the plunger adjusted to supply water to the cylinders. Fig. 12 is a similar view thereof, showing the plunger adjusted to shut off the supply and open the discharge. Fig. 13 is a central section of a supply-regulating valve. Fig. 14 is a plan of a perforated valve-disk.

Similar letters indicate corresponding parts.

In the drawings, the letter A designates the stationary bed of the press-frame, in which are secured two press-cylinders, B B′, and two ejector-cylinders, C C′.

Above the bed A, and loosely mounted upon a vertical shaft, D, is located a horizontal rotary mold-carrier, E, which in this example is provided with six molds, F, equidistant from the center. Above said mold-carrier is arranged a stationary bridge, G, which is supported at each end on pillars G′ G′, resting on and secured to the bed A. The upper press-cylinders, B^2 B^3, are secured in said bridge above and in line with the lower cylinders, B B′. An intermittent rotary motion is imparted to the mold-carrier E, so as to bring the molds F successively between the cylinders B and B^2 and B′ and B^3 by the following means: A driving-shaft, H, at the top of the frame is provided on one end with a gear-wheel, h, which meshes into a gear-wheel, h', on a shaft, I, extending parallel to shaft H. A toothed segment, h^2, on the face of said gear-wheel h' engages with a bevel-gear, h^3, mounted on the upper end of a vertical spindle, H′, whereby an intermittent rotary motion is imparted to the latter. A gear-wheel, h^4, on said spindle H′ meshes into gear-teeth h^5 on the periphery of the mold-carrier E. The toothed segment h^2 is of such length that for one revolution of the driving-shaft H the mold-carrier is moved, in this example, through one-sixth of a revolution, so that a new set of molds is brought between the press-cylinders at each revolution of the shaft.

The lower press-cylinders, B B′, Fig. 4, are each constructed with two distinct and separate chambers, a a', the upper or main chamber, a, being considerably larger in diameter than the lower or supplementary chamber, a'. In the chambers are fitted plungers b and b', which are rigidly connected with each other to form a compound plunger, said plungers having different diameters. Liquid under pressure is admitted in equal quantities to both chambers a a' at once, and the plunger b b' is rapidly forced outward under the force acting on the plunger b' alone, as the chamber a is so large in comparison to the chamber a' that the water merely fills the former as the piston advances. As the resistance of the mass in the molds to compression increases, the pressure of water also acts on the plunger b, and a great force is exerted on the mass near the completion of the stroke, owing to the large area of the plunger b. The water under pressure enters the chamber a' at a^2 and the chamber a at a^3. The length of the stroke of the compound plunger b b' is adjusted by means of a screw-cap, b^*, engaging with the cylinder when the plunger is at the end of its stroke. A second inlet, a^1, in the chamber a' is provided for the purpose of admitting the water to force the plunger inward on its non-working stroke, as will be hereinafter more fully described. In this case the

force of the water comes on a shoulder formed by the cap b^*, said cap fitting closely to a contracted portion of the chamber a'. The upper press-cylinders are constructed similarly to the lower press-cylinders just described and operate in the same manner.

The molds F, Figs. 1, 3, 7, and 8, are divided into two or more compartments of the dimensions desired by double partitions j', and are removably secured to the mold-carrier by the use of keys. Said molds consist of an internal steel box, J, open at its top and bottom, and an external box, J′, of cast-iron, air-spaces being left between the two. The compartments of the mold are adapted to be entered from the top and bottom by suitable punches, L L, secured to the plungers b b' of the press-cylinders, and from below they are entered by similar punches, L′ L′, secured to a cross-head, L^2, vertically movable on guide-rods l, pendent from the bodies of the molds F. The ends of the rods l are threaded and provided with nuts j. By turning said nuts the punches can be made to project more or less into the molds, so that they will receive more or less of the material to be compressed. Said cross-heads are adapted to be engaged by the plungers b b' of the lower cylinders, B B′, when the mold-carrier is rotated in the proper position. To provide for the escape of air from the material under compression, the walls of the inner box, J′, as well as the partitions, are provided with perforations or air-holes k, and head-plates j^2 on the punches may be similarly perforated, so that the air may escape at all sides. In order to prevent the holes k from becoming clogged, the wall is made as thin as practicable at the portion containing the holes by rabbeting or cutting away the material of the box J and the partitions, and the holes are drilled tapering, with the greater diameter outward.

To prevent the mold-carrier from yielding vertically, and also to provide a comparatively frictionless bearing for the same, I construct a bearing, Figs. 1, 9, and 10, of two steel rings, m, which are secured to the shaft D, and between which rings a number of conical rolls, m' m', can play, all said rolls pointing to a common center. The rolls rotate about spindles secured in a collar, m^2, loosely encompassing the stationary shaft D. Two such devices are placed at a distance apart on the shaft, Fig. 1.

The ejectors C C′ are secured to the bed A diametrically opposite to each other, and each of the same is provided with two chambers, c c', Fig. 5, the main chamber c having a slightly-smaller bore than the supplementary chamber c', and the plunger C^2, fitted in said chambers, is made smaller in diameter in its upper portion, thereby forming an annular water-space with the walls of the upper chambers. The water under pressure is admitted at c^2 near the bottom of the chamber c', and at c^3 at the top of the chamber c'. The water entering the inlet c^3 forces the plunger upward, and the downward or return stroke is quickened by the water-pressure on the shoulder c^*, formed at the junction of the two portions of the plunger.

The arrangement of pipes for distributing water to the various cylinders from an accumulator or hydraulic press (not shown) and the various valves in said pipes and means for operating the same are as follows:

M M′ are the supply-pipes from the accumulator or hydraulic press, which are connected to the inlets of two supply-valves, N N′, Figs. 1, 2, and 3, the construction of which latter is shown in Figs. 11 and 12. Each of said valves consists of a casing provided with an inlet, n, connected to the accumulator, two outlets, n' n^2, opening to the distributing-pipes of the various cylinders, and a discharge, n^3, for the water discharged from the said cylinders. A plunger, N^2, having a neck and two heads, n^4 n^5, controls said openings. When the plunger is in the position shown in Fig. 11, the water from the supply-pipe M can enter the valve-casing, and passes out through the two outlet-openings n' and n^2 to the various cylinders, since the discharge n^3 is closed by the head n^5. When the plunger N^2 is moved to the position shown in Fig. 12, the two outlet-openings n' and n^2 are closed by the head n^5, and the discharge from the various cylinders enters the casing through the outlet-openings n' and n^2 and discharge through the opening n^3.

The plunger N^2 of each valve is reciprocated once for each revolution of the shaft I by a suitable connection with the latter.

In the drawings, Figs. 1, 2, and 3, I have shown as a driving mechanism for each plunger a hub, I′, having an eccentric groove, i, which hub is rigidly mounted on said shaft. One arm of a crank-lever, i', engages the groove i, and the second arm of the lever is connected by a rod, i^2, with an arm, i^3, Fig. 3, extending from a rock-shaft, i^4. A second arm, i^5, projecting from the said rock-shaft, is in engagement with the plunger N^2. To the outlet-openings n' n^2 of the valve N are connected two pipes, P and Q, one of which, P, extends along the side of the press, and its end is connected with the supplementary chamber a' of the lower press-cylinder, B, to supply water to the same. A branch pipe, P′, extending upwardly and horizontally, is connected by auxiliary branches p p' with the supplementary chambers of the two upper press-cylinders, B^2 and B^3. The second pipe, Q, from the valve N connects directly with the supplementary chamber a' of the cylinder B′. A branch pipe, p^2, from the pipe P is connected with the main chamber c of the ejector-cylinder C.

To the outlet-openings n' n^2 of the valve N′ are connected two pipes, R and S, one, R, of which extends along the side of the press, and its end connects with the main chamber a of the lower press-cylinder, B. A branch, R′, of said pipe extends upwardly, and is con-

nected by two branch pipes, r r', with the main chamber of the two upper press-cylinders B^2 and B^3. The second pipe, Q, from the valve N′ connects directly with the main chamber of the lower press-cylinder, B′. A branch pipe, r^2, from the pipe R is connected with the main chamber of the ejector C′.

From this description it will be seen that the supply-valve N is connected with the supplementary chambers a' of the four press-cylinders B, B′, B^2, and B^3, and the valve N′ with the main chamber a of the same cylinders.

In the operation of the press the valves N N′ are opened for admission of water, and the plungers b b' of the said cylinders are started on their working stroke under a comparatively small pressure, owing to small diameter of the plunger b' in the supplementary chamber. When the plungers have been moved through a part of their stroke and the resistance of the material increases, the water in the main chambers a acts on the large plunger b, causing the punches to act with great force upon the mass within the molds F during the remaining part of the stroke, whereby the brick is rendered extremely compact and sound.

The regulation of the velocity with which the plungers move being an important matter, I provide valves T T′, Figs. 1, 3, and 13, for this purpose, which can be inserted in the pipes P Q R S. Each of said valves consists of a casing having an inlet, t, and an outlet, t'. A valve-disk, T^2, within the casing is guided vertically to and from its seat, and is provided with a number of orifices, t^2. The entering liquid presses the valve down to its seat, but can pass through said orifices. To regulate the quantity of liquid passing through the valve, any desired number of said orifices t^2 can be plugged with suitable screws, the orifices being provided with internal screw-threads. The discharging water enters the outlet t' and lifts the valve-disk T^2 from its seat, so that it passes unobstructedly through the valve. Any other suitable valve can, however, be used to accomplish this object.

To draw the plungers of the press-cylinders B B′ B^2 B^3 inward on their non-working stroke after the completion of the working stroke, I connect the inlets a^4 of the supplemental chambers, by means of pipes, with the supply-pipes from the accumulator, so that after the valve N^2 closes the supply the pressure of the water will act on the ends of the caps previously described, on the plungers b b', and on the shoulders c^3 of the plungers C^2, to force the plungers on their non-working stroke. The inlets c^3 of the ejectors C C′ are similarly connected to the said supply-pipes.

What I claim as new, and desire to secure by Letters Patent, is—

1. A press-cylinder containing a plunger, and an adjustable nut or cap on the lower end of the plunger for regulating the length of its stroke, substantially as shown and described.

2. A press-cylinder containing a main and a supplementary chamber of different diameters arranged in line, with the larger chamber in advance of the smaller, and the latter having an internal contracted part, in combination with a plunger composed of two connected plungers of different diameters and a cap on the smaller plunger, constituting a shoulder which closely fits the contracted parts of the smallest chamber, two fluid-inlets to admit fluid simultaneously to both chambers and impart greater force near the completion of the outstroke of the plunger, and an additional fluid-inlet between the plungers of different diameter to deliver fluid upon the aforesaid shoulder and force the plunger inward, substantially as and for the purpose described.

3. The combination of a series of presses, each having a main and supplementary chamber, as described, a valve, pipes connecting said valve with all the main chambers, a second valve, pipes connecting it with all the supplementary chambers, suitable supply-pipes for the valves, ejectors connected with either one of said valves, and means, as described, for actuating the valves, substantially as and for the purpose set forth.

4. The combination of a series of presses, each having a main and a supplementary chamber, two valves connected by pipes, respectively, with the main and supplementary chambers, water-supply pipes connected with the valves, means, as described, for actuating the valves, and regulating-valves in the pipe-connection of valves and chambers, substantially as and for the purpose set forth.

5. The combination of a series of presses, each having a main and a supplementary chamber, two valves respectively connected by pipes with the main and with the supplementary chambers, water-supply pipes for the valves, ejectors provided with main and supplementary chambers, the main chambers being connected with the supply-valves, and a pipe-connection of the supply-pipes with second inlets in the auxiliary chambers of the presses and ejectors, substantially as shown and described.

In testimony whereof I have hereunto set my hand and seal in the presence of two subscribing witnesses.

HERMANN VON MITZLAFF. [L. S.]

Witnesses:
B. ROI,
F. VON VERSEN.