No. 772,135. PATENTED OCT. 11, 1904.

J. DODGE.

PRESS FOR FORGING, SHAPING, OR PUNCHING METALS.

APPLICATION FILED AUG. 18, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

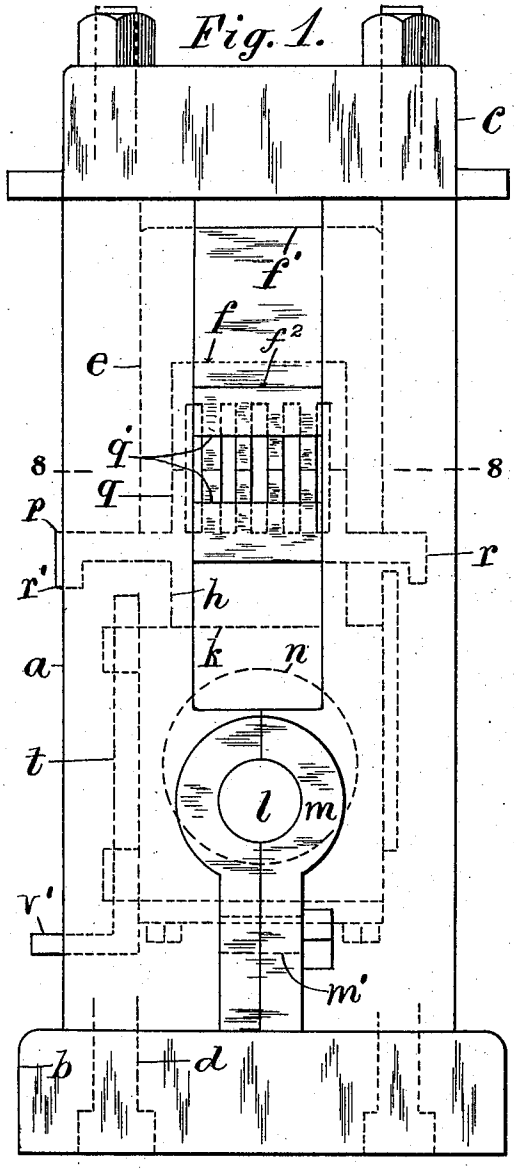


Fig. 2.

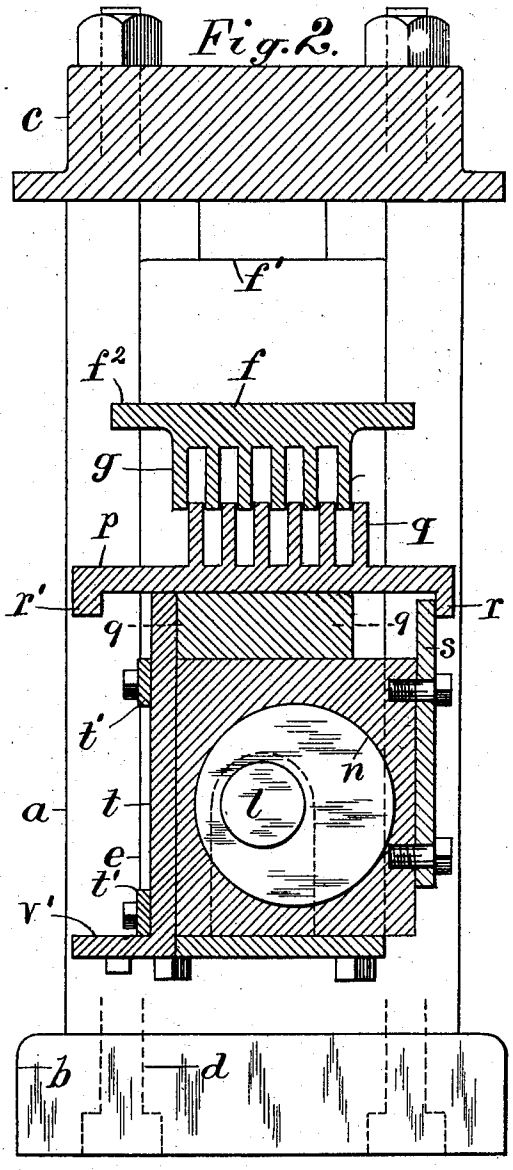
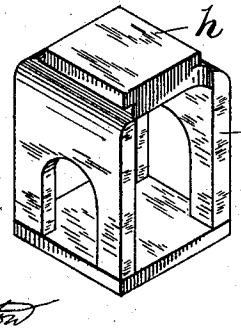


Fig. 3.



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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 4.

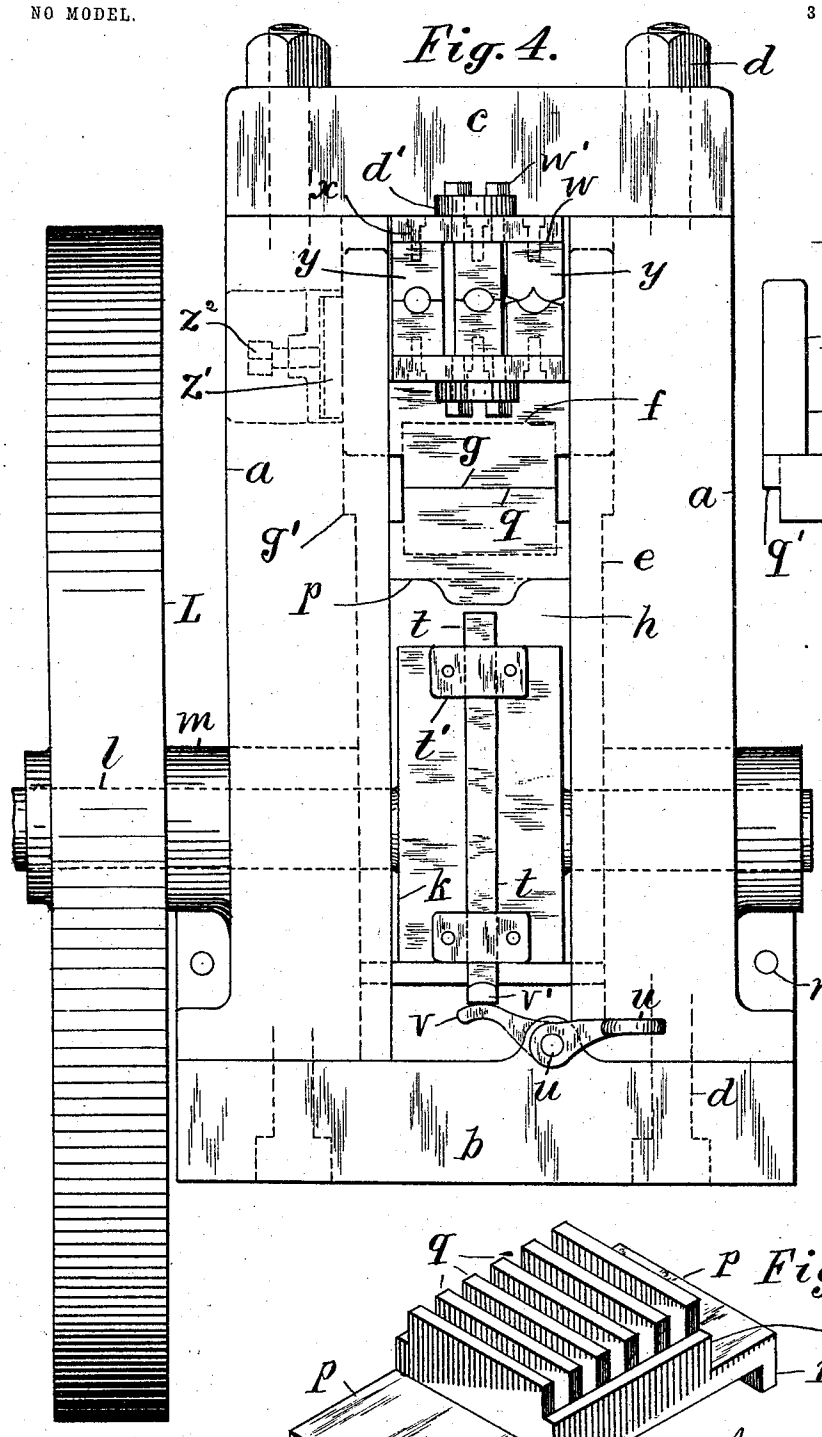


Fig. 5.

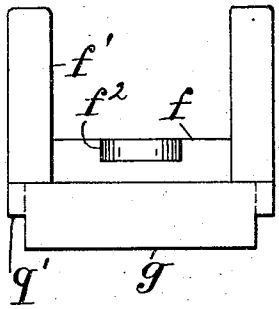


Fig. 6.

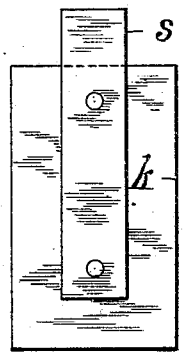


Fig. 7.

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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 8.

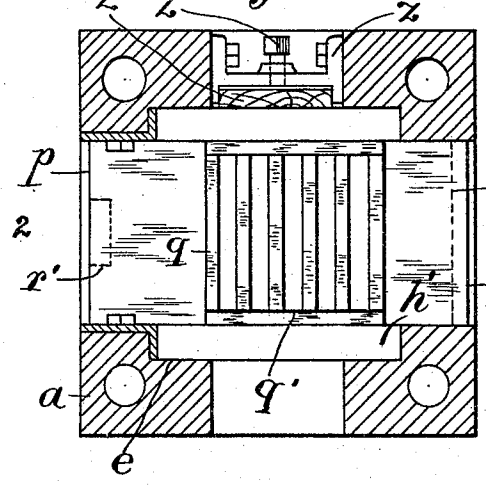
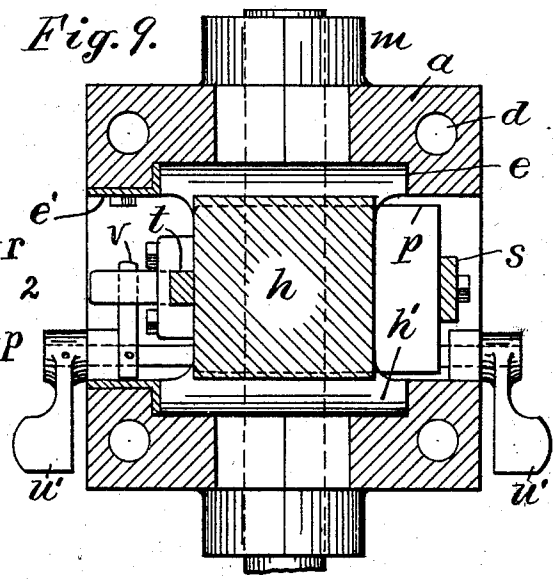


Fig. 9.



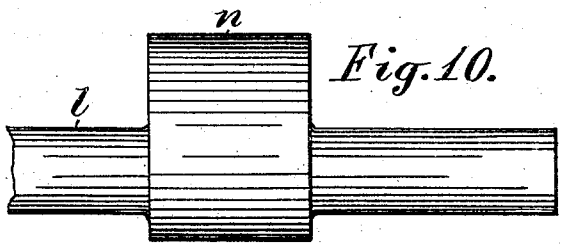


Fig. 10.

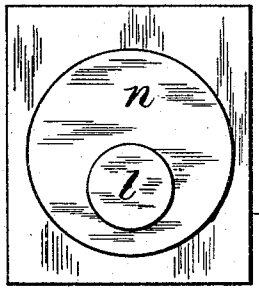


Fig. 11.

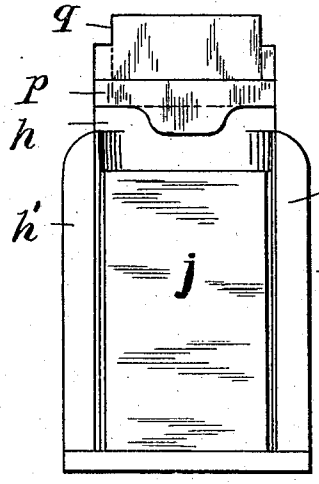


Fig. 12.

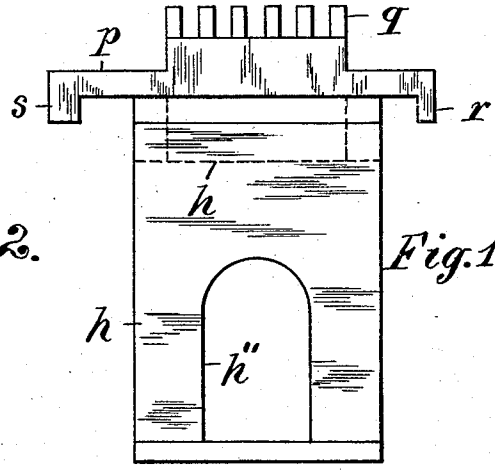


Fig. 13.

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No. 772,135. Patented October 11, 1904.

UNITED STATES PATENT OFFICE.

JAMES DODGE, OF NEWARK, NEW JERSEY, ASSIGNOR OF ONE-HALF TO DAVID BLAKE, OF NEWARK, NEW JERSEY.

PRESS FOR FORGING, SHAPING, OR PUNCHING METALS.

SPECIFICATION forming part of Letters Patent No. 772,135, dated October 11, 1904.

Application filed August 18, 1903. Serial No. 169,851. (No model.)

To all whom it may concern:

Be it known that I, JAMES DODGE, a citizen of the United States, residing at Grafton avenue, Newark, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Presses for Forging, Shaping, or Punching Metals, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to the class of power-presses in which dies are attached to a cross-head at the top of the press and to a ram movable beneath the cross-head, so that the ram is lifted to operate and falls by its own weight from the cross-head when the lifting power is removed.

My invention includes mechanism by which the ram is automatically arrested at the end of each stroke unless the operator actuates a given bolt by pressure upon a treadle provided for the purpose, and the ram can thus be kept in operation as long as desired. The location of the ram above the means for reciprocating it permits it to be formed as a comparatively light plate, adapted merely to sustain the dies and supported and propelled when in operation by a large plunger operated in contact with its lower side. Such a plunger may have any desired strength and magnitude to adequately support the pressure imposed upon the ram, and the ram itself may thus be made very light, so that it has very little momentum and may be readily stopped and started, while the heavier parts comprising the plunger and its driving mechanism are moved continuously. The momentum of the continuously-moving parts is thus imparted to the ram (which has very little momentum) at each stroke, and the weight of all such moving parts is utilized in the operative pressure of the ram. The stopping and starting of the ram at pleasure are effected by providing the ram and the plunger with a horizontal series of interspaced teeth, which when coincident serve to support the ram upon the plunger and transmit to the ram the motion of the plunger, but capable of being shifted from coincidence, so as to clear one another and avoid transmitting the motion of the plunger to the ram. With such construction the shaft and eccentric rotate continuously, and a speed of one hundred and twenty revolutions becomes admissible, which enables the press to perform more work than one running slower. The movable projections are shown in the annexed drawings projected upwardly from a slide which is fitted to move upon the top of the plunger, and means is attached to the eccentric-block by which the slide is shifted automatically at the end of each movement to draw the teeth out of line, and thus stop the action of the ram automatically. A bolt is also carried by the eccentric-block and actuated by a treadle, which bolt is operated by contact with the slide to retract it to its normal position upon the top of the plunger to make the teeth coincide with the ram, and the pressure upon the treadle thus serves at the will of the operator to set the ram in motion and to continue its movement as long as the treadle is depressed.

In the annexed drawings, Figure 1 shows the side of the press with the bearing *m* for the eccentric driving-shaft. Fig. 2 a section on line 2 2 in Fig. 8. Fig. 3 is a perspective view of the plunger. Fig. 4 is a side view of the press, including the fly-wheel, which is omitted from the other figures to avoid obscuring the working parts. Fig. 5 is a side view of the ram *f* the same as represented in Fig. 4. Fig. 6 is a side view of the eccentric-block *k* the same as shown in Fig. 4. Fig. 7 is a perspective view of the slide *p* for the top of the plunger. Fig. 8 is a plan taken in section on line 8 8 in Fig. 1 at the tops of the teeth upon the slide. Fig. 9 is a horizontal section on line 9 9 in Fig. 2, taken through the upper part of the plunger *h*. Fig. 10 is a side view of a portion of the driving-shaft with eccentric thereon. Fig. 11 is an end view of the driving-shaft and eccentric with

the eccentric-block k thereon. Fig. 12 is a side view, and Fig. 13 an edge view, of the plunger with the slide thereon.

Four posts a are shown in the drawings, attached to the base b and cap or cross-head c by through-bolts d, only the tops and bottoms of the bolts being represented in Figs. 1, 2, and 4. The inner corners of the posts are formed with rabbets or rectangular grooves e, and the ram and plunger are fitted to such grooves and packed to compensate for wear by angular gibs e', bolted in two of the grooves, and which are forced outward by inserting paper or tin behind the same when necessary to compensate for wear. The grooves e form guides on the posts.

The ram f is shown as a rectangular block with two guide-flanges f' projected upwardly therefrom and fitted to the grooves e, and shoulders g' (shown in Fig. 4) are formed in the grooves to arrest the ram at the bottom of its stroke. A horizontal series of six parallel teeth g (with five interspaces g'') is projected downwardly from the ram. The ram occupies the space directly below the cross-head c, and dies y are fixed to the under side of the cross-head and upper side of the ram to operate upon the material. Dies are shown suitable for forging hot iron or steel.

The plunger h is formed with flanges h', fitted to the lower part of groove e, and is provided with transverse slot j, (see Fig. 12,) in which the eccentric-block k is fitted to slide laterally. The driving-shaft l is mounted in bearings m, formed between the bottoms of the posts, which are (in the example shown) secured together in pairs by bolts m', forming stanchions at opposite sides of the space in which dies are shown in Fig. 4. The eccentric n is fitted to a circular hole in the eccentric-block k, and the rotation of the eccentric thus slides the block k laterally and the plunger h vertically.

A slide p is fitted to reciprocate between the posts a, as shown in Fig. 8, and rests upon the top of the plunger, as shown in Figs. 1 and 2. The slide is provided with upwardly-projecting parallel teeth q, adapted at times to interlock or fit in the spaces g'' between the teeth g, as shown in Fig. 2, or to fit beneath and support the ram upon the said teeth, as shown in Figs. 1 and 4. The teeth g and q are strengthened by shroudings q'. A dog s is attached to one side of the eccentric-block and projected upwardly nearly to the slide, and a lug r is formed upon the slide to engage the dog upon the first quarter of the plunger's downward movement. The eccentric rotates, as shown by the arrow in Fig. 2, and the engagement of the dog and lug shifts the slide p automatically into the position shown in that figure, so that the teeth q upon the slide clear the teeth g upon the ram, and the vertical movements of the plunger have no effect in reciprocating the ram. A bolt t is fitted in boxes t' upon the opposite side of the eccentric-block and may be moved vertically to the position shown in Fig. 2 to engage a lug r' upon the adjacent end of the slide, or it may be allowed to drop, as shown in Fig. 1, to clear such lug.

The treadle-shaft u is extended across the bed-plate b and treadles u', attached to the same, and a toe v is formed upon one of the treadles to engage a stud v', projected laterally from the bolt t. The eccentric-block reciprocates laterally, so as to move the stud v' laterally over the toe v; but the stud is of sufficient length for the toe to operate upon the same and shift the bolt t in any position of the eccentric-block. The pressure upon the treadle may thus at the will of the operator raise the bolt t and hold the same in a suitable position for the upper end of the same to engage the lug r' upon the slide contact with which retracts the slide to its normal position, (shown in Fig. 1,) with the teeth q exactly beneath the teeth g, so the teeth engage in the upward movement of the plunger and lift the ram to exert the desired pressure. The sides of the plunger are shown formed with arched openings h'' to straddle the shaft l adjacent to the sides of the eccentric, and the bottom of the plunger is made removable to apply the plunger over the shaft, the bottom gib serving as a bearing for the bottom of the eccentric-block k.

From the above description it will be seen that the separation of all the moving parts from the ram reduces the latter to a comparatively small part of the machine, and the disposition of the plunger, which operates the ram beneath the same, permits the small weight of the ram to fall after each actuation with very little momentum, and the remaining parts are thus enabled to move continuously and produce very little shock when suddenly contacting with the light weight of the ram to propel the same. The bolt t moves toward the lug r' only upon the lower quarter of the eccentric movement, and thus operates always to engage the teeth g and q when the plunger is lowered. The operator can therefore press the bolt upward at any time without producing any improper movement of the slide p. The dog s operates only upon the upper quarter of the eccentric's movement and acts to separate the teeth g and q from one another at each rotation of the driving-shaft.

Where the weight of the ram causes it to descend rapidly and make a concussion with the stop g', which limits its downward movement, the motion may be checked by a friction-brake. Such a brake is shown in Figs. 4 and 8, where a metal box z holds a wooden

brake-shoe z' against the flange f' of the ram and a set-screw z^2 is provided to adjust the pressure of the block as required. This brake is not essential in small presses, where the weight of the ram is comparatively small, but avoids any concussion of undesirable character in larger presses, where the weight of the ram would produce any jar.

With the construction described above the press can be run at exceptionally high speed, and by means of the bolt which is actuated by the treadle the movements are kept under perfect control. Where only a temporary pressure is made upon the treadle, the ram is caused to make only a single upward-and-downward movement and is then automatically stopped by the actuation of the dog upon the eccentric-block. The press is thus adapted for all those uses in which the article subjected to the press is only once punched or operated upon.

Having thus set forth the nature of my invention, what I claim herein is—

1. In a power-press having cross-head fixed at the top, the combination, with a ram movable vertically beneath the cross-head and carried downward by its own weight, of a driving-shaft, a plunger movable vertically beneath the ram and reciprocated continuously by the driving-shaft, two horizontal series of interspaced teeth carried respectively by the ram and the plunger and adapted, when the teeth are opposed, to lift the ram, one of said series being mounted to move laterally, and means actuated by the operator for engaging the series of teeth with one another, to lift the ram when desired.

2. In a power-press having cross-head fixed at the top, the combination, with a ram movable vertically beneath the cross-head and carried downward by its own weight, of a continuously-rotated eccentric, a plunger movable vertically beneath the ram and reciprocated continuously by the eccentric, a slide movable transversely upon the plunger, two horizontal series of interspaced teeth carried by the ram and by the slide, adapted to engage one another for lifting the ram, and means for shifting the slide to cause the teeth of one series to enter the interspaces upon the opposite series, to arrest the ram without stopping the eccentric.

3. In a power-press having cross-head fixed at the top, the combination, with a ram movable vertically beneath the cross-head and carried downward by its own weight, of a plunger (with transverse slot) movable vertically beneath the ram, a continuously-rotated eccentric, a block fitted to the eccentric and to the transverse slot to reciprocate the plunger, a slide fitted movably upon the top of the plunger, two horizontal series of interspaced teeth carried by the ram and by the slide, adapted to engage one another for lifting the ram, and means upon the slide and block for shifting the slide automatically at each movement of the plunger, to disengage the teeth and arrest the movement of the ram.

4. In a power-press, the combination, with a ram and a continuously-rotated eccentric, of a plunger with transverse slot, a block fitted to the eccentric and to the transverse slot to reciprocate the plunger, a slide movable transversely on the plunger, projections carried by the ram and slide adapted to engage one another for lifting the ram, means upon the slide and block for shifting the slide automatically to separate the projections at each movement of the plunger, a lug upon the slide, a bolt fitted movably upon the block to engage such lug when shifted, and a treadle for shifting the bolt at the will of the operator, to retract the slide to its normal position.

5. In a power-press, the combination, with four upright posts a having guides upon their inner corners and cross-head c fixed at the top, of the ram f fitted movably to the upper part of such guides, the plunger h fitted to the lower part of the guides and provided with a transverse slot, the continuously-rotating eccentric n having the block k fitted to the slot to reciprocate the plunger, the slide p movable transversely upon the plunger and projecting at its ends between the posts, the horizontal series of interspaced teeth q projected upwardly from the slide, the series of horizontal interspaced teeth g projecting downwardly from the ram and adapted when coincident to support the ram, and parts carried respectively by the block and slide for automatically shifting the slide, to disengage the teeth so as to clear one another and stop the ram at each rotation of the eccentric.

6. In a power-press, the combination, with four upright posts a having guides upon their inner corners and cross-head c fixed at the top, of the ram f fitted movably to the upper part of such guides, the plunger h fitted to the lower part of the guides and provided with a transverse slot, the bearings m between the posts, the shaft l extended across the bearings and plunger, with eccentric n and block k fitted to move transversely in the plunger-slot, a fly-wheel continuously rotated with the shaft and eccentric, and two horizontal series of interspaced teeth carried respectively by the ram and by the plunger adapted to engage one another for lifting the ram, and means for shifting the two series of teeth out of engagement to clear one another and arrest the ram without stopping the eccentric.

7. In a power-press, the combination, with the posts a having cross-head c fixed upon the top and the grooves e upon their inner corners, of the ram f having flanges f' fitted to the upper parts of such grooves, the plunger h

fitted to the lower parts of the grooves, and an eccentric for continuously reciprocating the plunger, two horizontal series of interposed teeth carried by the ram and by the plunger, and adapted when engaged to lift the ram, means for disengaging the teeth to stop the ram, shoulders in the grooves *e* forming stops *g* to limit the downward movement of the ram, the brake-box *z* fitted between the posts with brake-shoe *z'* in contact with one of the flanges *f'*, and means for adjusting the brake-shoe to regulate the operation of the brake and regulate the descent of the ram to the stops.

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

JAMES DODGE.

Witnesses:
THOMAS S. CRANE,
DAVID BLAKE.