

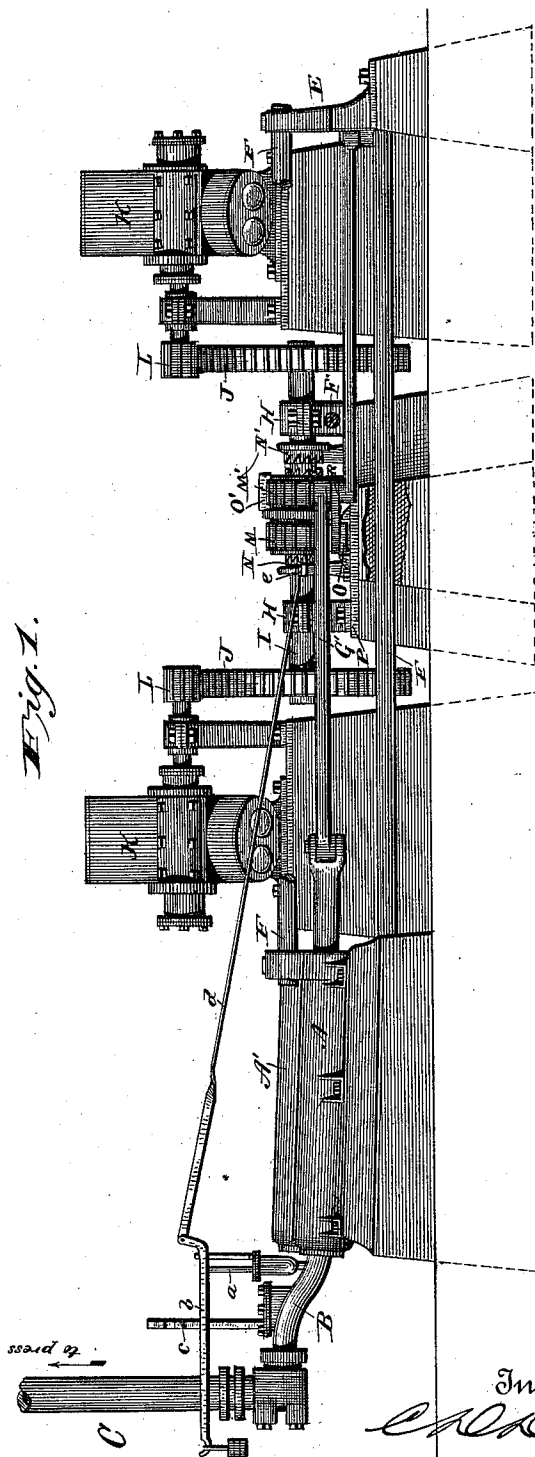
(No Model.)

5 Sheets—Sheet 1.

C. D. DAVIS.
HYDRAULIC PRESS.

No. 408,653.

Patented Aug. 6, 1889.



Witnesses
Jno. S. Finch
C. R. Jack

Inventor
C. M. Davis

By his Attorney
C. M. Alexander

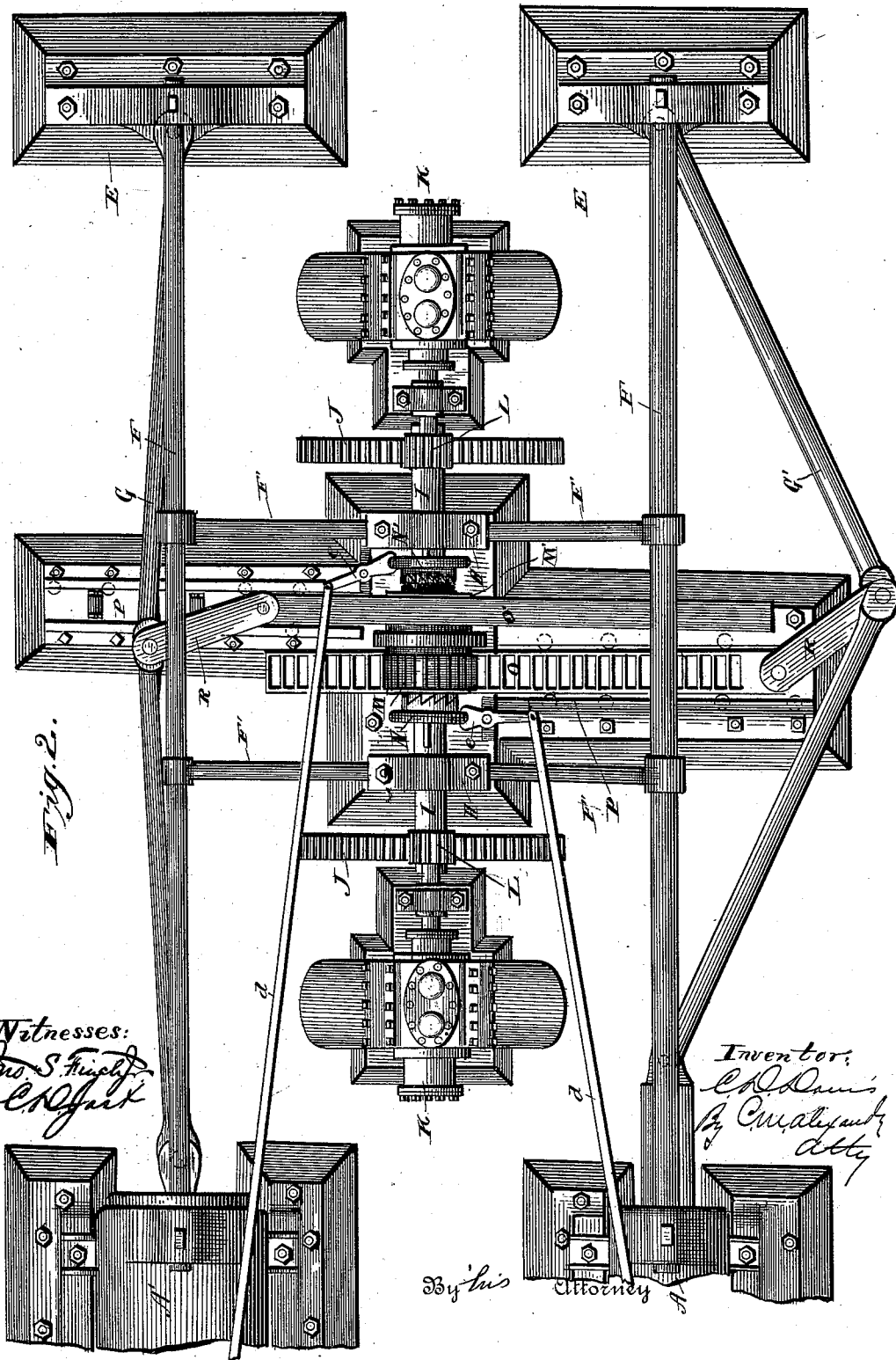
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Fig. 1.

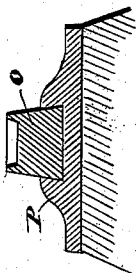
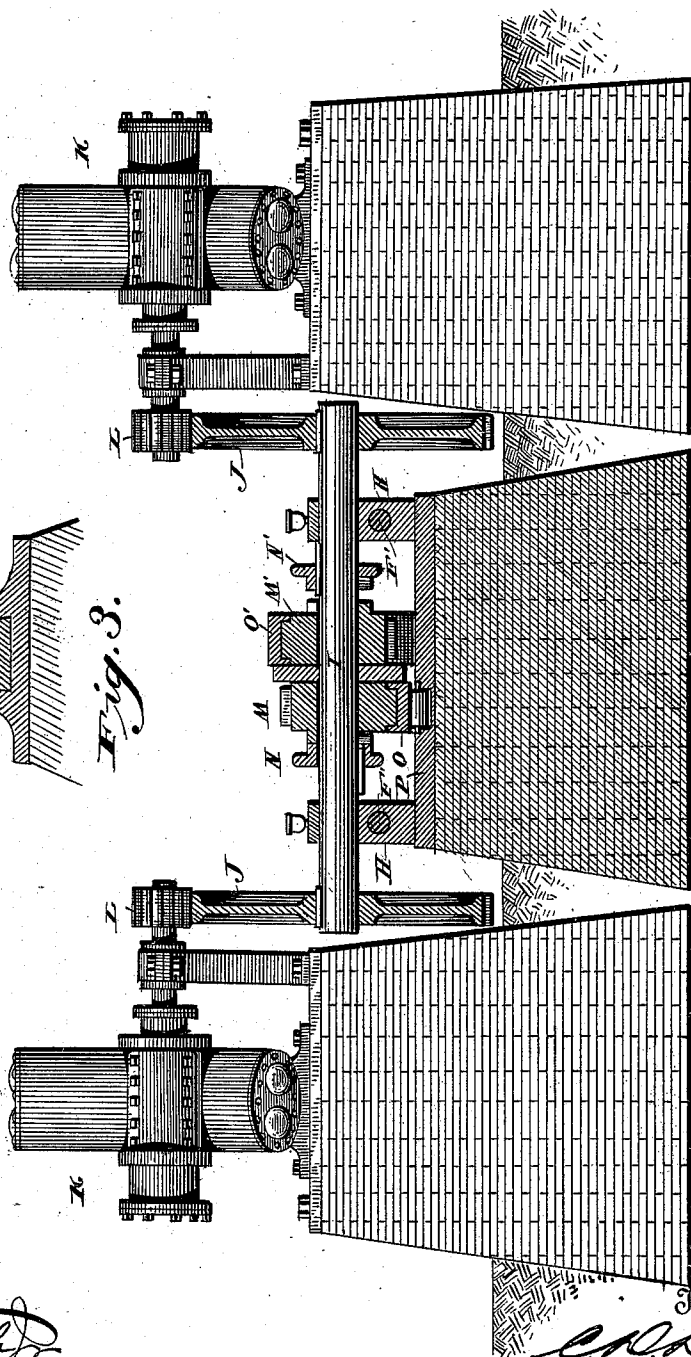


Fig. 3.



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Fig. 4.

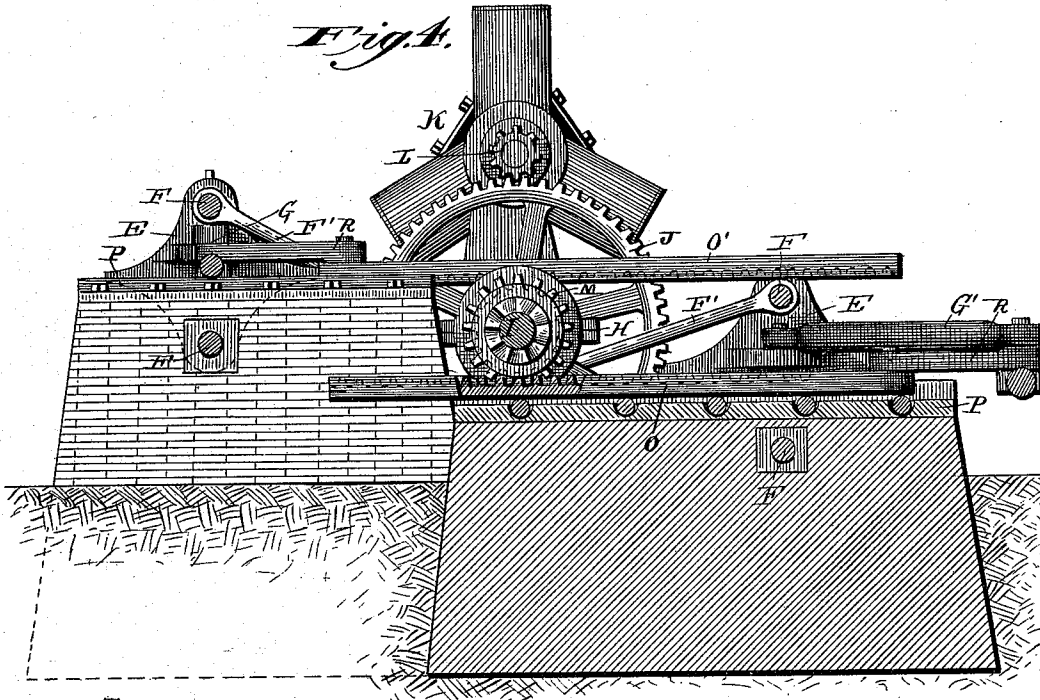
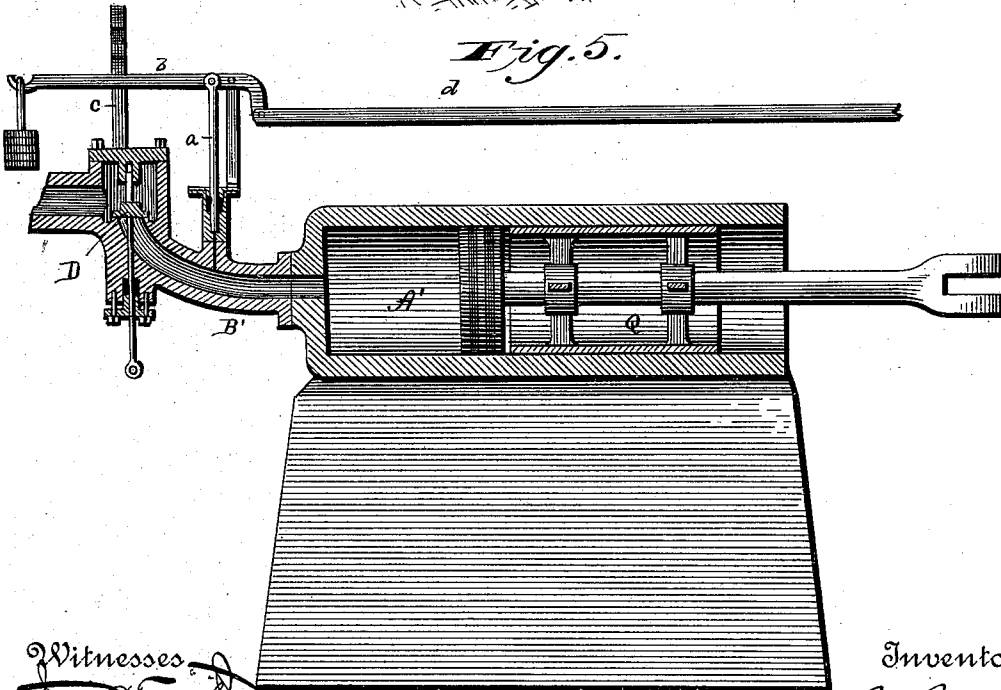


Fig. 5.



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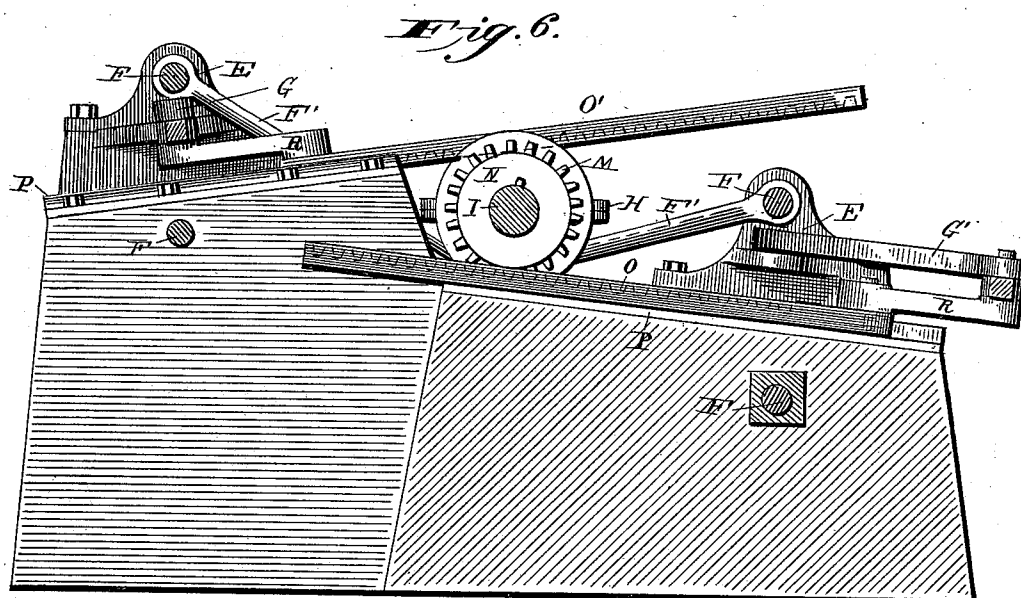
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C. D. DAVIS.
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Patented Aug. 6, 1889.



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UNITED STATES PATENT OFFICE.

CHARLES D. DAVIS, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR
TO LEWIS MILLER, OF PHILADELPHIA, PENNSYLVANIA.

HYDRAULIC PRESS.

SPECIFICATION forming part of Letters Patent No. 408,653, dated August 6, 1889.

Application filed January 28, 1889. Serial No. 297,806. (No model.)

To all whom it may concern:

Be it known that I, CHARLES D. DAVIS, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Hydraulic Presses, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

Figure 1 represents a side elevation, partly in section, of my improved apparatus for operating hydraulic rams; Fig. 2, a plan view thereof; Fig. 3, a longitudinal sectional elevation; Fig. 4, a transverse vertical sectional view; Fig. 5, a sectional view of one of the rams, showing mainly the check-valve and pressure controller and regulator; Fig. 6, a transverse sectional view of a slight modification of the bed-plates and guides for the rack-bars; and Fig. 7, a detail view showing rack-bar and portion of one of the bed-plates.

This invention relates more particularly to improvements upon that style of press covered by Letters Patent numbered 394,383, granted December 11, 1888, to Lewis Miller, and the special object I have in view is not only to simplify the mechanism covered by this patent, but also to render it more efficient by so arranging the devices that the greatest force will be exerted upon the bale when the maximum of pressure is needed, as will more fully hereinafter appear.

The invention also has for its object to provide an apparatus that will be positive and very rapid and automatic in its action, thereby requiring but little attention while in operation.

Another object had in view in designing this apparatus is to obtain a very great power with but a small expenditure of fuel, thereby reducing the cost of running the press to a minimum, as will be more fully hereinafter set forth.

The invention also has other minor objects in view, which will fully appear in the course of this description.

The invention consists in certain novel combinations and arrangements of parts that will be particularly pointed out in the claims appended.

Referring to the annexed drawings by letter, A A' designate, respectively, the high

and low pressure rams bolted to and mounted upon suitable substantial bases and foundations. Bolted to and communicating with the interior of the ram-cylinders, at the forward ends of the same, are the conduits BB', which also communicate with the leader-pipe C of the press, the press not being shown in the drawings.

In each of the conduits B B' is arranged a suitable check-valve D, which is adapted to automatically close when the ram reaches its maximum pressure. The pressure exerted by these rams is determined and regulated by means of pressure-controllers placed in the conduits B. These pressure-controllers, as shown most clearly in Fig. 5, each consist, essentially, of a vertical piston *a*, working in a cylinder whose lower end communicates with the interior of the conduit, the upper end of the piston being pivotally connected to a pivoted weighted angle-lever *b*. These pivoted weighted levers are adapted to be held in an elevated position by means of spring-catches *c*, and are each connected by means of connecting-rods *d* and pivoted levers *e* with the sliding clutches, hereinafter referred to.

Connecting the rear end of each ram-cylinder with a strong stationary head-block E are two or more strong rods F, the said head-blocks being bolted to substantial foundations and set at a suitable distance from the rams. Pivottally connected to the piston-rods of the rams and to the respective head-blocks are the ends of the jointed or toggle levers G G', the joints or knuckles of these toggle-levers being at a point preferably about midway their length. Journaled in bearings or standards H, bolted to a suitable bed-plate and foundation, is the main driving-shaft I, having keyed on its ends the large spur-wheels J J, this shaft being arranged approximately parallel with the connecting-rods F and toggle-levers G and located between them.

In order to brace and anchor the standards or bearings H H, I connect them with the rods F by means of bars F' F', as shown in Fig. 2 of the drawings. This arrangement of tie-rods prevents the main shaft from being disturbed or moved while the toggles are being operated. Mounted upon suitable foundations located at the ends of the main shaft

are two engines or motors K K, the drive-shafts of which are provided with pinions L L, which engage with the spur-wheels on the ends of the main shaft. By means of these
5 engines and pinions motion is given to the main shaft, as is evident.

Journalled loosely upon the main shaft, about midway its length and separated by an interposed disk or collar, are two pinions M
10 M', each of which is provided with suitable clutch-teeth on its outer face. Adapted to engage with the clutch-teeth upon these loose pinions are two independent sliding clutches N N', secured upon the main shaft and
15 adapted to rotate with it. These sliding rotating clutches are engaged and operated by the aforesaid pivoted levers and rods connected to the pressure-controllers at the forward end of the rams. Engaging the teeth
20 of the above-mentioned loose pinions are the rack-bars O O', the former of which engages the pinion M and passes under the main shaft, and the latter over it and engages the pinion M'. These rack-bars are arranged to work
25 at right angles to the shaft, and are guided in their movements by ways or grooves formed in bed-plates P. These ways may be provided with anti-friction rollers, as shown in Figs. 2, 3, and 4, or they may be made to fit
30 more closely the rack-bars, as in Figs. 6 and 7, and kept well lubricated. In either case the friction will be reduced to a minimum and the bars allowed to move back and forth freely and steadily. These ways hold the
35 rack-bars constantly in engagement with their respective pinions, and also keep them in a position at right angles to the main shaft. Pivotally connecting the outer ends of the rack-bars with the joints or knuckles of the
40 toggle-levers G G' are strong links R, which prevent the rack-bars being thrown out of a position at right angles to the main shaft, as is evident.

The pressure controllers and regulators of
45 the respective rams being set to operate at the required pressure and the engines being started, the operation will be as follows: The weighted lever *b* of the controller attached to the low-pressure ram is first released from its
50 spring-catch *c*. As this lever falls, it carries down the piston of the controller, and, through the medium of the connecting-rod *d* and pivoted lever *e*, throws the rotating sliding clutch N' into engagement with the loose pinion M'. As the main shaft rotates, it carries
55 with it the clutch and its engaged pinion, which latter draws in the rack-bar O', and, through the medium of the connecting-link and jointed levers G, forces the piston of the low-pressure ram up into its cylinder. The
60 rack-bar will continue to draw the toggle-levers inwardly until the maximum of pressure of the low-pressure ram is reached, when the piston *a* of the controller will be elevated and the clutch N' thrown out of engagement with
65 the loose pinion M'. The clutch will be held

out of engagement by the weighted lever catching or engaging the spring-catch. The instant the piston of the low-pressure ram comes to a rest the check-valve D in the conduit B automatically closes and prevents back-
70 pressure, when the high-pressure ram is brought into operation. When the low-pressure ram has thus operated, the attendant operator releases the catch that holds up the
75 weighted lever of the controller of the high-pressure ram, and the same operation is repeated in connection with this ram. After the bale has been properly bound the check-
80 valves in the conduits B are raised, permitting the pressing-liquid to flow back into the rams. The pressure of the liquid upon the pistons in the rams will force them back to the rear ends of their cylinders. The toggle-levers
85 and rack-bars will also be restored to their original position, ready for another operation. To facilitate the movement of the rack-bars and toggles in assuming their original position, I may incline or slant outwardly the bed-
90 plates and ways P, as shown in Fig. 6.

To prevent the oblique pressure exerted upon the piston-rods of the ram-pistons by the toggles from twisting or otherwise injuring the said piston-rods and pistons, I may attach to the piston-rods guiding-cylinders Q,
95 which are adapted to fit the ram-cylinders, as shown in Fig. 5.

By arranging the rack-bars as shown and described it is evident that I am enabled to keep the main shaft rotating continuously in
100 one direction, and at the same time alternately draw the rack-bars in from opposite sides.

The special advantage of the toggle-lever and link arrangement herein shown and de-
105 scribed is that the greatest pressure is transmitted to the press-platen when the greatest pressure is needed—that is, at the final pressure of the bale. When the toggles are nearly
110 straight, they exert their greatest force, and it is at this time that the final pressure of the bale is being performed.

Having thus fully described my invention, what I claim, and desire to secure by Letters
115 Patent, is—

1. The combination of a pair of rams, abutting or head blocks, rods connecting these
120 abutting blocks with the ram-cylinders, the toggle-levers pivotally connected at their ends to the piston-rods of the rams and the stationary abutting blocks, the main driving-
shaft provided with sliding clutches and loose pinions, and the rack-bars engaging these
125 loose pinions and pivotally connected to the said toggle-levers, as described.

2. The combination, with the rams and stationary head-blocks, of the toggle-levers pivotally connected at their ends to the piston-
130 rods of the rams and the head-blocks, the inwardly-extending rack-bars, links connecting the outer ends of the rack-bars to the joints of the toggles, guides for the rack-bars, and

a main shaft provided with sliding clutches and loose pinions, as and for the purpose described.

3. The combination of the rams and toggle-levers, the rack-bars connected to the toggles by means of pivoted links, a main shaft located between the toggle-levers and provided with loose pinions and clutches, one of the said rack-bars passing over the top of one of these pinions and the other bar passing below the other pinion, and guides for the rack-bars, whereby the said main shaft may be revolved continuously in one direction and the toggles drawn in from both sides, substantially as described.

4. The combination, with the rams and toggle-levers, of the rack-bars connected to joints of the toggle-levers by means of pivotal links, a main shaft provided with pinions, and guides for the rack-bars set at right angles to the said shaft, substantially as described.

5. The combination of a pair of rams, the head-blocks and connecting-rods, the toggle-levers connecting the ram-piston rods to the head-blocks, a main driving-shaft journaled in bearings between the said toggle-levers, a pair of loose pinions on this main shaft, sliding clutches also upon this shaft, these clutches being adapted to engage the said pinions, rack-bars engaging the said loose pinions, links R, pivotally connecting the outer ends of the rack-bars to the joints of the respective toggle-levers, spur-wheels J J upon

the ends of the main shaft, and motors K K, for imparting motion to the shaft, substantially as herein set forth.

6. The combination of a pair of rams, head-blocks, connecting-rods connecting the head-blocks to the rams, toggle-levers connecting the head-blocks and ram-pistons, bearings H H, located between the said connecting-rods, transverse bracing-rods F', connecting the said bearings H H to the respective connecting-rods, a main shaft provided with sliding clutches and loose pinions, means for operating these sliding clutches, and rack-bars engaging the pinions and pivotally connected to the toggle-levers, as and for the purpose set forth.

7. The combination of a pair of rams, toggle-levers connected to the pistons of the rams, a main driving-shaft journaled between the toggle-levers and provided with loose pinions, clutches upon this shaft, outwardly-inclined grooved ways or bed-plates located upon opposite sides of this main shaft, rack-bars working in these inclined grooved ways and engaging the said pinions constantly, and pivotal links R, connecting the outer ends of the rack-bars to the toggle-levers, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES D. DAVIS.

Witnesses:

JOHN S. LINCH, Jr.,
CHAS. D. JOST.