(No Model.) 3 Sheets—Sheet 1.

E. C. WILLIAMS.

PRESS.

No. 523,802. Patented July 31, 1894.

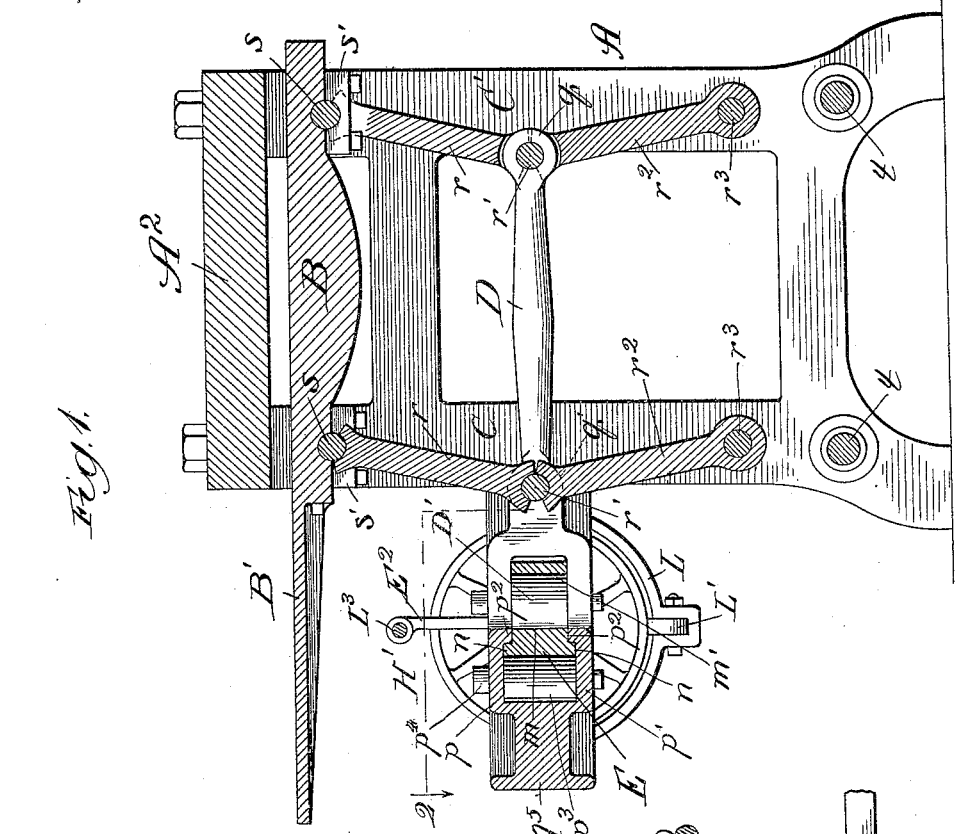

Fig. 1.

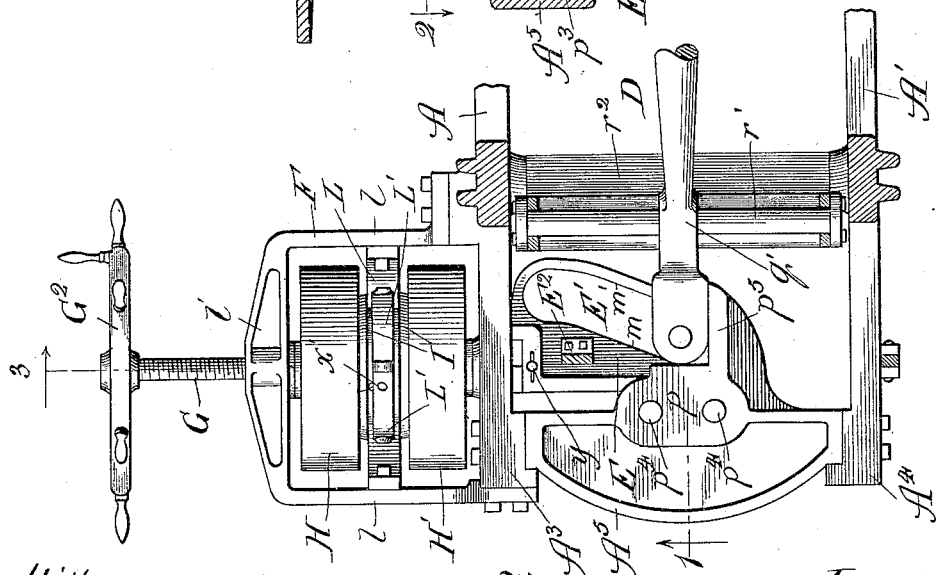

Fig. 2.

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Lute D. Alter.

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Attys.

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E. C. WILLIAMS.

PRESS.

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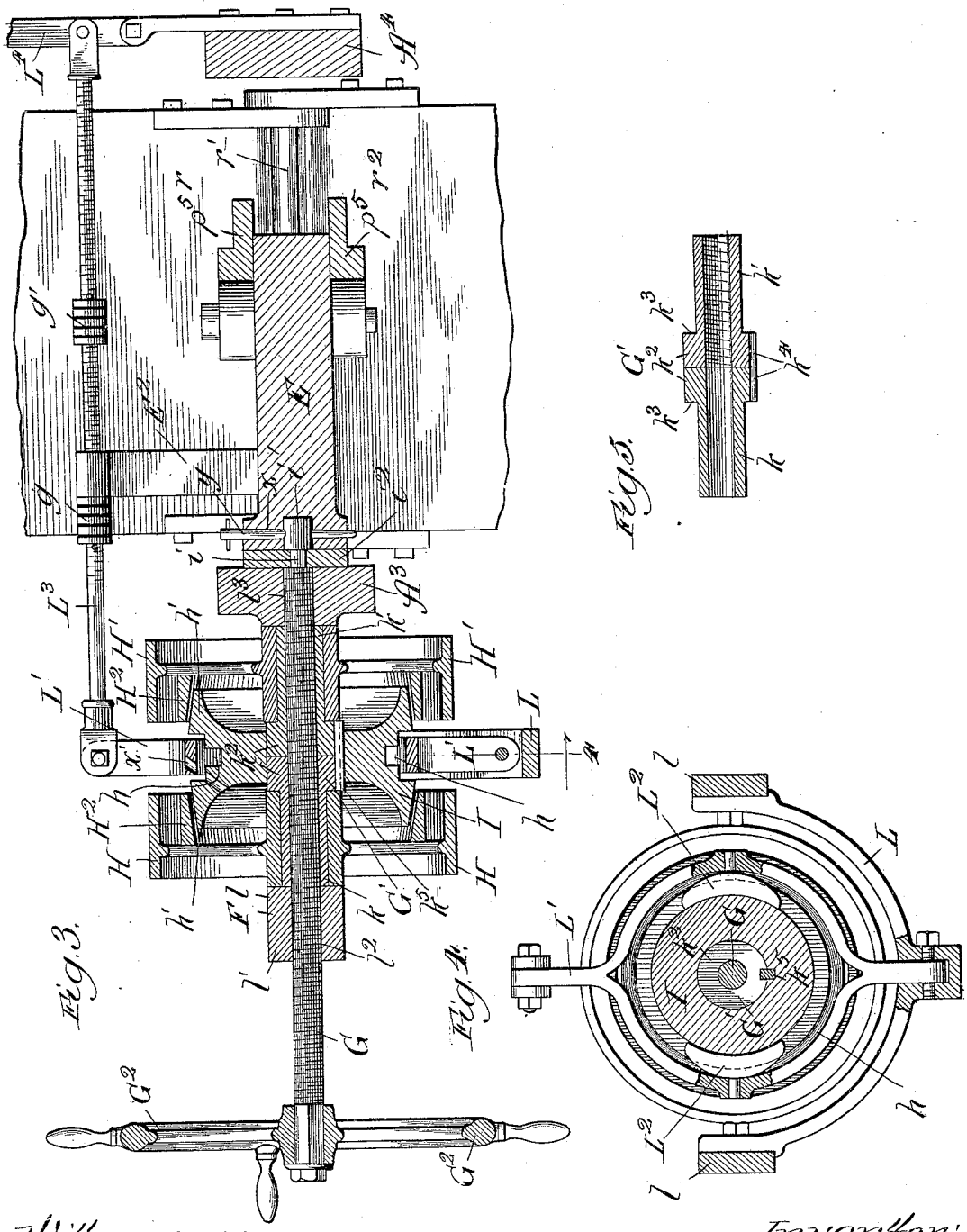

Fig. 3.

Fig. 4.

Fig. 5.

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(No Model.) 3 Sheets—Sheet 3.

E. C. WILLIAMS.

PRESS.

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Fig. 6.

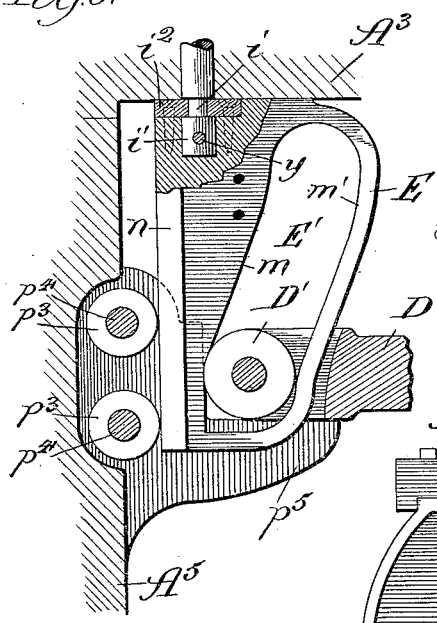


Fig. 7.

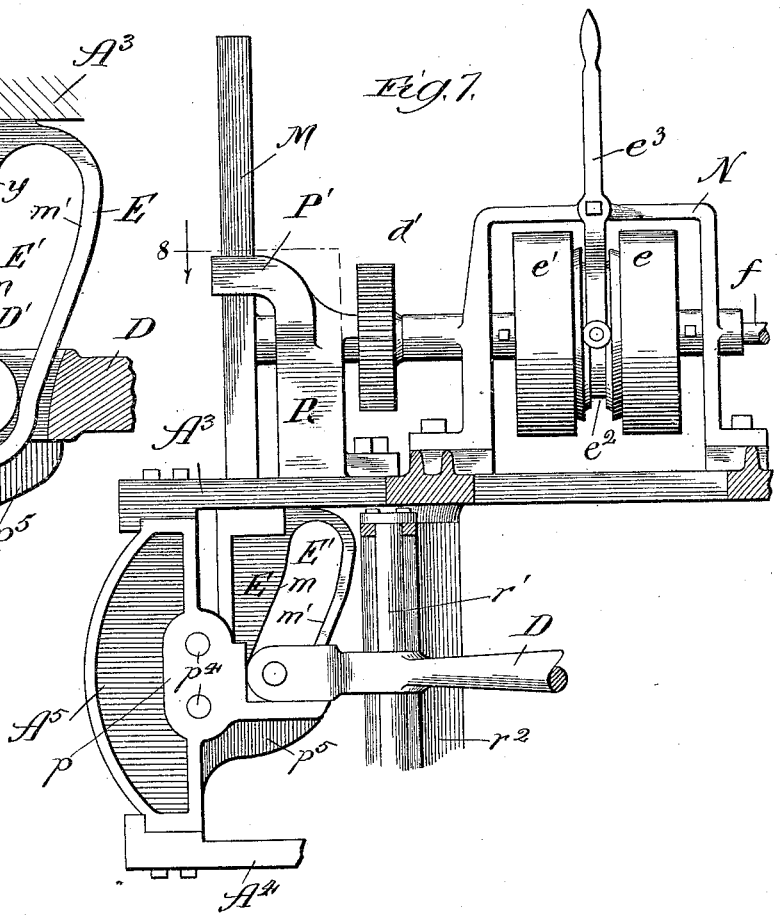
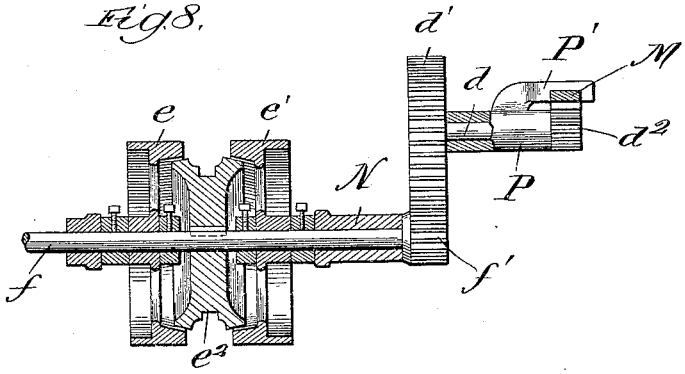


Fig. 8.



Witnesses:
Chas. E. Gaylord.
Lute S. Alter

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UNITED STATES PATENT OFFICE.

EDWARD C. WILLIAMS, OF CHICAGO, ILLINOIS.

PRESS.

SPECIFICATION forming part of Letters Patent No. 523,802, dated July 31, 1894.

Application filed December 11, 1893. Serial No. 493,381. (No model.)

To all whom it may concern:

Be it known that I, EDWARD C. WILLIAMS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Toggle-Presses, of which the following is a specification.

My invention relates to improvements in toggle-presses generally; and my object is to provide improved power transmitting mechanism between the driving power of the machine and the toggle mechanism, whereby a force greatly augmented over that of the driving power may be brought to bear against the toggles in extending them.

While my improvements are applicable to many types of toggle-presses, they are especially adapted to presses for making electrotype molds, and in the drawings and description I show and describe my invention in connection with a press of that particular character.

In the drawings—Figure 1 is a vertical section of a toggle-press provided with my improvements, the section being taken upon line 1 of Fig. 2, and viewed in the direction of the arrow; Fig. 2, a broken and partly sectional plan view, taken on line 2 of Fig. 1; Fig. 3, an enlarged broken sectional view taken on line 3 of Fig. 2, and viewed as indicated; Fig. 4, a section taken on line 4 of Fig. 3; Fig. 5, a view showing a sleeve detail of the construction in section; Fig. 6, an enlarged broken sectional plan view showing details of construction of the power transmitting mechanism; Fig. 7, a view corresponding with Fig. 2, but illustrating a modified construction; and Fig. 8, a broken and partly sectional view of the modified construction, the section being taken on line 8 of Fig. 7 in the direction of the arrow.

A A′ are side frames of the machine tied together by cross bars $t\,t$ near the base and provided at the top with a head or bed A^2 secured firmly in place. B is the platen of the press extending below the head A^2 and provided with a projecting table B′. On the under side of the platen B near its forward and rear edges are shallow circular recesses for round bars $s\,s$ which at their ends extend into bearings s' at opposite ends of the platen and are thereby held firmly in place. The platen rests upon two pairs of toggle-jointed leaves C C′. The upper leaves $r\ r$ are recessed longitudinally at their upper ends, to fit the round bars s, and at their lower ends to fit over round bars r'. The lower leaves r^2 at their lower ends, are provided with round openings to receive round bars r^3. The bars r^3 rest at their ends in coincident openings provided in the side frames A A′. At their upper ends the leaves r^2 are recessed longitudinally to fit under and support the bars r'.

D is the operating bar for the toggles having at its rear end a loop q, surrounding the rear bar r', and toward its forward end a loop q' surrounding the forward bar r'. The bar D extends and engages the bars r' about midway of the length of the latter.

A^3 A^4 are forward and horizontally extending arms preferably cast integral with the side frames A A′, respectively, and forming parts of the main frame of the machine. Secured to and extending between the outer end portions of the arms A^3 A^4 is a block or casting A^5. The block A^5 is formed at its center with upper and lower backward projecting plates $p\ p'$, respectively, which at their outer edges are flanged to afford guides p^3, as shown in Fig. 1. In the chamber formed by the plates $p\,p'$ are two vertically disposed anti-friction rollers p^3 on pins or shafts p^4 which extend through the plates $p\,p'$.

E is a sliding wedge having a working surface m, and formed with a loop E′ affording a working surface m' parallel with the surface m. At the forward edge or base of the wedge are upward and downward extending flanges or shoulders n which fit behind the guide flanges p^2 of the block A^5, and operate to guide the wedge, whereby it moves at its forward face or base against the bearing rollers p^3.

The operating bar D at its forward end portion beyond the toggle C is bifurcated, to embrace loosely the rear side of the wedge E, and it carries a vertical anti-friction roller D′ which extends through the loop E′ and is of a diameter but slightly less than the width of the loop. Formed upon the block A^5 are backward projecting stops p^5 above and below the path of the wedge E against which the bar D bears at one side of its bifurcated end. As the wedge E is slid in its guides in

the direction of the arm A^4 it bears at the surface m against the roller D′ and forces the bar D longitudinally in the backward direction to extend the toggle-jointed leaves r r^2 and raise the platen B in the direction of the head A^2. During this operation the bar D at its forward bifurcated end slides against the stops p^5 which operate as braces for the bar to prevent its becoming bent or broken by the lateral pressure exerted by the wedge. In the movement of the wedge in the direction of the arm A^3 the surface m' in the loop E′ bears against the roller D′, operating thus to draw the bar D longitudinally forward to flex the toggle-jointed leaves and lower the platen B.

The preferred mechanism for sliding the wedge in its guide, to bring about the operation described, is shown in Figs. 1 to 6 inclusive.

Secured upon the arm A^3 is a laterally projecting stirrup frame F comprising parallel side-bars l and an end-bar l'. Extending through a smoothly bored opening l^2 in the end-bar l', and a similar coincident opening l^3 in the arm A^3, is a threaded rod or screw G. The openings l^2 and l^3 are just large enough to permit the screw to slide readily in the longitudinal direction therein without lateral play.

Surrounding the screw in the frame F is a sleeve G′, which extends at opposite ends respectively against the arm A^3 and end-bar l'. For convenience of manufacture, I prefer to provide the sleeve in two sections k and k', each provided with an enlarged part k^2 affording a shoulder k^3 and a groove, affording a key-way k^4, the section k' alone being internally threaded to fit and engage the screw G. On the outer end of the screw G I provide a crank wheel G^2, and near its opposite end the screw is provided with a circumferential recess to afford a neck portion i and beyond the latter a head-portion i'. The screw is swiveled at its head i' in a socket in the end of the wedge E, being held thereto by a divided plate i^2 which surrounds the neck i and is fastened to the wedge by screws, as shown. Crossing the socket in the wedge, in which the screw G is swiveled, is an opening, x, and through the head i' is an opening which, when the screw is turned to one position on its axis, registers with the opening x whereby a pin y may be passed through the wedge and screw to hold them in rigid relation when desired, as hereinafter described.

Journaled upon the section k of the sleeve G is a pulley H, confined at its hub-portion between the respective shoulder k^3 and end-bar l; and journaled upon the section k' of the sleeve is a pulley H′, confined at its hub between the respective shoulder k^3 and arm A^3. The pulleys may be belted to a power shaft, not shown, one of the belts being open and the other crossed, whereby the pulleys will rotate in opposite directions. On the inner or adjacent sides of the pulleys are flanges affording annular flaring friction-clutch members H^2. Surrounding the enlarged part k^2 of the sleeve G is a wheel I, provided with a key-way to register with the key-way k^4, a suitable key or feather k^5 therein operating to maintain the wheel and sleeve sections against independent rotation while permitting the wheel to slide longitudinally off the sleeve. The wheel I is provided with a peripheral groove h, and with lateral flanges, affording tapering friction-clutch members h' adapted to enter and engage respectively the flaring clutch-members H^2. Fastened at opposite ends rigidly to the side-bars l end extending below the wheel I is a stirrup bar L, to the center of which is pivoted a yoke L′ surrounding the wheel I. The yoke L′ carries pivotal blocks L^2 which extend into the peripheral groove h, of the wheel I, at opposite sides of the latter. At its upper end the yoke L′ is pivotally connected to one end of a rod L^3, which extends in the horizontal direction across the front portion of the machine above the wedge E, and is pivotally connected at its opposite end to a lever or handle L^4 pivoted upon the arm A^4. Between its ends the rod L^3 is threaded to receive longitudinally adjustable stop-nuts g g'.

Rising from the wedge E is an arm E^2 provided in its upper end with a loop or opening through which the rod L^3 loosely extends between the stops g g'. In the yoke L′ is an opening x', and in the wheel I is an opening which when the wheel is in one position registers with the opening x' to receive a pin y which when inserted holds the wheel against rotation. When it is desired to operate the machine by hand-power applied to the crank wheel G^2, the pin y is withdrawn from the opening x, to permit the screw G, which thus constitutes the initial driving mechanism of the machine, to turn in the wedge E, and inserted into the opening x', to lock the wheel I, and, through the latter, the sleeve G′ against rotating. Turning of the crank wheel in one direction will cause the screw to travel through the sleeve and advance the wedge to produce extension of the toggles; while turning of the crank-wheel in the opposite direction will retract the screw and wedge and produce flexion of the toggles.

To operate the machine by power applied to the pulleys H H′, which then constitute the initial driving mechanism, the pin y is withdrawn from the opening x', whereby the wheel I and sleeve G′ are free to rotate; and the pin is inserted into the opening x, to lock the screw G against rotation; and the stops g g' are adjusted to properly limit the distance of travel of the wedge, as hereinafter explained.

To cause the wedge to advance and extend the toggles the lever L^4 is swung to cause the clutch-shipping mechanism L^3 L′ to shift the wheel I, from the intermediate or release position shown, into engagement with the clutch-member H^2 of the pulley H. This en-

gagement causes the wheel I, and through it the sleeve G′, to rotate with the pulley H and advance the screw G and wedge until the arm E^2 strikes the stop g', and thereby moves the clutch shipping mechanism and the wheel I to its intermediate position. The wedge stops the instant that the clutch members I H^2 are disengaged, the stop g' being adjusted to thus limit the distance of travel of the wedge and the rise of the platen. To retract the wedge, and lower the platen, the lever L^4 is moved to shift the wheel I to the pulley H′, whereby the said wheel and sleeve G′ will rotate with the pulley H′ and retract the screw G and wedge until the arm E^2 strikes the stop g and thus releases the clutch members. The machine may be started or stopped at any time by movement of the lever L^4, so that the compression exerted by the platen may always be under the perfect control of the operator.

The power transmitting mechanism, constructed as described, operates smoothly and without material friction to cause a force multiplied many times over that exerted by the driving power to be exerted against the platen, thus giving to the machine capacity for exerting enormous compression, whereby it may perform its function of making electrotype molds with apparent ease and turn out molds possessing a high degree of perfection.

In the modified construction the main-frame, toggle-mechanism, wedge E and the guiding and sustaining block A^5 may all be constructed as described. In place of the screw G, I provide a rack-bar M, fastened at its inner end to the wedge and movable longitudinally through a suitable opening in the arm A^3 (not shown). On the side A of the machine is a stirrup frame N in which is journaled a shaft f provided at one end, beyond said frame, with a pinion f'. Loosely mounted upon the shaft f in the stirrup frame are pulleys e e', corresponding with the pulleys H H′ described, and affording friction-clutch members. Feathered upon the shaft f between the pulleys is a peripherally grooved sliding clutch member e^2, corresponding in construction and operation with the wheel I described, which is operated to engage and release the pulleys e e' by a pivotal shipping lever e^3. Secured upon the arm A^3 is an arm P, having a projecting finger P′. The arm P affords a bearing for a short shaft d carrying at one end a gear wheel d', meshing with the pinion f', and carrying at its opposite end a pinion d^2, which meshes with the teeth of the rack-bar M. At the pinion d^2 the rack-bar slides in a recess in the under side of the finger P′ which thus operates to steady the rack-bar and hold it to the pinion d^2. The pulleys are belted to a drive-shaft and rotated in opposite directions. The clutch-member e^2 may be shifted by its lever from the intermediate or release position shown to engage either pulley, and cause the shaft f and its pinion f' to rotate, and turn the gear wheel d' and pinion d^2. Depending upon the direction of turning of the pinion the rack-bar is moved to advance or retract the wedge E to extend or flex the toggles. The power transmitted from the pulleys e e' to the toggles is greatly augmented by the speed reducing gears f' d' d^2 and the sliding wedge, and the platen may be caused to exert enormous pressure under comparatively slight power applied to the pulleys.

In the drawing of the modified construction no automatic clutch shifting means are shown, but mechanism for the purpose, substantially like that of the preferred construction, may be readily provided, if the function of the toggle-press makes such mechanism desirable.

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

1. In a toggle-press, the combination with the frame, the initial driving-mechanism to which the power is applied, and the toggle, of a reciprocal toggle-extending and flexing-bar pivotally connected with the toggle, a sliding wedge mounted against a bearing on the frame and engaging said bar, and power transmitting screw mechanism between the said driving-mechanism and wedge, operating to slide the wedge in its guide against the said bar, to move the bar and extend the toggle, substantially as described.

2. In a toggle-press, the combination with the initial driving-mechanism to which the power is applied, and the toggle, of a reciprocal toggle-extending and flexing bar pivotally connected with the toggle, a sliding wedge mounted in a guide, and having a wedge surface to bear against and advance the bar, to extend the toggle, when the wedge is moved in one direction, and a wedge surface to engage and retract the bar and flex the toggle when the wedge is moved in the opposite direction, and power-transmitting mechanism between said driving mechanism and wedge operating to slide the wedge in its guide, substantially as described.

3. In a toggle-press, the combination with the initial driving-mechanism to which the power is applied, and the toggle, of a reciprocal toggle-extending and flexing bar D pivotally connected with the toggle and having a bifurcated end, a sliding wedge E mounted in a guide, and provided with a loop E′ affording with the wedge parallel working surfaces m m', a roller mounted in the bifurcated end of the bar D and extending through the loop E′, and power-transmitting mechanism between the said driving-mechanism and wedge, operating to slide the wedge in its guide to move the said bar and extend and flex the toggle, substantially as described.

4. In a toggle-press, the combination with the frame of the machine, of a longitudinally movable toggle-operating bar, a sliding wedge at the end of said bar having shoulders n, a block, on the frame, in which the wedge is mounted to slide, provided with guides to engage the shoulders n and a roller bearing for

the wedge, and power mechanism for moving the wedge, substantially as and for the purpose set forth.

5. In a toggle-press, the combination with the frame and initial driving-mechanism to which the power is applied, of a reciprocal toggle-extending and flexing bar pivotally connected with the toggle, a sliding wedge mounted against a bearing on the frame and engaging said bar, a reciprocal screw mounted in a guide and connected with the wedge, and power-transmitting mechanism between said driving mechanism and screw for turning the screw to advance and retract it in its guide to slide the wedge and move the said bar to flex and extend the toggle, substantially as described.

6. In a toggle-press, the combination with the initial driving-mechanism to which the power is applied, and the toggle, of a reciprocal toggle-extending and flexing bar pivotally connected with the toggle, a sliding wedge mounted in a guide to bear against the end of said bar, a reciprocal screw connected with the wedge, a threaded sleeve upon the screw and means connected with the initial driving-mechanism, for rotating the sleeve to advance and retract the screw and wedge, to move the said bar and flex and extend the toggle, comprising contrarily rotating pulley clutch-members, a wheel affording an intermediate clutch-member and engaging the sleeve, and shipping-mechanism for moving the wheel into and out of engagement with the pulley clutch-members, respectively, substantially as and for the purpose set forth.

7. In a toggle-press, the combination with the toggle, of a reciprocal toggle-extending and flexing bar, pivotally connected with the toggle, a sliding wedge mounted in a guide and engaging said bar, initial power-mechanism, comprising contrarily rotating pulleys provided with clutch-members, an intermediate clutch member, means for sliding the wedge in its guide to move the bar and extend the toggle, geared to said intermediate sliding clutch member, shipping-mechanism for the sliding clutch member actuated by the movement of the wedge to the limit of its traverse in either direction to move the sliding clutch member to an intermediate position out of engagement with the pulley clutch-members, and an operating handle for the shipping-mechanism, substantially as and for the purpose set forth.

EDWARD C. WILLIAMS.

In presence of—
M. J. FROST,
W. N. WILLIAMS.