(No Model.) 3 Sheets—Sheet 1.

J. B. FOOTE.

STAMPING PRESS.

No. 487,730. Patented Dec. 13, 1892.

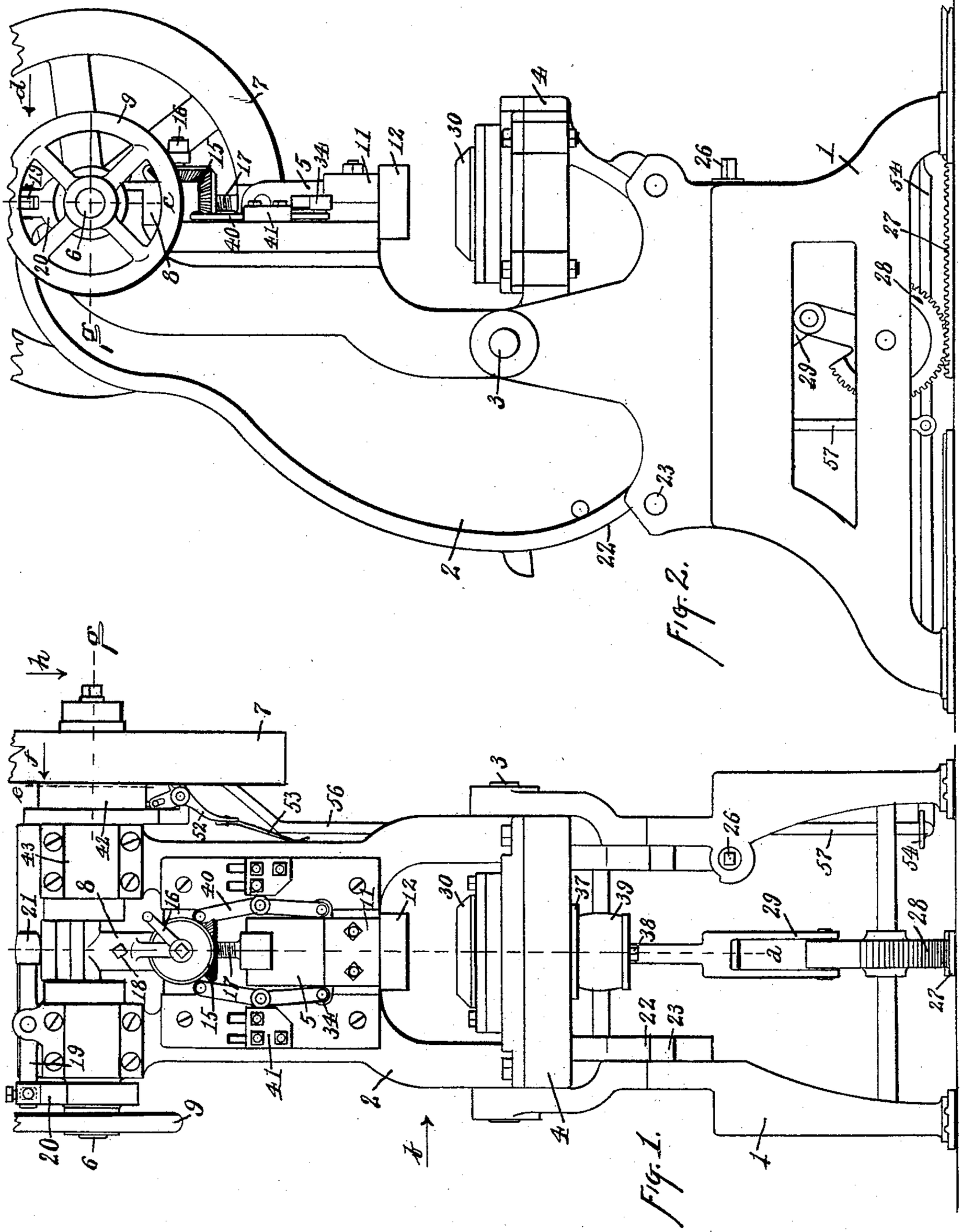

Fig. 2.

Fig. 1.

Witnesses:
M. S. Belden
P. P. Sheehan.

John B. Foote Inventor
by James N. See
Attorney

(No Model.) 3 Sheets—Sheet 2.

J. B. FOOTE.

STAMPING PRESS.

No. 487,730. Patented Dec. 13, 1892.

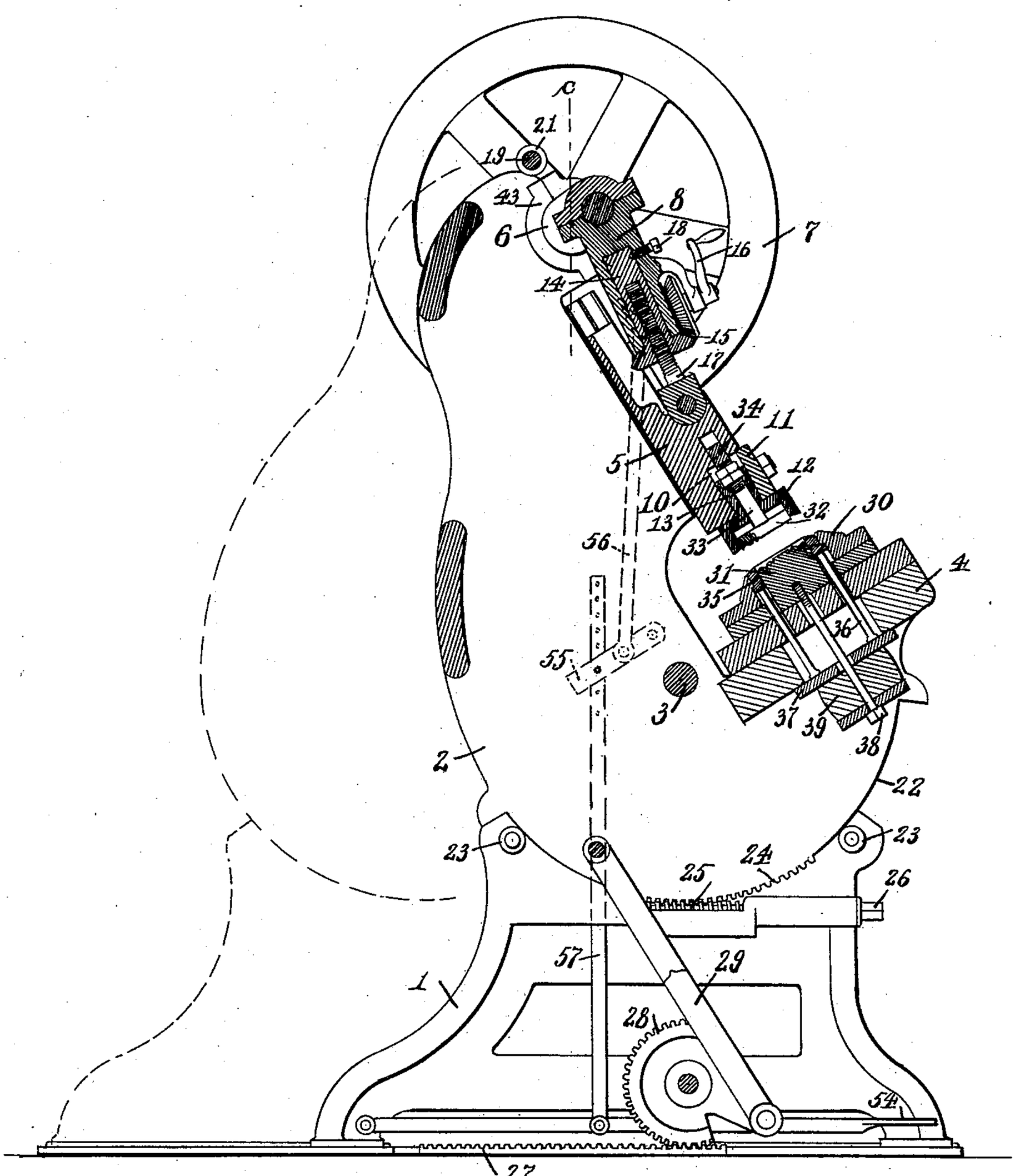

Fig. 3.

Witnesses:
W. L. Belden
P. P. Shoehan

John B. Foote Inventor
by James N. See
Attorney

(No Model.) 3 Sheets—Sheet 3.

J. B. FOOTE.

STAMPING PRESS.

No. 487,730. Patented Dec. 13, 1892.

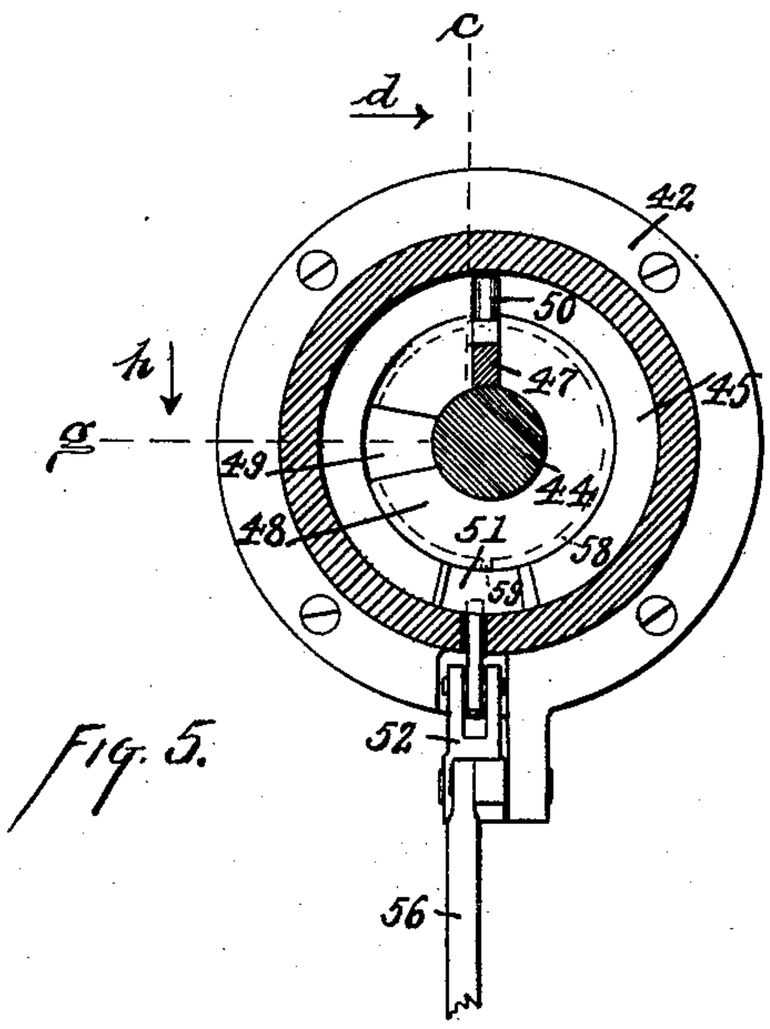

Fig. 5.

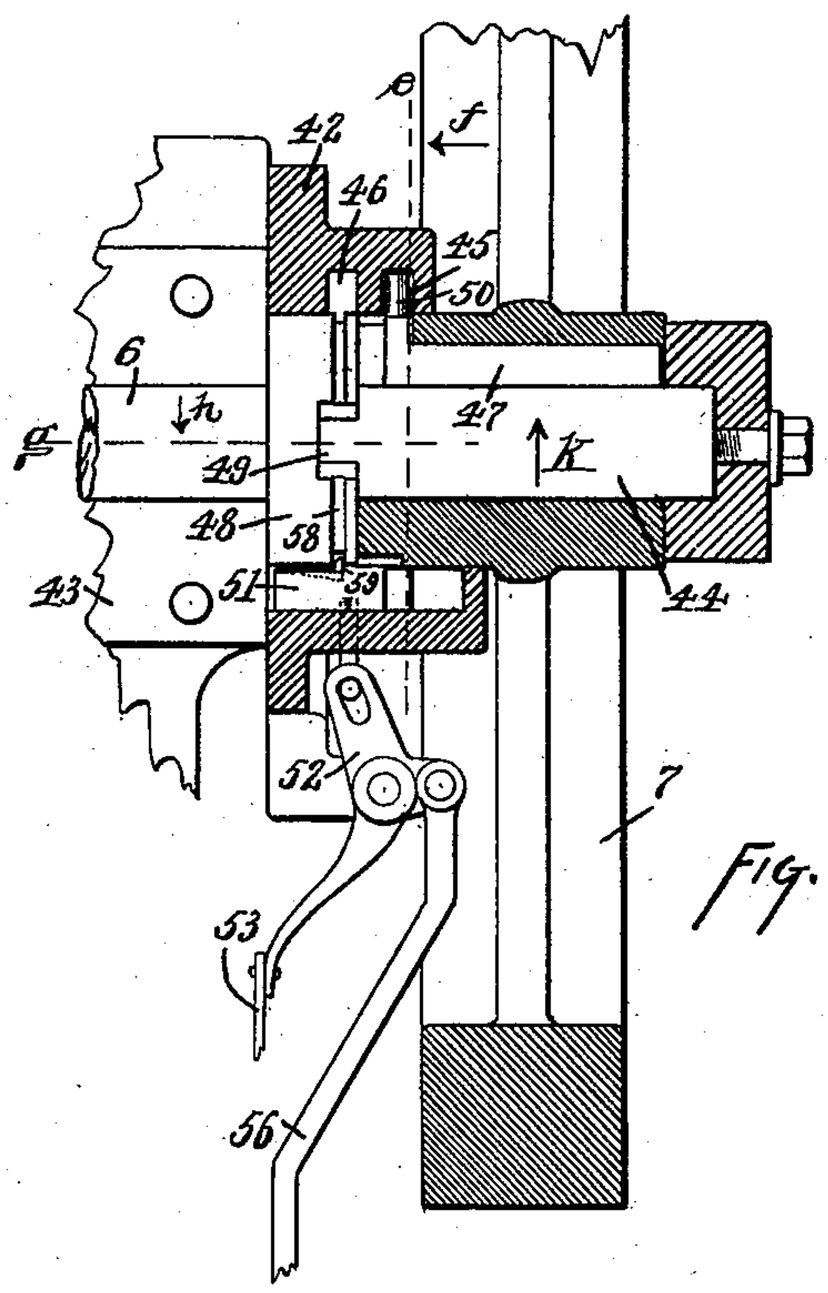

Fig. 4.

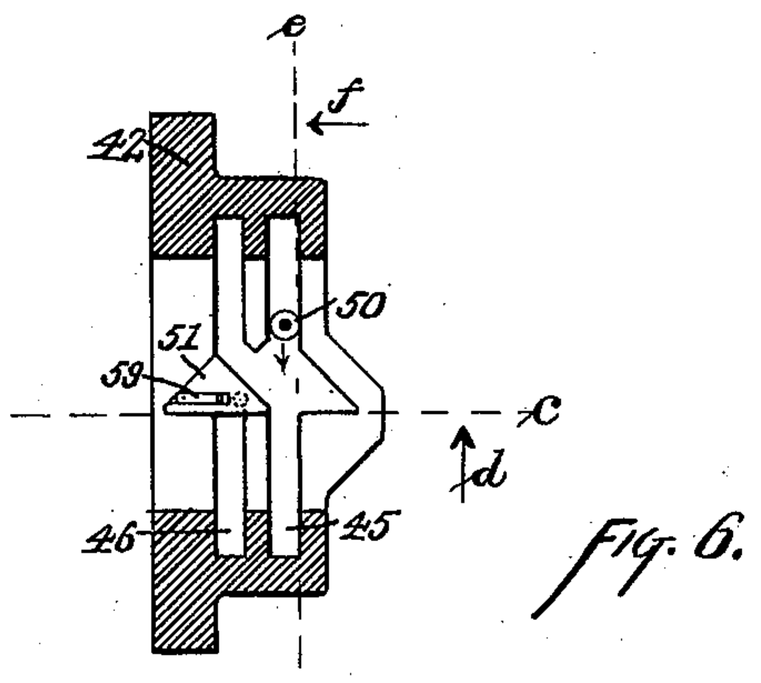

Fig. 6.

Witnesses:
W. L. Belden
P. P. Sheehan.

John B. Foote
Inventor
by James W. See
Attorney

UNITED STATES PATENT OFFICE.

JOHN B. FOOTE, OF HAMILTON, OHIO.

STAMPING-PRESS.

SPECIFICATION forming part of Letters Patent No. 487,730, dated December 13, 1892.

Application filed July 18, 1892. Serial No. 440,358. (No model.)

To all whom it may concern:

Be it known that I, JOHN B. FOOTE, of Hamilton, Butler county, Ohio, have invented certain new and useful Improvements in Stamping-Presses, of which the following is a specification.

This invention relates to improvements in presses designed for punching and stamping sheet metal. A mere example of this work may be found in a can-bottom whose rim is upwardly flanged to receive the body of the can and whose main surface is corrugated to give strength, and I have chosen to illustrate my improvements in connection with a press fitted for work of this character.

My improvements will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of a press exemplifying my improvements; Fig. 2, a side elevation thereof, the direction of view being indicated by arrow *b* of Fig. 1; Fig. 3, a vertical section of the press, (shown in inclined position,) the plane of the section being on line of *a*, viewed in the direction of arrow *b* of Fig. 1; Fig. 4, a vertical section through the stop-clutch and wheel in the plane of line *c* of Fig. 2, viewed in the direction of arrow *b* of that figure; Fig. 5, a vertical section of stop-clutch parts in the plane of line *e* of Fig. 4, viewed in the direction of arrow *f* of Fig. 4; and Fig. 6, a horizontal section of stop-clutch parts, taken in the plane of line *g* of Figs. 4 and 5 and viewed in the direction of arrows *h* of those figures.

In the drawings, confining attention as far as practicable to Figs. 1 and 2, 1 indicates the base or legs of the press; 2, the body of the press, supported by the base on trunnions, so to be capable of being tipped back, so that work may discharge from the die by gravity; 3, the trunnions uniting the body and base and forming the axis on which the angular adjustment may take place; 4, the die-bed of the press; 5, the cross-head working vertically in guides, as usual, over the die-bed; 6, the crank-shaft, commonly called the "cam-shaft," which gives reciprocating motion to the cross-head; 7, the driving-wheel through which motion is given to the cam-shaft by belt, this driving-wheel in the present case being loose on the cam-shaft and revolving idly thereon, except when locked to the cam-shaft by a clutch; 8, the pitman connecting the wrist of the cam-shaft with the cross-head; 9, a hand-wheel on the cam-shaft to serve in turning the cam-shaft by hand when adjusting the tools; 10, Fig. 3, a punch-socket in the lower end of the cross-head to receive the punch, this socket being tapering, largest at its upper end; 11, a clamp bolted to the front lower portion of the cross-head, this clamp containing the front half of the socket just referred to, the socket being therefore vertically divided, half in the cross-head and half in the clamp; 12, the punch; 13, Fig. 3, the shank of the punch, of a form to fit the socket 10, the punch being vertically held in the cross-head by the engagement of the socket with the shank and incapable of downward displacement by reason of the upward enlargement of the shank and capable of being either tightly clamped or loosened by clamp 11; 14, a long nut axially journaled in the body of pitman 8 and capable of rotation in the pitman and provided at its lower end with a bevel-gear; 15, a pair of bevel-gears, one being fast with nut 14, as just mentioned, and the other being on a spindle journaled in the front of the pitman, so that as this spindle is turned the nut will be turned; 16, a handle on the spindle just referred to, to serve in turning nut 14; 17, the lower end of the pitman engaging the wrist of the cross-head and having its upper end engaging the thread of nut 14; 18, a set-screw in the upper portion of the pitman, serving to prevent the downward displacement of nut 14, the arrangement of the pitman parts thus being such that by turning handle 16 the pitman may be lengthened or shortened to a nicety, thus permitting of a delicate adjustment of the relationship between the die and the punch when the punch is at the lower end of its stroke; 19, a brake-lever pivoted to one of the bearings of the cam-shaft and having its ends extending beyond the bearing; 20, a brake-shoe carried by the outer end of this lever and engaging the periphery of a friction-collar forming a part of the cam-shaft; 21, the inner end of the brake-lever, preferably provided with a roller and disposed over the upper end of the pitman, so that as the pitman reaches the upper limit of its stroke it will

press upwardly on the inner end of the brake-lever, and therefore bring the brake-shoe into action and tend to arrest the motion of the cam-shaft, thus bringing the cross-head to rest when at the upper extremity of its stroke, the driving-power being at this time disengaged from the cam-shaft by reason of the driving-clutch having been released; 22, lower portions of the press-body concentric with trunnions 3; 23, rollers supported by the base of the press and engaging under these concentric portions of the body, these rollers therefore serving to aid the trunnions in supporting the body and to thus give an extended base to the supports; 24, Fig. 3, a segment of teeth upon one of the concentric portions 22 of the body; 25, a worm journaled in the base of the press and engaging this segment of teeth; 26, a square or head upon the worm-shaft to permit of the use of a proper crank in turning the worm, the arrangment being obviously such that by turning the worm the press may be angularly adjusted with reference to the base; 27, a rack fixed to the foundation or bed upon which the press stands and independent of the base or legs, so that the base may have a backward-and-forward sliding motion with reference to the rack and floor or foundation; 28, a gear journaled in the base of the press and engaging the floor-rack, the function of this gear not requiring that it should be more than an extended segment; 29, a link having its lower end engaging a wrist carried by gear 28 and having its upper end engaging a wrist carried by the body of the press, the arrangement being obviously such that when the body of the press is adjusted angularly backward, as from the position shown in Fig. 2 to the position shown in Fig. 3, gear 28 will be turned more or less, which will force the base of the press to travel forward on the floor or foundation, thus putting the body of the press in inclined position without having materially disturbed the vertical plane of the axis of the cam-shaft, as will be readily understood from studying Fig. 3 in connection with the dotted lines indicating the position of the main parts when the body of the press was vertical, the arrangement thus permitting of angular adjustments of the press without calling for alterations in the length of the belt which drives the press; 30, the cutting-die bolted to the bed of the press and having its bore of a size to fit the punch, whereby when the punch descends into the die a flat punching will be cut from the sheet by the punch and forced into the die; 31, the corrugating-die, solid with the cutting-die and disposed concentrically within it and having its upper surface a trifle below the level of the top of the cutting-die and of a facial character suited to the character of corrugations or stamping which are to be produced in the article in hand; 32, the corrugating-punch, a counterpart of the corrugating-die and arranged concentrically within the punch and arranged for motion of recession upwardly into the punch; 33, the shank of the corrugating-punch extending up through the shank of the punch and having a suitable keeper, as nuts, to prevent downward displacement, the shank of the corrugating-punch thus having limited end-play in the shank of the punch; 34, a pressure-bar extending across through the cross-head and engaging over the top of the shank of the corrugating-punch, this bar being capable of upward motion in the cross-head; 35, a ring-stripper arranged in the annular space within the cutting-die around the corrugating-die and presenting its upper surface preferably a trifle above the top of the cutting-die, this stripping-ring being capable of a descending motion in the annular recess a distance equal at least to the distance a flange is to be turned down upon the edge of the work in hand; 36, studs extending from the stripper-ring downwardly through the bed of the press; 37, a plate engaged by the lower ends of these studs; 38, a spring-abutment formed in the present case by a centrally-disposed bolt having its upper end screwed into the corrugating-die and having at its lower end a large washer; 39, a spring disposed between this washer and plate 37, the spring in this case being assumed as a block of rubber, the arrangement at the lower diework being obviously such that the spring holds the stripper-ring 35 in its upper position, but permits that ring to descend under pressure; 40, toggles connected at their upper ends to the cross-head and at their lower ends to pressure-bar 34, the degree of flexation of these toggles therefore determining the vertical position of the pressure-bar, and therefore the corrugating-punch 32, with reference to the cross-head and punch 12; 41, blocks adjustably secured to the cross-head guides and presenting their inner edges in position to be engaged by the centers of the toggles as the cross-head rises and falls, the position being such that the toggles are held in their straightest conditions corresponding with the farthest downward position of the corrugating-punch 32 with reference to punch 12, the lower inner edges of these blocks being beveled outwardly, so that when the centers of the toggles reach these portions of the blocks the toggles are at liberty to expand and permit the corrugating-punch to rise in the punch 12; 42, a fixed ring encircling the cam-shaft outside one of the shaft-bearings of the press and between that bearing and driving-wheel 7; 43, the shaft-bearing just referred to; 44, that portion of the shaft projecting beyond the bearing and carrying the driving-wheel loosely upon it; 45, an inwardly-open groove in the interior of ring 42; 46, a second groove like the first one, but farther from the driving-wheel; 47, a dog sliding loosely endwise in a proper groove in the hub of the driving-wheel, the inner end of this dog projecting into ring 42, so as to come in line with groove 45, the inner end of the dog having an out-

ward projection engaging the groove, so that as the driving-wheel turns loosely upon the shaft the dog goes around idly with it, with its projecting inner end traveling in groove 45, which prevents endwise movement of the dog; 48, a collar formed solidly on the shaft within ring 42 and inwardly beyond groove 45; 49, a notch formed in the outer face of this collar, whereby if dog 47 could be moved sufficiently to the left the inner end of the dog could engage in notch 49, and thus lock the driving-wheel to the shaft and compel the shaft to turn with the wheel; 50, the outward projection at the inner end of the dog previously referred to and formed, preferably, with an antifriction-roller engaging the groove, the construction being obviously such that so long as groove 45 restrains the dog against endwise motion the driving-wheel may revolve idly on the shaft and that if the dog could be moved endwise, so that projection 50 traveled in groove 46 instead of groove 45, the dog would be in engagement with notch 49 and the wheel would be locked to the shaft; 51, Fig. 6, a switch-block arranged in the lower portion of the bore of ring 42 and capable of moving in the ring in a direction parallel to the axis of the ring, this block forming, virtually, a movable portion of the inner wall of the ring, the partition between the two grooves in the ring being cut away, so as to permit this block to shift in the ring, the block when in the position shown in Fig. 6 forming no obstruction to the travel of dog projection 50 in groove 45, that projection traveling in the direction indicated by the arrow just below it, the driving-wheel and the shaft when in motion being intended for motion in the direction indicated by arrow K in Fig. 4; but if the switch-block be moved to the right, Fig. 6, it would obstruct the passage of the roller in groove 45, the front edge of the block being, however, beveled, so that the dog projection 50 on reaching the block will be swerved to the left and thus come into position to travel in groove 46 instead of in groove 45, such endwise movement of the dog engaging the dog with notch 49 and serving to lock the driving-wheel to the shaft and give motion to the press so long as the dog is dominated by groove 46, which domination will continue till the switch-block is moved again to the left, which will cause the dog projection to move to the right and again come under the domination of groove 45, the office of the block being, therefore, to switch the dog from the domination of groove 45, representing idle position of the dog, to groove 46, representing its working position; 52, a lever connected with the switch-block and serving to shift the switch-block from one to the other of its positions; 53, Fig. 1, a spring connected with lever 52 and serving in an obvious manner to hold the switch-block in the position shown in Fig. 6, a position corresponding to the idle position of the dog 47; 54, a lever, a treadle in the exemplification, to serve in moving the switch-block from the normal position in which it is held by the spring 53; 55, a lever pivoted to the body of the press; 56, a link connecting this lever with switch-block lever 52; 57, a link connecting lever 54 with lever 55, whereby movement of lever 54 is in an obvious manner transmitted to the switch-block, the upper end of link 57 being provided with a series of holes for pivotal connection with lever 55, thus permitting of the practical lengthening of link 57 to suit the changed conditions brought about by adjusting the body of the press at angles; 58, a groove in the outer surface of collar 48; 59, a spring-latch carried by the switch-block and engaging this groove and insuring against the shifting of the switch-block to the right at improper times.

The design is that the cross-head shall come to rest when at the upper limit of its stroke; that upon pressing the treadle the switch-block will be moved to the right and cause the dog to go into notch 49, thus locking the wheel to the shaft and starting the cross-head into motion; that as soon as the switch-block shall have performed this duty it shall return again to the position shown in Fig. 6; that the dog will therefore be switched back to idle position when it again reaches the switch, which will represent a complete revolution from the time the switching into active position was done; that this unlocking of the wheel from the shaft shall take place when the cross-head is at the top of its stroke, and that the friction-brake shall aid in arresting the shaft when thus released from the influence of the wheel; but while the cam-shaft may have come to rest while the cross-head was at the top of its stroke and while the driving-wheel then revolves idly on the shaft there might be a possibility of the switch being thrown at a time when notch 49 was not in the position to receive the dog, in which case there would be a deadlock. Notch 49 is in such position with reference to the wrist of the cam-shaft that it will be in position to receive the dog when the cross-head is at the top of its stroke, this representing the switching time both for engagement and release; but it might be possible that the cam-shaft had been turned more or less by hand for some purpose between strokes, as in examining the tools or what not, and in such case the switching for engagement might be attempted when the notch was out of normal receiving position. It is the object of spring-latch 59 to prevent this. With the parts in the position shown in Fig. 4 the switch-block cannot be thrown to the right; but when the shaft is in normal switching position, with the notch in proper receiving position, then the notch will permit the switch-block to make its motion. The spring-latch, being beveled on its back, allows the switch-block to move to the left at any time the treadle may be released. In other words, if groove 58 were continuous the switch-block could not be moved to the right at all, for spring-latch 59, engaging the groove, would prohibit the movement of the switch-block;

but the notch forms a gateway to the right from the groove, and when the notch comes opposite the spring-latch then the spring-latch forms no impediment to the movement of the switch-block, which may then be moved to the right. At the time of such permission the notch is in position to be engaged by the dog. Therefore the switch-block can be thrown only when the notch is in position to receive the dog.

Referring to the punch and die arrangement, Fig. 3, a sheet of metal being laid upon the dies, the punch 12 descends and, co-operating with the inner edge of cutting-die 30, cuts out a disk the size of the punch, the disk resting on stripper-ring 35, which holds it nice and flat and free from buckle, the disk becoming clamped between punch 12 and the stripper-ring 35, corrugating-punch 32 pressing on top of the disk. The continued descent of the punches carries the disk down and corrugates its face, the stripper-ring 35 yielding as the disk is forced down while the corrugating is being performed. The disk having been squeezed between the corrugating-die and the corrugating-punch has its corrugations finished, and the disk becomes clamped between the corrugating-punch and the corrugating-die. At this instant the center of the toggles 40 are permitted to properly expand by the toggle-blocks 41, the effect of this expansion of the toggles being to permit the cross-head to proceed in its downward motion while the corrugating-punch 32 moves no farther downward. The continued downward motion of punch 12, pressing on the rim of the disk, flanges the disk downwardly around corrugating-die 31, stripper-ring 35 yielding downwardly to permit this flanging. While this flanging is being done the body of the disk is firmly clamped between the corrugating tools, thus preventing the flanging strains from straightening out the corrugations and insuring that the flanging shall be concentrically performed. As the cross-head rises the punching-tools rise and the spring forces the stripper-ring up, the inner rim of the stripping-ring pushing up on the flange of the work and stripping it from the corrugating-die 31, thus freeing the work from the dies and permitting it to be removed or to fall from the press, if the press be adjusted at an angle.

In stamping-presses arranged to have their bodies tilt in the base it has been customary to provide the press-bodies with concentric portions like the portions 22 of the body of my press, these concentric portions resting on supports in the base. This resulted in a broad base-support for the press-body; but the center of gravity of the press-body was located high up, as was also the cam-shaft on which the belt exerted its pull. There was consequently a liability for the press to topple over, and it became necessary to apply clamps at the concentric portions of the press-body. The support of the press-body, as well as its steadying features, were therefore found entirely at the base of the press-body. In another type of tilting press the press-body, instead of being supported at its lower portion, was suspended in a frame structure on a pivot formed by the cam-shaft, giving a suspended structure in which the center of gravity of the press-body was below the pivot of suspension. A serious defect in this type of press is the great movement given to the die-bed of the press as it is adjusted into various angular positions. In other words, the center of oscillation is too far away from the die. In my improved construction I embody all of the merits of the first-mentioned form of press—namely, a tilting press-body whose axis of tilting motion is close to the die—and I support the weight of the press-body on elements engaging lower portions concentric with this axis of tilting motion, thus getting a broad and substantial lower support, and in order to avoid the danger of the press toppling over and without the necessity for clamping devices at the concentric lower portions of the press-body I provide the press-body with trunnions at the axis of tilting motion near the die, and I extend portions of the base up to and into engagement with these trunnions to act as steadying agents. These trunnion engagements need not act as vertical supports for the press-body, the vertical strains being met by the rollers on which the lower concentric portions rest; but any toppling of the press is resisted by these trunnion engagements.

I claim as my invention—

1. In a pitman for a press, the combination, substantially as set forth, of a pitman part having a wrist-bearing and having a bearing at right angles thereto, an axially-threaded nut journaled in said last-mentioned bearing, means for turning said nut in said bearing, and a pitman part having a wrist-bearing and having a threaded shank engaging said nut.

2. In a pitman for a press, the combination, substantially as set forth, of a pitman part having a wrist-bearing and a bearing at right angles thereto, an axially-threaded nut journaled in said last-mentioned bearing, bevel-gearing carried by said pitman part to serve in turning said nut in said pitman part, and a pitman part having a wrist-bearing and provided with a threaded shank engaging said nut.

3. In a press operated by a cam-shaft, the combination, substantially as set forth, of a part reciprocated by the cam-shaft, a brake-lever pivoted to a fixed part of the press and having one end projecting over and adapted to be engaged by said reciprocating part, and a brake-shoe carried by the other end of the lever and adapted to be pressed into frictional engagement with a part of the shaft when said reciprocating part engages the lever.

4. In a press, the combination, substantially as set forth, of a cross-head having in its lower portion a socket enlarged at its upper end and formed with one vertical half in the

cross-head, and a clamp bolted against the cross-head and containing on its inner face a corresponding half-socket.

5. In a press, the combination, substantially as set forth, of a base, a press-body provided with segmental lower portions resting on said base, a crank-shaft journaled in the upper portion of the press-body, trunnions upon the press-body axially disposed with reference to said segmental portions, and upward extensions from said base into steadying engagement with said trunnions.

6. In a press, the combination, substantially as set forth, of a base, a press-body united thereto by a horizontal axis of articulation, and devices, substantially as set forth, connecting said press-body with the floor or foundation on which the press is mounted independent of said base, whereby the angular movement of the press-body with reference to the base causes the base to shift upon the floor or foundation.

7. In a press, the combination, substantially as set forth, of a base, a press-body connected thereto by a horizontal axis of articulation, a rack fixed upon the floor or foundation upon which the press is mounted, a gear journaled in said base and engaging said rack, and a link connecting said gear with the press-body.

8. In a press, the combination, substantially as set forth, of a base, a press-body connected thereto by a horizontal axis of articulation, a movable clutch part, a lever pivoted to the body of the press and connected up with said movable clutch part, a treadle pivoted to the base of the press, and a link connected at one end to said treadle and provided at its other end with a series of pivot-holes for alternative connection with said lever.

9. In a press, the combination, substantially as set forth, with a cutting-die, corrugating-die, cross-head, a punch carried by the cross-head, and a corrugating-punch carried by the cross-head and capable of up-and-down motion in the cross-head, of a pressure-bar above said corrugating-punch, toggles engaging said pressure-bar and cross-head, and fixed blocks controlling the flexure of said toggles.

10. In a stop-clutch for a press, the combination, substantially as set forth, of a shaft provided with a dog-notch, a driving-wheel free on said shaft, a ring encircling said shaft and having two interior grooves, a dog arranged for sliding motion in the hub of said wheel parallel with the axis thereof and having a projection adapted to engage and be controlled by either of said grooves, said dog being adapted to engage and disengage from said driving-notch, a passage through the partition separating said grooves, a switch-block arranged to slide in said ring and switch said dog projection from one of said grooves to the other, a spring tending to hold said switch-block in such position that the dog projection will engage the groove corresponding with the non-driving position of the dog, and devices through which the operator's hand or foot may shift said switch-block from the position in which the spring tends to hold it.

11. In a stop-clutch for a press, the combination, substantially as set forth, of a shaft provided with a dog-notch, a driving-wheel free on said shaft, a ring encircling said shaft and having two interior grooves, a dog arranged for sliding motion in the hub of said wheel parallel with the axis thereof and having a projection adapted to engage and be controlled by either of said grooves, said dog being adapted to engage and disengage from said driving-notch, a passage through the partition separating said grooves, a switch-block arranged to slide in said ring and switch said dog projection from one of said grooves to the other, a spring tending to hold said switch-block in such position that the dog projection will engage the groove corresponding with the non-driving position of the dog, devices through which the operator's hand or foot may shift said switch-block from the position in which the spring tends to hold it, a spring-latch carried by said switch-block, and a groove circumferentially grooved in said shaft, normally engaged by said spring-latch, and provided with a passage to permit the switch-block to be moved when said passage is at said switch-block.

JOHN B. FOOTE.

Witnesses:
J. W. SEE,
M. S. BELDEN.