

(No Model.)

2 Sheets—Sheet 1.

N. C. STILES.
POWER PRESS.

No. 364,142.

Patented May 31, 1887.

Fig. 1.

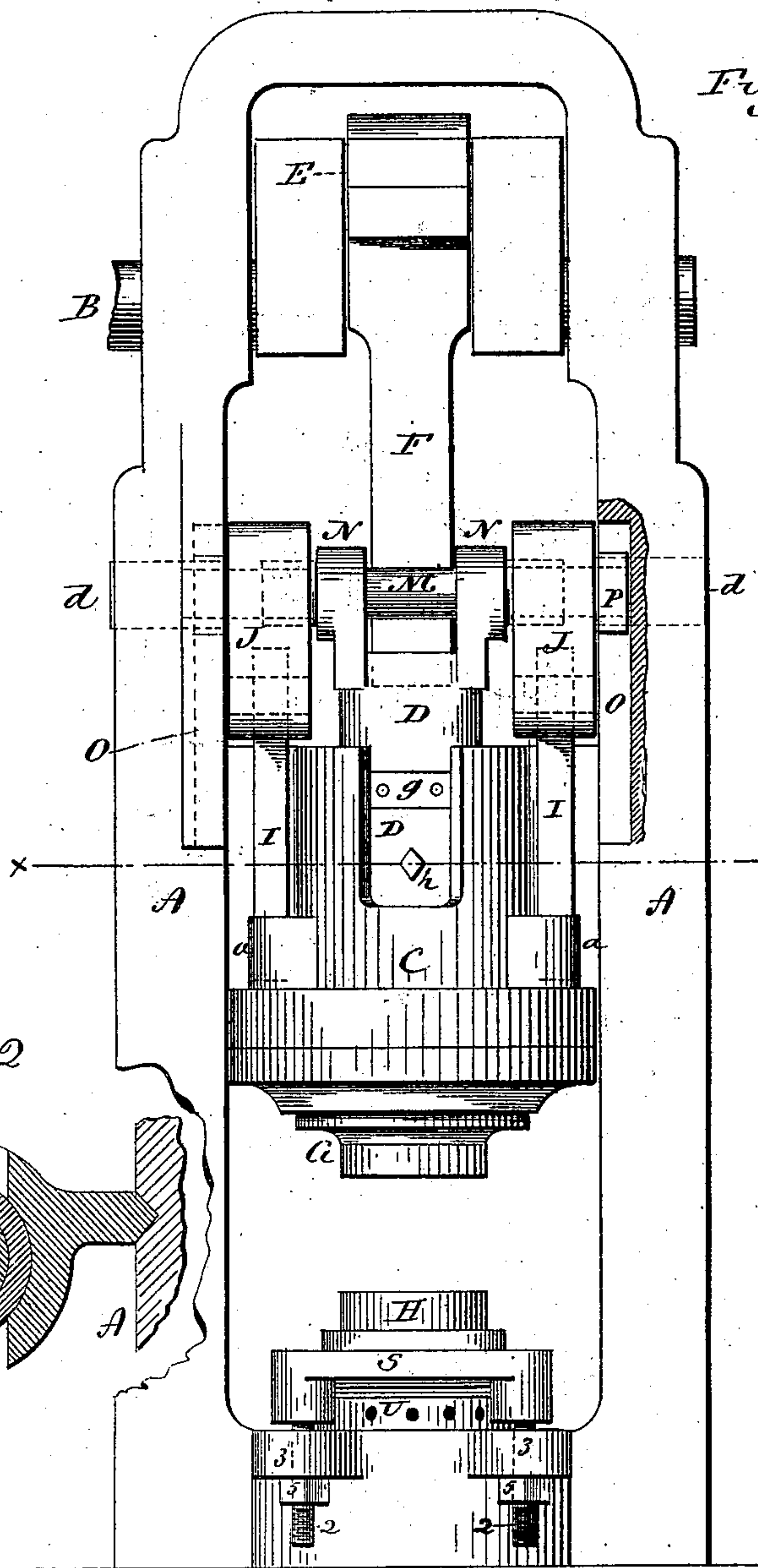


Fig. 1^a.

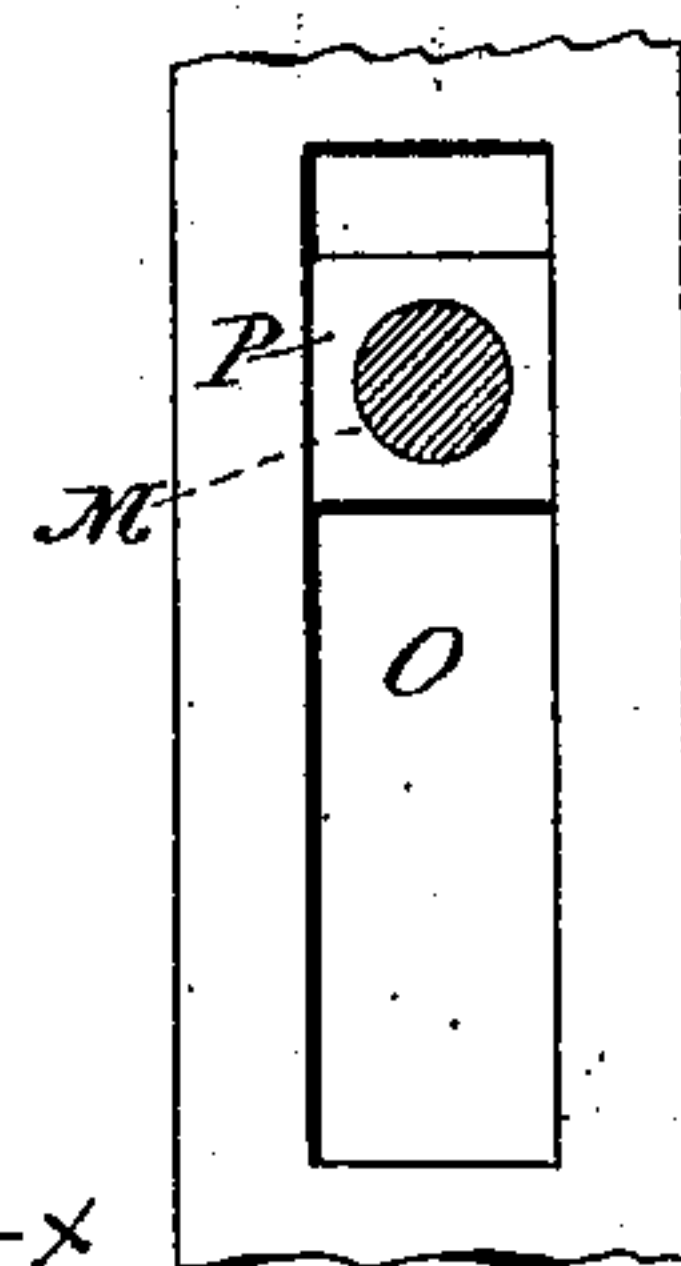


Fig. 2.

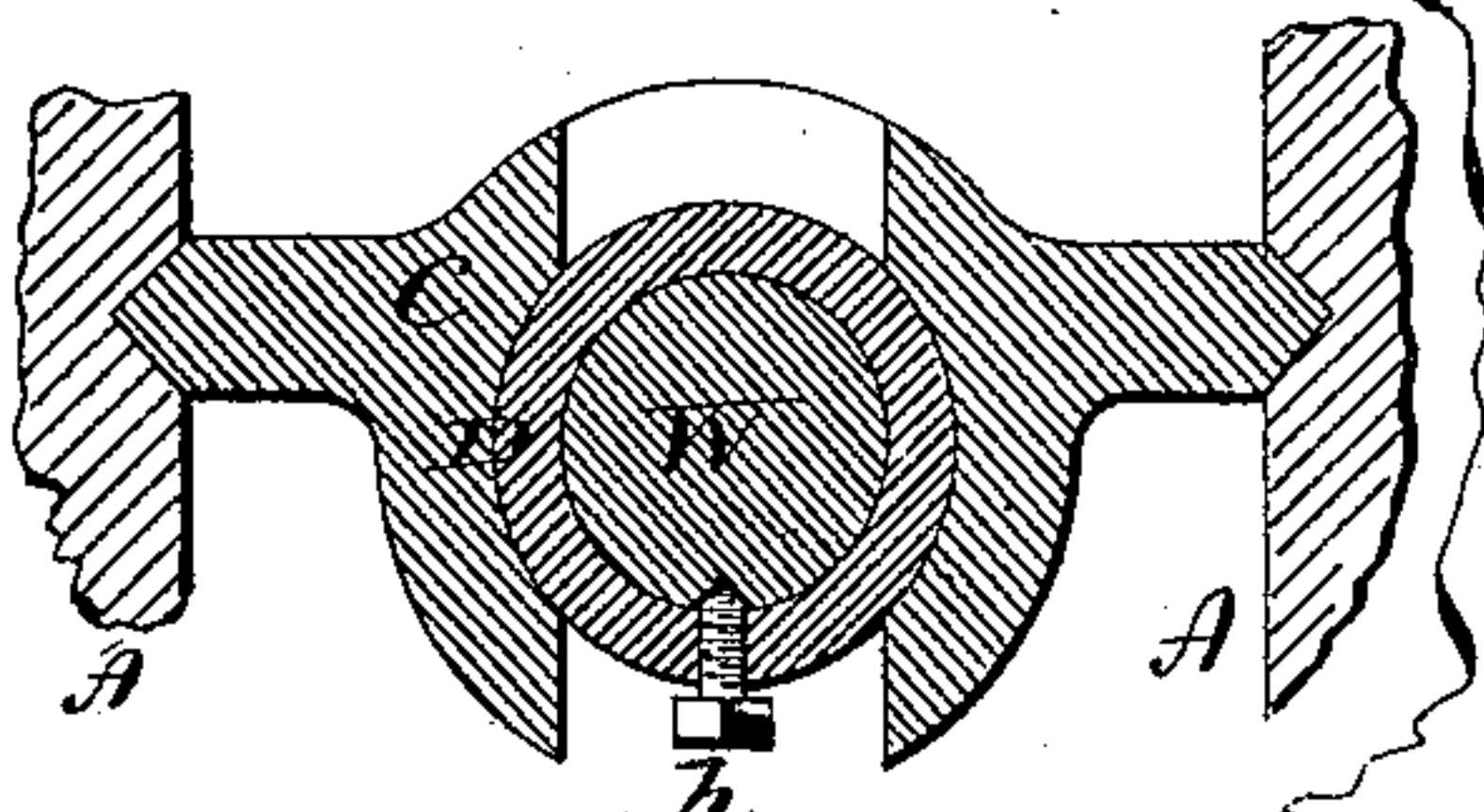


Fig. 6.

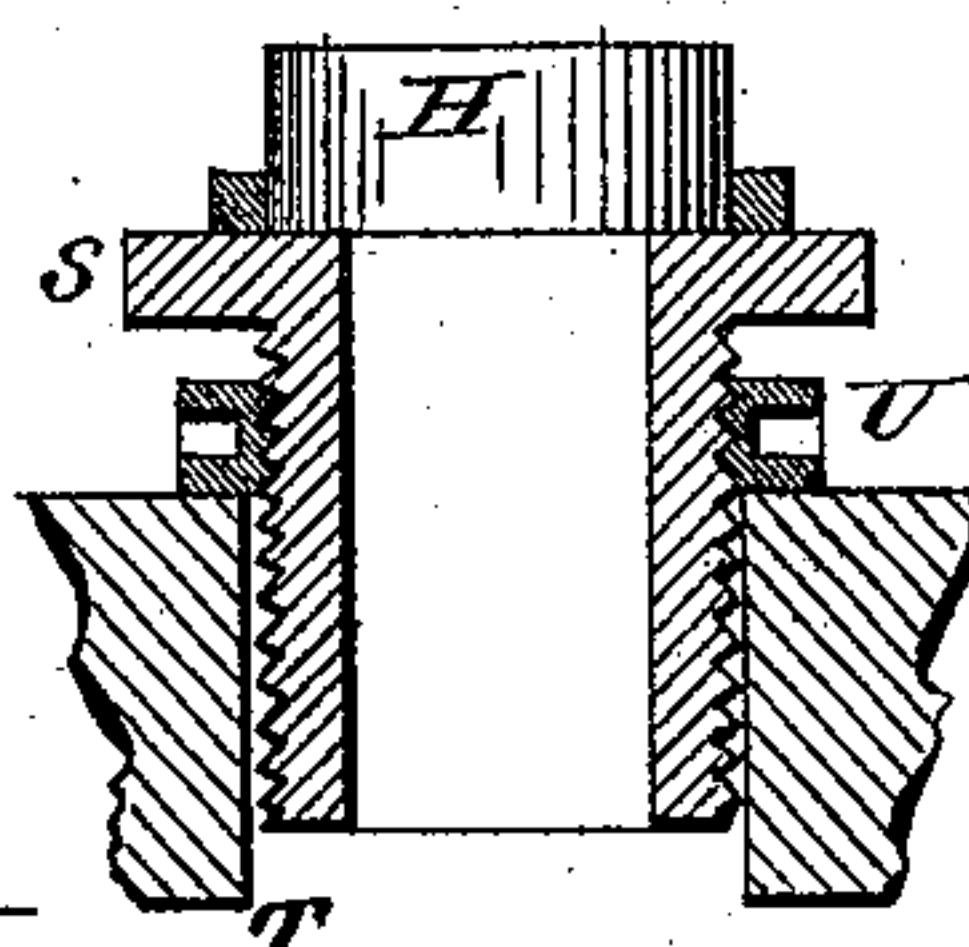
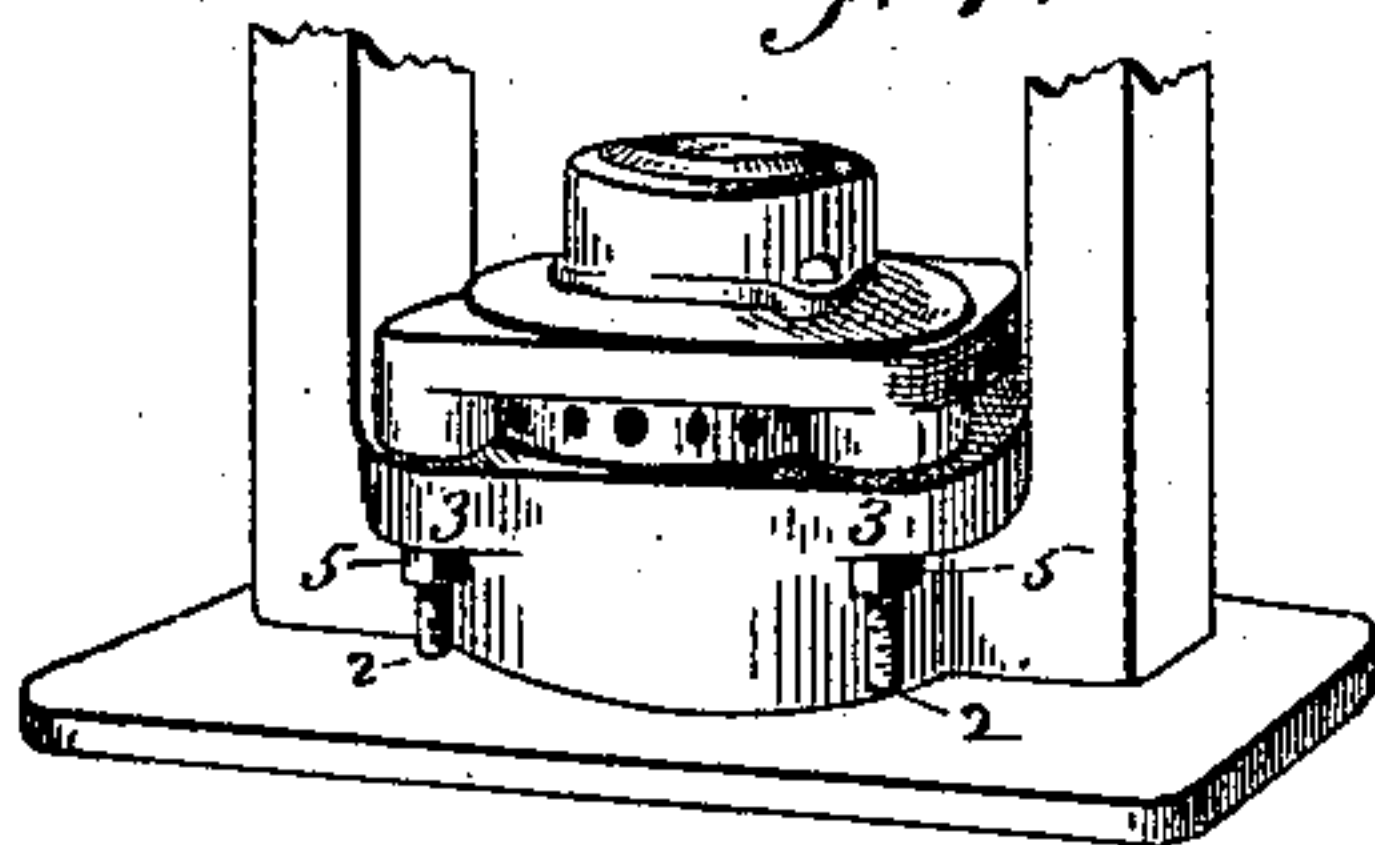


Fig. 7.



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Fred C. Earle

Norman C. Stiles
By Atty,
Fred C. Earle

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Fig. 3.

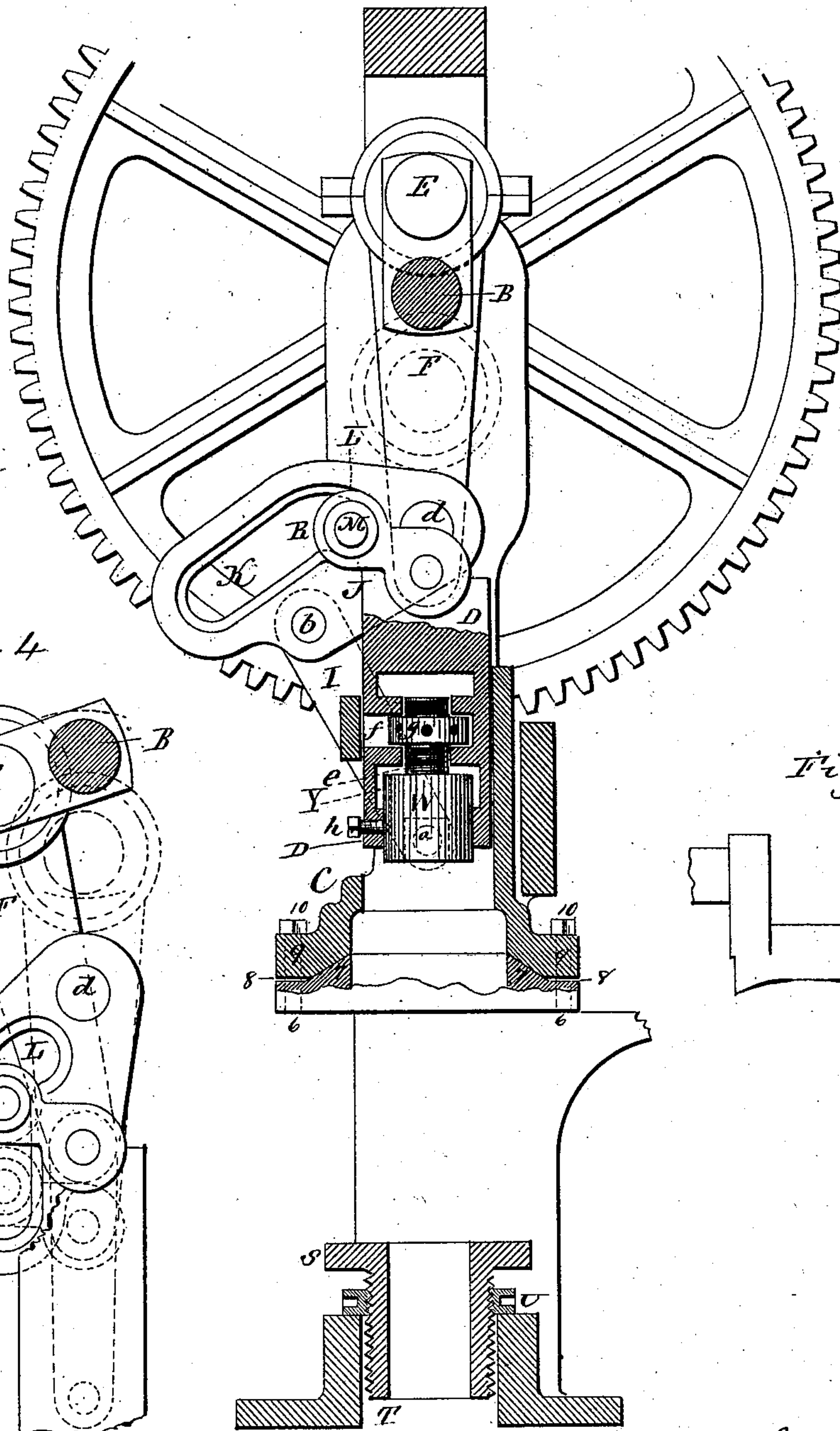


Fig. 4.

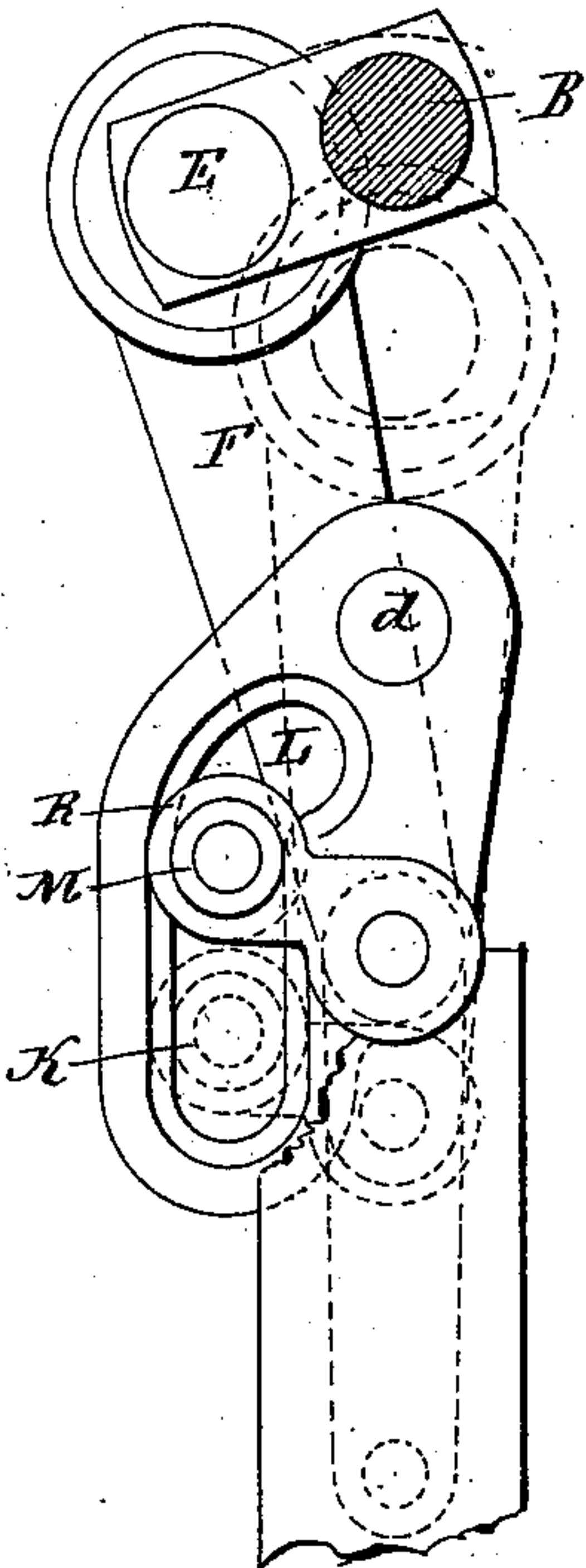
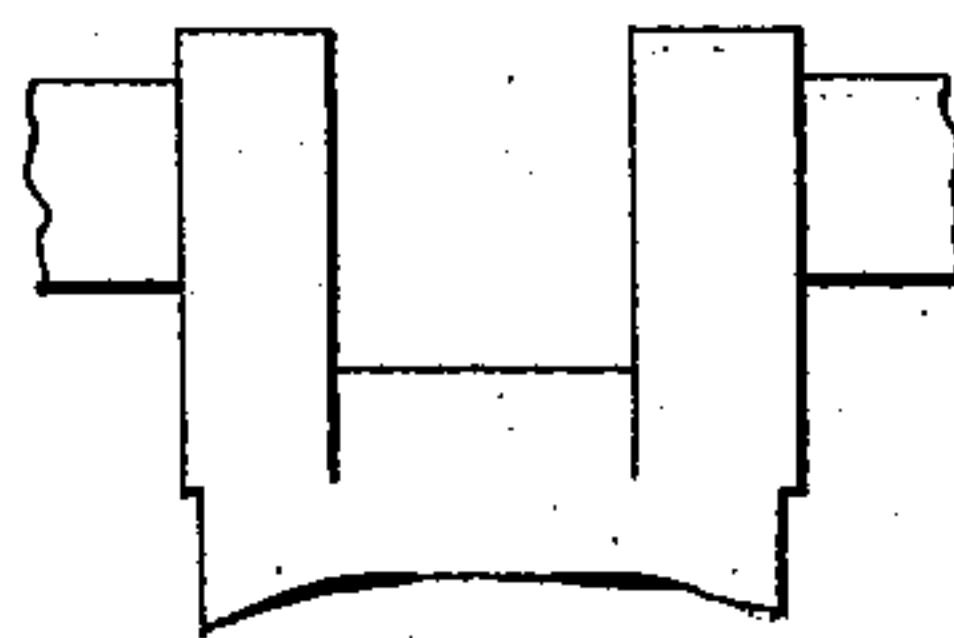


Fig. 5.



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UNITED STATES PATENT OFFICE.

NORMAN C. STILES, OF MIDDLETOWN, CONNECTICUT.

POWER-PRESS.

SPECIFICATION forming part of Letters Patent No. 364,142, dated May 31, 1887.

Application filed December 13, 1886. Serial No. 231,406. (No model.)

To all whom it may concern:

Be it known that I, NORMAN C. STILES, of Middletown, in the county of Middlesex and State of Connecticut, have invented new Improvements in Power-Presses; and I do hereby declare the following, when taken in connection with accompanying two sheets of drawings, and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a front view; Fig. 1^a, an inside view of one side of the frame, showing the vertical guiding-groove O with the shaft bearing therein; Fig. 2, a transverse section through the slides on line *xx* of Fig. 1; Fig. 3, a vertical section through the slides, showing side view of the toggle in the contracted or up position; Fig. 4, substantially the same parts as in Fig. 3, showing the toggle in the extended or down position; Fig. 5, a modification in the connection between the punch-slide and the toggles; Fig. 6, a vertical section through the fixed die-holder; Fig. 7, a perspective view of the lower portion of the press, illustrating the adjustment of the fixed die.

This invention relates to an improvement in that class of power-presses in which two operations are to be performed, commonly called "double-action power-presses"—as, for illustration, in drawing or "cupping" sheet metal the sheet or blank to be operated upon lies flat upon the surface surrounding the die into which the metal is to be forced, and so that as the punch approaches the metal it will strike the surface of the metal upon the side opposite the die upon which the sheet lies, and will force the metal down into the die, drawing, contracting, or expanding the metal, so as to bring it to the shape of the space between the punch and the die when the punch stands within the die.

Were not some provision made, the portion of the flat sheet extending beyond the die would be fullered or puckered in the process of being drawn into the die, so as to produce uneven work. To obviate this difficulty, a holder is provided which will rest upon the sheet of metal around the cavity in the die, so as to hold the sheet flat and permit it to be gradually drawn into the die. The two opera-

tions before referred to are one to thus hold or bear upon the blank while being drawn and the other to operate the punch. The first usually consists of a slide, presenting a flat surface toward the die, and so that after the blank or sheet has been laid over the die this holding slide descends in advance of the punch and comes close upon the side of the blank or sheet opposite the die, and so as to grasp the blank between the die and the face of the said slide. Then as the die comes upon the blank within the said slide and over the cavity in the die it operates upon the blank and gradually draws the metal from between the clamping-surfaces, and because the blank is held in a flat condition by such clamping-surfaces it cannot pucker or wrinkle, it being understood that the force of the clamping of the blank must be only sufficient to prevent the blank from being too rapidly drawn from between those surfaces.

In Letters Patent No. 299,290, granted to me May 27, 1884, I pointed out difficulties which existed in the then common devices for operating this holding-slide. Up to that time the holding-slide had been generally operated by means of a cam on the driving-shaft, which would force the holder down upon the blank, and as a very nice adjustment is necessary between the two holding or grasping surfaces it required but a slight wear of the cam or surface upon which it worked to disturb the proper relation of these two surfaces. The object of that invention was principally to overcome that difficulty and devise a mechanism in which the wear would be slight and not materially affect the proper relation of the holding-surfaces. To that end that invention consisted in combining the slide which carried the movable holding-surfaces with a toggle, through which, from the driving-shaft, the reciprocating movement was imparted to the said holding-slide, and in that invention the toggle was operated directly from the driving-shaft, either by a cam thereon or some projection extending therefrom.

My present invention is an improvement upon that described in my said patent, and has for its object a more simple and effective arrangement and operation of the toggle.

A A represent the two sides or uprights of the apparatus, in the upper part of which the

driving-shaft B is arranged in suitable bearings, and so as to revolve by the application of power thereto in any known manner, not necessary to be illustrated in this application.

5 C represents a slide arranged to receive an up-and-down reciprocating movement in vertical guides in the frame. Within this slide C is the punch-carrying slide D, to which reciprocating movement is imparted, by means of
10 a crank or eccentric, E, on the driving-shaft, through a pitman, F, in the usual manner and as in my patent before referred to, so that each revolution of the driving-shaft imparts a full up-and-down reciprocating movement to the
15 punch-carrying slide. The punch-slide D works through the slide C in the usual manner and as seen in Figs. 2 and 3.

The slide C carries the holding-surface G, which in its downward movement is adapted
20 to come so close to the face of the die H as to grasp the sheet or blank laid thereon, as in my previous patent; and this downward movement of the slide C is such as to bring the holding-die G into the gripping condition upon
25 the blank before the punch reaches the blank and hold it upon the blank while the punch continues its descent into the die, and so that the metal is drawn into the die from between the holding-surface and the face of the die in
30 the usual manner. Then the slide C rises, as well as the punch.

To impart the up-and-down reciprocating movement to the slide C, a pair of toggles are provided, each consisting of one link, I, hung
35 by its lower end to the slide C, as at *a*, and so as to swing in a plane at right angles to the axis of the driving-shaft, and a second link, J, to which the upper end of the link I is hung, as at *b*, the other end of the links J hung upon
40 a fixed bearing, *d*, in the frame, these bearings (here represented as trunnions) extending from the links into the frame, as seen in broken lines, Fig. 1, and so that as the links are in their straight or extended position, as seen in Fig.
45 4, the slide C will be forced to its extreme down position, and when the links are in the contracted position, as seen in Fig. 3, the slide C will be raised to its highest point. Each of the links J is constructed with a slot, K, parallel with a line between their two connecting-
50 points *b d*. At the upper end this slot is curved inward, as at L. Through these slots is a transverse shaft, M, and on the upper end of the punch-slide D bracket-arms N N are fixed or
55 made a part of the slide, through which the said shaft M extends, as seen in Fig. 1, and so that in the up-and-down movement of the punch-slide the shaft M will be carried with it. The shaft extends through the slots in the two slides
60 and into a vertical groove, O, in the frame at each side, and in that groove there is preferably arranged a sliding box, P, in which the ends of the shaft M rest, the sliding boxes P forming the bearing for the shaft M. In each of the
65 slots K the shaft is preferably provided with an anti-friction roll, R, which will freely work in the slots of the links as the punch-slide is

moved up and down. The shaft M is in such relation to the slot that when the parallel portion K of the slots stands in an upright position
70 they will be in a vertical plane, as seen in Fig. 4, and so that the shaft M, under the movement of the punch-slide, may move up and down through the parallel portion of the slot K without effect upon the toggles; but as the
75 punch-slide rises and brings the shaft M to the upper end of the parallel portion of the slots, and as it (the shaft) cannot turn from its vertical path, it acts as a cam on the curved portion of the slots, and as it completes its up-
80 ward movement it passes into the curved portion of the slots and turns the links outward from their straight or extended position into the contracted position, as seen in Fig. 3, and this position occurs when the punch-slide is in its
85 extreme up position. Then as the punch-slide commences its descent the shaft M also descends, and, working through the curved portion of the slots, quickly throws the links into their extended position, and consequently
90 quickly forces down the holding-slide C to its extreme position, as seen in Fig. 4, this extreme down position occurring just as the shaft M passes into the straight or parallel portion of the slot. Then the punch-slide continues its
95 descent without effect upon the holding-slide. Thus it follows that the punch-slide descends to its holding position considerably in advance of the punch, and remains in that holding position until the punch-slide approaches its extreme up position, and the operation of the holding-slide is produced without direct connection with the driving-shaft.

I have described and prefer the arrangement of the shaft as supported in the brackets
105 and slide and extending into the sides of the frame, because the frame takes the bearing of the shaft in the operation of the links and relieves the slide; but the links may be operated simply by trunnions projecting from the slide,
110 as seen in Fig. 5, the trunnions performing substantially the same operation as the shaft, and may be considered as a part of the shaft.

As the links must always bring the face of the slide to a certain point, and cannot therefore be conveniently adjustable, it is necessary
115 to make the face of the die adjustable with relation to the holding-face of the slide, in order that the two faces may come into the proper relative position to grip the sheet. To
120 this end I construct the die-holder S (see Fig. 6) of tubular shape, screw-threaded upon its outer surface, and construct the bed with an opening, T, through which the tubular portion of the die-holder may extend, and on the
125 tubular portion of the die I place a nut, U, adapted to rest upon the bed around the opening therein, and as seen in Fig. 6.

From the die-holder bolts 2 extend down through ears 3 3 on the bed, the bolts being
130 fixed in the die-holder, and so that as the holder is raised or lowered the bolts will move accordingly, and I prefer to arrange these bolts two in front, as seen in Fig. 7, and with

two like bolts at the rear. (Not shown.) These bolts, below the ears 3, are each provided with a nut, 5. When it is desired to adjust the lower or fixed die, the holding-slide is brought to its lowest position, a blank laid upon the lower die-holder, the nuts 5 are unscrewed, and then the nut U turned to raise the die-holder up until the blank will be properly gripped between the face of the holding-slide and the die below. This done, the nuts 5 are returned up to a hard bearing, and so as to securely lock the die-holder in place.

If it be required to drop the lower die, then the nut U is turned accordingly, and the nuts 5 brought up to a bearing, as before. By this arrangement not only is the die-holder firmly held, but its level is maintained, and all liability to displacement is avoided.

To adjust the punch with relation to the die, I construct the punch W, or may be the punch-holder, separate from the slide D, and of cylindrical shape, and in the lower end of the slide D, I make a corresponding cylindrical cavity, Y, (see Fig. 3,) and from the upper end of the punch W, or punch-holder, as the case may be, is a concentric screw-shank, *e*, which extends up into a corresponding cavity in the punch-slide, and in the slide is a transverse recess, *f*, in which a nut, *g*, is arranged, threaded corresponding to the shank *e* of the punch or punch-holder. This recess *f* opens to the front of the punch-slide D, as seen in Fig. 1, so that access is had to the nut *g*. The nut is provided with radial holes or other means whereby instruments may be applied to rotate the nut.

The punch or holder W is grooved vertically, and in the slide a set-screw, *h*, is introduced, the end of which enters the vertical groove in the holder W, as seen in Fig. 2, to prevent its rotation, and so that it may be positively set when once adjusted.

To adjust the punch or holder, the nut *g* is turned to raise or lower the punch or holder, as the case may be, into its proper relation with the fixed die.

Each punch may be constructed with a shank, *e*, screw-threaded corresponding to the nut *g*; or it may be a holder adapted at its lower end to receive the punch, as indicated in broken lines, Fig. 3, by the term "punch-holder." Therefore I wish to be understood as including the punch itself as an integral part of the holder, if such construction is desirable.

It is desirable, if not necessary, that the holding-surfaces should be in perfect parallel planes in order to make an even pressure upon the sheet between them. However perfectly the machine may be built, there is liability of some degree of variation in changing the holding-surfaces or the dies. To provide for such adjustment of the holding-surfaces, I construct the holding-slide with an adjustable face-piece, 6. (See Fig. 3.) This piece corresponds in outline to the lower end of the slide.

On the adjacent surfaces of the holding-

piece 6 and the lower end of the slide I form a projection, 7, on the one part, with a corresponding cavity in the other part, the projection being represented in Fig. 3 as made on the holding-face piece 6. The surfaces between the two parts outside of this projection 7 do not come to a bearing—that is, a space, 8, is left between the two parts around the projection 7. The lower end of the slide projects outward to form a flange, 9, and through this flange several screws, 10, are introduced into the face-piece 6 below, the screws being outside the projection.

I do not wish to be understood as claiming, broadly, a die-holder having a screw-threaded shank set into a recess in the bed of the press, with a nut on the shank, as such, I am aware, is not new.

I claim—

1. In a double-action power-press, the combination of the vertical slide carrying the movable holding-surface, a vertically-movable slide carrying the punch, mechanism, substantially such as described, to impart reciprocating movement to the punch-slide, and a toggle or toggles, one link, I, of which is hung to the slide which carries the holding-surface, the other link, J, hung to a fixed point in the frame, the said link J constructed with a slot parallel with the line between its fixed point of connection with the frame and its point of connection with the other link, I, the said slot curved at the fixed end and toward the fixed point, the punch-slide provided with an extension into said slot and so as to work therein under the reciprocating movement of the punch-slide, substantially as described, and whereby under such up-and-down reciprocating movement of the slide the corresponding contracting and extending movements are imparted to said link, and thence to the holding-slide.

2. In a double-action power-press, the combination of the vertical slide carrying the movable holding-surface, a vertically-movable slide carrying the punch, mechanism, substantially such as described, to impart reciprocating movement to the punch-slide, a toggle or toggles consisting of the two pairs of links I J, hinged together, the lower end of the links I hung to the said holding-surface slide, the upper end of the links J hung to a fixed point in the frame, the said links J constructed with a slot, K, parallel with the line between the fixed point upon which the said links J are hung and the point by which they are connected to the other links, I, the upper end of the said slot K turned inward toward the fixed point upon which the links J are hung, a shaft, M, fixed to the punch-slide and extending through the slot in the link or links J, and the frame provided with vertical grooves O, into which the ends of the said shaft M extend as vertical working-guides, substantially as described.

3. The herein-described adjustment for the fixed die of power-presses, consisting of the die-holder S, constructed with a tubular shank

extending into a corresponding opening in the bed of the machine, the said shank externally screw-threaded, and the die-holder provided with fixed bolts 2, extending through corresponding ears on the bed, combined with a nut, 5 U, around the shank of the die-holder and between the holder proper and the bed, substantially as described.

4. In a power-press, the combination of the 10 reciprocating punch-carrying slide D, constructed with a vertical cavity in its lower end to receive a punch-holder, the said slide also constructed with a transverse recess, *f*, above

said cavity, the punch-holder arranged in said cavity and constructed with a screw-threaded 15 shank, *e*, extending vertically upward from said cavity through said recess *f*, and a nut, *g*, in said transverse recess corresponding in thickness to the height of said recess, the said nut screw-threaded corresponding to the 20 screw-threaded shank of the die-holder, all substantially as described.

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