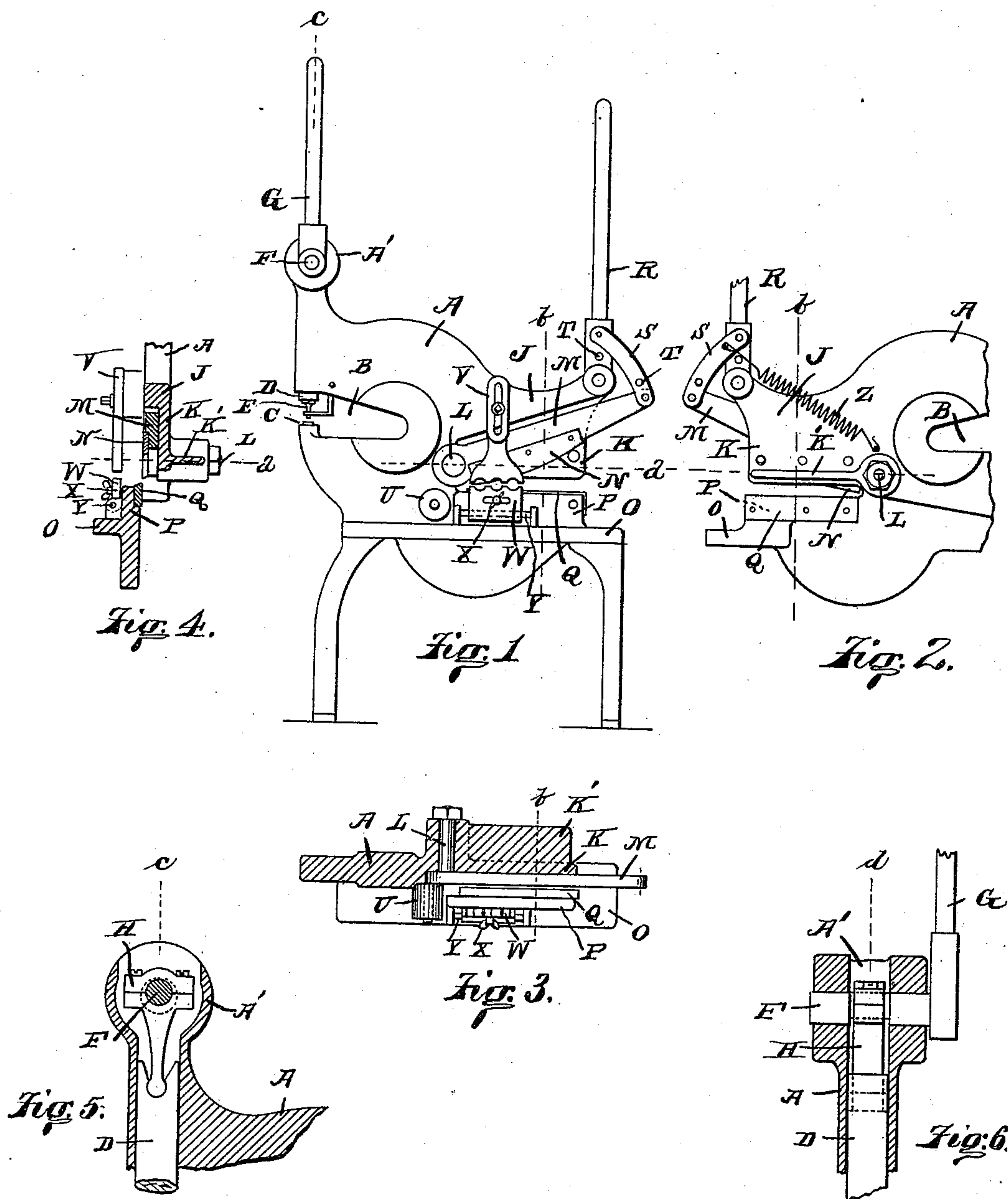


(No Model.)

C. A. BERTSCH.
PUNCHING AND SHEARING MACHINE.

No. 430,264.

Patented June 17, 1890.



Witnesses:
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CHARLES A. BERTSCH, OF CAMBRIDGE CITY, INDIANA.

PUNCHING AND SHEARING MACHINE.

SPECIFICATION forming part of Letters Patent No. 430,264, dated June 17, 1890.

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To all whom it may concern:

Be it known that I, CHARLES A. BERTSCH, of Cambridge City, Wayne county, Indiana, have invented certain new and useful Improvements in Punching and Shearing Machines, of which the following is a specification.

This invention pertains to improvements in combined punching and shearing machines to be operated by hand, and the improvements will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is an elevation of the front side of a punching and shearing machine embodying my improvements; Fig. 2, an elevation of the rear side of a portion of the body thereof; Fig. 3, a sectional plan in the plane of line *a*; Fig. 4, a vertical section in the plane of line *b*; Fig. 5, a vertical section in the plane of line *d*, and Fig. 6 a vertical section in the plane of line *c*. Figs. 5 and 6 are on a somewhat enlarged scale.

In the drawings, A indicates the body of the punching-machine, the same having the general form of a disk set vertically.

B is the throat of the punching-machine, formed by a horizontal radial gap in the body, whereby are produced an upper and a lower jaw.

C is the punch-die, secured, as usual, in the lower jaw of the punch-body.

D is the cylindrical punch-ram, fitted to slide vertically in a cylindrical guide in the upper jaw of the punch-body over the punch-die.

E is the punch, secured in the lower end of the punch-ram.

F is an eccentric-shaft disposed horizontally over the upper end of the punch-ram and journaled in ears A', formed upon the punch-body, the intermediate portion of this shaft being eccentric to the journaled portions. G is a hand-lever secured to a portion of this shaft, projecting to one side of the ears, the relation of this hand-lever to the eccentric being such that when the eccentric occupies its uppermost position the hand-lever is substantially upright.

H is a pitman journaled at its upper end upon the eccentric of the shaft F and provided at its lower end with a knuckle jour-

naled in a knuckle-seat in the upper end of the punch-ram.

J is a rearward projection from the punch-body, such projection forming the upper jaw of the shearing-machine. K is a curtain projecting downwardly from this upper shear-jaw and presenting a truly-dressed vertical front.

L is a pivot-bolt journaled in a boss projecting to the rear of the punch-body at the root of the upper shear-jaw, the head of this bolt presenting itself at the front of the machine.

M is the shear-bar, secured at its heel to the head of the pivot-bolt L and projecting to the right beyond the upper shear-jaw, the rear face of this shear-bar lying against and working upon the front face of the curtain K.

N is the upper shear-blade, secured at the front lower edge of the shear-bar.

O is a horizontal flange projecting from the front side of the punch-body and projecting to the right thereof, and serving to form the lower jaw of the shearing-machine, and serving, also, as a means by which the machine may be attached to legs or to other supports.

P is the lower shear-rib, projecting upwardly from the flange O below, but in front of the upper shear-blade, and having a rear surface parallel with the face of the upper shear-blade.

Q is the lower shear-blade, bolted against the rear face of the lower shear-rib.

R is a hand-lever pivoted at the extreme projecting upper portion of the upper shear-jaw upon a pivot whose axis is parallel with the axis of the eccentric shaft F.

S is a pair of links having their upper ends pivoted to the hand-lever R near the pivot thereof, and having their lower ends pivoted to the free extremity of the upper shear-bar, the pair of links straddling the hand-lever and shear-bar—that is to say, the pair of links are disposed one at each side, so as to equalize the strains on the pivots.

T is pivot-holes in the hand-lever and links, these holes serving as means by which the length of links can be practically shortened by readjustment of the end pivots of the links.

U is a horizontal roller projecting from the front of the machine at the root of the throat

of the shearing-machine, the top of this roller presenting itself substantially at the level of the top edge of the lower shear-blade.

V is a hold-down iron secured to the upper jaw of the shearing-machine toward the root of the throat thereof, and presenting notches downwardly above the level of the top of the lower shear-blade, this hold-down iron being vertically adjustable, so that the height of the notches above the level of the lower shear-blade may be regulated. W is a block disposed below this hold-down iron and having notches in its upper surface, the bottom of these notches being substantially even with the top edge of the lower shear-blade, this block standing against the front of the lower shear-rib, but supported in such a position on a horizontal pivot as to be capable or being turned down out of the way. X is a screw engaging this block and the frame of the machine and serving to hold the block in an upright position, the screw passing through a horizontal slot in the block, so as to permit an endwise adjustment of the block and the securing of the block in an adjusted endwise position.

Y is the horizontal pivot on which the block W is supported, and on which it is capable of turning down or up in a hinge-like manner, and on which it is capable of a horizontal endwise adjustment, and Z a spring attached at one end to the body of the machine and at the other end connected with the lever R in such a manner that the spring tends to sustain the hand-lever in an upright position.

Moving the hand-lever G to the right or to the left will serve to bring the punch down. If the punch part of the machine is being used alone, then the lever may be moved either way; but if the shear part of the machine is being used by another operator then the hand-lever G is to perform its work by being moved to the left, so as not to interfere with the operations of the attendant of the shear part of the machine.

By moving the hand-lever R to the right the shear-bar and upper shear-blade will be depressed in an obvious manner and with a power proportionate to the movement of the hand-lever relative to that of the shear-blade, and the parts are to be so constructed that the hand-lever R in making its complete sweep from the vertical to the horizontal position will effect a closure of the shear-blades throughout their entire length, and the machine is to be thus used for its ordinary everyday work; but in case of an emergency it may be desirable to do heavier shearing than the machine is capable of under the conditions just recited. In such case the pivots of the links S are to be shifted to the holes T. The effect of this readjustment of the link-pivots is to increase the movement of the hand-lever R with reference to that of the upper shear-bar, and consequently to increase the power with which the upper shear-blade may be depressed. Under these new conditions

the shearing power has been greatly increased, and, perhaps, to such an extent as to endanger the body of the machine in case this extraordinary shearing power could be brought to bear at the outer portion of the shear-jaw; but under the new conditions of increased power the shears are incapable of closing throughout their entire length, and thus danger incident to extra heavy shearing at the outer extremity of the shear-jaw is guarded against.

The pivot L is fixed to the shear-bar and oscillates with it, turning freely in the boss in which it is journaled. The journal-hole of the pivot-bolt L is counterbored at its front end, this counterbore extending back even with the front face of the curtain K, and the heel of the shear-bar is given a circular form, so as to take a fair bearing against the circular wall of the counterbore, thus relieving the pivot-bolt of a large portion of the pivotal strains. The rear side of the shear-bar works against the front face of the curtain K, and the shear-bar is thus kept up solidly to its work with the upper shear-blade against the lower shear-blade without depending on the pivot L to resist the shearing side strains. The upper shear-blade is bolted to the shear-bar, and perforations in the curtain K, as shown in Fig. 2, serve in permitting access to the bolts when the upper shear-blade is to be removed from the shear-bar.

The hold-down iron V operates in the usual manner and prevents the tipping of bar-stock while being cut up. The pivot-block W operates in conjunction with the hold-down iron, but its office is to prevent bar-stock from moving outward in the throat of the shear. The upper shear-blade is given a rank shear, the consequence of which is that bar-stock will tend to be forced outwardly without being sheared. The notch-block W prevents this outward movement of the stock and insures that the heavy work of bar-cutting shall be done near the heel of the shear-blades, a point at which the body of the machine is capable of withstanding extraordinary strains. It is highly desirable that the shearing of bar-stock shall be done as near as possible toward the heel of the shear-blades in order to guard against the danger of overstrains on the body, and sometimes it is highly desirable to restrict the shearing of bars to certain portions of shear-blades in order to avoid notches or dull places which may have formed in the shear-blades. The notch-block W provides for this, and its endwise adjustment provides for accomplishing shearing at precisely the desired points in the shear-blades.

When the shear part of the machine is being used for the shearing of sheet metal or for slotting wide or long sheets, then the notch-block W is to be turned down out of the way, so as to permit the slits of the sheets to pass to the left, that portion of the slit of the sheet at the front of the machine passing to the left over the roller U and resting

thereon, whereby a movement of the sheet in slotting is facilitated. That portion of the slit sheet to the rear of the machine passes to the left under an offset in the punch-body, as indicated in Fig. 2, the lower portion of which offset in the body is substantially flush with the face of the lower shear-blade Q.

The lever R stands upright when the shear is open. If unsupported, the weight of the shear-bar would tend to pull the hand-lever forward. An ordinary spring-support for the hand-lever would increase in resistance as the hand-lever is brought down, and thus detract from the operator's power just where he needs it most. The spring Z (seen in Fig. 2) serves in supporting the hand-lever in an upright position, and it yields when the hand-lever is brought down; but as the hand-lever is brought down the outer end of the spring sweeps in an arc toward a line cutting the axis of oscillation of the lever and the heel of the spring, and the spring thus becomes of less resistance as the lever descends. A spring operating on this principle may be attached to either or both levers, if desired. I have illustrated it only in connection with the shear-lever, deeming a single exemplification sufficient.

I claim as my invention—

1. In a shearing-machine, the combination, substantially as set forth, of a body throated to form an upper and lower shear-jaw, a lower shear-blade secured to such lower shear-jaw, a shear-bar pivoted to the body at the root of the shear-throat of the body, an upper shear-blade secured to such shear-bar and adapted to coact with said lower shear-blade, a lever pivoted to the upper shear-jaw of said body, and links pivoted to said hand-lever and the free end of said shear-bar and adapted for adjustment in length and power in such manner that when the links are adjusted for maximum power the shear-blades will close for a portion of their length only.

2. In a shearing-machine, the combination, substantially as set forth, of a body throated to form an upper and a lower shear-jaw and provided with a counterbored pivot-hole at the root of such throat, a lower shear-blade secured to the lower jaw of the body and shear-bar, engaging the body by a pivot-bolt engaging the pivot-hole therein, and having a circular heel engaging the counterbore of such pivot-hole, an upper shear-blade secured to such shear-bar and arranged to coact with said lower shear-blade, and mechanism for oscillating said shear-bar.

3. In a shearing-machine, the combination, substantially as set forth, of a body throated to form an upper and a lower shear-jaw, a lower shear-blade secured to such lower jaw, a movable shear bar and blade mounted on said body and adapted to coact with said lower shear-blade, mechanism for actuating said shear-bar and its attached shear-blade, and a notch-block mounted on said lower

shear-jaw and adapted to prevent the improper movement of bars being sheared.

4. In a shearing-machine, the combination, substantially as set forth, of a body throated to form an upper and a lower shear-jaw, a shear-blade secured to such lower shear-jaw, a shear-bar and upper shear-blade arranged to coact with said lower shear-blade, mechanism for actuating said shear-bar and its attached shear-blade, and a notch-block mounted on said lower shear-jaw and adapted for endwise adjustment thereon.

5. In a shearing-machine, the combination, substantially as set forth, of a body throated to form an upper and a lower shear-jaw, a lower shear-blade secured to such lower shear-jaw, a shear-bar and shear-blade arranged to coact with said lower shear-blade, mechanism for actuating said shear-bar and its attached shear-blade, and a notch-block mounted on said lower shear-jaw on an axis and adapted to be adjusted into either a vertical or horizontal plane.

6. In a shearing-machine, the combination, substantially as set forth, of a body throated to form an upper and a lower shear-jaw, a shear-blade secured to said lower shear-jaw, a shear-bar and shear-blade arranged to coact with said lower shear-blade, mechanism for actuating said shear-bar and attached blade, and a horizontal roller mounted on said body beyond the inner end of said lower shear-blade and presenting its upper portion at about the level of the upper edge of said lower shear-blade.

7. In a combined punching and shearing machine, the combination, substantially as set forth, of a body having two oppositely-opening throats, so as to form at one throat an upper and lower punch-jaw and at the other throat an upper and lower shear-jaw, a punch-ram fitted for vertical movement in such upper punch-jaw, a hand-lever pivoted to such upper punch-jaw and adapted to stand normally upright and to move outwardly away from the side of the body which has the shear-jaws, mechanism connected with said hand-lever and said punch-ram and adapted to cause the punch-ram to move downward when the hand-lever is moved in a direction away from said shear-jaw, a lower shear-blade secured to the lower shear-jaw of the body, a shear-bar and shear-blade arranged to coact with said lower shear-blade, and a hand-lever pivoted to the upper shear-jaw and connected with said shear-bar and adapted to depress said shear-bar when said hand-lever is moved in a direction away from the before-mentioned hand-lever which operates the punch-ram.

8. In a punching and shearing machine, the combination, substantially as set forth, of a body throated to form an upper and a lower jaw, a lower cutting-tool secured to said lower jaw, an upper cutting-tool arranged to coact with said lower cutting-tool, a hand-lever piv-

oted to said upper jaw, transmitting mechanism connecting said hand-lever with said upper cutting-tool, and a spring connected with said body and said hand-lever and serving
5 to hold said hand-lever in an upright position and arranged to resist the downward movement of said hand lever with a force decreasing as the hand-lever is moved downward.

9. In a punching-machine, the combination,
10 substantially as set forth, of a body throated to form an upper and lower punch-jaw and having such upper punch-jaw formed with a vertical cylindrical guide terminating at its

top in ears forming a bearing with a horizontal axis, an eccentric-shaft journaled in the 15 bearing of said ears, a lever attached to said eccentric-shaft, a punch-ram fitting said vertical cylindrical bearing and provided with a knuckle-seat at its upper end, and a pitman engaging said eccentric-shaft and provided 20 at its lower end with a knuckle engaging said knuckle-seat.

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Witnesses:

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