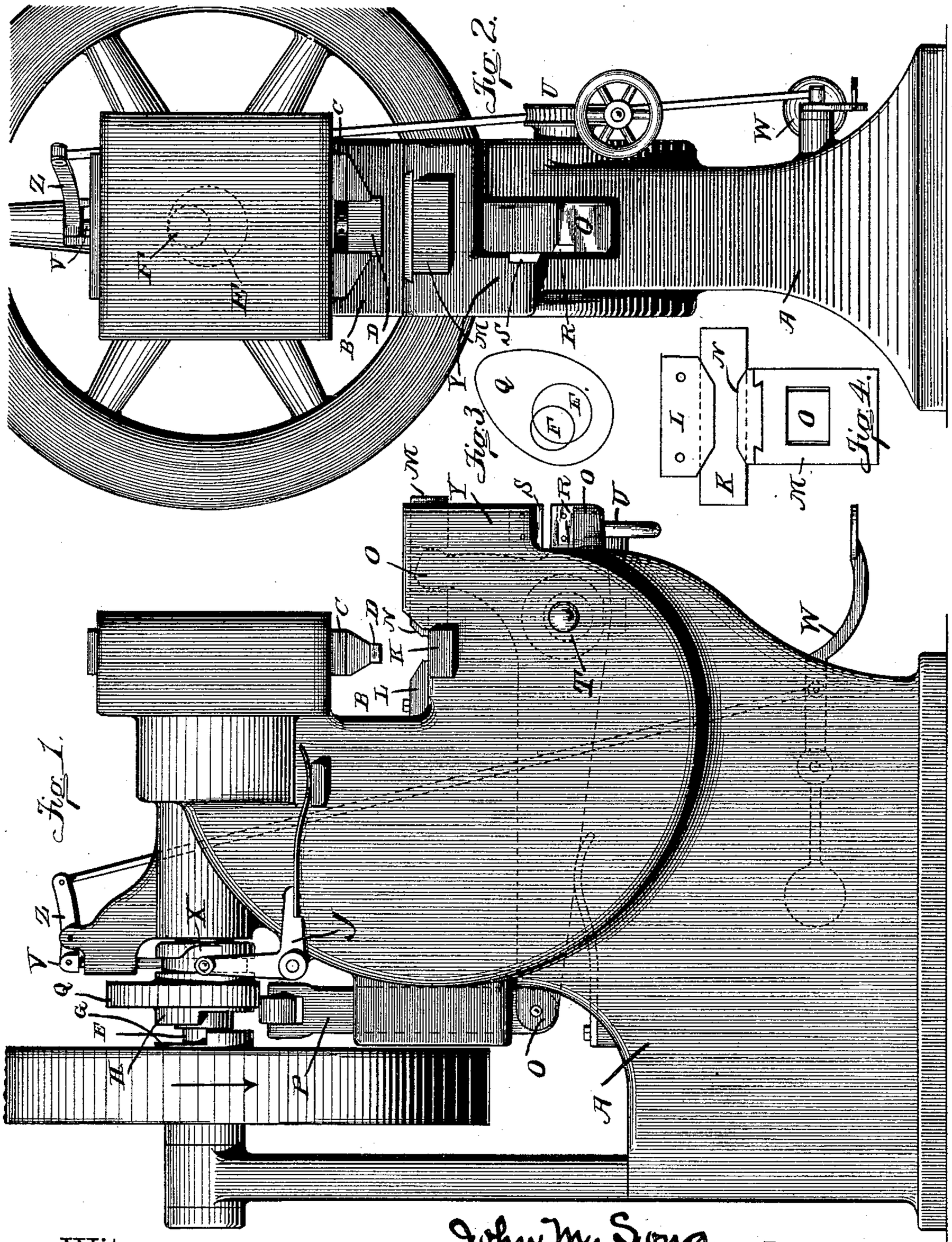
(No Model.)

J. M. LONG.

WELDING AND CUTTING MACHINE.

No. 366,848. Patented July 19, 1887.



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JOHN M. LONG, OF HAMILTON, OHIO.

WELDING AND CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 366,848, dated July 19, 1887.

Application filed April 30, 1887. Serial No. 236,665. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. LONG, of Hamilton, Butler county, Ohio, have invented certain new and useful Improvements in Welding and Cutting Machines, of which the following is a specification.

This invention pertains to machinery for welding metallic bars and for cutting or cropping the same.

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

Figure 1 is a side elevation of a machine illustrating my improvements; Fig. 2, a front elevation of the same; Fig. 3, a diagram of the cam for moving the shear-lever, and Fig. 4 a plan showing the lower and back anvils and the side die.

In the drawings, A indicates the body of the machine, presenting the general aspect of the metal-punching machine; B, the open throat of the machine; C, the vertically-moving ram usual in punching-machines; D, the top die secured to this ram, the same having a mere hammer-face, intended to press upon the parts to be welded; E, the usual cam-shaft, by which motion is given to the ram; F, the usual eccentric on this shaft, engaging the ram and serving to reciprocate the ram vertically as the shaft revolves; G, the usual clutch on the fly-wheel, loose on the shaft; H, the usual clutch splined to the shaft and fitted to slide endwise and engage the fly-wheel clutch; J, the usual clutch-shifting fork engaging the clutch H, this fork being provided with a spring and arranged, as clearly shown, so that the tendency of the spring is to throw the clutch into engagement; K, the lower anvil, the same being rigidly seated in the floor of the throat of the machine and intended to support the parts to be welded and furnish the abutments for the welding pressure given by the top ramming-die; L, the back anvil, fixed upon the floor of the throat over the lower anvil, this back anvil being intended to receive the side pressure, the pressure-receiving face of the back anvil being seated substantially even with the rear edge of the top die, so that when the top die is down the space formed between the bottom anvil, the top die, and the back anvil will conform substantially to the section of bar being welded; M, a side ram housed in the lower jaw of the throat and fitted for reciprocation to and from the back anvil; N, the side die, with which the inner end of the side ram is armed, this die forming the reciprocating counterpart of the side anvil; O, a bell-crank lever pivoted in the body of the machine, its forward upper end engaging a mortise in the side ram and its rear end projecting under and parallel with the cam-shaft and terminating about under the clutches; P, a vertical plunger fitted to slide in a guide in the rear of the machine, and having its lower end articulated to the bell-crank lever, the upper end of the plunger being armed with an anti-friction roller; Q, a single-lobed cam formed or made fast upon the sliding clutch H, this cam engaging the roller of the plunger; R, a shear-blade secured upon the outward extension of the bell-crank lever and presenting itself at the front of the lower jaw of the machine; S, a shear-blade secured to the lower jaw of the machine in position for shearing engagement with the blade of the lever; T, the rotary eccentric pivot on which the bell-crank lever oscillates; U, worm-gearing by which this pivot may be rotated so as to adjust the position of the axis of oscillation of the bell-crank lever; V, a vertically-sliding stop-pin engaging the groove of the sliding clutch in a manner well known in connection with the automatic stop-motions of punching and shearing machinery; W, the foot-treadle by which the stop-pin may be withdrawn from engagement with the clutch-groove, this treadle being counterweighted, so as to cause the stop-pin to normally project downward into tendency to engagement with the clutch-groove; X, a notch in the rear wall of the clutch-groove, the advancing end wall of this notch being beveled; Y, a downward projection at one side of the front of the lower jaw of the machine, this projection receiving the fixed shear-blade S; and Z, the lever by which the stop-pin V is connected with the treadle-rod.

Power is applied to the machine through the medium of the fly-wheel in any of the manners usual in punching and shearing machin-

ery. The fly-wheel is loose upon the cam-shaft, and normally the cam-shaft does not revolve and the machine is idle. The tendency of the spring-pressed fork J is to throw the clutch into engagement and cause the shaft to revolve and the machine to operate; but the stop-pin engaging the clutch prevents the moving of the clutch, and the counterweight on the treadle causes the stop-pin to seek to maintain its restraining position in the clutch-groove. If the treadle be depressed, the stop-pin will be withdrawn from the clutch-groove and the fork will throw the clutch into engagement, and the cam-shaft will then revolve with the fly-wheel and the machine will operate, and will continue to do so so long as the treadle be held down. The starting of the machine is instantaneous upon pressing the treadle, and the starting is therefore much quicker than when the foot motion is depended upon for the actual throwing of the clutch.

If the foot be taken from the treadle, the stop-pin will descend, but cannot enter the clutch-groove, and will rest its lower end upon the front land of the groove with a constant tendency to move downward, by reason of the counter-weight on the treadle. When the clutch has so far revolved as to bring the notch X under the stop-pin, the stop-pin will drop into this notch, and the pin is then virtually in a forward extension of the groove. As the clutch continues to revolve, the bevel end wall of the notch engages the pin, and the result is, that the clutch is drawn out of engagement, and the clutch and cam-shaft and machine generally come to rest, while the fly-wheel continues to revolve. The notch X is so disposed that the clutch will be drawn out of engagement when the rams occupy their farthest open position.

The rotation of the cam-shaft reciprocates the ram C in the usual manner, and the lobe upon the cam Q will oscillate the bell-crank lever and give reciprocation to the side ram, M, in an obvious manner, and at the same time the shear-blades S and R will operate in conjunction with each other in an obvious manner. The cams F and Q should be so timed with reference to each other that the two rams make their working strokes in alternation, and at the same time both reach their widest open point simultaneously.

It will thus be understood that the machine stands normally idle with both its dies withdrawn the maximum distance from their respective anvils, and with the shear-blades open. By pressing the treadle the machine is set into operation, and the iron to be welded may be properly trimmed or cropped by means of the shear. In welding wheel-tires or a bar of any similar section I find no scarfing necessary in order to produce a perfect weld even in section with the rest of the bar.

The parts to be welded, being subjected to a welding heat, are placed in the throat of the machine against the anvil, and the machine is started, and about two strokes completes the welding. At first the top die comes down and gives the main effective stroke, and brings the joint down to the finished thickness intended. The result of this stroke is of course that the bar at the weld has been swelled edgewise. When the top die comes up, the side die operates upon the metal edgewise and reduces the width of the metal to the desired dimension; but of course results in the thickening of the metal. The next stroke of the top die reduces the thickness, and so on, the repeated alternate strokes upon the top and side of the metal producing, finally, the finished effect produced by the blacksmith in hammering alternately upon the sides and edge of the bar. The machine, however, produces a smoothness and accuracy of weld seldom done in rapid hand-work, the opening between the dies and anvils, if all be imagined as closed, conforming precisely with the section of bar being welded, thus insuring uniformity as well as rapidity and solidity of work. It is of course to be understood that the finished size of the hot weld will exceed, probably, the size of the cold bar, so as to allow for shrinkage and permit the weld when cold to be the same size as the bar.

The dies should be adjusted accurately with reference to their respective anvils, so as to produce the desired finished dimension. The top die is adjusted in its ram in any of the manners common in the adjustment of punches in punching-machines, and the side die may be adjusted in a similar manner. I, however, prefer to employ an eccentric pivot in connection with the bell-crank lever, and adjust the side die by rotarily adjusting the pivot in an obvious manner. The side die, N, may be formed integrally with the side ram, M, or it may be separably inserted. Where motion is given to the side ram through the medium of the cam plunger and lever, as illustrated, I employ a spring under the lever, as shown, to produce the opening motion of the lever.

I claim as my invention—

1. In a welding-machine, the combination, substantially as set forth, of a bottom anvil, a back anvil, a reciprocatable top die, a reciprocatable side die, and mechanism for reciprocating the two dies in alternation.

2. In a welding-machine, the combination, substantially as set forth, of a bottom anvil, a back anvil, a reciprocatable top die, a reciprocatable side die, mechanism for reciprocating said two dies in alternation, and an automatic stop for arresting the motion of the two dies simultaneously when at their farthest open position.

3. The combination, substantially as set forth, of a machine-frame with an open throat, the two anvils secured in the throat, the two reciprocatable rams working in conjunction with the anvils, a rotary cam-shaft for operating the top ram, the lobed cam revolved by

the cam-shaft, the plunger engaged by the lobed cam, and the bell-crank lever engaging the side ram and the plunger.

4. The combination, substantially as set forth, of a machine-frame with an open throat, an anvil disposed in said throat, a reciprocatable ram in the upper jaw of the frame, a cam-shaft arranged to reciprocate said ram, a cam rotated by said shaft, a plunger engaged by said cam, a shear-blade upon the front of the lower jaw of the frame, a lever pivoted in the frame and engaged by said plunger and projecting outwardly from the front of the machine, and a shear-blade upon the projecting end of said lever and engaging said first-mentioned shear-blade.

5. The combination of frame A, ram C, cam-shaft E, and fly-wheel loose upon the cam-shaft and having clutch G, sliding clutch H, provided with a groove having bevel-ended notch X, clutch-shifting fork J, provided with a spring and arranged to throw the clutch into engagement, stop-pin V, arranged to normally engage the clutch-groove, and treadle W, arranged to withdraw the stop from the clutch-groove.

6. The combination, substantially as set forth, of frame A, ram C and its actuating mechanism, ram M and its actuating mechanism, involving a bell-crank lever, eccentric pivot T for said lever, and worm-gearing U for rotarily adjusting said pivot.

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Witnesses:
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