(No Model.) 2 Sheets—Sheet 1.

J. M. LONG.

PUNCHING MACHINE.

No. 456,579. Patented July 28, 1891.

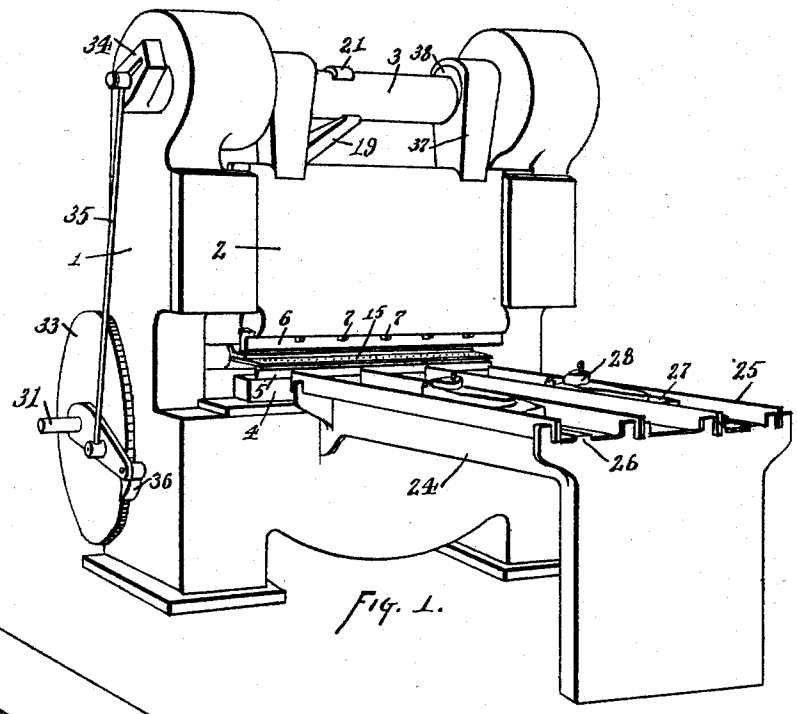


Fig. 1.

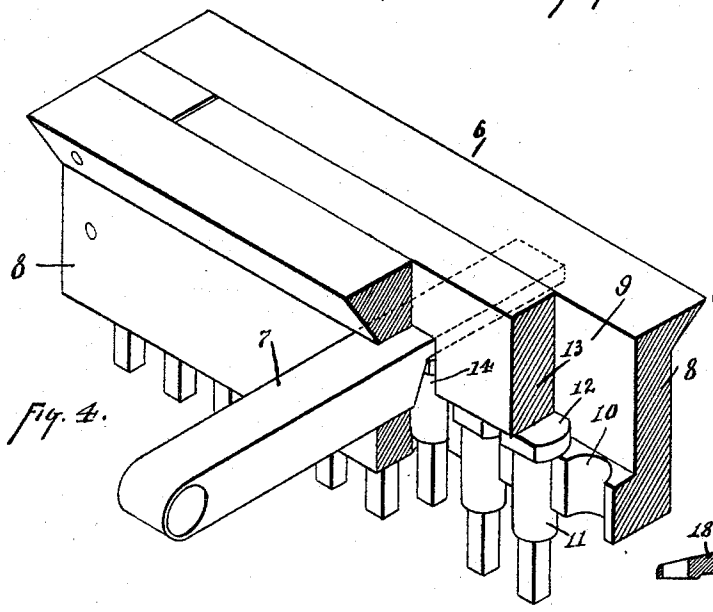


Fig. 4.

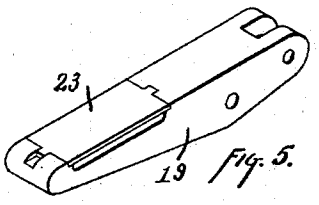


Fig. 5.

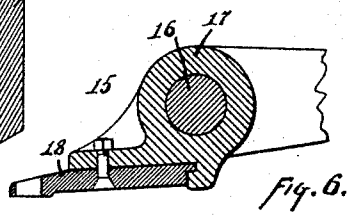


Fig. 6.

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(No Model.) 2 Sheets—Sheet 2.

J. M. LONG.

PUNCHING MACHINE.

No. 456,579. Patented July 28, 1891.

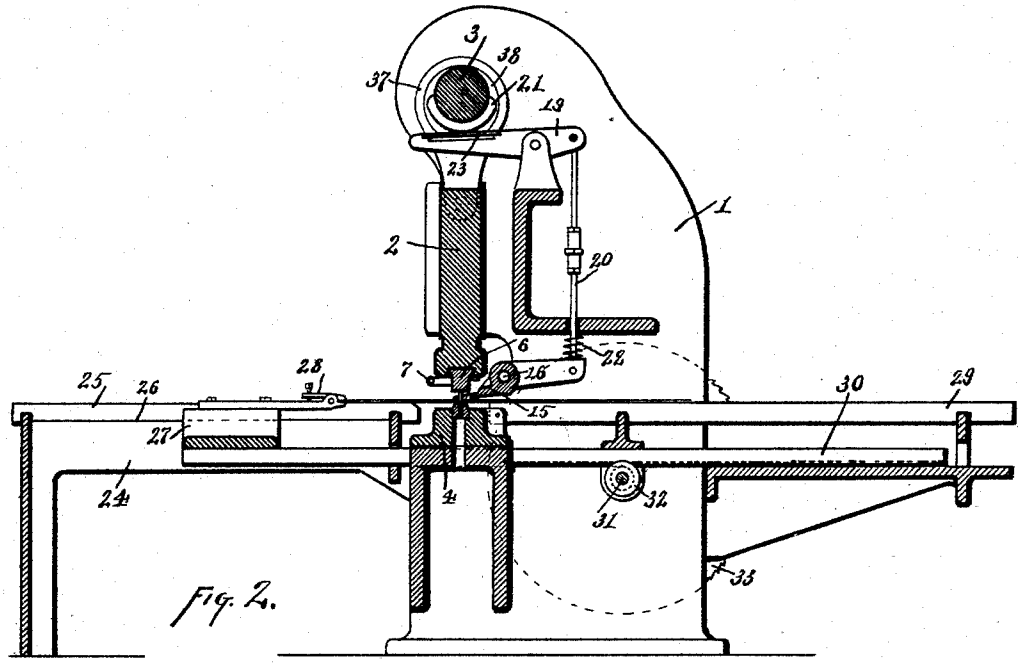


Fig. 2.

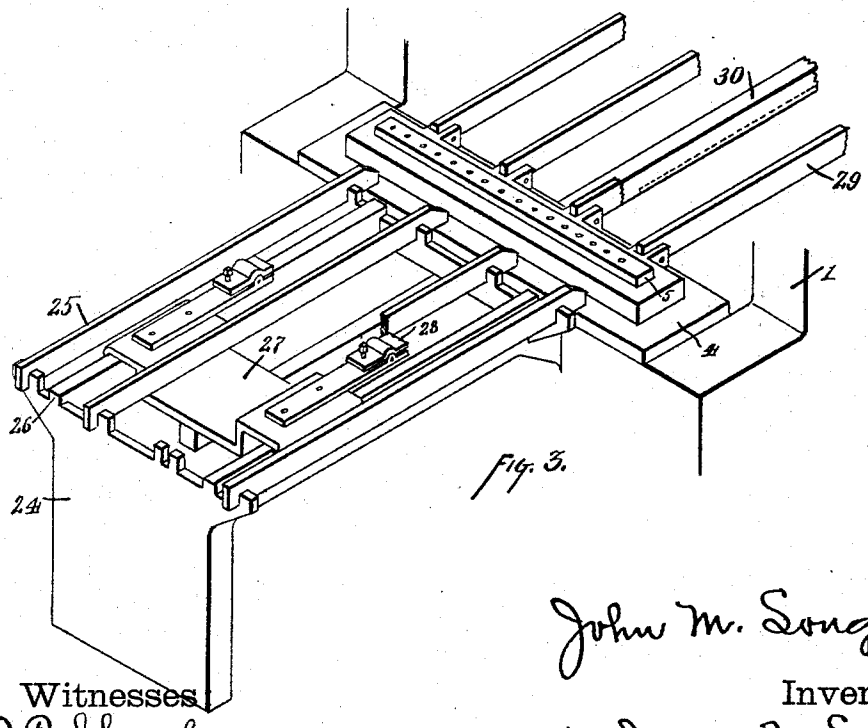


Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN M. LONG, OF HAMILTON, OHIO.

PUNCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 456,579, dated July 28, 1891.

Application filed April 20, 1891. Serial No. 389,574. (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 Punching-Machines, of which the following is a specification.

This invention pertains to metal-punching machinery, and while the improvements have been devised with special reference to machines intended for punching successive rows of holes, and so exemplified, they will be found capable of more general application in metal-punching machinery.

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

Figure 1 is a perspective view of a punching-machine embodying my improvements, the punches being omitted; Fig. 2, a vertical section of the same in a plane transverse to the row of punches and in a plane parallel with the direction of feed as the sheet of metal being punched is drawn through the machine; Fig. 3, a perspective view of the supporting-table, the die, and the feed-carriage; Fig. 4, a perspective view and transverse section of the punch-holder, illustrating the system by which a given punch of the group may be thrown out of action in order to leave a blank or unpunched space in the sheet being punched; Fig. 5, a perspective view of the spring-lever through which the stripper is operated, and Fig. 6 a vertical transverse section of the stripper.

In the drawings, which illustrate in its main features a well-known type of punching-machine arranged to punch a long row of holes at once, 1 indicates the usual housings of the machine; 2, the usual vertically-reciprocating slide which carries the punches at its lower end; 3, the usual cam-shaft whose rotations serve in reciprocating the slide, the motion being transmitted, as common, through the medium of the eccentrics and pitmen; 4, the usual die-block supported by the bed of the machine below the slide; 5, the usual die secured in the die-block and having the usual holes, in conjunction with which the punches operate in doing their work; 6, the punch-holder secured removably to the lower edge of the slide, as by means of the dove tail fit illustrated; 7, releasing-bars carried by the punch-holder and serving as means by which certain punches of the series may be allowed to rise to an inoperative height, so as to leave unpunched spaces in the metal being punched; 8, the sides of the punch-holder; 9, a deep open-topped parallel groove extending the length of the punch-holder, a thick floor being left at the base of the groove; 10, holes drilled vertically through this floor, one for each punch; 11, the punches, with their bodies, fitting neatly in the holes 10 and with their lower ends of a form suited to the holes to be punched, Fig. 4 illustrating the punches as suited for the punching of rows of square holes; 12, a flat head formed upon the upper end of each punch and resting on the floor of the groove in the punch-holder, the sides of the head being flattened off, as seen in Fig. 4, so as to neatly fit sidewise in the groove of the punch-holder, whereby the punches are prevented from turning in their holes 10 in the punch-holder; 13, a pressure-bar seated in and filling the groove in the punch-holder and resting upon the heads of the punches; 14, notches in the lower edge of this pressure-bar at points over certain of the punches, as many as may be desired, the notch being of sufficient width to allow the head of the appropriate punch to rise within it and thus reach such a height as not to descend into the metal being punched, one of the releasing-bars 7 engaging each of these notches, the punch-holder being horizontally mortised at each notch to admit the releasing-bar, and the releasing-bar having such transverse section as will fill the notch and hold the punch under it to normal position, the rear end of the releasing-bar being thin, however, so that when the releasing-bar is pulled forward its thin portion only is over its punch and the punch thereby allowed to rise in the punch-holder; 15, the stripper arranged to press upon the work just over the die and hold it firmly in position while being punched, the stripper releasing its pressure after the punches have risen from the work; 16, a shaft extending across the machine to the rear of the punches and forming the fulcrum-shaft on which the stripper is to oscillate; 17, the body of the stripper, being a strong tube journaled upon the stripper-shaft 16; 18, the stripper-shoe removably bolted to

the stripper-body and projecting forward of the same over the die and perforated to permit the downward passage of the punches; 19, a lever pivoted to the frame of the machine and having its free end projecting forwardly under the cam-shaft; 20, a rod connecting the rear end of this lever with a lever projecting rearwardly from the body of the stripper, whereby oscillations of lever 19 result in oscillations of the stripper; 21, a cam upon the cam-shaft arranged to engage and oscillate the lever 19 and thereby oscillate the stripper, the form of this cam being such that the stripper will be pressed to the metal being punched as the punches reach the metal, or a little before, and during the actual work of punching and until the punches are withdrawn from the metal, the stripper at other times rising so as to leave the sheet being punched free of pressure; 22, a spring upon rod 20, serving to lift the stripper away from the die when cam 21 is not pressing the stripper toward the die, the spring thus being the agent that opens or lifts the stripper, while the cam is the agent that depresses or closes the stripper; 23, a plate of spring-steel, mounted upon the upper face of lever 19 where that lever is engaged by its cam, the lever being relieved or cut away under the plate, so that the plate is capable of a limited amount of elastic yielding under the pressure of its cam; 24, a work-supporting table of skeleton form, arranged in front of the machine to support the sheet of metal as it is being drawn through the machine; 25, bars forming the skeleton top to this table, these bars being vertically set edgewise and having their top edges level with the top of the die, the bars being at right angles to the row of punches; 26, guides upon the top of the table parallel with these bars; 27, a carriage supported by and arranged to slide upon the guides 26, the central portion of the carriage being depressed so as to come below the central bars of the table; 28, tong-like grippers secured to this carriage and presenting their mouths toward the die and level with it, so as to properly grasp the front edge of a sheet of metal resting upon the die; 29, bars to the rear of the die, forming a rear skeleton table for the support of the sheet; 30, a rack-bar attached to the carriage and projecting rearwardly therefrom and to the rear of the die-block; 31, a feed-shaft carried by the framing of the machine and disposed below the level of the die and to the rear thereof; 32, a pinion on this shaft engaging the teeth of the rack-bar, whereby rotation of the feed-shaft results in a sliding movement of the carriage upon its guides; 33, a ratchet-wheel mounted upon this feed-shaft outside the framing of the machine; 34, a feed-crank of adjustable stroke, mounted upon the cam-shaft of the machine over the ratchet-wheel; 35, a connecting-rod extending from this crank to the pawl-arm of the ratchet-wheel; 36, the pawl which operates the ratchet-wheel through the medium of the feed-crank and rod; 37, the usual pitmen through which the cam-shaft operates the slide which carries the punches, and 38 the usual cams on the cam-shaft, engaged by these pitmen.

The length of the tables should be such as to properly support and permit appropriate carriage movement for the sheet to be punched. The carriage being at the rear of its stroke, its grippers will be at the front edge of the die. A sheet laid upon the rear table-bars is to be passed under the punches and have its forward edge grasped by the grippers. The feed-crank is to be adjusted to secure the desired forward amount of carriage movement at each stroke of the machine. All being in readiness, the machine is started into operation. The punches and stripper having been up or open, the first effect is the closing down of the stripper upon the sheet, thus clamping it firmly to the die, spring-plate 23 endowing this pressure with a certain degree of elasticity to compensate for possible irregularities in the sheet being punched. While the sheet is thus clamped to the die the punches descend and punch the row of holes entirely across it at one stroke, after which the punches rise, the sheet being meanwhile firmly clamped by the stripper, after which the stripper rises, leaving the sheet free. Then, while the punches and stripper are up, the feed-shaft receives a slight rotation and the carriage moves forward, pulling the sheet through the machine a proper distance, after which the stripper again clamps the metal and another row of holes is punched, and so on, punching one row after another.

In some uses of perforated sheet metal it is desirable to leave blank unpunched spaces in the metal at intervals. This may be done by withdrawing the proper ones of the releasing-bars 7, thus permitting the given punches to rise and become inoperative. The number and disposition of the releasing-bars will of course be controlled by the desire as to the blank spaces in the work to be produced.

The stripper-plate 18 is perforated to permit the passage of the punches, and consequently the stripper-plate must correspond with the spacing of the punching being employed. The stripper-plate, being removably attached to the body 17 of the stripper, permits of the ready removal and changing of the stripper-plates when changes are made in the punches and dies.

The construction of punch-holder shown clearly in Fig. 4 permits of the employment of very short punches and secures against the rotation of the punches in their holes and permits of the ready change of punches in the punch-holder. For instance, if it be desired to replace a broken punch or to replace any of the punches by punches of different punching shape, it is only necessary, the punch-holder being removed from the machine, to lift out the pressure-bar, whereupon any of the punches can be readily removed.

I claim as my invention—

1. In a punching-machine, the combination, substantially as set forth, with the slide of the machine and the punches and die thereof, of a table level with the die, a carriage arranged to slide upon the table in front of the die and at right angles to the die, one or more grippers on said carriage, and mechanism for moving the carriage from the die at each stroke of the punches.

2. The combination, substantially as set forth, with a punching-machine, of a skeleton table level with the die of the machine, bars disposed vertically edgewise at the top of the table, guides upon the table, and a carriage arranged to move upon the guides.

3. The combination, substantially as set forth, with a punching-machine, of a table, a carriage sliding thereon, grippers on the carriage, a clamping-stripper over the die of the machine, and mechanism for alternately moving the stripper toward the die and the carriage from the die.

4. In a punching-machine, the combination, substantially as set forth, with the punches and die, of a pivoted stripper-body mounted for oscillation in the machine, mechanism for oscillating the stripper-body, and a perforated stripper-plate removably attached to the stripper-body and disposed over the die.

5. In a punching-machine, the combination, substantially as set forth, of a slide, punches, a die, a table, a feed-carriage, a stripper, a cam-shaft, cams thereon and connections therefrom to operate the slide, a cam thereon and connections therefrom to operate the stripper, and a crank thereon and connections therefrom to operate the feed-carriage.

6. The combination, substantially as set forth, of a cam, a lever to be engaged by said cam, and a spring-plate upon the face of the lever where the cam engages it.

7. In a punching-machine, the combination, substantially as set forth, of a punch-holder provided with an open-topped longitudinal groove and with holes through the floor of the groove, punches seated in said holes and having heads resting on the floor of the groove, and a pressure-bar disposed in said groove over the punches.

8. In a punching-machine, the combination, substantially as set forth, of a longitudinally-grooved punch-holder having holes through the floor of the groove, punches seated in said holes and having non-circular heads resting on said floor, and a pressure-bar disposed in said groove over the punches.

9. In a punching-machine, the combination, substantially as set forth, of a punch-holder having a vertical hole and a transverse mortise over said hole, a punch seated in said vertical hole and adapted to rise into said mortise, and a releasing-bar removably seated in said mortise and serving to prevent such rising of the punch.

JOHN M. LONG.

Witnesses:
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JAS. FITTON.