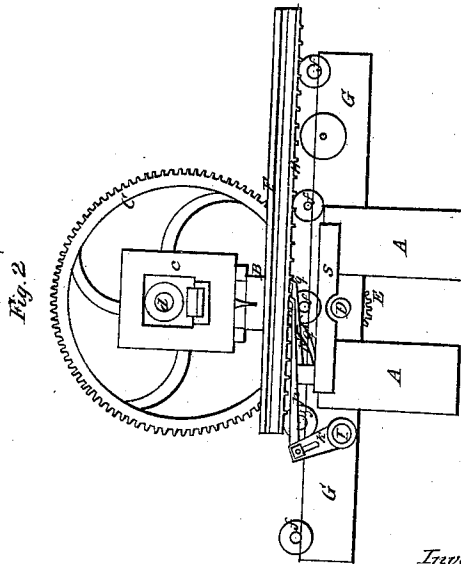
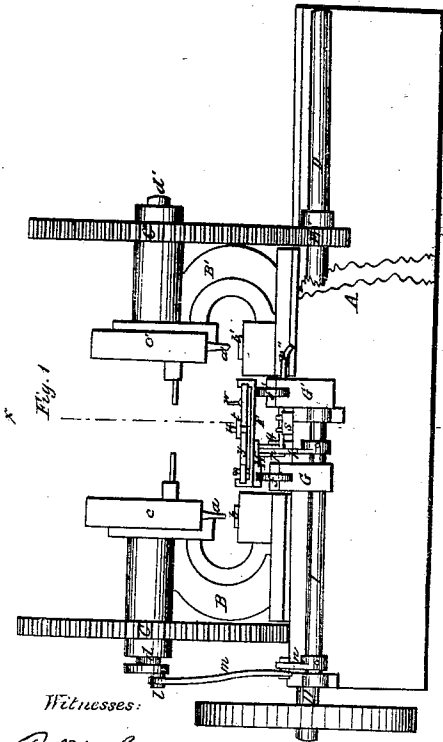
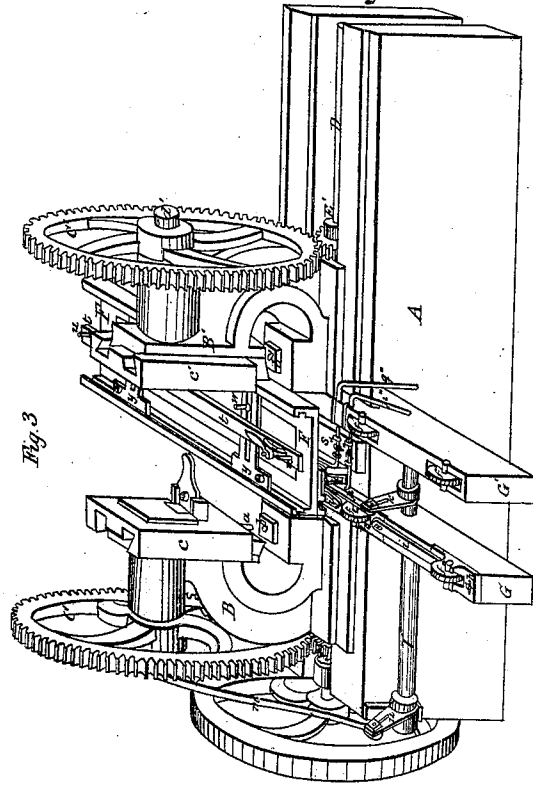
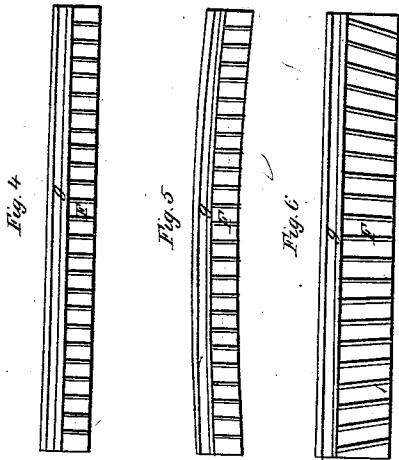


H. W. Bill,

Metal Punch,

N^o 39,209-

Patented July 14, 1863.



Witnesses:

Robt Lowden
Geo W Reed

Inventor:

Henry M Bill

UNITED STATES PATENT OFFICE.

HENRY W. BILL, OF CUYAHOGA FALLS, OHIO.

IMPROVEMENT IN PUNCHING-MACHINES.

Specification forming part of Letters Patent No. 39,209, dated July 14, 1863.

To all whom it may concern:

Be it known that I, HENRY W. BILL, of Cuyahoga Falls, in the county of Summit and State of Ohio, have invented certain new and useful Improvements in Machinery for Punching Boiler-Plates and other Articles; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front view, partly in section, of a punching-machine with my improvements. Fig. 2 is a transverse vertical section of the same in the plane indicated by the line *x x* in Fig. 1. Fig. 3 is a perspective view of the same. Figs. 4, 5, and 6 are under side views of different constructions of the toothed rack through which the movement of the carriage is transmitted.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists in the combination of two punches with the same driving mechanism in such manner that they may be adjusted at the different distances apart to provide for the punching of plates of various widths at opposite edges simultaneously.

It also consists in the employment, in combination with two such punches, of an intermittently-moving carriage, so arranged as to present the plate to be punched to both punches in such a manner as to cause the punching of the holes in both edges of the plate at the required distance apart.

It also consists in certain means of moving the plate-carriage in different curves for the purpose of punching the holes in curved lines to suit the curvature of the edges of the plates required in making a boiler in conical sections; and it further consists in certain means of producing a variable feed of the carriage.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is a horizontal bed, on which all the work parts of the machine are supported.

B and *B'* are the two frames which contain the two punches *a a'*. These frames are like the frames of punches in common use, being of a form to sustain the dies *b b'*, and containing guides for the slides *c c'*, to which the punches are attached, and bearings for the

shafts *d d'*, which carry the eccentrics for working the punch-slides. The shafts *d d'* are furnished with large spur-gears *C C'*, which gear with smaller gears or pinions *E E'* on the main shaft *D* of the machine, which is arranged horizontally and lengthwise of the bed under the frames *B B'*, and which has rotary motion given to it by any suitable means. The frame *B* of the punch *a* is stationary upon the bed *A*, but the frame *B'* of the punch *a'* is movable, to set the latter punch at any distance from the former, as may be required, according to the width of the plate, in which two rows of holes are to be punched, or according to the distance between the two rows of holes. The pinion *E'* is also movable lengthwise of the shaft *D*, to accommodate the position of the gear *C'*, which moves with the punch-frame *B'*, and by that means the shaft *D* is enabled to drive both punches, whatever may be the distance of *a'* from *a*. The eccentrics on the shafts *d d'* should be so arranged that the punches will not descend together, but one a little after the other, that the machine may not be subject to the labor of the two punches at once.

F is the carriage for the plate, arranged to run between the punches transversely to the bed *A*, upon ways composed of a series of rollers, *f f* and *f' f'*, arranged upon two transoms, *G G'*, secured to the bed *A*. To the under side of this carriage there is secured a toothed rack, *H*, to be operated upon by a pawl, *p*, for producing the intermittent movement of the carriage between the successive operations of the punches, and in this rack there is a groove, *g*, which is just wide enough to admit the rollers *f f*, and which serves to guide the carriage in its movement across the bed. I provide the carriage with two or more of these racks, one of which has its groove *g* straight, as shown in Figs. 4 and 6, and the other or others have their grooves curved, as shown in Fig. 5, the straight groove being to produce a rectilinear movement of the carriage for the punching of the holes in straight rows, and the curved groove to produce a curvilinear movement as is necessary for punching the holes along the curved edges of flat plates to be employed in making the slightly-conical sections of which the best cylindrical boilers are composed, and these racks are to be so attached to the carriage that they can be changed at pleasure.

I propose to provide as many racks, with grooves of different curvature, as may be desirable for the punching of plates having different curvatures of edge.

In order to enable the positions of the several rollers *f f* to be adapted to the straight or variously-curved grooves, the bearing-plates *h h*, in which the said rollers are supported, are connected by links *i i* in such manner as to make them form portions of a chain and allow them to be adjusted laterally, and when the adjustment has been effected they are secured firmly to the transom *G'* by means of screws *j*. The curvilinear movement of the carriage, which is produced when a rack with a curved groove is used, causes the two edges of the plates to move in concentric arcs, and one edge of the plate to move in an arc of as much smaller radius than the other edge as is required to bring the punched holes of each row in one plane when the plate is rolled up to form the boiler.

Separate racks, having their teeth at different distances apart, may be employed for producing a greater or less movement of the carriage for punching the holes at greater or less distances apart, but by constructing the teeth of a rack in the manner shown in Fig. 6—viz., to radiate from a common center—and shifting the pawl so as to work in the wider or narrower spaces between the teeth, the same rack may be made to serve for obtaining a greater or less feed-movement of the carriage.

The carriage *F* is furnished with a clamping-bar, *t*, which is fitted loosely to two fixed pins, *u u*, on the carriage, and furnished at its ends with screw-clamps *v* to clamp the plates. While the holes along their side edges are being punched, the bar *t* is free to rock slightly on the pins *u u* to enable the plate to adapt itself to the faces of the dies. The said carriage is also furnished with two adjustable pins, *w*, fitted to adjustable slides *y y*, the said pins being intended to enter two of the punched holes in the side edges of the plate for the purpose of preventing the plate from moving on the carriage while the end holes are being punched. The pawl *p* is attached to the arm *k* of a horizontal rock-shaft, *I*, which is arranged in bearings in front of the bed *A*, and which is driven by a crank, *l*, on the punch-shaft *d*, the said crank being connected by a rod, *m*, with an arm, *n*, on the rock-shaft. The said pawl has a spring, *p'*, applied below it to keep it up to the rack, but a lever, *p''*, is provided to depress this spring by hand for the purpose of allowing the pawl to drop out of gear when it is desired to run back the carriage. *q* is a stop-pawl operating in the rack to prevent it from being pulled back by the pawl *p*. This pawl is held up to its work by a spring, *q'*, and a hand-lever, *q''*,

is applied to depress this spring, and so allow the pawl *q* to drop out of gear when the carriage is to be run back. The pawl *q* is attached to a block, *s*, which is adjustable upon the bed *A* in a direction transverse to the carriage. The pawl springs *p' q'* and the levers *p'' q''* are attached to the same block, and by shifting this block and shifting the pawl arm *k* along the rock-shaft *I*, when the rack shown in Fig. 6 is used, the pawls are enabled to operate on such portions of the teeth of the said rack as may be desired.

The advantages of this machine consist in the rapidity with which the holes can be punched in the several plates of a boiler or other article, and in the exactness with which the holes for the reception of the same rivets can be made to match each other without the necessity of making them, the holes being infallibly in line with each other and at uniform distances apart.

Instead of being made with a curved groove, as shown in Fig. 5, the rack itself may be curved and run between two series of horizontally-arranged rollers to make the movement of the carriage curvilinear.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of two punches with the same driving mechanism in such manner that they may be adjusted at different distances apart to provide for the punching of plates of various widths at opposite edges, or in two lines simultaneously, substantially as herein described.

2. The employment, in combination with two punches adjustable at different distances apart, of an intermittently-moving carriage, so arranged as to present the plate to both punches in such manner as to cause the punching of the holes in both edges of the plate or in two rows at a desired distance apart, substantially as herein specified.

3. The employment, in combination with two punches, arranged as described, for guiding the movement of the plate-carriage in straight or curved lines, as may be desired, of a variable system of guide-rollers operating in combination with a straight or curved rack, or a straight or curved groove, or its equivalent, on or in the carriage, substantially as herein set forth.

4. The employment, for producing a variable feed-movement of the plate-carriage, of a rack with radiating teeth, as shown in Fig. 6, and a laterally-movable pawl, operating in combination with such rack, substantially as herein specified.

HENRY W. BILL.

Witnesses:

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GEO. W. REED.