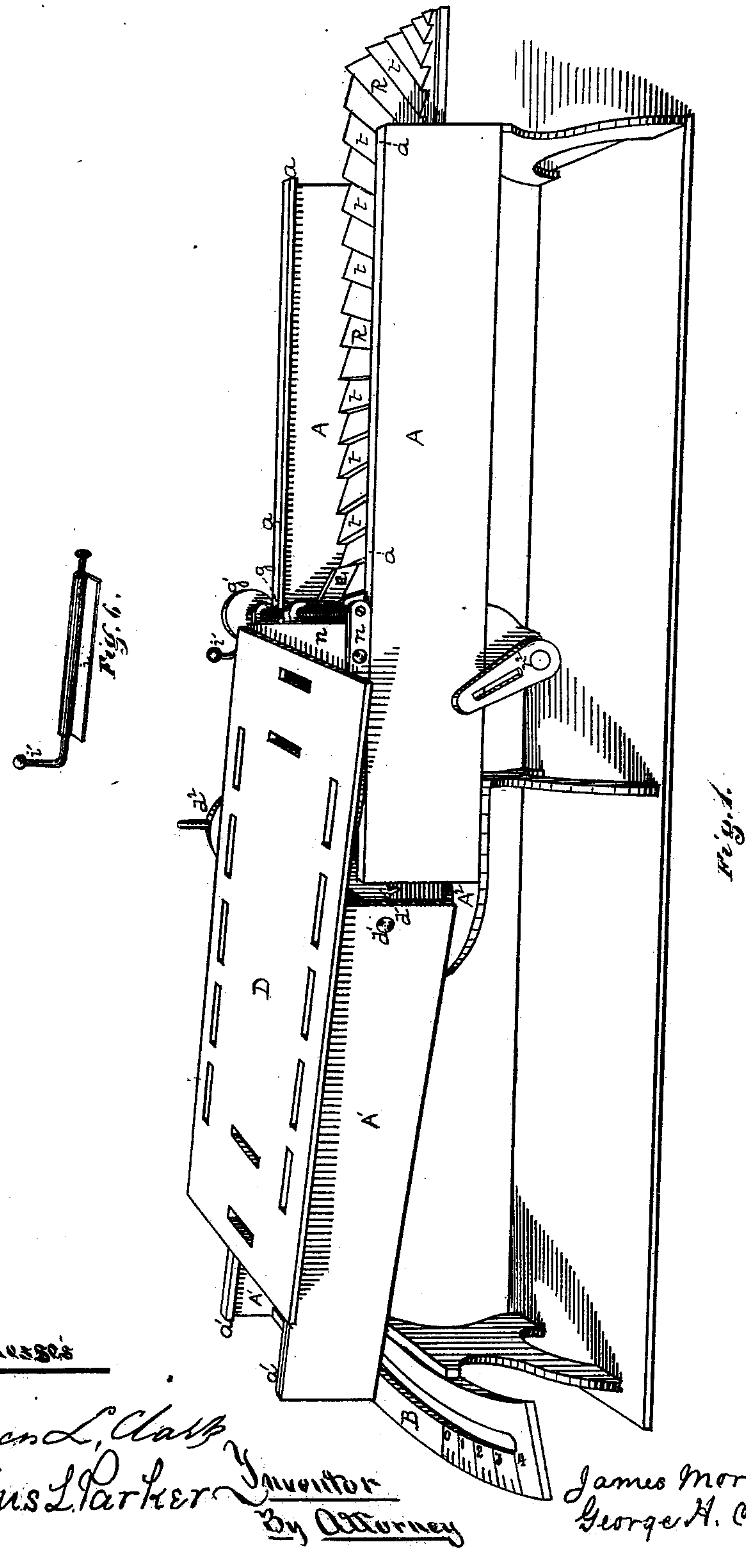
2 Sheets—Sheet 1.

J. MORGAN.

FEED APPARATUS FOR PUNCHING AND OTHER METAL MACHINES

No. 186,212. Patented Jan. 16, 1877.



Witnesses

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Claudius L. Parker

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2 Sheets—Sheet 2.

J. MORGAN.

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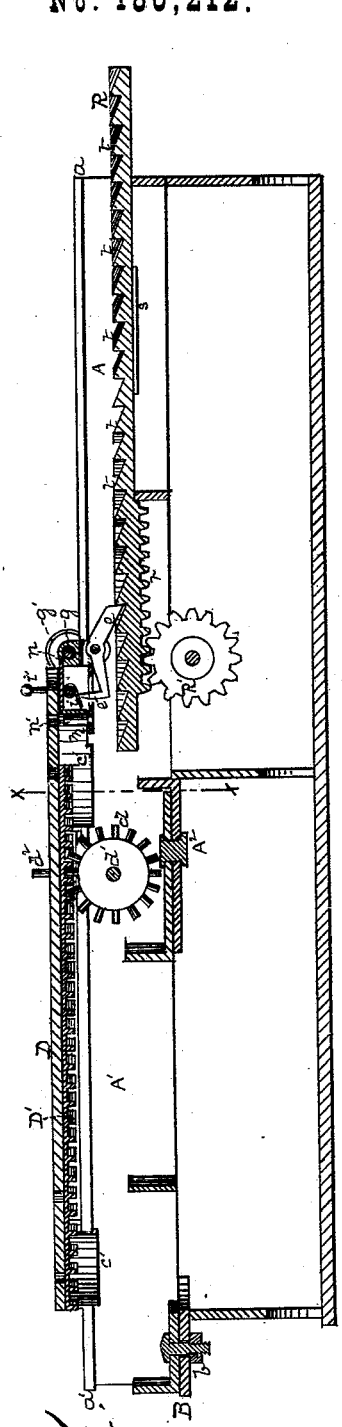

Fig. 2.

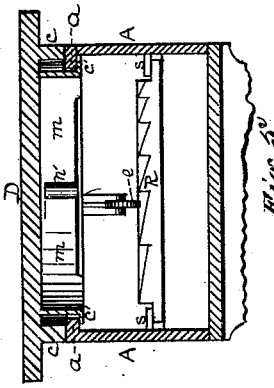

Fig. 3.

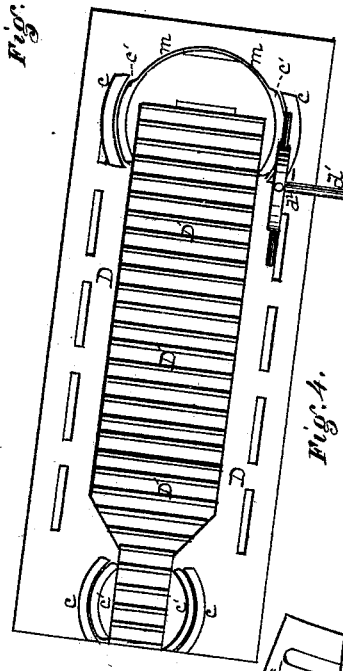

Fig. 4.

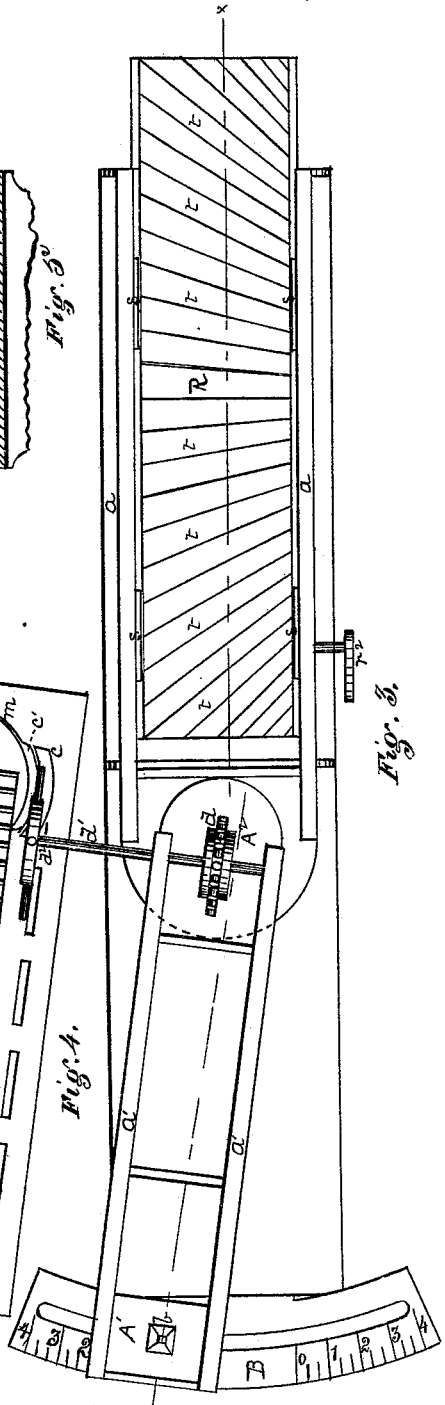

Fig. 5.

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UNITED STATES PATENT OFFICE.

JAMES MORGAN, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN FEED APPARATUS FOR PUNCHING AND OTHER METAL MACHINES.

Specification forming part of Letters Patent No. **186,212**, dated January 16, 1877; application filed November 24, 1876.

To all whom it may concern:

Be it known that I, JAMES MORGAN, of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Feed Apparatus for Metal Punching, Shearing, and Planing Machine; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawing, making part of this specification, in which—like letters indicating like parts—

Figure 1, Sheet 1, is a perspective view of my improved machine. Fig. 2, Sheet 2, is a longitudinal vertical section of the same through the line of *x x*, Fig. 3. Fig. 3 is a top or plan view of the machine, with the traveling feed-table removed. Fig. 4 is an inverted plan view of the table. Fig. 5 is a transverse section, somewhat enlarged, through *x' x'* of Fig. 2; and Fig. 6, Sheet 1, is a detached view in perspective of the tripping devices used to throw the pawl out of gear.

My present invention relates to that class of machines used in feeding metallic plates, sheets, bars, slabs, &c.. to a punch, shear, or chisel, in other than a right line, or at varying distances in a right line; and the nature of it consists in the features of construction and combination hereinafter set forth.

In showing and describing my invention, I have not deemed it necessary to show a punching, shearing or planing mechanism, as the use of such devices, and the manner of combining them with other machines of this class, are either well understood in the art, or come within the knowledge of the skilled mechanic.

The frame A A^1 is of any suitable construction, such as will maintain, in the proper position, the guide-rails *a a'* on which the moving table operates, or by which it is guided in its motion. This, frame, however, is made in two parts, one part, A^1, being jointed to the other, as at A^2, so that on such pivot it may turn freely in a horizontal plane, and be secured at any desired point of adjustment by a clamp-screw, *b*, or other equivalent clamping device, on a fixed end plate or bearing, B. This plate is preferably made of the form of the sector of a circle, having a radius equal to its distance from the pivoting-center at A^2, and it is graduated, as shown, so that the movable part A^1 of the frame may be adjusted at any desired angle relative to the other part of the frame A. The traveling table D, on which the plate, sheet, bar, or slab to be punched, sheared, or planed, is properly secured, is designed to move back and forth on this frame; and, to secure or facilitate such motion, it is provided on its under side with a broad toothed rack, D^1, into which gears a pinion, *d*, driven by power communicated in any suitable way to its shaft d^1 by a hand-wheel, d^2, or otherwise. The rack D' should be broad enough, and in connection with its pinion have enough freedom of mesh or play, to permit of its operation and secure its action at the different angles which the parts A A^1 may form with each other. At each end, and on the under side of the table D, are the curved ribs *c*, which rest on the rails *a* or *a'* and curved flanges *c'*, to work under the rail and hold the table steady. The curvature of these parts is such as to allow the table to change its direction by the adjustment of the moving part A^1 of the frame and still be retained in its operative relation to both ends of the frame.

With the two parts of the frame in line with each other, it is obvious that the table would move in a direct line, and the plate, sheet, slab, or bar be presented to the punching, shearing, or planing tools, (which are to be arranged in relation thereto in any manner known in the art,) so that the action of such tools would also be in a straight line. If, now, the movable part A^1 of the frame be adjusted to one side, a little out of line, as represented in Figs. 1 and 3, and the table be given a forward motion, any point on the table, or any point on the plate secured thereto, would have a motion in the arc of a circle, varying in curvature with the angle of the part A^1, at being understood that one end of the table is guided in its motion by the rails *a*, and the other end by the rails *a'*. The result would be that the edge of the plate, sheet, bar, or slab would, in passing the punch, shear, or planing tool, describe a curved line in relation thereto, the degree of such curva-

ture being varied with the variation of the angle made by the two parts of the frame with reference to each other.

In such machines it is also important to vary or change the length of feed when used for punching or otherwise working the sheet or plate at intervals. To do this I employ a ratchet-rack, R, in the frame A, stationary when desired, but preferably having a short range of motion on guides *s*, which motion it may receive by a rack, *r*, pinion R′, shaft r^1, and crank r^2, or in other suitable way.

The ratchet-teeth *t* extend across the surface of the rack-bar. The distance between the teeth is, at one edge of the bar, equal to the maximum distance desired between rivet-holes, or some fractional part of that distance, as one-half, one-third, &c. The distance between the teeth at the other edge is equal to the least distance desired between rivet-holes, or some fractional part of such distances. The lines of the teeth will then, with possibly a single exception, be oblique, as shown, and, the pawl being adjusted at the proper point back or forth across the rack-bar, each forward stroke from one tooth to the next, or to the next but one, will give the proper distance between rivet-holes.

The pawl is shown at *e*. It is hung to or suspended from a threaded stem, *g*, so that, by turning the latter by a hand-wheel, *g′*, the pawl may be adjusted to any desired point transversely across the rack-bar R. In order to disengage the pawl in running the table back, I use a trip, *i*, which is tilted by a crank, *i′*, engages the tail *e′* of the pawl, and lifts the pawl clear of the teeth of the rack-bar.

The distance desired between rivet-holes being ascertained, the pawl *e* is adjusted to such point that, in the path of its motion, it will, in going from tooth to tooth, pass forward exactly the same distance; and the feed-motion may be secured either by giving to the rack-bar R a reciprocating motion or by the use of the rack and pinion beneath the table, the rack-bar R, in the latter case, remaining stationary.

Truck-wheels may be employed on the track-rails, if so preferred, and other substitution of mechanical equivalents may be made, so long as the function and mode of operation remain substantially unchanged.

The frame *n*, which carries the pawl *e*, screw *g*, and trip *i*, is connected to the table D by means of a pin, *n′*, which catches back of a downwardly-projecting curved flange, *m*, on the under side of the table. The curvature of this flange is such that any change in the direction of the movement of the table, caused by a change in the position of the frame A′, will not affect the pawl, nor break or interrupt the connection between the pawl-frame and the table. The ends of the pawl-frame *n* rest on the rails *a*, and the frame itself plays beneath the table, as clearly shown in Fig. 1.

The curvature of the flange *m*, as well as of the ribs *c* and flanges *c′*, which work on and under the rails, is governed by the distance of the rails apart, in accordance with well-known rules.

By the construction described I am enabled to dispense with the feed-carriage onto which the feed-table has heretofore been commonly pivoted in this class of machines.

I claim herein as my invention—

1. A jointed frame, A A^1, as a carrier and guide for a reciprocating feed-table, and in combination therewith, substantially as set forth.

2. The combination of jointed frame A A^1, feed-table D, and rack and pinion D′ *d*, substantially as set forth.

3. The combination of jointed frame A A^1, table D, and graduated sector B, substantially as set forth.

4. The curved ribs *c* and table D, in combination with rails *a a′*, substantially as and for the purposes set forth.

5. The pawl-frame *n*, connected to the table by pin *n′* and curved flange *m*, in combination with rack and table, substantially as and for the purposes set forth.

6. The rack-bar R, having ratchet-teeth extending across its face, not parallel with each other, but at uniform distances apart along each line of feed, substantially as described.

7. The combination of rack-bar R, pawl *e*, and feed-table receiving its motion directly from the pawl without any intervening carriage, substantially as set forth.

8. The rack-bar R, having a system of ratchet-teeth, substantially as described, in combination with a pawl adjustable transversely across its face, a feed-table connected with the pawl, and a rack and pinion for operating the table, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JAMES MORGAN

Witnesses:

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J. J. MCCORMICK.