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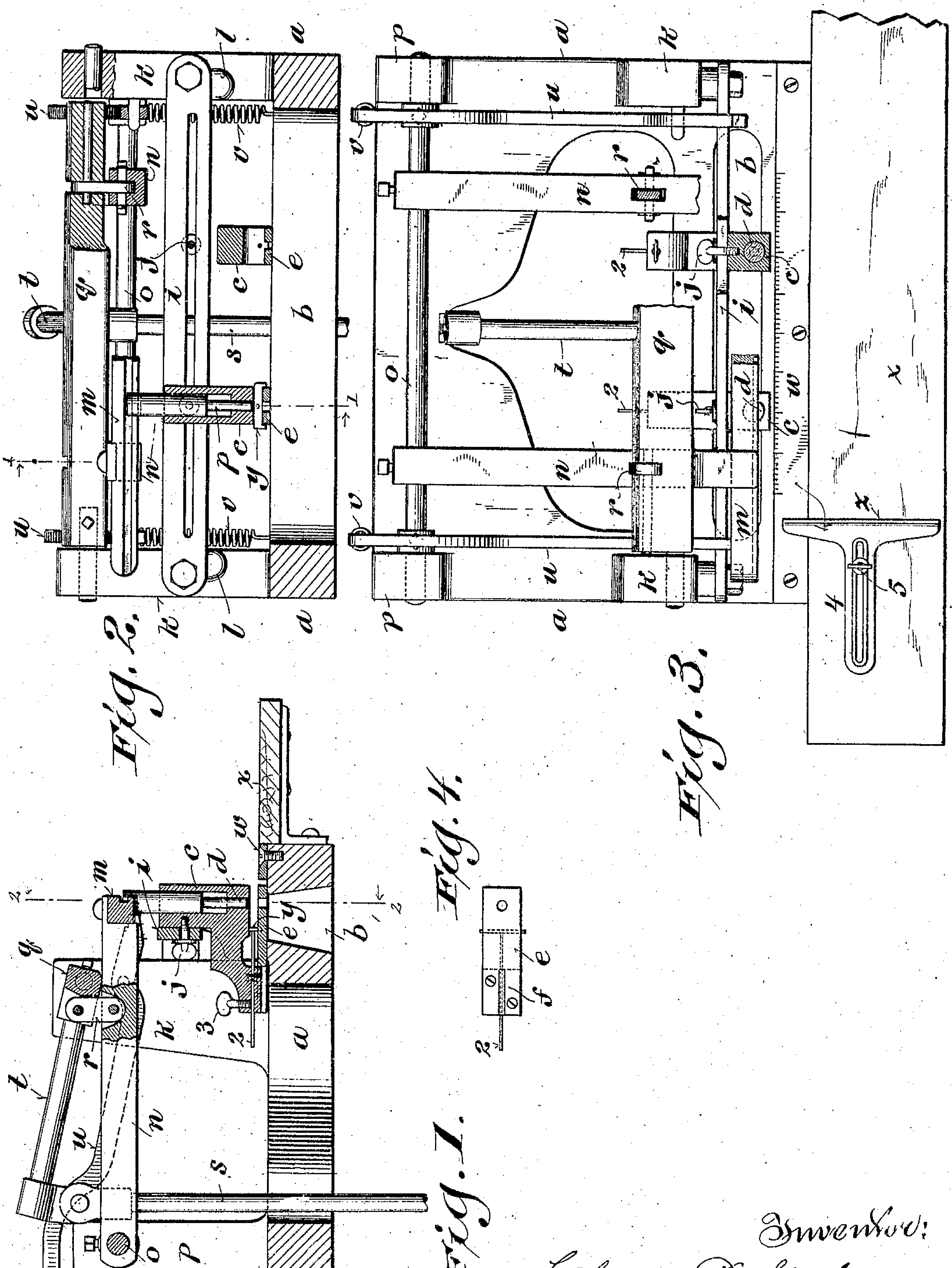
C. R. GETHER.

PUNCHING MACHINE.

APPLICATION FILED JULY 16, 1903.



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No. 791,146. Patented May 30, 1905.

UNITED STATES PATENT OFFICE.

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PUNCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 791,146, dated May 30, 1905.

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To all whom it may concern:

Be it known that I, CHARLES R. GETHER, a citizen of the United States, residing at Whitefish Bay, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Punching-Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

This invention relates particularly to machines for simultaneously punching a series of holes in paper or similar material. Its main objects are to avoid lateral thrust upon the punches and the consequent binding and unequal wear of the same in their guides or bearings and in the opposing dies, to firmly support the punches and dies in their proper working relation to each other, to dispense with springs for retracting the punches from the dies, to provide for readily varying the number, size, shape, and arrangement or relative positions of the holes to be punched, and generally to improve the construction and operation of machines of this class.

The invention consists in certain novel features of construction and in the peculiar arrangement and novel combinations of parts hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings like characters designate the same parts in the several figures.

Figure 1 is a vertical cross-section from front to rear on the line 1 1, Fig. 2, of a machine embodying my invention. Fig. 2 is a vertical longitudinal section thereof on the line 2 2, Fig. 1. Fig. 3 is a plan view of the machine, certain parts being broken away; and Fig. 4 is an inverted plan view of one of the punch and die sets.

Upon a suitable base *a*, having a longitudinally-slotted opening *b* therein near its front side, are adjustably mounted a number of punch and die sets, each comprising a head or guide block *c*, a punch *d*, guided therein, and a die-plate *e*, attached thereto and having an opening registering with the punch. At their rear ends the die-plates *e* are slotted lengthwise to engage ribs *f* on the rear depending ends of the heads *c*, to which they are attached by screws, as shown in Fig. 4. The shanks of the punches *d* are fitted and guided in vertical sockets in the heads *c* and are formed at their upper ends with rearwardly-presented transverse notches or grooves. The heads *c* are supported and held in any desired position with relation to each other and to the base by a longitudinally-slotted horizontal bar *i*, to which they are adjustably fastened by set-screws *j*. The bar *i* is bolted at its ends to standards *k*, rising from the ends of the base, and its position is accurately determined independently of the bolts which fasten it to said standards by lugs *l*, cast on said standards, so that when the heads are clamped by the screws *j* to said bar the die-plates *e* will rest squarely upon the base *a* over the slot or opening *b* therein. The punch-guiding heads and the associated die-plates are thus firmly supported and securely held in the proper working relation to each other, and the several punch and die sets may be readily adjusted or removed and replaced, so that the machine may be provided with any desired number and kind of punches and dies arranged therein according to the number, size, shape, and arrangement of the holes to be punched.

m is a vertically-movable thrust-bar formed with a longitudinal tongue loosely engaging the transverse notches or grooves in the upper ends of the punches *d*. It is attached to the front ends of horizontally-disposed arms *n*, secured at their rear ends on a rod *o*, which is supported parallel with the bar *m* by bearings in standards *p*, rising from the base *a*, at the rear side thereof.

q is a rocker-bar journaled at its ends in the standards *k*, parallel with the bar *m* and above the arms *n*, with which it is eccentrically connected by links *r*. It may be turned or oscillated by means of a treadle, crank, or eccentric, connected by a rod *s* with an arm *t* thereon or by other suitable means. When the rocker-bar is operated by hand or foot through a lever or crank-arm, levers *u*, fulcrumed to the standards *k* and engaging the bar *m* and springs *v*, connecting the other ends of said levers with the base, are provided for retracting the thrust-bar and punches after they have been depressed; but

when it is operated by a power connection through a crank or eccentric the retracting levers and springs may be dispensed with, the crank or eccentric serving both to depress and retract the thrust-bar and punches.

The tongue-and-groove connection between the thrust-bar and punches enables me to dispense with a retracting-spring for each individual punch and also allows for the ready adjustment, removal, and replacing of the punches.

The rod *o*, on the axis on which the arms *n* swing, is located at a sufficient distance from the bar *m* to avoid any considerable lateral movement of the said bar within the limits of its vertical movement and to thus prevent lateral thrust on the punches and binding and unequal wear thereof in their bearings and the opposing dies. The bar *n* acting against the punches substantially in the direction of their axes, wear on their engaging faces is also reduced and an equal depression and the proper operation of all the punches, whatever positions they may occupy with relation to the thrust-bar, are secured.

Secured to the front part of the base *a* is a scale *w*, having its upper face flush with the upper face of the die-plates *e*, and *x* is a leaf attached to the front side of the base on a level with the scale *w* for the purpose of supporting the paper, cardboard, or other material to be punched.

The location of the holes made by the punches in the paper or other material for any given arrangement of the punch sets is determined in one direction by gages *y*, adjustably connected with the several heads *c*, and in the other direction by a gage *z*, adjustably attached to the leaf *x*. The gages *y* are provided with stems 2, passing rearwardly through holes in the holder *c* and adjustably held therein by set-screws 3, and the gage *z* has a slotted arm 4, adjustably secured by a set-screw 5 to the leaf *x*.

My improved punching-machine operates as follows: The sheets of paper or other material to be punched being placed in a pile on the leaf *x* are inserted between the punches and dies against the gages *y* and are carried sidewise against the gage *z*. The rocker-bar *q* is then turned backward by means of its operating connection, and the bar *n* is thereby thrust downward against the upper ends of the punches *d*, which are simultaneously forced through the paper or other material into the die-plates *e*, the punchings dropping through the opening *b* in the base. Any number and arrangement of holes of any desired shape may be made by placing the required number of punch sets having punches and dies of the requisite size and shape in the machine and setting them in the proper relative positions. To vary the relative arrangement of the holes, the screws *j* are loosened and the punch sets are simply moved lengthwise of the bar *i* and the base, and when properly adjusted they are secured in place by tightening said screws. To change the number and shape of the holes, the required number of punch sets are added or withdrawn, or punch sets having punches and dies of different shapes are substituted by simply turning the screws *j* out of the heads *c* to be removed and inserting them through the slot in the bar *i* in the heads of the die sets which are placed in the machine.

Various changes in the minor details of construction and arrangement of parts may be made without departing from the principle and intended scope of my invention.

I claim—

1. In a punching-machine the combination of a base having a longitudinal opening, punch and die sets each comprising a head, a punch and a die which are adjustable together and independently of other sets over and lengthwise of said opening, a vertically-movable thrust-bar engaging the upper ends of the several punches and supported by vertically-swinging pivoted arms, and a rocker-bar adapted to depress said thrust-bar and simultaneously operate a number of punches, substantially as described.

2. In a punching-machine the combination of a base having a longitudinal opening, punch and die sets each comprising a head, a punch and a die, which are adjustable together and independently of other sets over and lengthwise of said opening, a vertically-movable thrust-bar engaging the upper ends of the several punches and supported by vertically-swinging pivoted arms, a rocker-bar adapted to depress said thrust-bar and simultaneously operate a number of punches, and a spring tending to lift the thrust-bar and withdraw the punches, substantially as described.

3. In a punching-machine the combination of a base having a longitudinal opening, punch and die sets adjustable thereon over and lengthwise of said opening, a vertically-movable horizontal thrust-bar engaging the upper end of each punch and carried by horizontally-disposed arms pivoted at a distance therefrom to fixed supports, a rocker-bar parallel with said thrust-bar, and connected by links with said arms, and means for turning said rocker-bar, substantially as described.

4. In a punching-machine the combination of a base having a longitudinal opening, a supporting-bar above and parallel with said opening, punch and die sets adjustable thereon, over and lengthwise of said opening, and each comprising a head having a lateral bearing fitted to said bar, means for adjustably fastening each head to said bar, and means for simultaneously operating a number of punches, substantially as described.

5. In a punching-machine the combination of a base, a longitudinally-slotted supporting-bar above and parallel with said base, punch

sets each comprising a head detachably secured by a clamping-screw to said bar and adjustable lengthwise thereof, substantially as described.

6. In a punching-machine the combination of a base having a longitudinal opening, punch sets adjustable thereon over and lengthwise of said opening and each comprising a head, a punch guided therein and a die registering with said punch, a vertically-movable horizontal thrust-bar loosely engaging transverse grooves in the upper ends of the punches and means for operating said thrust-bar and simultaneously depressing and retracting a number of punches, substantially as described.

7. In a punching-machine the combination of a base having a longitudinal opening, punch and die sets adjustable thereon over and lengthwise of said opening, a vertically-movable thrust-bar engaging the upper end of each punch and carried by horizontally-disposed pivoted arms, means for depressing said bar and simultaneously forcing a number of punches into the opposing dies, a lever engaging said thrust-bar and a spring connected with said lever and tending to lift the thrust-bar and withdraw the punches connected therewith from their dies, substantially as described.

In witness whereof I hereto affix my signature in presence of two witnesses.

CHARLES R. GETHER.

Witnesses:
CHAS. L. GOSS,
ALICE E. GOSS.