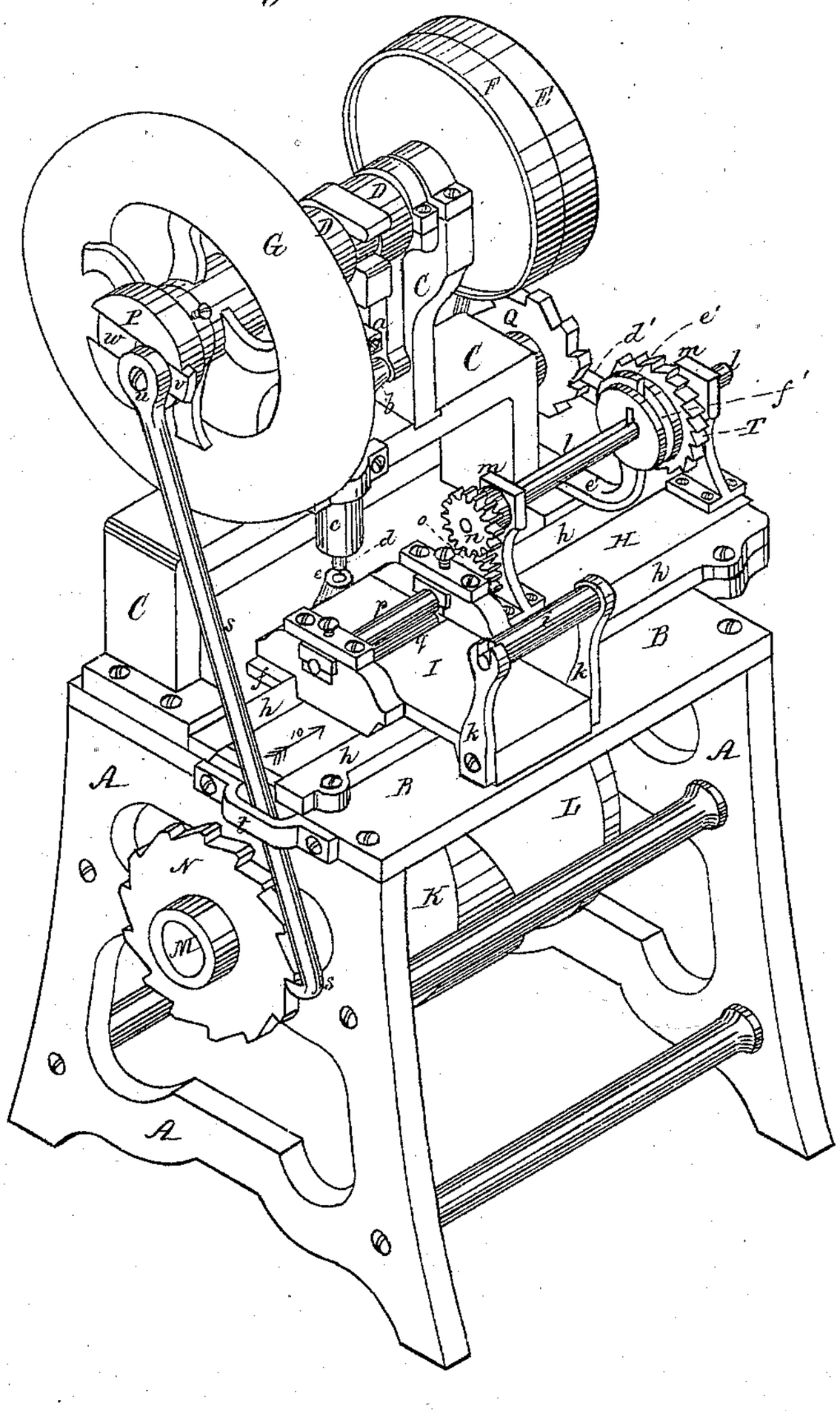
3 Sheets--Sheet 1.

J. LOWE.

Machines for Cutting out Planchets of Sheet-Metal.

No. 138,264. Patented April 29, 1873.

Fig: 1.



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Inventor,
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Fig: 2.

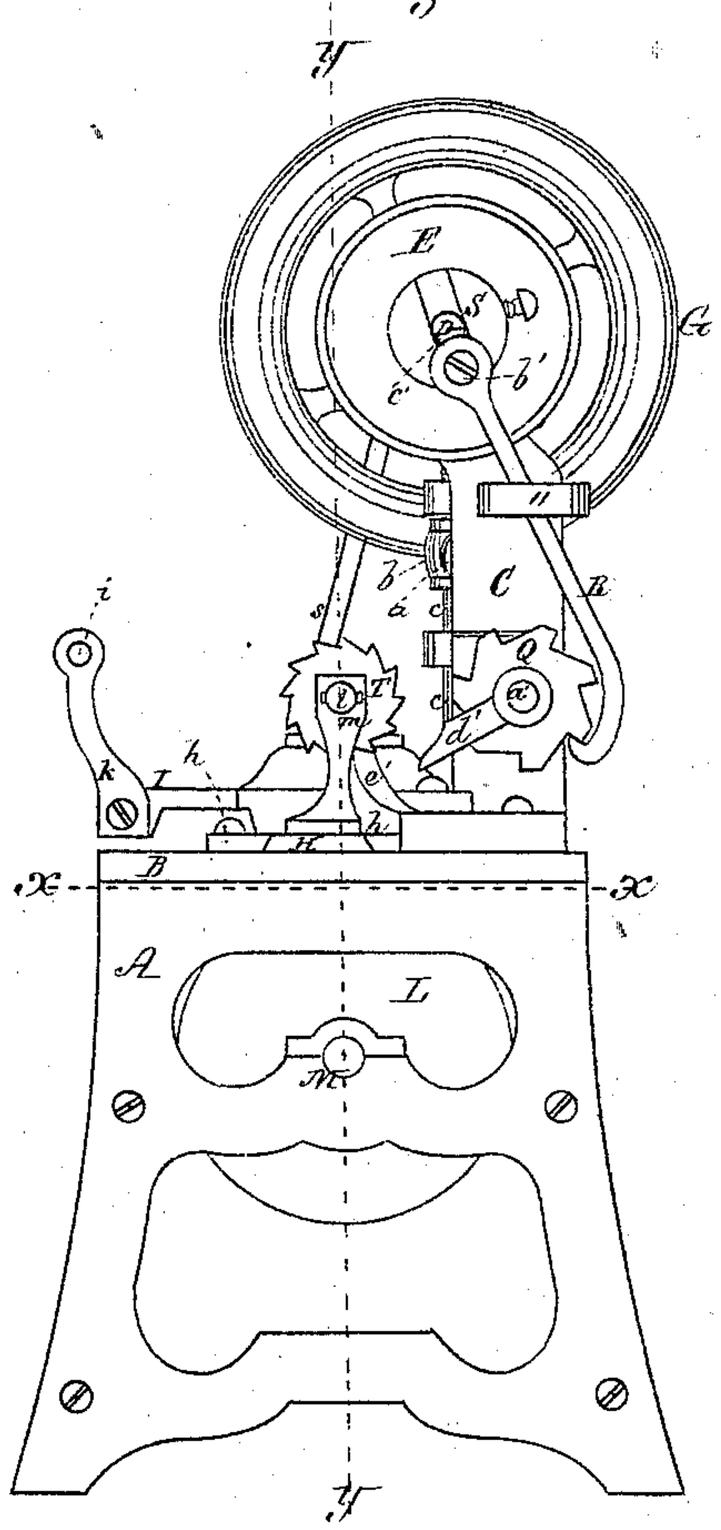
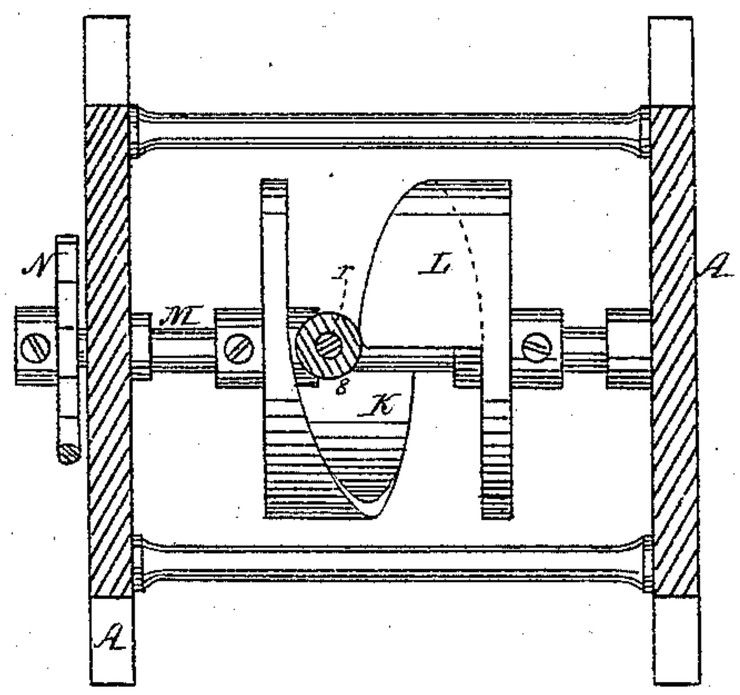


Fig: 3.



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3 Sheets--Sheet 3.

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Fig: 4.

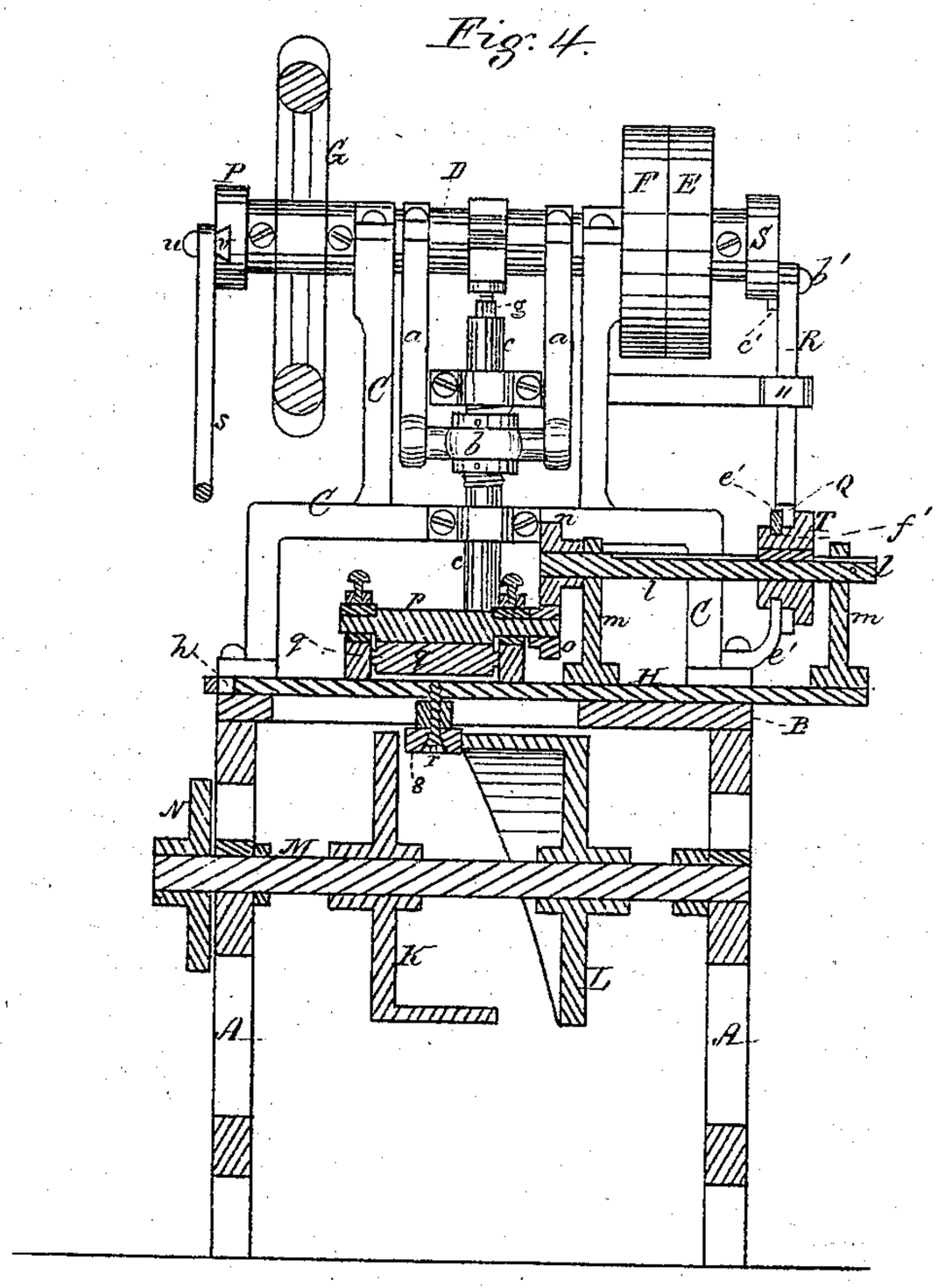


Fig: 5.

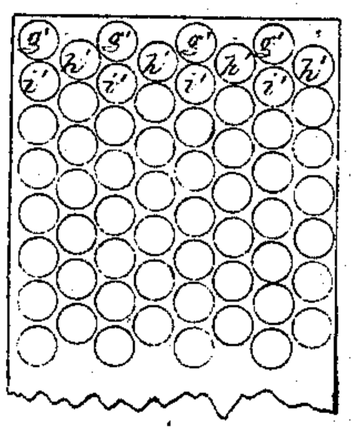


Fig: 7.

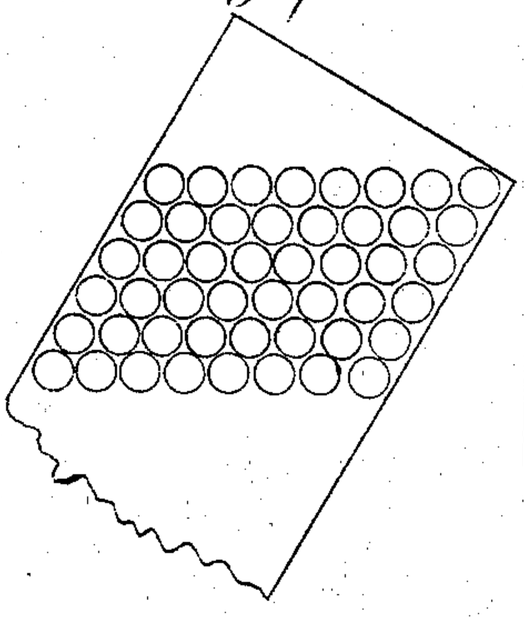
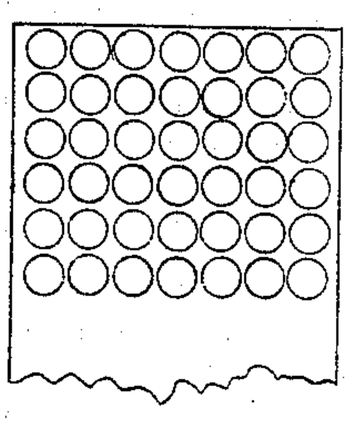


Fig: 6.



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AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

UNITED STATES PATENT OFFICE.

JOHN LOWE, OF TAUNTON, MASSACHUSETTS, ASSIGNOR TO THE ALBERT FIELD TACK COMPANY, OF SAME PLACE.

IMPROVEMENT IN MACHINES FOR CUTTING OUT PLANCHETS OF SHEET METAL.

Specification forming part of Letters Patent No. **138,264**, dated April 29, 1873; application filed March 11, 1873.

To all whom it may concern:

Be it known that I, JOHN LOWE, of Taunton, in the county of Bristol and State of Massachusetts, have invented an Improvement in Punching-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1 is a perspective view of a punching-machine constructed in accordance with my invention. Fig. 2 is an end elevation of the same. Fig. 3 is a horizontal section on the line *x x* of Fig. 2. Fig. 4 is a vertical section on the line *y y* of Fig. 2. Fig. 5 is a plan of the end of a strip of metal out of which blanks have been punched by my improved machine. Figs. 6 and 7 are plans of strips of metal representing former methods of punching.

This invention relates particularly to machines for punching out blanks for eyelets, buttons, &c., from long strips of sheet metal.

In machines of this description as heretofore constructed, in which the strip of metal was fed forward to the punch in a direction at right angles to that of the lateral feed, the blanks have been punched in rows, as shown in Fig. 6, so that the distance of the center of any opening from which a blank was punched in one row from the edge of the strip was exactly equal to that of the corresponding opening of any other row. This method of punching resulted in a considerable waste of stock, to avoid which machines have been constructed in which the strip was presented to the punch and fed forward at an angle of thirty degrees to the direction of the lateral or side feed, which reduced the waste of stock between the rows to a minimum; but nevertheless, in practice, a triangular-shaped piece at the front end of the strip of metal, as seen in Fig. 7, was wasted; and, furthermore, the inclination of the feed-rolls at an angle prevented them from being placed as close to the punch as was desirable, which resulted in the waste of a larger piece at the end of the strip than would be the case if the rolls were in a plane passing longitudinally through the machine.

My invention has for its object to effect the same saving in stock with a machine in which the forward feed of the strip is at right angles to the direction of the lateral feed as is effected where the strip is fed to the punch at an angle of thirty degrees, and with the additional advantages of avoiding the waste at the ends of the strip incident thereto, and enabling the machine to be made more compact; and my invention consists in the peculiar construction of the mechanism whereby the strip is fed in two directions, in such a manner that the center of each opening from which blank has been punched in one row will be opposite to a point midway between the centers of two contiguous openings in the rows contiguous thereto, the relative positions of the openings in the strip being the same as is the case where the strip is fed to the punch at an angle.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawing, A represents the framework of the machine, and B the table, from which rises another frame, C, in suitable bearings at the top of which runs the driving-shaft D, at one end of which are the fast and loose pulleys E F, and at the other end the balance-wheel G. The driving-shaft has, on each side of its center, an eccentric, these eccentrics being connected with rods *a a*, which are attached at their lower ends to a bar, *b*, which operates the hollow vertical shaft *c*, which slides in suitable bearings, and carries at its lower end the punch *d*, which enters the die *e*, secured to a block, *f*, made adjustable upon the table B. Through the hollow shaft *c* passes a rod, *g*, which is operated by a crank at the center of the driving-shaft D, and serves to press the blank after it is cut through the die *e* and give it the cup-shaped form required in the process of making eyelets. Where, however, blanks for other purposes are to be cut, the construction of the punching or cutting mechanism may be varied according to the requirements of the case. On the table B is a slide, H, which is moved back and forth between guides *h*, and has secured to it, at right

angles to the direction of its length, a table, I, over which the strip of metal is fed to the punch from a reel, *i*, on which it is to be rolled or coiled. This reel has its bearings in uprights *k*, secured to the outer end of the table I. *l* is a horizontal shaft, which is supported in bearings *m*, attached to the slide H, and has secured to its inner end a gear, *n*, which engages with a gear, *o*, on the end of the shaft of the feed-roll *p*, between which and a friction-roll, *q*, the strip of metal to be punched passes, the perimeter of the friction-roll *q* projecting slightly above the surface of the table I, which insures its contact with the under side of the strip. The slide H is reciprocated intermittingly so as to give the required lateral motion to the strip of metal to be punched in the following manner. *r* is a pin, projecting from the under side of the slide H, and carrying at its lower end a friction-roll, 8, which is operated upon alternately by the curved inclines or cams K L, the slide being moved by the cam K in the direction of the arrow 10, Fig. 1, and by the cam L in the opposite direction. These cams are secured to a shaft, M, having its bearings in the frame-work A, and carrying at one end a ratchet-wheel, N, which is rotated by a pawl, S, which passes through a guide, *t*, and is attached at its upper end to a crank-pin, *u*, projecting from a slide, *v*, which is made adjustable in a groove, *w*, in a disk, P, at one end of the driving-shaft D, and thus, as the latter is revolved, the required movements are given to the table I and strip of metal thereon to cause the blanks to be punched therefrom in a straight row at right angles to its sides, as seen in Fig. 5, each revolution of the driving-shaft causing the material to be punched to be fed a distance equal to that between the centers of two contiguous openings in the same row. The proportions of the cams K L and the ratchet-wheel N, as well as the adjustment of the crank-pin slide, to which the pawl *s* is attached, must be varied to suit the width of the stock and the size of the holes to be punched.

After one row of blanks has been punched, the strip is carried forward the required distance for the next row by the rotation of the feed-roll *p*, which is effected as follows: Q is a ratchet-wheel, which revolves upon a stud, *a'*, projecting from the frame C, and is operated by a pawl, R, which passes through a guide, 11, and is attached at its upper end to a crank-pin, *b'*, projecting from a slide, *c'*, made adjustable in a groove in a disk or wheel, S, secured to the end of the driving-shaft D next to the fast pulley E. To the outside of the ratchet-wheel Q is secured an arm, *d'*, which projects out into the path of the teeth of a ratchet-wheel, T, on the shaft *l*. This wheel T is held in a position opposite to the arm *d'*, so as to insure its being operated thereby, by a curved arm, *e'*, one end of which is secured to the frame C, the other end projecting into an annular groove, *f'*, in a hub on one side of the ratchet-wheel. The ratchet-wheel T and shaft *l* are constructed with a spline and feather, which admits of the shaft sliding through the ratchet-wheel when the slide H is reciprocated, while any rotary movement of the ratchet-wheel is communicated to the shaft *l*, and through the gears *n o* to the feed-roll *p*.

At each revolution of the driving-shaft the wheel Q is moved by the pawl R a distance equal to that between two of its teeth, and after the last blank of the first row *g'*, Fig. 5, has been punched, the slide H is moved forward a distance equal to one-half of its previous movement, simultaneously with which, or immediately thereafter, the arm *d'* engages with one of the teeth of the ratchet-wheel T, and moves it a distance equal to that betwen two of its teeth, partially rotating the shaft *l* and feed-roll *p*, so as to produce the required forward feed of the strip, these movements causing the first blank of the next row to be punched in a line on one side of, as seen in Fig. 5, instead of directly under, the opening formed by punching the last blank of the previous row, as in the old method represented in Fig. 6. The direction of the movement of the slide H is now reversed, and a second row, *h'*, of blanks is punched with the center of each opening opposite to a point midway between the centers of two contiguous openings of the row previously punched. As soon as the last opening of the second row is punched the slide H is moved forward a distance equal to half its previous movement, the same as before described, at the opposite end of its traverse, and the strip is again fed forward by the movement of the roll *p*, when the punch descends and cuts out a blank in a line on one side of the opening formed by punching the last blank of the previous row. The direction of the movement of the slide H is now reversed, and a third row, *i'*, is punched, and so on until the last end of the strip has been fed through the rolls *p q*, the center of each opening from which a blank has been punched in one row being opposite to a point midway between the centers of two contiguous openings in the rows contiguous thereto, which peculiar manner of punching is effected by so constructing each of the inclines or cams K L that the last movement of the slide H at each end of its traverse will be only half that of its other movements.

The diameter of the feed-roll *p* may be changed, and the mechanism which actuates it adjusted, so as to vary the amount of feed of the material to be punched to suit the requirements of the case.

The various movements of the punch *d*, slide H, and feed-roll *p* are accurately timed with respect to each other, so as to produce the result above described; and I am thus enabled, in a machine in which the forward feed of the strip is at right angles to the direction of the lateral feed, to punch the strip with the minimum of waste between the rows, as seen in

Fig. 5—a desideratum heretofore unattained—and thus effect the same saving in stock as is made in a machine in which the forward feed of the strip is at an angle of thirty degrees to the direction of the lateral feed. My improved machine, however, possesses several advantages over the latter machine, inasmuch as the feed-roll can be placed closer to the punch than where it is inclined at an angle, as above described; and, consequently, the machine can not only be made more compact, but the amount of waste at the last end of the strip is reduced, and that of the triangular piece at its front end entirely avoided.

Claim.

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

The intermittingly-reciprocating slide H, so actuated that the last movement at each end of its traverse shall be one-half that of its other movements, in combination with the feed-roll *p* and its actuating mechanism, and the punch *d*, when the table I is so arranged that the forward feed of the strip to be punched takes place at right angles to the direction of its lateral feed, all operating substantially in the manner and for the purpose described.

Witness my hand this 5th day of March, A. D. 1873.

JOHN LOWE.

In presence of—
GEO. F. HOWARD,
N. BRADFORD DEAN.