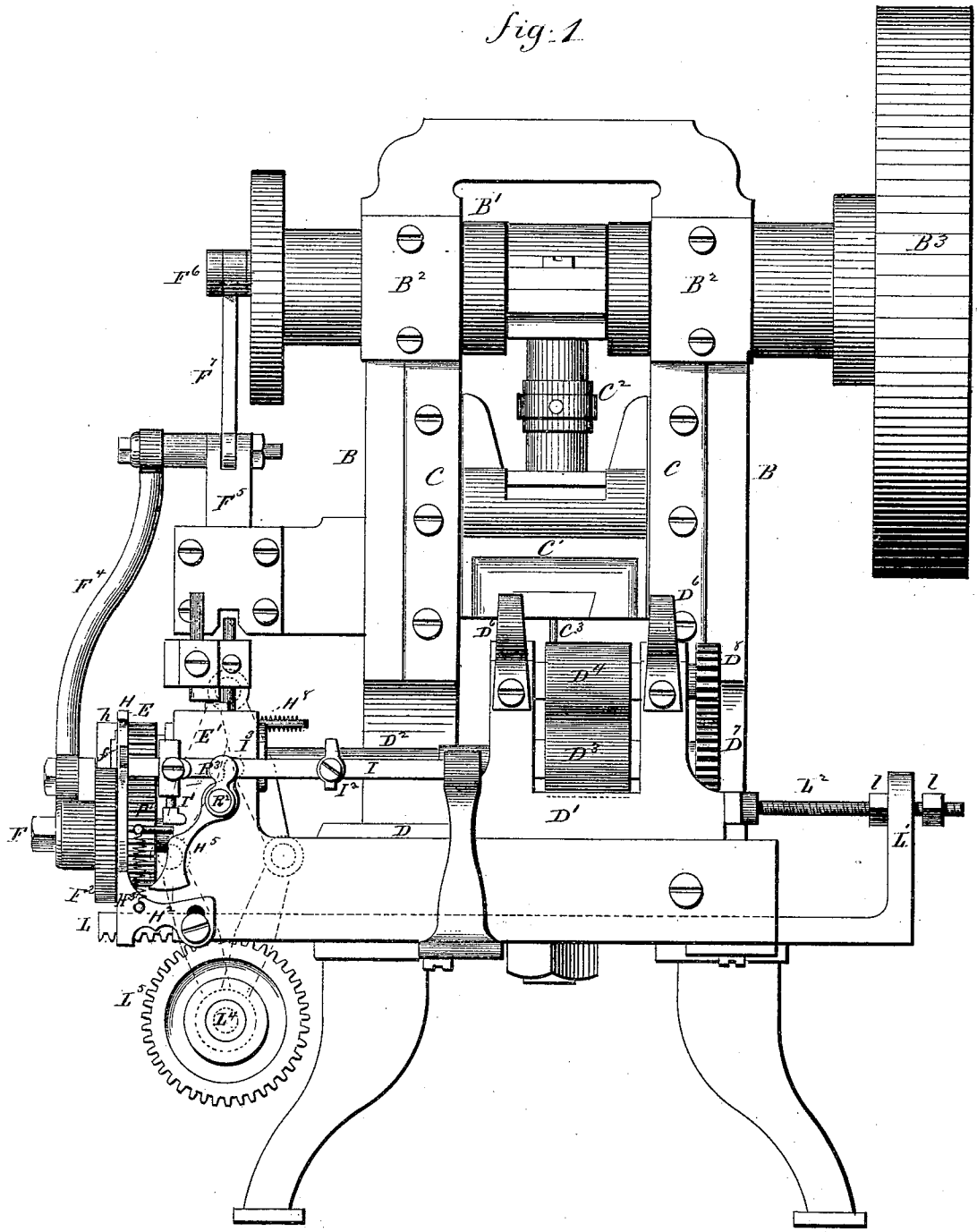
(Model.) 4 Sheets—Sheet 1.

F. MARGGRAFF.

FEEDING DEVICE FOR PUNCHING MACHINES.

No. 252,786. Patented Jan. 24, 1882.

Fig. 1.



Witnesses.
J. F. Shumway
L. D. Rogers

Fred'k Marggraff
Inventor
By atty.
Thos. Earle

N. PETERS, Photo-Lithographer, Washington, D. C.

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F. MARGGRAFF.

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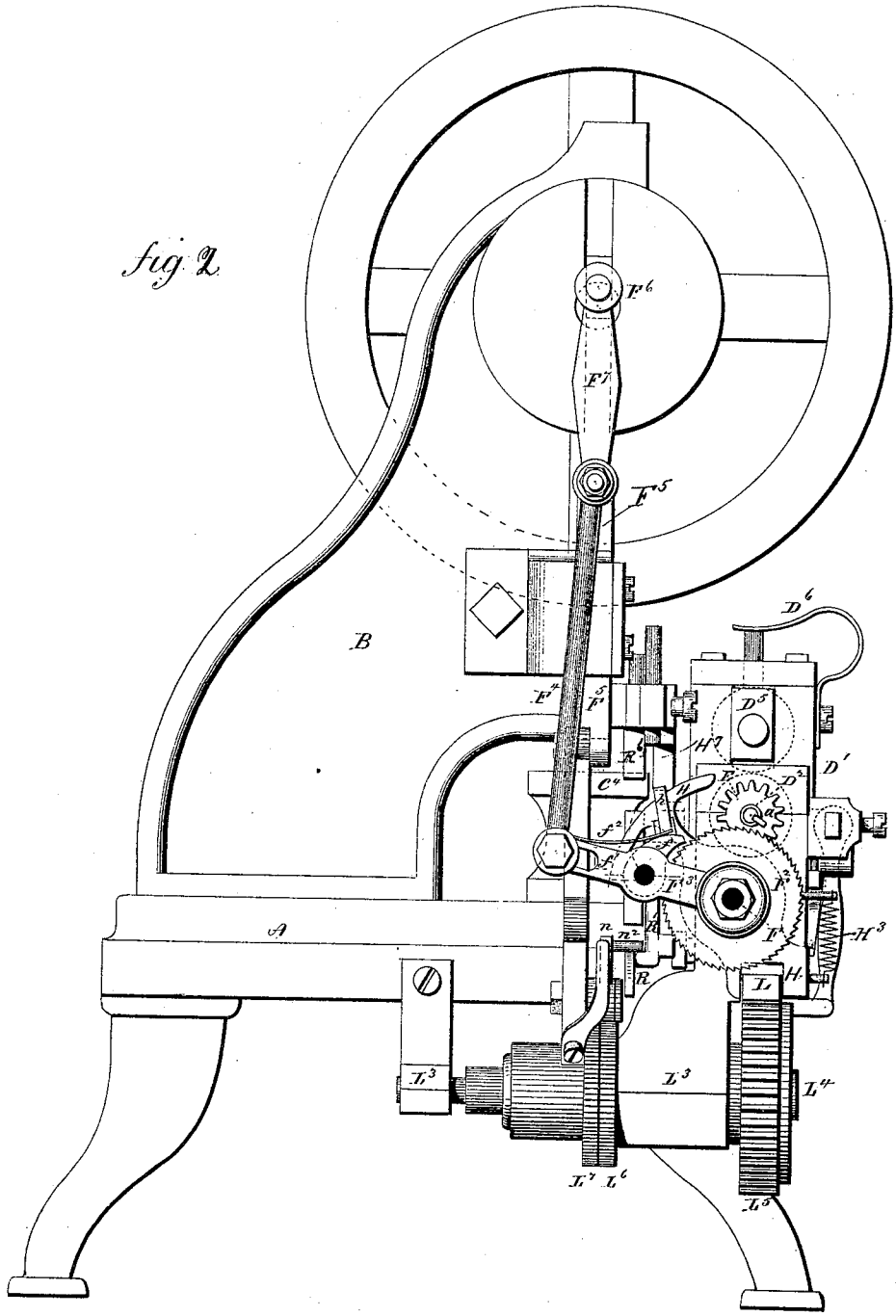
No. 252,786. Patented Jan. 24, 1882.

Fig. 2.



Witnesses.
J. W. Shumway
L. D. Rogers

Fred.k Marggraff
Inventor.
By atty.
Thos. Ewell

N. PETERS, Photo-Lithographer, Washington, D. C.

(Model.) 4 Sheets—Sheet 3.

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fig. 5

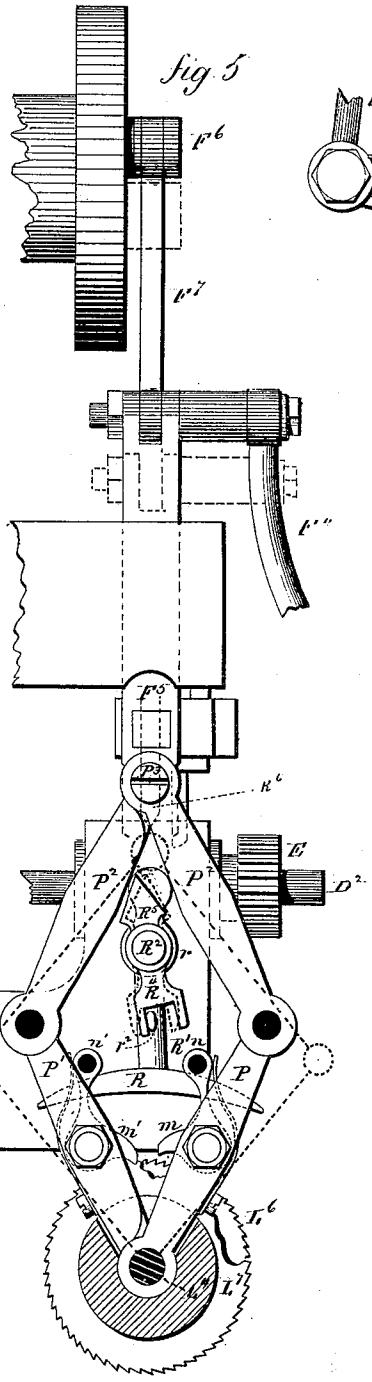


fig. 3

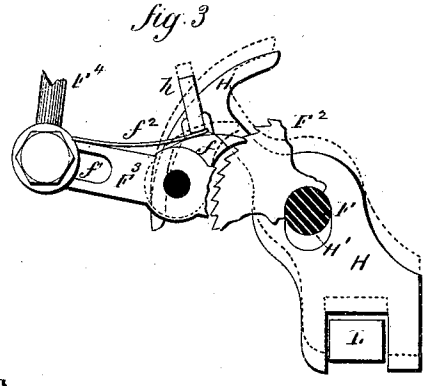


fig. 4

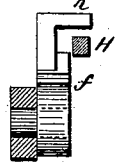
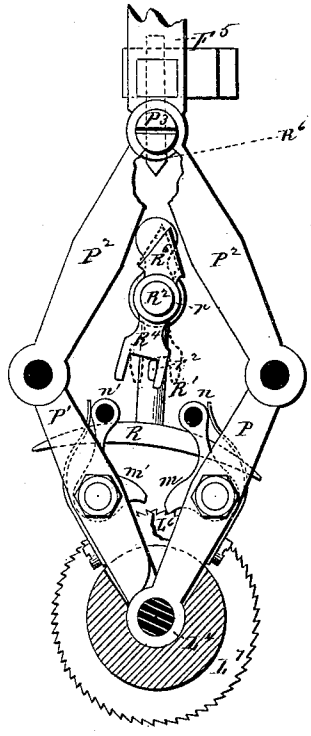


fig. 6



Witnesses.
J. F. Shumway
L. D. Rogers

Fred'k Marggraff.
Inventor.
By Atty.
Wm. E. Earle

N. PETERS. Photo-Lithographer, Washington, D. C.

(Model.) 4 Sheets—Sheet 4.

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Fig. 7

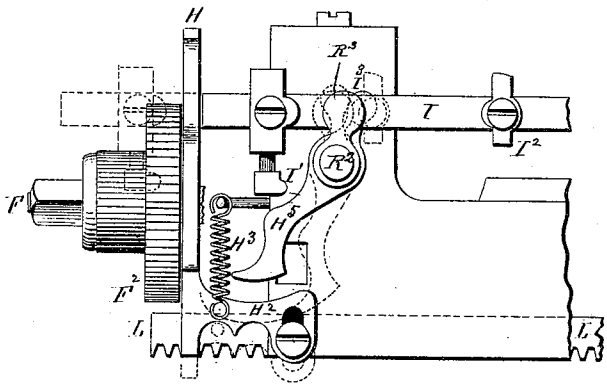


Fig. 8

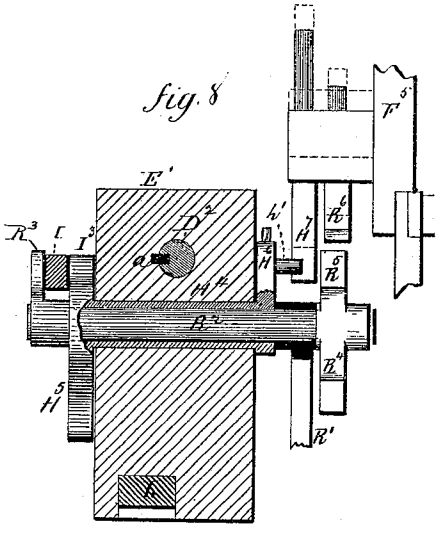
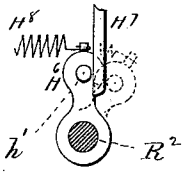


Fig. 9



Witnesses.
J. H. Shumway
L. D. Rogers

Fred'k Marggraff
Inventor.
By attys.
Dyer & Earle

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

FREDRICK MARGGRAFF, OF WATERBURY, CONNECTICUT.

FEEDING DEVICE FOR PUNCHING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 252,786, dated January 24, 1882.

Application filed July 30, 1881. (Model.)

To all whom it may concern:

Be it known that I, FREDRICK MARGGRAFF, of Waterbury, in the county of New Haven and State of Connecticut, have invented a new Improvement in Feeding Devices for Punching-Machines; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a front view; Fig. 2, a side view, looking from the left-hand side of Fig. 1; Figs. 3 to 9, inclusive, detached views.

This invention relates to an improvement in the device for feeding strips of sheet metal to a punching press or machine, the operation of which is to cut successive disks from the strip, as in the manufacture of eyelets, cartridges, button-backs, and like articles, and in which a regular intermittent forward advance of the strip to be punched is required, combined with a regular intermittent transverse movement, so that after the forward or advancing movement of the strip the successive operations of the punch will punch a series of holes in or blanks from the strip in a transverse line, and when one such transverse line of punchings has taken place, then a forward advance of the strip is made and the next series of punching made, as the strip passes transversely in the opposite direction to that in which it moved when the next preceding series was punched, the object being to make this intermittent forward and transverse movement of the strip automatic by a device arranged to make either or both of such advancing and transverse movements of this strip adjustable, to adapt the machine to punchings of larger or smaller diameter, or to a greater or less number of punchings across the strip.

The invention consists in the combination of mechanism, as hereinafter described, and particularly recited in the claims.

My invention is illustrated as applied to a punching-press of common construction, which needs but brief description.

A is the bed of the machine, on which are uprights B, carrying the driving-shaft B′, in suitable bearings, B^2, caused to revolve by the application of power thereto through a pulley, B^3, or in any other known manner.

Between the uprights B B, and in suitable guides, C, is the vertical slide C′, which is connected with an eccentric on the driving-shaft by means of a pitman, C^2, the slide carrying the punch C^3, to work in connection with the die C^4 below, all in the usual manner.

On a suitable guide or way, D, at the front of the machine is a carriage, D′, arranged to be moved on said guide transversely across the front of the machine. On the carriage, in suitable bearings, is a shaft, D^2, which carries a roll, D^3, and on the carriage above the roll D^3 is a second roll, D^4, arranged in vertically-adjustable bearings D^5, the said two rolls having their axes parallel with the path of movement of the carriage and the line between them substantially on the line of the surface of the die C^4. A spring-pressure is applied to the bearings of the upper roll by means of springs D^6 in a well-known manner for applying spring-pressure to rolls, and the two rolls are geared together by corresponding pinions, D^7 D^8, in the usual manner for such feed-rolls. The shaft D^2 of the roll D^3 extends longitudinally to the left and slides freely through a pinion, E, the said pinion E being arranged in a bearing, E′, so as to revolve freely therein, but without longitudinal or axial movement. The shaft D^2 is grooved longitudinally, and the pinion E, provided with a spline, *a*, working in said groove, as seen in Fig. 2, so that as power is applied to rotate the pinion E such rotation will be communicated to the roll D^3, and by means of the pinions D^7 D^8 the same rotation will be imparted to the roll D^4, so that the strip of metal introduced between said two rolls will, by the rotation of the rolls, be drawn inward toward the die.

On a stud, F, below the shaft D^2, is a gear, F′, working into the pinion E. Attached to the gear F′, and so as to be revolved with it, is a toothed ratchet, F^2. On the same stud F a lever, F^3, is hung, extending backward, and connected by a rod, F^4, to a vertical slide, F^5, operated from a crank-pin, F^6, on the driving-shaft through a pitman, F^7, so that at each revolution of the driving-shaft the vertical slide F^5 is moved up and down—that is, a full reciprocating movement is imparted to the slide at each revolution of the shaft, and by

the connecting-rod F^4 a corresponding vibrating movement is imparted to the lever F^3, the center of vibration being the center of the stud F. On the said lever F^3 a pawl, *f*, is hung to work in the ratchet F^2, and so that when engaged with the ratchet in one movement of the lever F^3 a corresponding advance movement will be given to the ratchet F^2, and through its connections such movement will be communicated to the feed rolls D^3 D^4; but when moving in the opposite direction the pawl will not engage, even if permitted to ride upon the teeth.

The movement of the pawl to advance the rolls must be to the extent required to produce the feed. If the punchings be smaller, then the extent of movement of the ratchet will be smaller, and the extent of movement must be increased as the extent of feed is required to be increased. This may be done by means of a slotted connection, *f'*, in the lever, or it may be by adjusting the throw of the crank. If the pawl be permitted to ride upon the ratchet and engage it at each revolution, as it would do by means of the spring f^2, an advance feed movement will be imparted at each full movement of the punch, and thus there would be punched in the strip a continuous line of holes in the direction of the length of the strip. Therefore, in order to permit a transverse movement of the strip, it is necessary that so soon as the pawl has imparted the advance or feeding movement it should be thrown out from the teeth of the ratchet, and so as not to engage with it until the next advance movement is required. A saddle, H, on which an arm, *h*, extending up from the pawl *f*, rides, is arranged to be moved vertically, as from the position seen in Fig. 3 to that seen in broken lines, same figure, and in such vertical movement it raises the pawl from the ratchet F^2, as also seen in broken lines, same figure, or when dropped permits the engagement of the pawl with the ratchet.

As here represented, the saddle H is guided by a vertical slot, H', over the stud F. Its lower end, extending down and turned to the right, forms the arm H^2, as seen in Fig. 1, and also seen in Fig. 7. The said saddle is held up in position of disengaging the pawl by means of a spring, H^3, so that to permit the pawl to make engagement with the ratchet the saddle must be depressed.

Transversely through the frame beneath the bearing E' is a hollow rock-shaft, H^4, on which is a cam-like lever, H^5, directly over the arm H^2.

Attached to the carriage D', or as here represented, to the rack L, which is attached to the carriage, and so as to move with it, is a horizontal bar, I. On this bar I, outside the rock-shaft H^4, is a trip, I', which as the carriage moves to the right will strike the cam H^5 and cause the rock-shaft to rotate and bring the lower end of the cam or arm H^5 down upon the arm H^2 of the saddle or near to it.

Attached to the hollow rock-shaft H^4 at the back side of the bearing part E', an arm, H^6, extends upward, and from this arm a stud, *h'*, extends outward into the path of a dog, H^7, extending down from the slide F^5, and which has a vertically-reciprocating movement with said slide. As the rock-shaft is turned by the trip I', as before described, the stud *h'* is brought beneath the inclined lower end of the dog H^7, as seen in Fig. 8. Then in its descent the inclined end of the dog H^7 strikes the stud *h'*, and because of the incline of the end of the dog the stud is forced to one side and turns the arm H^6 to the position seen in broken lines, Fig. 9, and correspondingly turns the rock-shaft H^4, which gives to the cam H^5 a further downward movement upon the arm H^2 of the saddle H, and gives to the saddle the downward movement before referred to necessary to permit the engagement of the pawl with the ratchet, as seen in Fig. 3. The punching made while the dog H^7 is performing the operation last described is the last of the transverse series, and as the dog rises and escapes from the stud *h'* the rock-shaft is returned by means of a spring, H^8, as seen in Fig. 1, permitting the saddle H to spring up and take the pawl from its engagement with the ratchet; but before the saddle springs up, and while the dog is rising to permit the saddle to escape, the lever F^3 also rises, the pawl being engaged with the ratchet, and gives the requisite rotation to the feeding-rolls. Then when the carriage moves in the opposite direction a trip, I^2, on the bar I on the opposite side of the rock-shaft, strikes an arm, I^3, extending up from the rock-shaft, as seen in broken lines, Fig. 1, and also seen in Figs. 7 and 8, which turns the rock-shaft in the same direction as did the trip I' below, and the dog will operate to engage the pawl with the ratchet, as before described. Therefore, by the adjustment of the trips I' or I^2 so as to sooner or later act upon the rock-shaft, the time when the pawl will engage the ratchet will be varied accordingly, and this will be according to the width of the strip from which the punchings are to be made.

Movement is imparted to the carriage D' by means of a toothed rack, L, connected with the carriage by means of an arm, L', extending upward, and an adjusting screw, L^2, the said screw being attached to the carriage and extending through the arm, with nuts *l* on opposite sides of the arm, so that by means of the nuts the carriage may be drawn nearer to or set farther from said arm for adjustment of the carriage independent of the moving mechanism.

Below the rack L, and in a bearing, L^3, a transverse shaft, L^4, is arranged, on which is a gear, L^5, working in said rack, so that by the rotation of said shaft L^4 a corresponding movement will be imparted to the rack L, and through the said rack the carriage will be correspondingly moved along its ways D to the right or left, according to the direction in which the gear L^5 is turned. On the said shaft L^4, and rigidly connected to it, are two ratchets,

L^6 and L^7, the teeth of one inclining in one direction and of the other in the opposite direction. (See Figs. 2, 5, and 6.) Hung to the same shaft, L^4, are two levers, P P′, one radiating from the shaft L^4 to the right and the other to the left of a vertical central line. The upper ends of these two levers P P′ are connected by rods P^2 to a pivot, P^3, on the vertical slide F^5, so that as the vertical slide descends from the position seen in Fig. 5 to that indicated in broken lines, same figure, the two levers P P′ are turned away from each other, as also indicated in broken lines, same figure, and then when the slide returns upward it draws the said levers toward each other. On the said lever P is a spring-pawl, *m*, arranged to engage the teeth of the ratchet L^6, as seen in Fig. 6. On the other lever, P′, is a like pawl, *m′*, arranged to engage the teeth of the other ratchet, L^7, as seen in Fig. 6, so that as the said levers vibrate one pawl is engaged—say the pawl *m′*, Fig. 5—with its ratchet L^7 and the other disengaged, and the shaft L^4 will be rotated in one direction; but when the other pawl, *m*, is engaged with its ratchet L^6 and the pawl *m′* disengaged, as in Fig. 6, the ratchet L^7 will be turned in the opposite direction, together with the shaft to which it is attached. Therefore when the carriage and the strip of metal it carries are to be moved in one direction one pawl is engaged, and to be moved in the opposite direction the other pawl is engaged. It becomes necessary, then, at each extreme movement of the carriage to throw out the pawl which produced the movement in that direction and throw in the pawl which will give the reverse or return movement to the carriage. For this purpose an inverted-T-shaped trip, R R′, is hung upon a pivot, *r*, above the pawls, and from each of the pawls *m m′*, respectively, an arm, *n n′*, extends up, with a projection, n^2, therefrom, over the T part R of the trip, (see Fig. 2,) and so that when the said T part is swung to the right, as it Fig. 5, it will raise the pawl *m* from its ratchet and permit the other pawl, *m′*, to drop upon its ratchet; but when swung in the opposite direction, then the T part R of the trip will raise the pawl *m′* from its ratchet and permit the other pawl, *m*, to engage.

To hold the T-piece R in either of its extreme positions, the usual spring-catch is employed, which will engage the T part at either of its extremes with sufficient force to hold it in either of those positions, but yet permit it to be moved therefrom at the proper time. This device is too well known to require particular description or illustration. The pivot on which the T-piece R is hung is concentric with, and is in fact, the rock-shaft R^2, as seen in Fig. 8.

Through the tubul r shaft H^4 is a rock-shaft, R^2, (see Fig. 8,) which extends through to the front, and attached to this shaft R^2 at the front is an arm, R^3, extending upward between trips I′ and I^2 on the bar I, and so that as the trips respectively come against the said arm R^3 they correspondingly turn the said arm to the right or left, as the case may be. On the opposite end of the rock-shaft R^2 a forked lever is attached so as to turn with the shaft. Its lower or forked end, R^4, engages with a stud, r^2, on the vertical part R′ of the T-shaped trip. The upper end, R^5, of the said lever is inclined upon opposite sides to a point or inverted-V shape, as seen in Figs. 5 and 6.

Attached to the slide F^5 above is a dog, R^6, which, as the slide descends, will engage one of the inclined sides of the forked lever, according to which is presented. The fork is open, or its prongs so far apart as to permit a certain movement to the right or left without effect upon the trip R. This forked lever is turned by the rotation of the shaft R^2, as before described, until its upper point is carried to one side of the central line, as indicated in broken lines, Fig. 5. Then when the dog R^6 comes in contact with the inclined or right-hand side of the lever, and still moving downward, it will, because of the incline of the lever, cause it to turn the fork, and with it the trip R, to the position seen in Fig. 5. Then when the rock shaft R^2 is turned in the opposite direction, as seen in Fig. 6, broken lines, the next descent of the dog will operate upon the opposite side of the lever and throw the trip in the opposite direction to the position seen in Fig. 6.

The throw of the pawls is made adjustable, so that the feed may be varied to correspond to the diameter of the punching to be made, and it may be adjusted by changing the position of the crank-pin F^6 relative to its center, so as to make a greater or less eccentricity, according to the greater or less feed required.

It will be understood that if but a single longitudinal line of holes or punchings are to be made in the strip the side feed will not be employed. Hence in that case the transverse feed will be detached, and if only such a single line of punching is required for the machine it may be omitted altogether. The transverse feed operates entirely independent of the longitudinal feed. Hence other longitudinal feed may be substituted for the longitudinal feed herein described; or if only a transverse feed is required, then the longitudinal feed may be omitted altogether. It will be understood that this feed is applicable to other purposes where an intermittent feed in one direction, either with or without an intermittent feed at right angles thereto, is employed.

Instead of the inclined T-shaped trip R R′, the trip may be made a part of the lever R^4 and engage directly with the pawls which throw them out or in, in the same manner as does the said swinging trip.

I do not wish to be understood as broadly claiming an automatic feed for power-presses, as such, I am aware, is not new; but

What I do claim is—

1. In a feeding mechanism, the combination of the rolls D^3 D^4, the ratchet F^2 in connec-

tion with said rolls, the pawl *f*, the saddle H, having a vertical movement with relation to said pawl and by such movement to engage or disengage said pawl from said ratchet, the cam-lever H^5, arranged upon a rock-shaft, a horizontal sliding bar with trips I' I^2 thereon, one of which, at each extreme horizontal movement of said bar, turns the said rock-shaft to present an arm, H^6, extending from said rock-shaft or the stud thereon in the path of the reciprocating dog H^7, whereby said dog imparts to said rock-shaft a rotative movement to depress the saddle on which the pawl rides and permit the pawl to engage the said ratchet until said dog, on its return, escapes from said arm H^6 and permits the return of the rock-shaft, substantially as described.

2. In a feeding mechanism, the combination of the rolls D^3 D^4, the ratchet F^2, in connection with said rolls, the pawl *f*, the saddle H, having a vertical movement with relation to said pawl and by such movement to engage or disengage said pawl from said ratchet, the cam-lever H^5, arranged upon a rock-shaft, a horizontal sliding bar with trips I' I^2 thereon, one of which, at each extreme horizontal movement of said bar, turns the said rock-shaft to present an arm, H^6, extending from said rock-shaft or the stud thereon in the path of the reciprocating dog H^7, whereby said dog imparts to said rock shaft a rotative movement to depress the saddle on which the pawl rides and permit the pawl to engage the said ratchet until said dog, on its return, escapes from said arm H^6 and permits the return of the rock-shaft, and mechanism, substantially such as described, to impart a transverse movement to said rolls, substantially as described.

3. In a feeding mechanism, the combination of the longitudinal sliding bar I and a shaft for imparting longitudinal movement thereto, reverse ratchets L^6 L^7 on the said shaft, their respective pawls *m* *m'*, hung upon vibrating levers P P', and mechanism, substantially such as described, to impart vibratory movement to said levers, the rock-shaft R^2 having a rotative movement imparted to it, first in one direction and then in the opposite, by trips on said bar I, the said rock-shaft being provided with a lever, R^4, one arm of which engages a tripping device between said arm and said pawls to throw them alternately out of or into engagement with their respective ratchets, the other arm being inclined upon its two sides, and a vertically-reciprocating dog, R^6, operating upon said inclined sides of the said lever to give to said lever the rocking motion required to so operate the said pawls, substantially as described.

4. In a feeding mechanism, the combination of the longitudinal sliding bar I, and a shaft for imparting longitudinal movement thereto, reverse ratchets L^6 L^7 on the said shaft, their respective pawls *m* *m'*, hung upon vibrating levers P P', and mechanism, substantially such as described, to impart vibratory movement to said levers, the rock-shaft R^2 having a rotative movement imparted to it, first in one direction and then in the opposite, by trips on said bar I, the said rock-shaft being provided with a lever, R^4, one arm of which engages a tripping device between said arm and said pawls to throw them alternately out of or into engagement with their respective ratchets, the other arm being inclined upon its two sides, and a vertically-reciprocating dog, R^6, operating upon said inclined sides of the said lever to give to said lever the rocking motion required to so operate the said pawls, with mechanism for imparting a longitudinal or forward feed, substantially as described.

FREDRICK MARGGRAFF.

Witnesses:

WILLIAM SCHMITZ,

D. F. WEBSTER.