(No Model.)

3 Sheets—Sheet 1.

C. HILDEBRAND.

Feeding Device for Punching Machines.

No. 233,757. Patented Oct. 26, 1880.

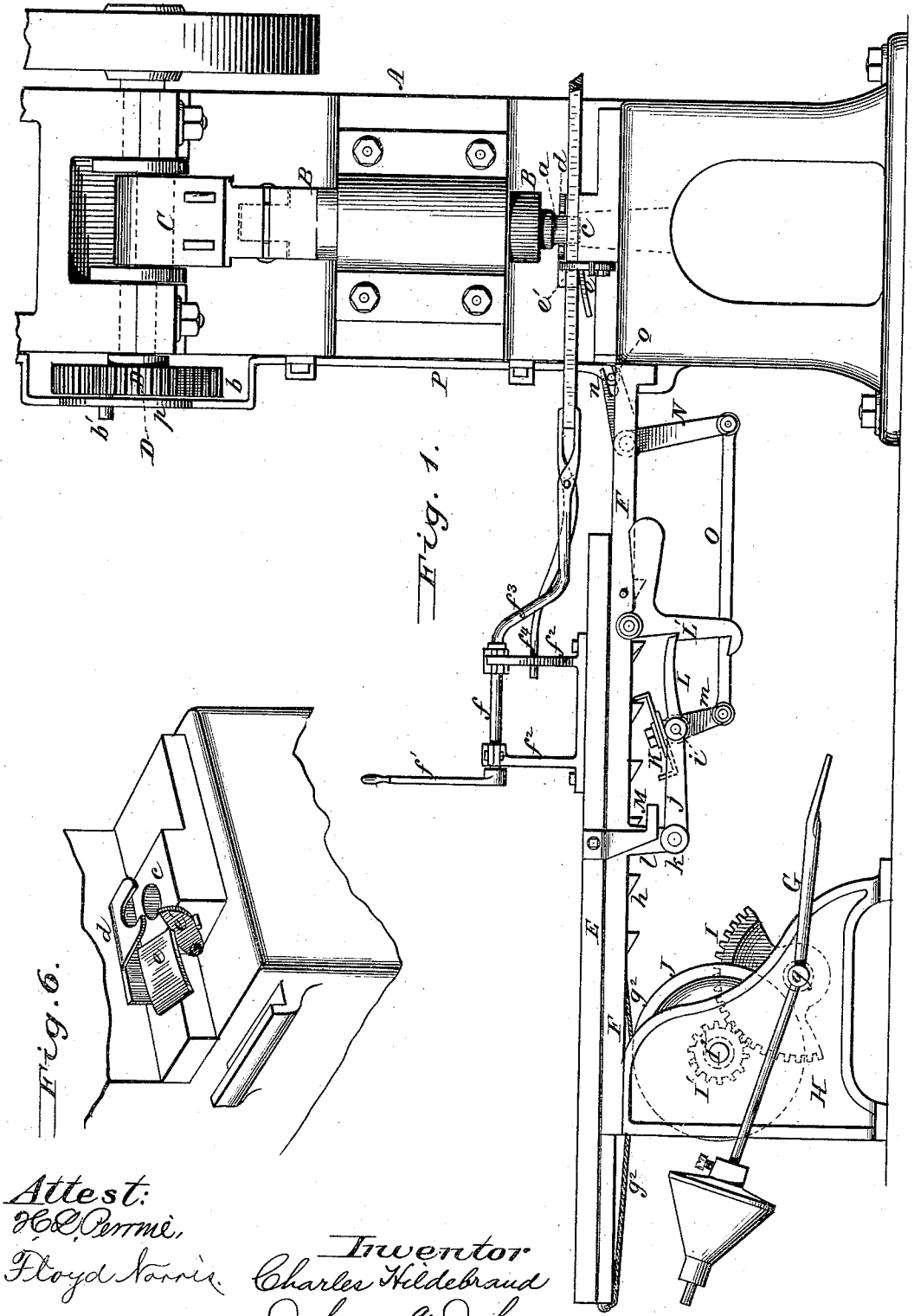


Fig. 1.

Fig. 6.

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(No Model.)

3 Sheets—Sheet 2.

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Feeding Device for Punching Machines.

No. 233,757. **Patented Oct. 26, 1880.**

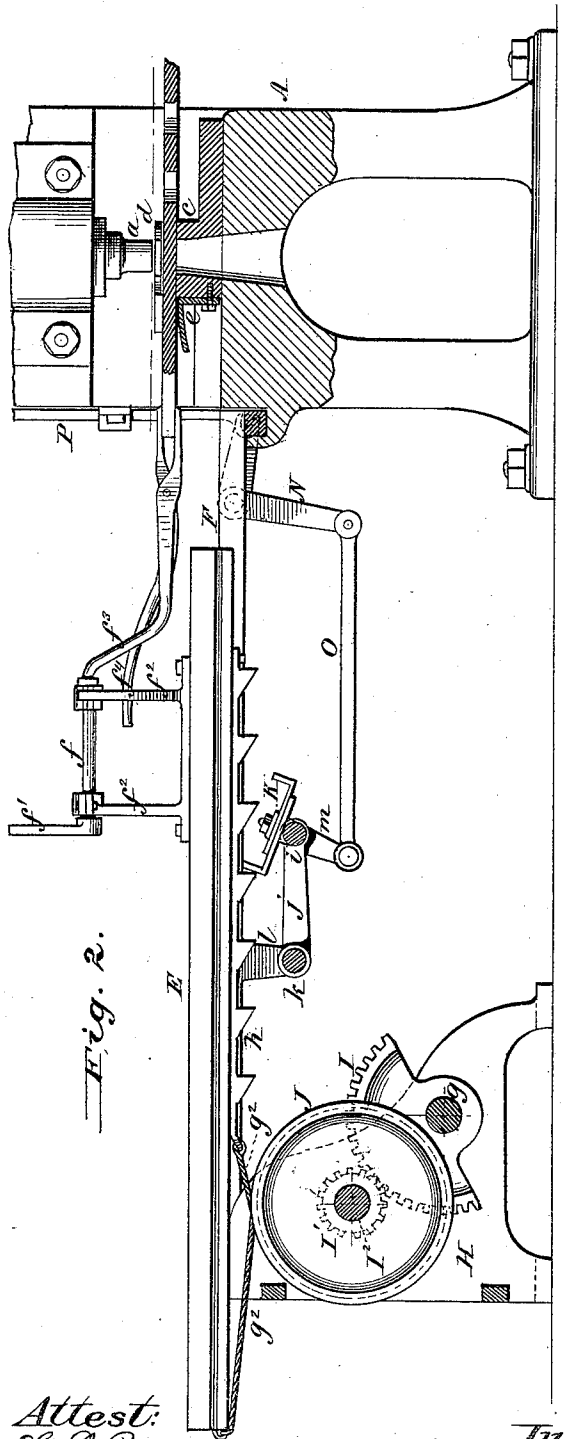


Fig. 2.

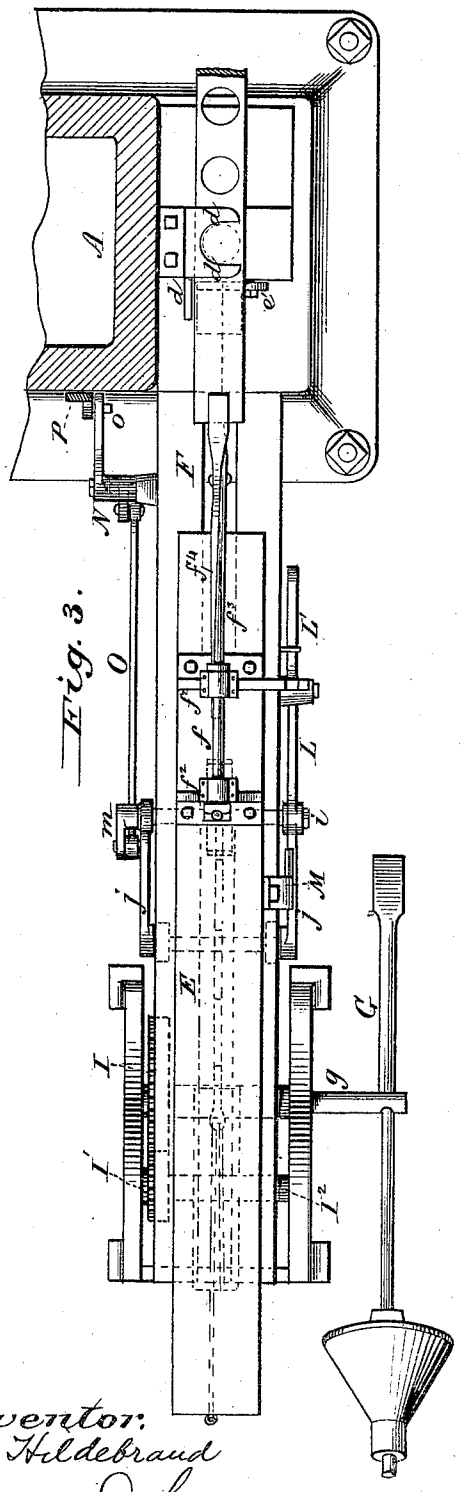


Fig. 3.

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(No Model.) 3 Sheets—Sheet 3.

C. HILDEBRAND.

Feeding Device for Punching Machines.

No. 233,757. **Patented Oct. 26, 1880.**

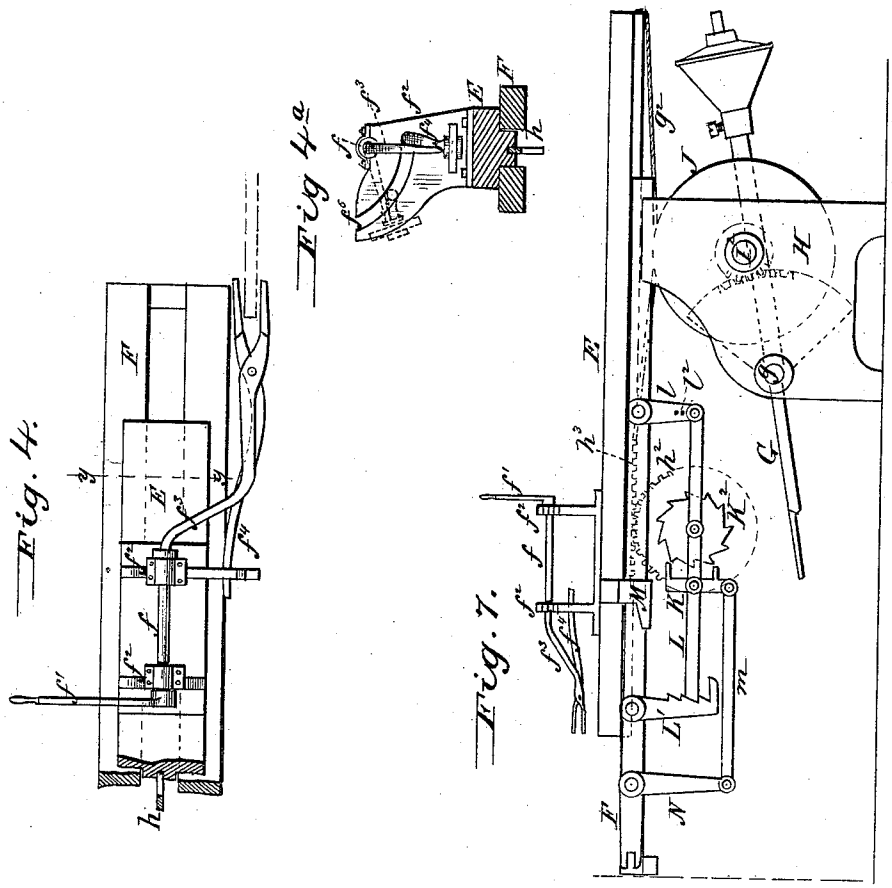


Fig. 4.

Fig. 4a.

Fig. 7.

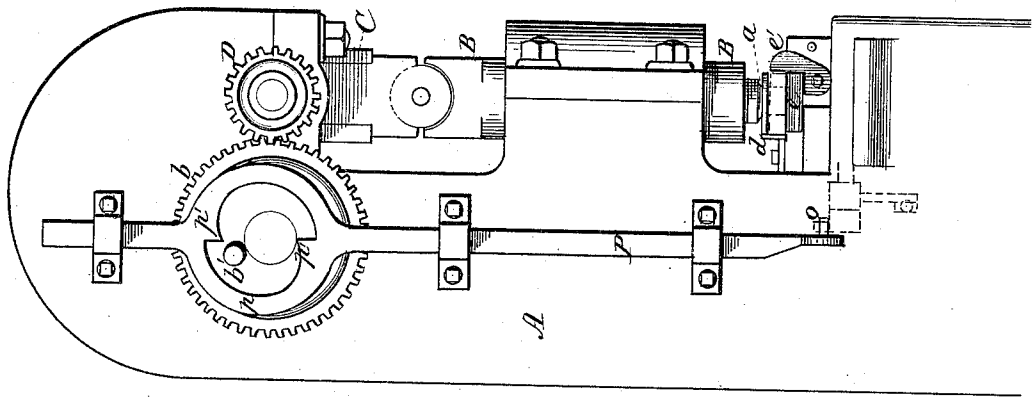


Fig. 5.

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UNITED STATES PATENT OFFICE.

CHARLES HILDEBRAND, OF YOUNGSTOWN, OHIO, ASSIGNOR OF ONE-HALF TO ARMS, BELL & CO., OF SAME PLACE.

FEEDING DEVICE FOR PUNCHING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 233,757, dated October 26, 1880.

Application filed March 22, 1880. (No model.)

To all whom it may concern:

Be it known that I, CHARLES HILDEBRAND, a citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented new and useful Improvements in Feeding Devices for Punching and Cutting Machines, of which the following is a specification.

My invention relates to certain improvements in feed mechanism for punching-machines in which the material is fed forward intermittingly to receive the action of the plunger-punch.

The primary features of my improvements consist in the combination of a verge-escapement with a feed-slide and a plunger-punch, whereby a very simple automatic feed for the sheet of metal is effected by the verge-escapement through suitable connections with the reciprocating plunger. The feeding-slide carries griping-tongs for the sheet of metal, and their action is such that upon being turned out they are opened to receive the metal, and upon being turned in they gripe and hold it and carry it in position beneath the punch. The die is provided with a pivoted guide device for the sheet of metal and a device for preventing the metal from following the upstroke of the punch, and which co-operates with the pivoted device to form the guide, the object being to effect the feed, the holding, and the guiding of the sheet of metal by devices and mechanism combined with the punching-machine. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 represents an elevation of a punching-machine in connection with my invention of feeding and holding devices for the sheet of metal, which is shown in the position it occupies in being punched; Fig. 2, a vertical section in the line of the length of the feed-slide; Fig. 3, a top view, showing the tongs holding the sheet of metal within the die-guide; Fig. 4, a similar view, showing the tongs turned out to receive the metal to carry it to the die; Fig. 4ª, an end view of the tongs, showing their opening and closing guide; Fig. 5, a side view of the punch-standard, showing the cam-operating connections with the verge-escapement. Fig. 6 shows the pivoted guide device of the die in the position turned out to receive the strip of metal, or to allow of its removal after being punched; and Fig. 7, a modification of the verge-escapement feed device, or rather a different manner of applying such feed device to obtain different distances of feed.

Any suitably-constructed punching-machine in which the standard A has the usual guide for the plunger B of a punch, *a*, may be used with my new feed-mechanism combination. The plunger is reciprocated in any ordinary way, as by the band C, secured by a knuckle-joint to the upper end of the plunger and connected with a crank or eccentric upon the main driving-shaft, which is journaled in the standard and provided with a driving-wheel upon one end and a gear, D, upon its other end, which, engaging with a crank-pin gear, *b*, on the standard, actuates mechanism which effects and controls the feed, as will be presently described.

The die *c*, upon which the material is punched, is provided with an angle-plate, *d*, having prongs elevated above the die and extending horizontally forward past the punch, so as to embrace it and prevent the strip or sheet of metal from being lifted or following the punch in its upward movement as it is being drawn out of the metal. An angularly-shaped plate, *e*, is pivoted to the side of the die and adapted to receive and guide the sheet of metal in place upon the die as it is carried by the tongs for the purpose of placing it under the prongs of the angle-plate *d*, through which the punch acts. This guide-plate also serves as a rest for the metal while it is being so carried by the tongs, and it further acts, in conjunction with the plate *d*, as a guide for the sheet of metal during the feed. This guide-plate *e* is formed with a vertical arm, *e'*, having an outer curved edge, upon which the metal to be punched, in being carried by the tongs, will strike and then slide over the same and beneath the angle-plate prongs *d* until it clears the said arm *e'* and is deposited in the line of feed. In being thus deposited the sheet of metal to be punched de-

scends upon the plate *e*, which projects horizontally from the arm or pivoted part of said plate.

The material, in passing over the arm *e'*, which also serves as a rest for the same, turns the pivoted guide device so that the plate *e* will fall in a horizontal plane with the surface of the die and deliver the sheet thereon. As the material is fed along under the punch it will be guided between the vertical wall of the pronged angle-plate *d* and the inner edge of the vertical arm *e'* of the pivoted guide.

The tongs have one of their handles formed into a turning operating crank-handle, and they are supported upon and carried by the feed-slide. The longer handle *f* has the crank *f'*, and is journaled in the vertical bearings f^2 on the slide, and it is formed with a bend, as at f^3, whereby a partial revolution of such handle *f* will cause the griping-jaws of the tongs to describe the arc of a circle to carry the material held by the tongs down upon the guide device and under the punch, and by which to remove the punched sheet by lifting it out from the die. To insure the griping of the material by these jaws the shorter handle f^4 of the tongs works in a segmental guide, f^5, Fig. 4ª, formed in one of the bearings in which the long handle of the tongs is journaled, and the swinging movement of the tongs is effected by the crank-arm *f'*, to carry the metal sheet into and remove it from the die-guide. While the jaws of the tongs are swung out in an elevated position, as in Fig. 4, they will be opened by the peculiar relation of the guide f^5 with the long handle to receive the material. As they are turned down, however, the shorter handle of the tongs will be forced by the curved guide f^5 toward the long handle which is journaled in the bearings, and thus the jaws will be firmly closed upon the material to deposit and hold it upon the die.

The mechanism for actuating the slide and effecting and controlling the feed will now be described.

The feed-slide E is supported upon a suitable table, F, in the line of the punch, and the tongs are arranged upon said slide so as to operate in the plane of the die in the feed of the sheet of metal. A weighted foot-lever, G, is employed for carrying the feed-slide forward under the action of the verge-escapement, and as a means for accomplishing this the shaft *g*, upon which this weighted lever is secured, is journaled in a properly-constructed frame, H, and provided with a sector-rack, I, which intermeshes with a pinion, I', upon a shaft, I^2, likewise journaled in said frame. This second shaft, I^2, carries a wheel, J, having two circumferential grooves, which receive cords or bands g^2, which are attached to the wheel and to the feed-slide as a medium of transmitting motion to the feed-slide. One cord is attached to the feed-slide adjacent to one of its ends, and the other cord at some distance from such end, so that the action of the weighted lever carries the slide forward as it is released from the verge-escapement. This weighted foot-lever serves also as the means by which the feed-slide is withdrawn or moved back when required. It is not essential, however, to employ this particular system of a pulley-wheel and cords, since it is evident that other suitable mechanical means might be employed, such as gearing in connection with the weight.

The frame H and the punch-standard support the opposite ends of the table F, which constitutes a way for the feed-slide.

The feed-slide E has a rack-bar, *h*, along a portion of its under side, and the table F has a central longitudinal opening extending along its length to receive this rack-bar of the feed-slide, and thus allow of the free movement of the slide.

The means for checking the forward movement of the feed-slide at certain points in the feed, so as to determine the spaces between the holes punched in the material, consist, essentially, of a verge-escapement, one arrangement of which will now be described. A verge, K, is secured upon a suspended rod, *i*, so that its pallets will be brought into engagement with the rack-bar *h* at proper times. The ends of its supporting-rod *i* are journaled in the free ends of arms *j j*, which are rigidly connected to the ends of a rod, *k*, pivoted to hangers *l*, secured to the sides of the table at points in advance of the frame H, which supports the slide-actuating device. Extending from the rod *k*, upon which the suspension-arm *j* are pivoted, is an arm, L, of sufficient length to engage in a notch in a swinging weighted catch, L', which is pivoted to the table, and to the feed-slide is connected a tripping device, M, arranged to strike against the catch L' when the feed-slide has reached its forward feed limit, so as to automatically throw the catch away from the arm L, and thus admit of the arm dropping down, and hence freeing the verge from its engagement with the rack-bar. The notch in this catch, it is understood, will be made so that the engagement of the arm L with said catch will bring the verge into contact with the rack-bar of the feed-slide.

The means for connecting the verge with the cam-movement presently described, so as to effect the proper vibrations of the verge during the feed, are as follows: To the rod *i*, upon which the verge is secured, is also rigidly secured an arm, *m*, which connects with a bell-crank lever, N, by a rod, O. The bell-crank lever N is pivoted to the table near its end which connects with the punch-standard, and it is provided with a forked or notched end, *n*, Fig. 1, adapted to engage with a stud or like device, *o*, upon a vertically-reciprocating bar, P. This reciprocating bar works in suitable guides upon the standard A, and it is provided with a ring, *p*, having two interior cam-projections, *p'*, against which a crank-pin, *b'*, upon the gear-wheel *b* will strike at intervals, thus causing the reciprocations of the bar P at in-

tervals, and the consequent vibrations of the bell-crank lever N and the verge at the same time.

The rack-bar *h*, heretofore described, in connection with the feed-slide and verge, may have its teeth formed at any specified distance apart, since the verge is composed of two slotted angle-plates held upon its shaft by a screw passing through the slots, and hence the pallets may be adjusted with reference to the teeth of the rack-bar. The feed-slide and its supporting-table are brought into appropriate proximity to the bed of the die, and the said supporting-table may be held at its forward end against the standard by means of any suitable bracket.

The operation is as follows: The feed-slide being drawn back by depressing the foot-lever, the material is placed within and grasped by the tongs and the latter swung down, so as to place the metal in proper position on the die. The pivoted arm L is then raised and engaged with the notched catch L′, thus raising the several pivoted bars with which it connects, so as to bring the verge into position to take into the rack to regulate the feed at the proper time, and to hold the slide against the action of the weight. The machine being now started, the action of the gear crank-pin *b′* upon the cams *p′*, as heretofore described, will at periods, by the mechanism set forth, vibrate at intervals the bell-crank lever N upon the table which supports the feed-slide, and this operation will consequently vibrate the verge through the medium of the arm *m*, secured to the rod on which the verge is secured, and the rod connecting said arm *m* with the bell-crank lever, and thus allow the weight to carry the slide forward. The verge, acting after the manner of an escapement, limits the intervals of motion of the feed-slide; and the mechanism being timed with relation to the movements of the plunger, the spaces between the holes punched will consequently be determined by the intervals between the engagements of the vibrating verge with the rack-bar; but in the arrangement described of the verge-escapement the feed cannot be changed except by using different racks with differently-spaced teeth. In some instances, however, it is desirable to provide a different arrangement of the verge-escapement, so as to readily vary the lengths of feed, in order to increase or decrease the distance between the holes punched or the incisions made in the material with a greater range for the variation of such feed than can be effected by a change of the rack; and to this end a modified arrangement of the verge mechanism will be employed, as shown in Fig. 7. This change consists in pivoting the verge device in the long catch-arm L and using the verge K, with a crown-wheel, K^2, to make the escapement; and upon the axis of the crown-wheel is mounted a gear-wheel, h^2, which engages with rack-bar h^3 of the feed-slide. In this instance the verge K engages with the crown-wheel K^2 and is actuated by the rod *m*, which connects with the verge and with the bell-crank lever N, which is arranged as before described. The swinging notched catch L′ and the tripping device M are also employed in this instance, so that when the catch L′ is freed by the tripping device M from the bar L, which maintains the cog-wheel in engagement with the rack-bar, the cog-wheel h^2 and crown-wheel K^2 will drop, so as to allow of the feed-slide being drawn back through the action of the foot-lever. In this case the hanger *l* has a series of holes, l^2, so that the shaft of the gear h^2 and crown-wheel may be shifted in the series, and thus admit of different-sized cog-wheels being employed, hence changing the distances between the holes punched by changing the radius of the wheel.

It is obvious that other arrangements of verge-escapements might be employed with like result.

The feed can also be changed by using crown-wheels having differently-spaced teeth in the same diameter of wheel; but in whatever way the distance between the punched holes is regulated the function and combination of the verge-escapement will be the same, and its connections and relation to the slide and to the plunger-punch will produce the same results without regard to the particular position in which it may be used.

The improvements can be used for cutting washers, nuts, nail-plates, and nails, or for such work where an exact feed is necessary.

Referring to the means by which the tongs are swung out and the jaws opened to receive the plate and the tongs again swung in and the jaws closed to gripe and carry the plate into and upon the die, I have described the short handle of said tongs as working in a segmental guide; but it will be seen in Fig. 4ª that such guide is not concentric with the axis of the long handle, but, starting from a point below the bearing thereof, sweeps upward therefrom eccentrically and at right angles to said axis, and in this particular has a peculiar relation to the long handle to effect the described movement of the short handle in conjunction with the oblique or bent part of the long handle, which is formed therein at a point between the handle-bearing and the jaw of said handle, so that the in-and-out-swinging movement of the cranked part of the long handle carries with it the short handle, while the guide operates to open and to close the short handle with the long handle, and thus gives the jaw of the short handle its opening and closing movement with the jaw of the long handle, and in this way the short handle has a compound movement.

I claim—

1. The combination of the plunger in a punching or cutting machine with a feed-slide which constantly presses forward and a verge-escapement consisting of alternately-engaging pallets, which operate to regulate the periods

of feed and to hold the slide at each feed, the said verge-escapement being oscillated, substantially as and for the purpose herein set forth.

2. The combination of the plunger in a punching or cutting machine with a feeding-slide, a verge-escapement consisting of alternately-engaging pallets, which operate to regulate the periods of feed and to hold the slide at each feed, and mechanism connecting said verge-escapement with the eccentric which operates the plunger, said verge-escapement being oscillated by said connecting mechanism, substantially as and for the purpose herein set forth.

3. In a feed device for punching-machines, the tongs having one of its handles journaled in fixed bearings on the feed-slide and formed with a cranked or bent part between the jaws and said bearings, in combination with a curved way or guide in the tongs-support, and within which the other handle is free to travel and be governed in its movement as the journaled part is turned, whereby the jaws are swung out and opened to receive the plate and swung in with a clamping action upon said plate to hold it for operation, substantially as herein set forth.

4. In a punching-machine, the combination, with the die, of a pivoted guide, *e*, arranged to receive the metal on its way to the die, said guide having a vertical arm, *e'*, with a curved outer edge for the metal to rest upon as it is brought down by the tongs, substantially as set forth.

5. The combination of the pivoted guide *e* in a punching-machine with the angle-plate *d*, having prongs elevated above the die and extending on each side of the punch, the said two devices being constructed and arranged as set forth, and for the purpose stated.

6. The combination of the feeding-slide having a rack-bar upon its under side with the verge-escapement and its operative mechanism, the notch-catch L', suspended from the slide-supporting table, the pivoted arm L, adapted to elevate the verge and engage with said catch, and a tripping device, M, for disengaging the catch from said pivoted arm at the completion of the forward movement of the feed-slide, substantially as and for the purpose set forth.

7. In a feed device for punching and cutting machines, the combination of the feed-slide E with the verge-escapement K, the weighted foot-lever G, the drum J, operating mechanism therefor, and the cord g^2, connecting said drum and slide, whereby the slide is both carried forward and drawn back, substantially as herein set forth.

8. In a punching-machine, the combination of a feed-slide and tongs carried thereby, for griping and holding the material to be punched, with a guide device pivoted to the bed of the die, and a forked device, forming a part of said guide, and the means for stripping the sheet metal from the punch, substantially as herein set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES HILDEBRAND.

Witnesses:

MARTIN G. HURD,

PHILIP EBERHART.