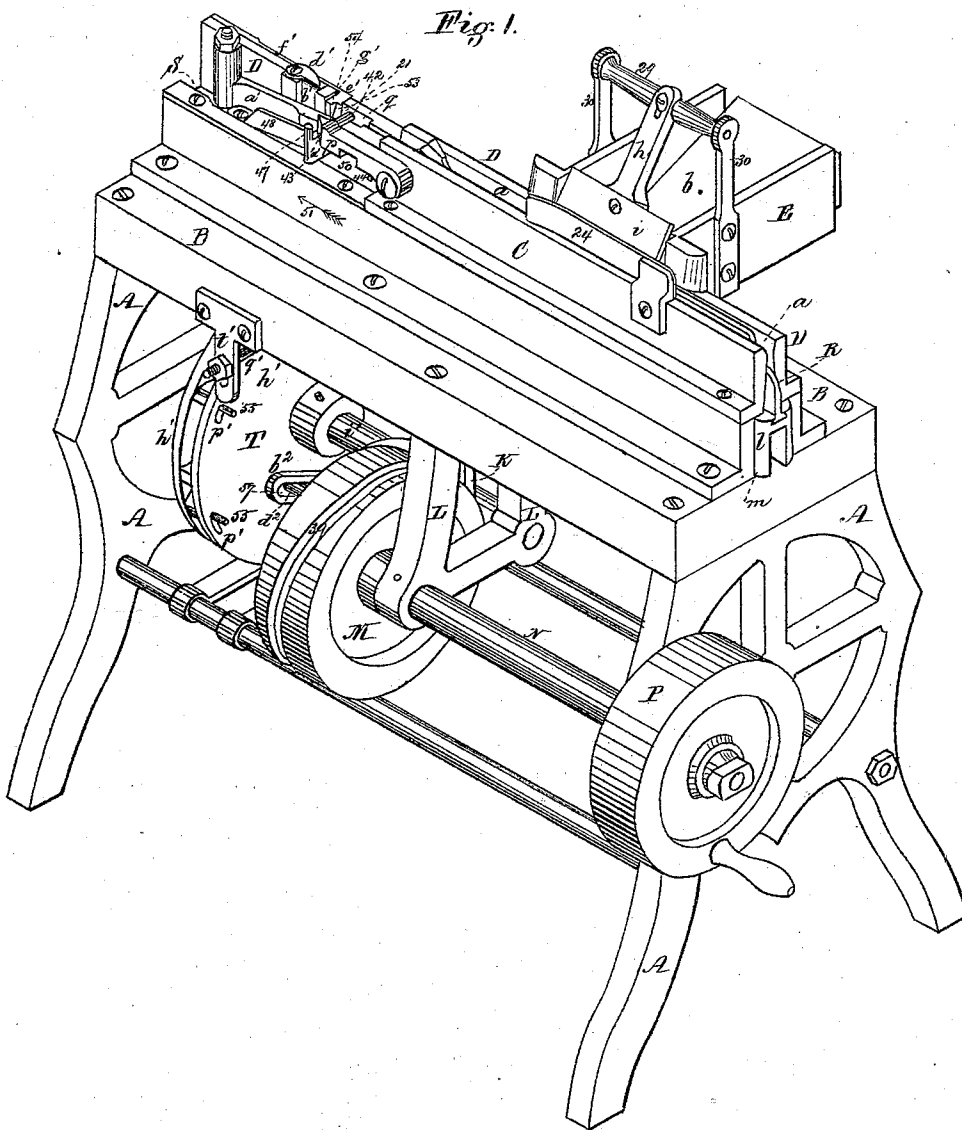


S. S. PUTNAM.

Machines for Feeding Horseshoe Nails.

No. 144,226.

Patented Nov. 4, 1873.



Witnesses,
P. C. Eschmacker
W. J. Cambridge

Inventor,
Silas S. Putnam

S. S. PUTNAM.

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Fig. 4.

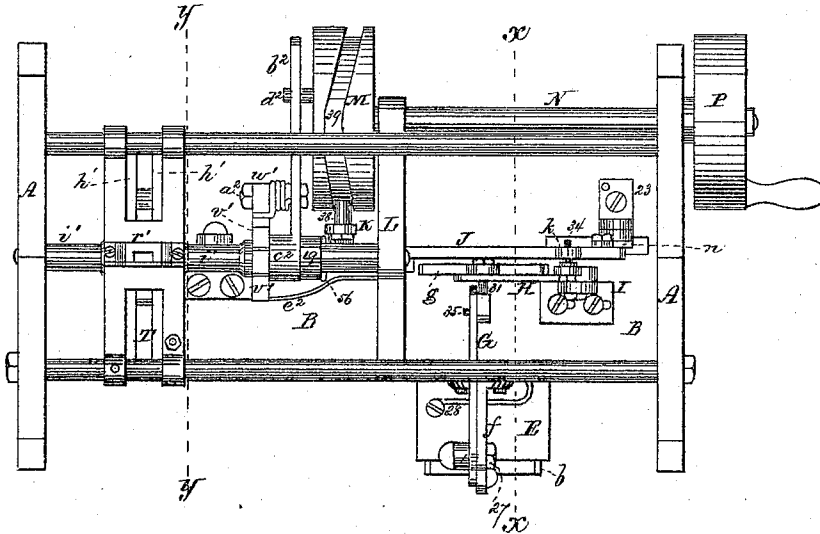


Fig. 5.

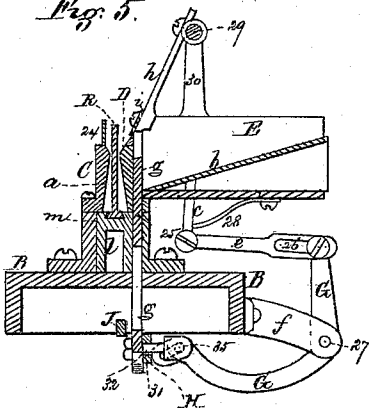
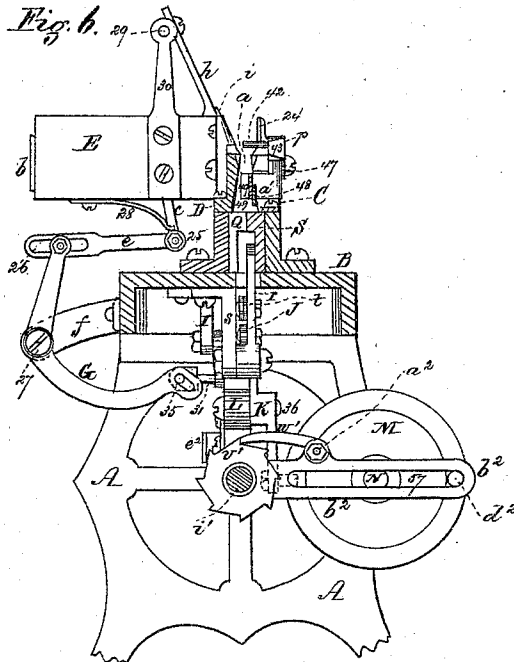


Fig. 6.



Witnesses,
J. C. Schenck
W. J. Cambridge

Inventor,
Silas S. Putnam.

S. S. PUTNAM.

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Fig. 7.

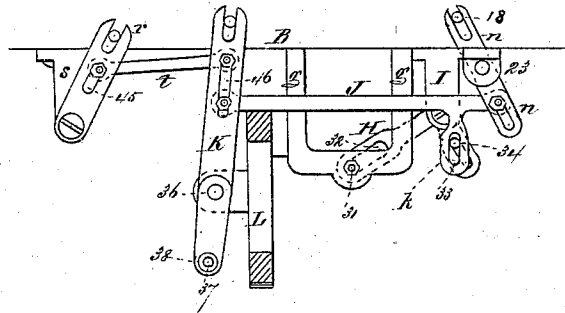


Fig. 8.

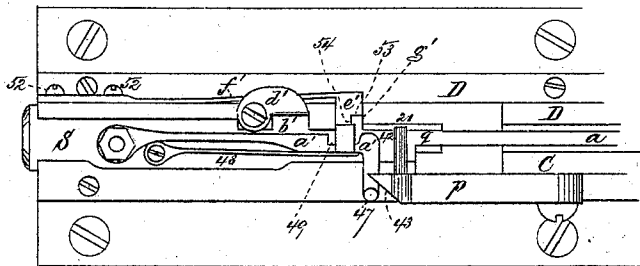


Fig. 9.

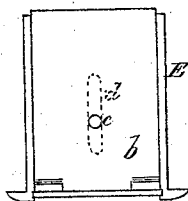
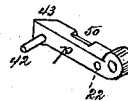


Fig. 10.



Witnesses,
P. E. Schoenmacker
W. J. Cambridge

Inventor,
Silas C. Putnam

UNITED STATES PATENT OFFICE.

SILAS S. PUTNAM, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN MACHINES FOR FEEDING HORSESHOE-NAILS.

Specification forming part of Letters Patent No. 144,226, dated November 4, 1873; application filed July 9, 1873.

To all whom it may concern:

Be it known that I, SILAS S. PUTNAM, of Boston, in the county of Suffolk and State of Massachusetts, have invented a machine for automatically feeding or delivering in the proper position forged or partially-made horseshoe-nails to other machinery for pointing and finishing or otherwise operating upon them, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings making part of this specification, in which—

Figure 1 is a perspective view of my improved machine. Fig. 2 is a longitudinal vertical section through the center of the same. Fig. 3 is a vertical section through the carrier enlarged. Fig. 4 is a plan of the under side of the machine. Fig. 5 is a section on the line *x x* of Fig. 4. Fig. 6 is a transverse section on the line *y y* of Fig. 4. Fig. 7 is an elevation of a portion of the mechanism below the table. Fig. 8 is a plan of a portion of the top of the machine enlarged. Fig. 9 is a plan of the hopper; Fig. 10, detail in perspective.

The operation of feeding or delivering forged or partially-made horseshoe-nails—one at a time—to machines for pointing and finishing them has heretofore been performed by hand; but this method is tedious and expensive, and if, through inadvertence, a nail should be dropped into the machine in a wrong position, or at the wrong time, it will either be rendered imperfect or will cause the breakage of the machine.

My invention has for its object to overcome these objections; and consists in an automatic machine which will separate the nails and deliver them one by one in the exact position required, and at regular intervals of time, to other machinery for pointing, finishing, or otherwise operating upon them, whereby the possibility of a nail being delivered in a wrong position or time is effectually prevented, and the necessity of employing hand-labor for this purpose avoided.

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 drawings, A represents the framework, and B the bed or table, of the machine,

to which are secured two parallel guide-pieces, C D, placed a short distance apart, so as to leave a narrow space, *a*, which serves as a way to receive and guide the nails, as will be hereafter described. To the outer side of the plate D is secured a hopper or receiver, E, for the reception of the forged or partially-made horseshoe-nails with which it is intended to be supplied, the nails being thrown in together in any desired quantity without regard to the position of their heads or points. Within the hopper E is an inclined plate, *b*, upon which the nails rest, and which is reciprocated by the movement of a bent lever, G, to cause the nails thereon to slide down to its inner end, which is beveled or rounded to leave a thin edge. To the under side of the plate *b* is attached a pin, *c*, which projects through a slot, *d*, in the bottom of the hopper, and is pivoted at 25 to a connecting-rod, *e*, the outer end of which is provided with a slot, 26, and is connected by a screw and nut to the upper end of the lever G, which is pivoted, at 27, to a brace, *f*, attached to one side of the bed B, and thus, as this lever is vibrated, the plate *b* is reciprocated as desired.

The screw which connects the rod *e* with the lever G slides in the slot 26, which allows the plate *b* to yield against the resistance of a light spring, 28, in case two or more nails should get between its inner edge and the guide-plate D; and the plate *b* is cut away at each corner, as seen in Fig. 9, to prevent its coming into contact with the head of a nail should the central portion of the edge of the plate strike against the side of the nail instead of passing under it. As the nails arrive at the bottom of the hopper they drop onto the upper edge of a slide or plate, *g*, which extends across the inner end of the hopper, and moves vertically up and down in ways formed to receive it, the upper edge of the plate descending below the bottom of the hopper, so as to leave a narrow opening, into which the nail drops, while the edge of the plate is inclined inward, to prevent the nail from dropping off as it ascends. The nails are thus successively picked up one at a time, with the head on either side of the slide, and raised up above the level of the upper edge of the plate D; and each nail, as it rises, is brought into contact with the lower end of

a swinging arm, *h*, provided with a narrow plate or apron, *i*, by which means the nail is pushed or crowded off into the space *a* between the plates C D, the upper inner edges of which are beveled or inclined, to facilitate its proper entrance.

The arm *h* is attached at its upper end to a shaft, 29, which rocks in bearings in the posts 30, attached to the sides of the hopper. The lower end of the arm *h* is enlarged, and its under side beveled, while the apron *i* extends a little beyond its lower edge, and the arm is made adjustable on the shaft 29 by means of a slot and screw. The apron *i* serves to keep the nail in a longitudinal position with respect to the way *a*, and also holds the head so as to insure the dropping of the nail-point first into the guideway, as desired; and to the plate C, opposite to the hopper, is secured a spring, 24, of a little greater length than the apron *i*, which serves as a guard to prevent the nail from being thrown transversely across the tops of the plates C D. In case two or more nails should be picked up at the same time by the slide *g*, the arm *h* and apron *i* tend to push off the surplus nail or nails, and hold the lower one until it is delivered into the way *a*. The vertical reciprocating motion of the slide *g* is produced by a bell-crank, H, pivoted to the lower end of a hanger, I, secured to the under side of the bed B, the long arm of the bell-crank being connected with the slide *g* by a stud, 31, which projects therefrom and passes through a slot, 32. The bell-crank is vibrated by a connecting-rod, J, provided with an arm, *k*, having a slot, 33, in which works a stud, 34, which is made adjustable in the short arm of the bell-crank by a slot and tightening-nut, in order that its position may be changed so as to vary the throw of the bell-crank. The hanger I is also made adjustable horizontally on the under side of the bed B by means of slots and screws, as seen in Fig. 4; and by thus varying the position of the hanger, or that of the stud 34, or both, the slide *g* can be made to descend sufficiently low to allow the nail to drop squarely onto it between the hopper and the guide-plate if it is presented with its thin edge uppermost, and to rise to a sufficient height to insure the nail being pushed off its upper edge into the way *a* by the arm *h* and apron *i*; and, by means of these adjustments, I am thus enabled to regulate the motions of the slide so as to produce the best effect. From the head of the stud 31 projects a pin, 35, which fits into a slot in the lower end of the bent lever G, and the motion of the slide is thus communicated thereto to produce the movement of the inclined plate *b*, previously described. The connecting-rod J receives its motion from a lever, K, pivoted at 36 to a frame or hanger, L, and carrying at its lower end, on a pin, 37, a friction-roll, 38, which fits into a cam-groove, 39, in the periphery of a wheel, M, secured to the driving-shaft N, which revolves in bearings in the frame-work A and hanger L, and has secured to its outer end the driving-pulley P.

Should the nail drop into the way *a*, with its point inclined in the direction in which it is to be fed, it requires to be thrown over, so that its point will be inclined in the opposite direction, in order to allow of its being fed forward by a reciprocating toothed bar, Q, on which the point of the nail rests. This reversing of the inclination of the nail is effected by a plate, R, which slides in the way *a*, and strikes the head of the nail so as to throw it over as soon as it drops into the way *a*, the upper corner 40 of the plate being of such shape as to catch the nail under the shoulder beneath the head, whereby it is carried along out of the way of the next nail. Below the corner 40 the plate is beveled off at 41 to prevent it from striking the nail at any point below the head, which might cause its point to bind against the toothed bar Q, if the nail was inclined in the proper position to go forward. The plate R is attached to a hollow block, *l*, sliding in a long passage or way, *m*, formed between the plates C D below the way *a*; and passing transversely through the block is a pin, 18, which is embraced by the bifurcated upper end of a lever, *n*, pivoted to a hanger, 23, and projecting up into the hollow portion of the block, the lower end of the lever being provided with a slot, into which fits a stud or pin, projecting from the end of the long connecting-rod J, and secured in place by a screw and nut, and thus as the rod J is moved the plate R is reciprocated at the required times, as desired. By varying the position of the stud in the slot the throw of the plate R may be increased or diminished, as desired, according to the length of the nails, a greater throw of the plate R being necessary when a longer nail is used, as its inclination will be less. The width of the way or space *a* between the guide-plates C D is greater at the bottom than at the top, so as to avoid any possibility of the blade of a nail getting wedged in between the plate R and either of the guide-plates C D. The nail is advanced or carried forward in the way *a* by the hollow toothed bar Q, which slides in the way *m*, and is reciprocated by the lever K, the upper end of which is bifurcated and embraces a pin passing transversely through the bar. The weight of the head of the nail as it rests on the edges of the guide-plates C D is sufficient to prevent it from being carried back by the return movement of the bar Q, which insures the point of the nail dropping into the next tooth in advance, and it is thus fed along the way *a*. The length of the throw of the bar Q is such, that, if the points of two nails should happen to get into the same notch, the point of the front nail will enter the next notch in advance, while the point of the rear nail will remain in the same notch until the next movement of the bar, and the nails are thus separated, and prevented from clogging the machine. As the nail is carried forward by the last tooth of the bar Q, its head drops onto a pin, 42, which projects from an arm, *p*, directly across the open end of a recess, *q*,

made to receive the head of the nail, and as the nail continues to advance it rides up on this pin until the latter catches under its head, whereby it is held until its point drops off the last tooth of the bar Q, as the latter recedes, when the nail swings into a vertical position, its head being supported within the recess *q*. The arm *p* is provided with an incline, 43, at its outer end, and is pivoted to the plate C, and it is prevented from falling below a horizontal line by a stop-pin, 44, while its upward motion is limited by another stop-pin (not shown) projecting from the plate C into a recess, 22, on its inner side. (See Fig. 10.) S is a slide which moves in the way *m*, and is reciprocated by a lever, *r*, the upper end of which is bifurcated, and embraces a pin projecting from the inside of the slide. The lower end of the lever *r* is pivoted to a hanger, *s*, and is vibrated by a connecting-rod, *t*, attached thereto and to the lever K. The studs which hold the rod *t* to the levers *r* K are made adjustable in the slots 45 46, and are each provided with a tightening-nut; and the stud by which the connecting-rod J is attached to the lever K also passes through the slot 46, and is held in place by a tightening-nut. On a vertical stud projecting up from the block S is pivoted one end of an arm, *a*¹, the opposite end of which is bent outward at a right angle, and is provided with a pin or projection, 47, which, just before the nail assumes a vertical position, as above described, strikes the incline 43 at the end of the arm *p*. This vibrates the arm *a*¹ against the resistance of a flat spring, 48, and draws it away from the plate D to allow its end to pass the nail as it hangs in the recess *q*, the arm *a*¹ being held away from the plate D, as it advances, by the pin 47 traveling over the outer flat surface of the arm *p*. On the inner side of the arm *a*¹ is a notch, 49, which is brought into a position opposite to the blade of the nail at the same time that the pin 47 is brought opposite an inclined notch, 50, in the arm *p*, into which it is instantly carried by the force of the spring 48, which allows the arm *a*¹ to be carried back against the plate D, and causes that portion of the blade of the nail immediately under the head to be inclosed within the notch 49. This movement of the arm *a*¹ causes the top of the pin 47 to strike the upper inclined surface of the notch 50, which raises the arm *p*, by which means the pin 42 is raised above the top of the head of the nail, so that it will not obstruct its farther advance. The arm *a*¹ now commences to move in the direction of the arrow 51, Fig. 1, carrying with it the nail; and as soon as the pin 47 passes out of contact with the under surface of the arm *p* the latter drops into its horizontal position, bringing the pin 42 back into a position to catch the head of the next nail. As the arm *a*¹ continues its movement, the nail is slid along with its rear surface in contact with the side of the plate D until it arrives opposite to a vertical groove, *b*¹, formed in the side of this plate, this groove, together with the notch 49, forming an open-

ing or passage through which the nail drops by its own gravity, point first, into a conductor, *c*¹, by which it is guided into one of the compartments of a revolving carrier, T, placed beneath it, the construction and operation of which will be presently explained. The upper edges of the notch 49 are rounded or beveled off to prevent any liability of the catching of the head of the nail; and at the upper end of the groove *b*¹ is an adjustable guide-piece, *d*¹, which serves to prevent the nail from turning into a cornerwise position, which might prevent its dropping into the conductor, this guide-piece being made adjustable for nail-heads of different thicknesses.

As it is absolutely necessary for the nails to drop into the carrier with the inclined side of the nail always in the same position, in order to insure their correct delivery to other machinery for subsequently operating upon them, a device is employed to turn the nail half-way around should the inclined side of its head happen to be on the side next to the plate D. *c*¹ is a block, formed at one end of a flat spring, *f*¹, which lies against the outer side of the plate D, to which it is secured by screws 52. This block fits into a rectangular notch, *g*¹, cut entirely through the side of the plate D, and is provided on one side with an inclined notch, 53, which forms a shoulder, 54, as seen in Figs. 1 and 8. The top of the plate D is beveled off at 21, from the recess *q* to the notch *g*¹, to correspond to the bevel of the inclined side of the head of the nail.

When the straight side of the nail is next the plate D, its head does not come into contact with the shoulder 54, and the nail is carried past it, by the arm *a*¹, to the opening, through which it passes to the conductor *c*¹, as previously described. When, however, the inclined side of the head of the nail is next the plate D, it comes into contact, as it is carried forward, with the shoulder 54 of the block *c*¹, by which its passage is obstructed, and, as the arm *a*¹ continues to move, the nail is turned, by the pressure of the end of the notch 49, against the corner of the blade of the nail, which is diagonally opposite to the corner of its head, which is against the shoulder 54, the arm *a*¹ and the block *c*¹ yielding against the resistance of their springs 48 *f*¹ to allow of this movement of the nail; and, when the latter is turned one quarter way round, its head extends into the notch *g*¹, still pressing out the block *c*¹, as seen in Fig. 8. The flat side or back of the head then strikes the exposed side of the notch *g*¹; and, as the end of the notch 49 continues to press against the front of the blade of the nail, it is turned another quarter-way round, bringing it into the exact position required, with the straight side or back of the head against the plate D, after which it is carried to the groove or passage *b*¹, and drops into the carrier, as before described.

The spring 48 of the arm *a*¹ is a little stiffer than the spring *f*¹ of the block *c*¹, in order that the latter may be forced back to expose the

side of the notch g' , against which the flat side of the head of the nail strikes when being turned.

If desired, the block c^1 may be made without the notch 53; but it must, of course, project beyond the beveled surface 21 of the plate D, so as to catch the nail as it is carried forward. In such case, however, the block c^1 will not require to be made of so great width as shown.

The construction of the carrier T, and the manner in which it is operated, will now be described.

h' h' are two disks, secured, at a little distance apart, upon a horizontal shaft, i' , having its bearings in the frame-work A and hanger L, the space between the disks being divided into a series of compartments by division-plates k' , Fig. 3. Within each of the compartments so formed is pivoted an arm, l' , which is forced, by a spring, m' , toward the plate k' , another division-plate, n' , being placed within a short distance of the plate k' , so as to form a long narrow space for the reception of the nail. Each division-plate k' and its adjacent pivoted arm l' form a pair of jaws, to receive a nail as it falls from the conductor c^1 above. The outer ends of the division-plates k' , and also the enlarged ends of the arms l' , are made rounded or flaring to facilitate the entrance of the nails into the narrow spaces between the plates k' and n' . To each arm l' , near its outer end, is secured a pin, 55, which projects out, through a slot, p' , in the inner disk h' , into the path of a spring-arm, q' , the outer end of which is flattened or bent, and is so placed that each pin 55 is brought into contact therewith as the carrier revolves, which causes the movable jaw, from which the pin projects, to be pressed back from the stationary jaw against the resistance of its spring m' , an opening being thus left between the jaws for the reception of the nail, as seen in Fig. 3. This movement of the jaw takes place immediately before its arrival beneath the conductor c^1 ; and as the carrier continues to revolve the pin 55 passes out from under the end of the spring-arm q' , when the movable jaw will be instantly thrown, by its spring m' , against the nail, which is thus held tightly in place, and prevented from dropping out as the carrier is revolved. The length of the spaces or compartments for the reception of the nails is sufficient for those of the greatest length intended to be used in the machine, and as the head of the nail, when held between the jaws, projects above the bottom of the conductor c^1 , the latter is cut away on one side, as seen at 20, Fig. 3, to allow the head to pass. As each nail arrives at its lowest point, immediately over a conductor, r' , the spring-jaw is forced back by the contact of its pin 55 with the bent end of a spring-arm, s' , similar to the arm q' , when the nail is released, and drops head first through the conductor r' into the machine for pointing, finishing, or otherwise operating upon it. The spring-arms q' s' are attached to supports t' w' , and are made ad-

justable therein by means of slots and screw-nuts. To the shaft i' is secured a ratchet-wheel, v' , which is revolved intermittingly by a pawl, w' , pivoted on a stud, a^2 , projecting from a lever, b^2 , the inner end of which is attached to or forms part of a sleeve, c^2 , which fits around the shaft i' close to the ratchet-wheel, and is held from slipping longitudinally by a pin, 56, and collar 19. The lever b^2 is provided with a long slot, 57, in which works a pin, d^2 , projecting from one side of the cam-wheel M, and thus, as the latter is revolved, the lever b^2 is vibrated, each revolution of the driving-shaft causing the ratchet-wheel to be moved a distance equal to that between two of its teeth, a spring-retaining pawl, e^2 , being employed to prevent the ratchet-wheel from being moved back by the return movement of the pawl w' ; and each movement of the ratchet-wheel causes the carrier T to be moved a distance equal to that between two adjacent pairs of jaws.

At every revolution of the driving-shaft a nail is caused to drop through the passage b^1 ; and the movements of the various parts of the machine are so timed with respect to each other that one of the pairs of jaws will be open, and in a proper position to receive the nail as it drops through the conductor c^1 , while the nail at the bottom of the carrier is, at the same time, released; and the nails are thus automatically delivered, one by one, at regular intervals of time, and with certainty and precision, to any other machine, for subsequently operating upon them, thus avoiding all of the objections incident to the use of hand-labor for this purpose, the machine for delivering the nails, and that for subsequently operating upon them, being properly timed with respect to each other, so as to produce the desired result.

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

1. In combination with the hopper E and the slide g , the inclined reciprocating plate b , operating substantially in the manner and for the purpose set forth.

2. The swinging arm h , with its plate or apron i , in combination with the slide g and the guide-plates C D, operating substantially in the manner and for the purpose described.

3. The reciprocating slide or plate R, in combination with the guide-plates C D, operating substantially as and for the purpose set forth.

4. In combination with the guide-plates C D, the reciprocating toothed bar Q, or its equivalent, for carrying forward the nails, substantially as described.

5. The reciprocating slide S, with its notched arm a^1 and spring 48, in combination with the guide-plates C D and the arm p , operating substantially in the manner and for the purpose set forth.

6. The adjustable guide-piece d^1 , placed within the groove or passage b^1 , as and for the purpose set forth.

7. The yielding block c^1 , fitting into a notch

in the guide-plate D, in combination with the arm a' and its spring 48, for turning the nail, substantially as described.

8. In a machine for automatically feeding or delivering forged or partially-made horse-shoe-nails to other machinery, the intermittingly-revolving carrier T, provided with a series of compartments or jaws for receiving and holding the nails, in combination with the pins 55 and spring-arms q' s' , or equivalent de-

vices, for opening the jaws to receive the nails and release them at the proper times, substantially as set forth.

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

SILAS S. PUTNAM.

In presence of—

P. E. TESCHEMACHER,
W. J. CAMBRIDGE.