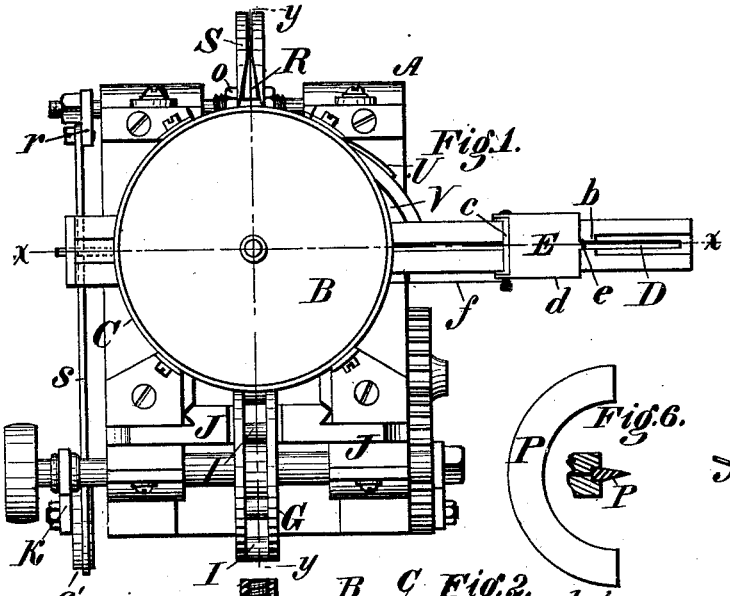
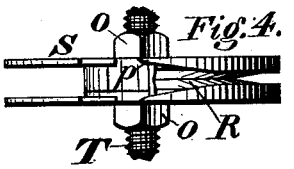
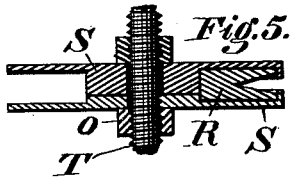
J. B. HUSTED.

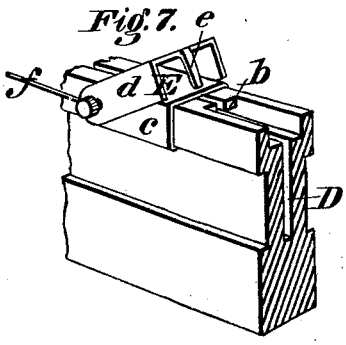
Machine for Finishing Horseshoe Nails.

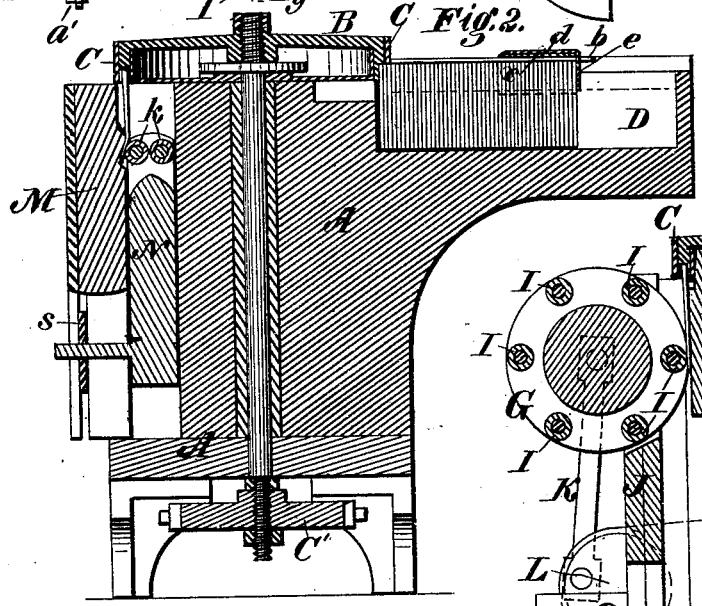
No. 208,683. Patented Oct. 8, 1878.

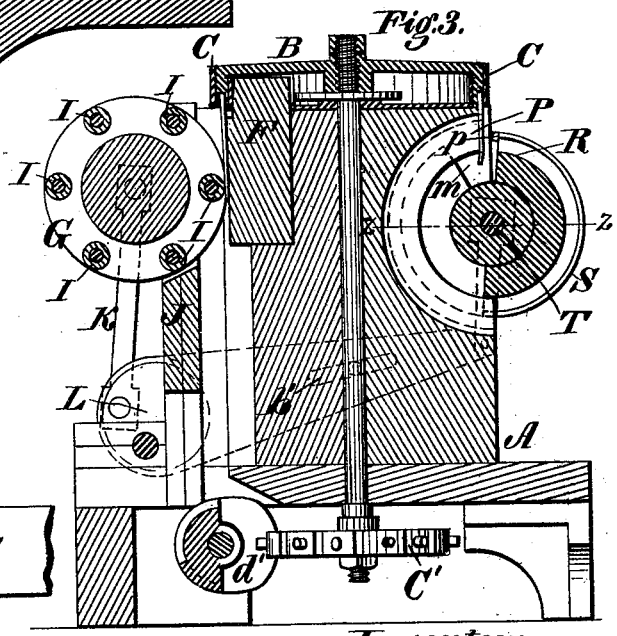


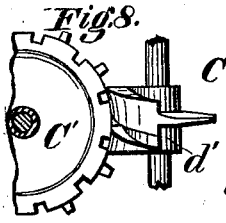


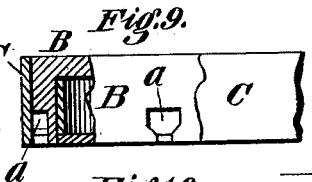


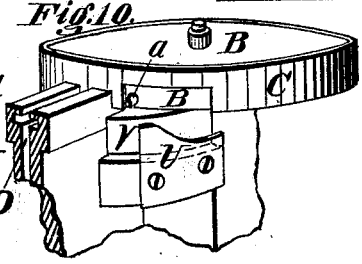












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UNITED STATES PATENT OFFICE.

JETHRO B. HUSTED, OF VERGENNES, VERMONT.

IMPROVEMENT IN MACHINES FOR FINISHING HORSESHOE-NAILS.

Specification forming part of Letters Patent No. **208,683**, dated October 8, 1878; application filed May 28, 1878.

To all whom it may concern:

Be it known that I, JETHRO B. HUSTED, of Vergennes, in the county of Addison and State of Vermont, have invented certain Improvements in Horseshoe-Nail Machines, of which the following is a specification:

This invention relates to various improvements in automatic machines for manufacturing horseshoe-nails, and more especially to that particular type of machine in which a rotary carrier supports the nails and presents them to the devices for performing the various necessary operations thereon.

The improvements consist, first, in the combination, with the rotary carrier, of an automatic rack-feed, consisting, essentially, of a slotted bar or guide, in which the nails are suspended by their heads, and of a sliding dog or carrier, by which the row of nails is caused to advance, so that the inner one of the row will be taken up automatically by the carrier at each movement of the latter.

Second, in an improved method of and means for reducing and tempering the nail-blanks, consisting in the employment of a rotary stock or head provided with a series of rollers, which serve as hammers, and which act successively upon the blank, commencing at the point and moving upward as far as required, and then moving backward again toward the point. The head or stock is rotated at a high velocity, so that the rollers or hammers act upon the nail in very rapid succession. By thus operating upon the nail it is drawn out or reduced with great rapidity and well tempered. This part of my invention consists, broadly, in operating upon the nail in the manner stated, and it is immaterial whether the nail be moved in relation to the rotary hammer or the hammer moved in relation to the nail.

The third feature of the invention consists in the combination of a circular punch and circular die for trimming the nails, the punch and die being made adjustable in relation to each other, so that they may be set forward as they wear away, and thus be used until their entire length is consumed; and also, in this connection, of a peculiar arrangement of the die and its holding and protecting devices.

The next feature of the invention consists in an assorting arrangement, for separating the perfect and imperfect nails, comprising two eccentric guards or rails, for the purpose of removing the nails from the carrier, arranged at different distances below the nail-carrier and at different points, so that one rail will remove the long nails, while the short nails will pass over the same and be removed by the second rail.

The invention also further consists in other details, which will be hereinafter fully described.

Referring to the accompanying drawings, Figure 1 represents a top-plan view of the machine, illustrating the general construction and the arrangement with relation to each other of the rotary carrier, the feeding, drawing, beveling, shearing, and delivering devices. Fig. 2 is a transverse vertical section of the same on the line *x x*, showing the rotary carrier and the feeding and beveling devices. Fig. 3 is a transverse vertical section on the line *y y* of Fig. 1, illustrating, in connection with the rotary carrier, the drawing or tempering devices and the shearing-die. Fig. 4 is a top-plan view of the shearing or trimming die. Fig. 5 is a cross-section of the same on the line *z z* of Fig. 3. Fig. 6 is a side elevation and a cross-section of the trimming-punch. Fig. 7 is a perspective view, illustrating the feeding-guide and carrier, and the manner in which the latter is elevated to permit the introduction of the nails into the machine. Fig. 8 is a plan view, illustrating the devices for rotating the nail-carrier. Fig. 9 is a view illustrating the construction of the nail-carrier. Fig. 10 is a perspective view, illustrating the assorting devices.

A represents the rigid main frame of the machine, which may be of any suitable construction adapted to receive and sustain the various operating parts hereinafter described.

B represents the nail-carrying wheel, mounted horizontally upon the top of the machine, and provided in its periphery, at regular distances apart, with recesses *a*, as shown in Fig. 9, each adapted to receive the head of one nail, and to thereby hold the nail in a suspended position, as shown.

It is to be noted that the recesses *a* are of such form and size as to fit closely around the nail-heads, so as to hold the nails firmly and rigidly, and prevent them from rising or inclining sidewise when subjected to the action of the finishing devices.

The carrier B is mounted on the upper end

of a vertical shaft, and receives, by the mechanism hereinafter described, an intermittent rotary motion. Around and closely against the periphery of the nail-carrier B there is secured a stationary rim or ring, C, the office of which is to retain the nail-heads in the cavities in the carrier and prevent them from falling out at the wrong time. At the points where the nails are to be introduced and removed the rim C is cut away to permit the nails to pass through it. For the purpose of feeding the nails one at a time to the carrier B, I arrange on one side of the frame a fixed vertical slotted guide, D, into which the nails may be inserted in a single line or row, and suspended by means of their heads resting thereon, as represented in Figs. 1 and 7.

As shown in the drawings, the guide is provided with inwardly-turned lips *b*, to engage over the heads of the nails and prevent them from rising, while at the same time it admits of their sliding freely forward toward the carrier B. At its inner end the guide D extends through or abuts closely against the ring C, which is cut away in such manner as to permit the nails to pass from the guide D one at a time into the recesses of the carrier B, as they are presented one after another. At its outer end the guide D has the lips *b* cut away in order to permit the introduction of the nails, which are preferably fed into the machine from a portable slotted tube, in which they are suspended by their heads.

For the purpose of feeding the nails forward in the guide D, I employ a sliding carrier, E, consisting of a sliding block, *c*, and of a plate, *d*, pivoted to the block *c*, and provided with a depending tongue, *e*, to act against the outer end of the row of nails and push them forward. The object of pivoting the plate or dog *d* is to admit of its being turned upward, as represented in Fig. 7, when the nails are to be introduced. The feeding carrier or dog E will be connected to a cord, *f*, extending over a pulley, and provided with a weight for the purpose of urging it inward; or any other suitable means may be employed for moving it inward to cause the advance of the nail toward the carrier B. The nails being urged toward the carrier, the latter receives and carries forward one of them in each of its cavities as they pass the guide D, the nails being suspended from the carrier and held therein by the outside band, C. The nails thus suspended are carried and presented by the carrier, successively, to the drawing, beveling, trimming, and assorting devices, as hereinafter described.

On one side of the main frame, beyond the guide D, I locate a fixed die, F, within the periphery of the carrier B, and in such position that the nails are brought in succession by the carrier against its outer face, as represented in Fig. 3. On the outside of the frame, directly opposite the die or anvil F, I arrange on the horizontal shaft a rotary stock or carrier, G, provided in its periphery, at regular distances from each other and from the center of the stock, with a series of small steel rollers or hammers, I, the purpose of which is to act upon the nails as they rest against the die or anvil F. By means of the pulley on the end of its shaft and of an independent belt, the stock G is given a very rapid rotary motion, and its rollers or hammers I thereby caused to act forcibly and in very rapid succession upon the nail. In order to cause the hammers or rollers to move lengthwise upon the nail, the shaft on which the stock or head G is mounted is supported in a vertically-moving slide, J, and connected by pitmen K to crank-wheels L, whereby a vertical reciprocation is imparted to the head or stock during its rotation.

The arrangement of parts is such that the hammers or rollers commence their action at the point of the nail, and move upward over the same to the required distance, and thence downward to the point. This operation may be repeated any desired number of times; but under ordinary circumstances it is not necessary that it should be repeated.

The rollers or hammers operating with the combined percussive and rolling action on the nail at the same time that the point of impact thereon is being changed produces an excellent drawing and tempering of the nail. It is to be observed that owing to the rapidity with which the rollers act one after another, each one strikes the nail at almost the same point as the one before it, and that in consequence the nail is in effect subjected to a continuous blow or pressure, and its surface finished exceedingly smooth and true.

While it is preferred to move the head in relation to the nail as described, it is obvious that the stock may be mounted in fixed bearings and the nail arranged to move in relation thereto.

On the side of the machine opposite the feeding devices, beyond the reducing devices, I arrange a fixed die, M, and a vertically-reciprocating slide, N, provided in its upper end with one or more rollers, *k*, as clearly represented in Fig. 2, the die and the slide being arranged in such relation that the nails are presented between them by the carrier B, as shown. The die is provided in its inner face with a cavity of such shape as to give the proper beveled and slightly-curved form to the point of each nail, and the roller is so arranged that as it is elevated by the slide it forces the point of the nail into or against the die to effect the beveling of the point.

In the drawings two rollers are represented in the slide, that on the inside being merely for the purpose of sustaining the slide against the pressure to which it is subjected, and thereby reducing the friction of the parts.

I am aware that a rotating roll and stationary die have been used.

On the rear side of the machine I mount a

trimming mechanism, consisting of the fixed punch P and a vibrating die, R, as represented in Figs. 1, 3, 4, 5, and 6.

As shown in Figs. 3 and 6, the male die or punch P consists of a single blade of steel of a sectional form, corresponding with that which it is desired to give the point of the nail, and curved from end to end in the arc of a circle. This blade is clamped firmly in place between two plates, as represented in Fig. 6, and is capable of being adjusted endwise to compensate for wear, so as to present its cutting-edge always in the same position. The female die R is also curved in the arc of a circle, and consists of a curved steel blade, properly grooved, secured between two plates or washers, S, which are mounted upon a central shaft, T, and provided in their inner faces with grooves to receive the die, the shaft T being arranged concentric with the male die, so that when the female die is advanced it will straddle the end of the male die P. In order to permit the nails to be brought into position against the front end of the male die P, the side plates are cut away at the points *m*, in order to permit the nail to pass through them to the die. The female die is held firmly in position between the side plates, S, by means of nuts *o*, screwed against their outer sides; but any other arrangement may be adapted for the purpose of fastening the die between the plates; or the plates may be omitted and the curved die adjustably secured upon the shaft in any other suitable manner. As the end of the male die wears away, the plates are loosened and the die advanced until its front end reaches the original position. By curving the two dies P and R in the manner shown, and making them adjustable lengthwise, I am enabled to compensate quickly for wear, and to insure the presentation of their ends always in the same position. Being curved in the manner shown, it is only necessary to grind off their ends in order to sharpen them, no forging or finishing being necessary.

For the purpose of insuring the proper presentation of the nail to the dies, the side plates, S, of the female die are extended forward beyond the cutting end of the said die and beveled inward, in the manner represented at *p*, Fig. 4. These inclined points, acting upon the sides of the nails, insure their presentation squarely in front of the die before it acts upon them.

The assorting devices are located behind the trimming-die, and consist, as shown in Figs. 1 and 10, of two tracks or guides, U V, located at different points below the carrier B, and extending outward eccentrically beyond the center. The first track, U, has its upper edge below that of the second track, V. As the nails are brought around opposite these rails by the carrier, the lower ends of the long nails, or those of full length, extend below the top of the track U and are carried outward thereby, so that when opposite the outlet-opening in the band C they are disengaged and caused to fall from the machine. The short and imperfect nails, failing to reach the track U, pass by the same and against the track V, which causes their discharge at a different point from that at which the long nails were delivered.

For the purpose of actuating the trimming-die, its shaft is provided with a depending arm, *r*, which is connected to one end of the bar or yoke *s*, the opposite end of which is mounted on an eccentric, *a'*, attached to one of the crank-wheels L. For the purpose of operating the vertical slide N, the bar *s* is provided with a longitudinal slot, *b'*, to receive a pin or arm on the side of the slide, as shown in Figs. 2 and 3. It will thus be seen that the bar or yoke serves to operate both the bevel-slide N and the trimming-dies.

For the purpose of imparting an intermittent rotary motion to the nail-carrier B, the lower end of its shaft is provided with a wheel, *c'*, having at regular distances radial studs, and between the studs vertical grooves; and on the horizontal shaft, by the side of the wheel *c'*, I mount a hub or wheel, *d'*, of the peculiar construction represented in Figs. 3 and 8.

One half of the circumference of the hub or wheel is provided with a spiral groove to receive the studs upon the wheel and cause the rotation of the latter. The other half of the wheel consists of a disk having a straight edge to enter the slots in the wheel *c'*, in order to lock the same, and thereby hold the carrier after it has been moved by means of the spiral groove. During one-half of the rotation of the wheel *d'* the spiral groove moves the wheel and nail-carrier, and during the remaining half of the revolution the disk holds the wheel *c'* from moving. In this way it will be seen that a positive intermittent motion is imparted to the nail-carrier by the continuous rotation of the hub *d'*.

The parts of the machine are so adjusted in relation to each other that a recess is presented to receive the nail from the feeding mechanism, and the nails are presented to the reducing, beveling, and trimming devices simultaneously, and during the time that the carrier B is at rest.

The male die shown in the drawing has its thin edge on the inside; but when used in connection with the ordinary form of straight V-shaped die, the outer edge of the male die will be the thin edge.

I am aware that a die curved in the arc of a circle is old; and I am also aware that an inclined dog or guide has been arranged directly below the nail-carrier of a nail-machine in such manner as to act against the nails at a point close to their heads, so as to discharge all the nails regardless of their length, and without effecting any separation or assortment. I therefore make no claim thereto.

Having thus described my invention, what I claim is—

1. In a horse-nail machine, the combination of a carrier-wheel provided with peripheral re-

cesses to receive the heads of the nails, a slotted guide adapted to suspend the nails by their heads and arranged to deliver them directly into the recesses of the carrier, and a sliding dog arranged to act upon the last nail and cause the advance of the forward nails into the carrier, as shown.

2. In combination with the slotted guide D, the sliding dog E, consisting of the two parts *c d*.

3. The herein-described method of reducing and tempering horse-nails, consisting in subjecting the same to a rapid succession of blows by small rollers, and shifting the point of impact from the point upward, and thence backward to the point.

4. In a nail-machine, the combination of a series of rollers or hammers, I, mounted in a rapidly-rotating head or stock, in combination with devices, substantially such as shown and described, for presenting the nails to the action of the rollers, and at the same time moving the latter lengthwise of the nail, in order that the rollers may act from the point of the nail upward, and thence backward to the point.

5. In a nail-machine, an anvil or support for the nail, in combination with a rotary head provided with a series of roller-hammers, and arranged to reciprocate over the anvil in such relation thereto as to cause the rollers to act upon each nail during both the forward and backward movements of the head.

6. In a horse-nail machine, a carrier-wheel provided in its periphery with recesses *a*, adapted to receive and fit closely around the heads of upright nails, in combination with the encircling band C, whereby the nails are held from raising or tipping sidewise when subjected to the action of the finishing devices.

7. In a nail-machine, the combination of a nail-carrier and one or more eccentric or diverging guides or rails, arranged in such relation to the carrier as to act against the points of the long nails and deliver them from the carrier, while permitting short nails to pass.

8. In combination with a carrier suspending the nails in an upright position, two delivery rails or guides arranged at different distances from the carrier, to separate nails of different lengths and discharge them at different points, substantially as described and shown.

9. In combination with the adjustable die R, the plates or washers S, having their ends beveled and extended forward, as shown and described, whereby they are caused to serve the double purpose of supporting the die and bringing the nail directly opposite the same.

10. In combination with the male die P, curved and adjustable in the arc of a circle, the female die R, curved adjustable and arranged to reciprocate in the arc of a circle concentric with the male die.

JETHRO B. HUSTED.

Witnesses:
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