(No Model.) 3 Sheets—Sheet 1.

H. A. WILLS & J. D. KINGSLAND.

AUTOMATIC FEEDER FOR HORSESHOE NAIL BLANK FINISHING MACHINES.

No. 275,558. Patented Apr. 10, 1883.

Fig 1

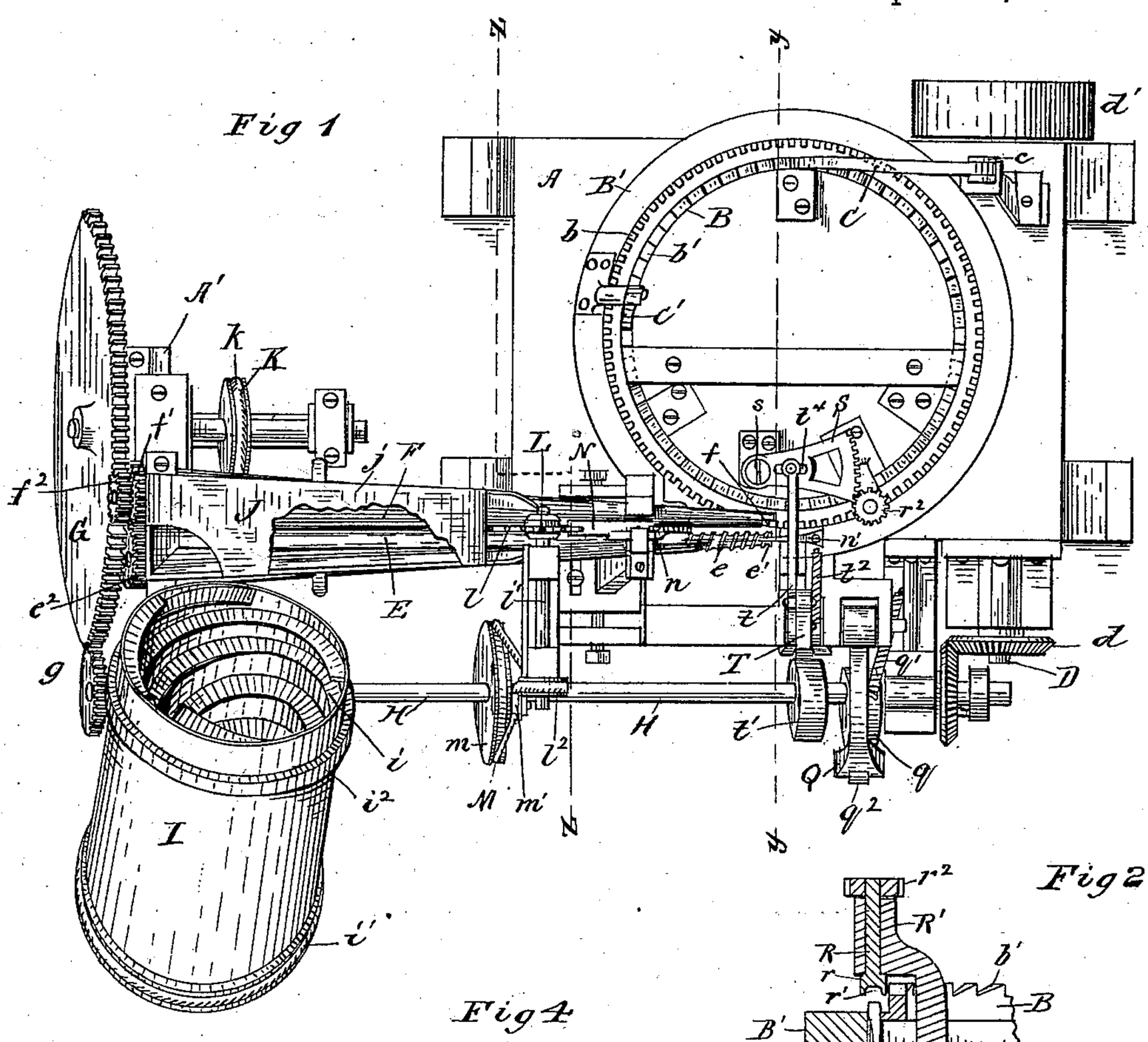


Fig 2

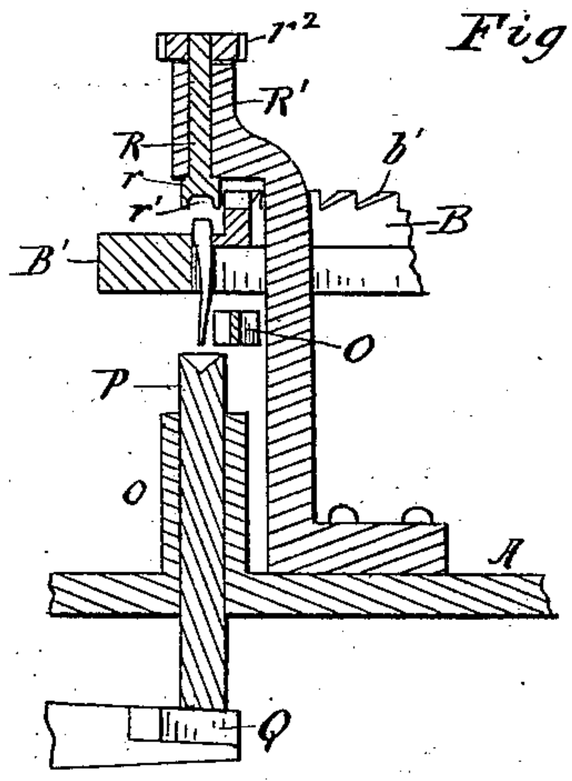
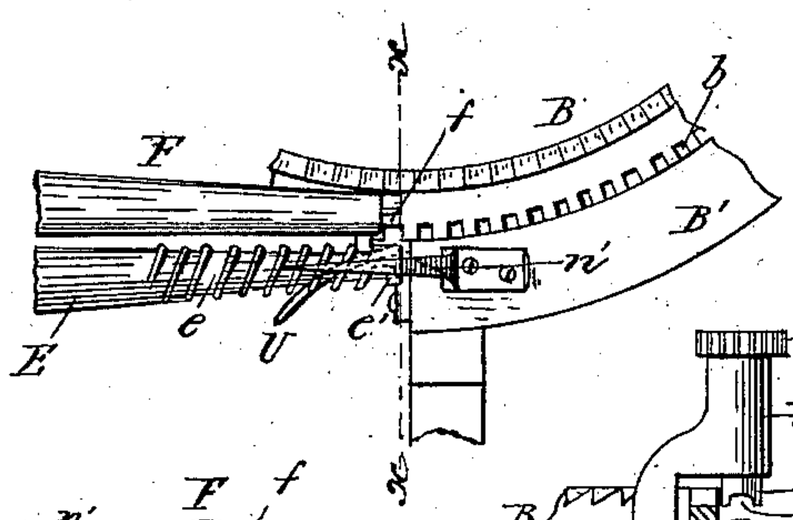


Fig 4



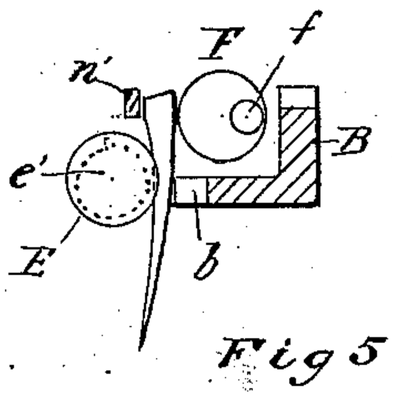


Fig 5

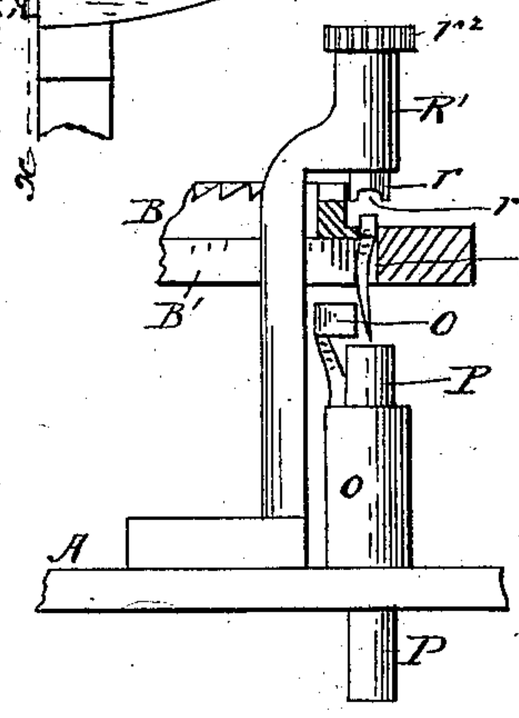


Fig 3

Witnesses
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(No Model.) 3 Sheets—Sheet 2.

H. A. WILLS & J. D. KINGSLAND.

AUTOMATIC FEEDER FOR HORSESHOE NAIL BLANK FINISHING MACHINES.

No. 275,558. Patented Apr. 10, 1883.

Fig 6

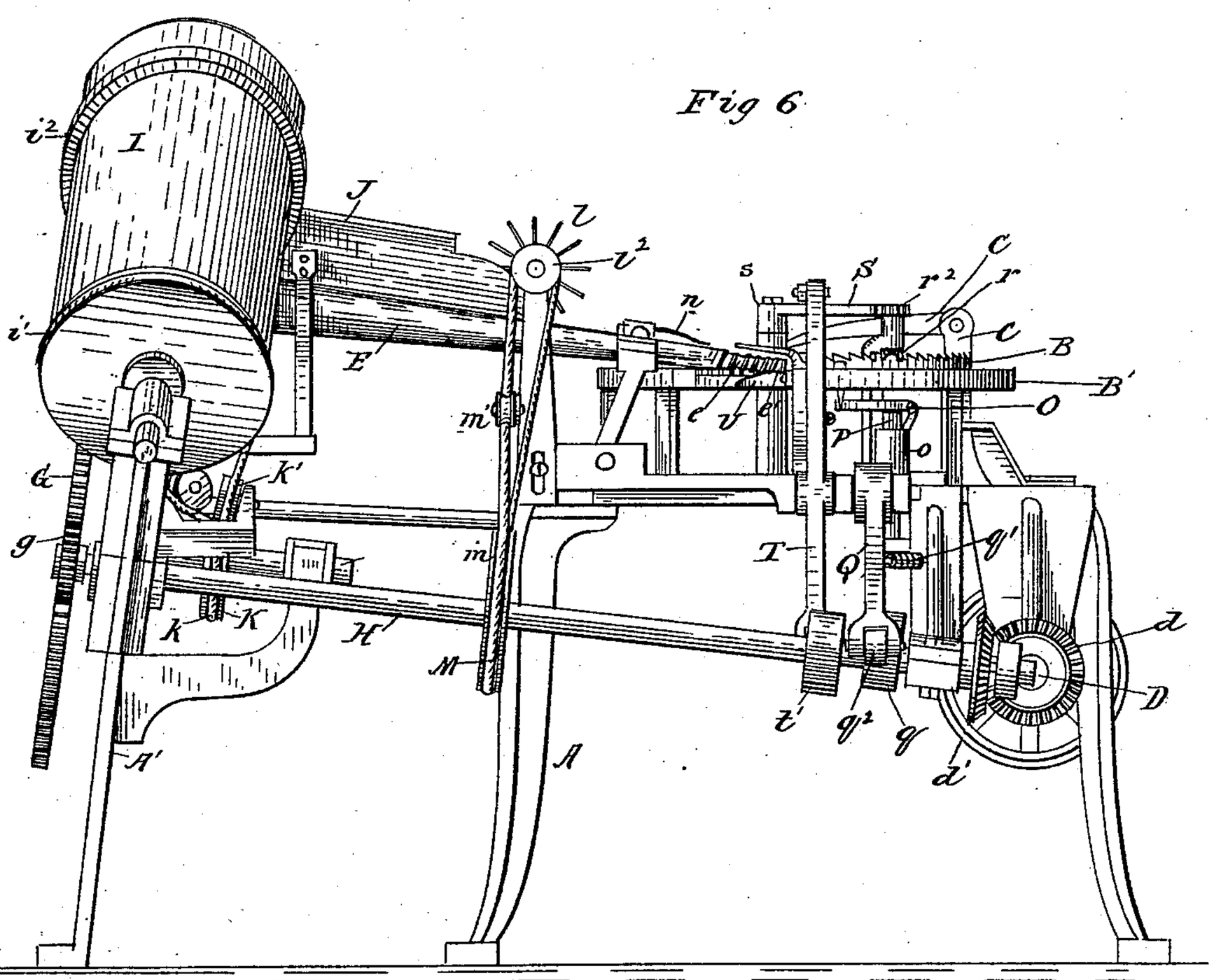
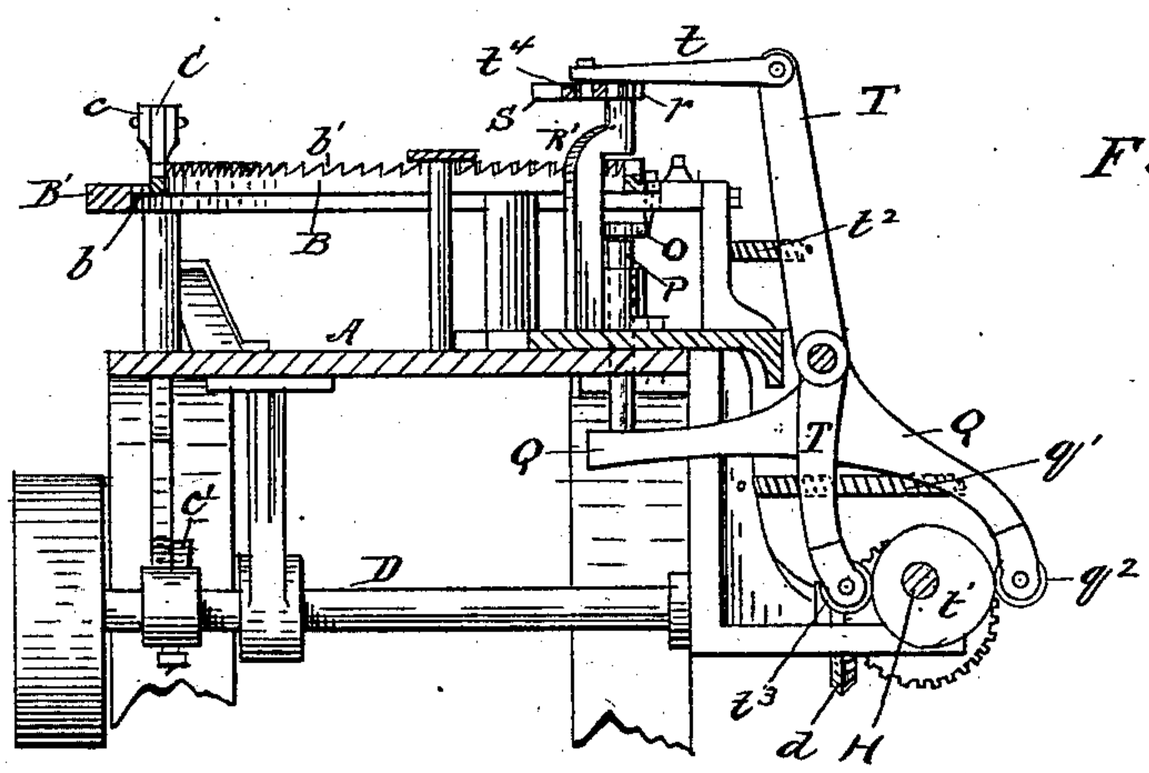


Fig. 7



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(No Model.) 3 Sheets—Sheet 3.

H. A. WILLS & J. D. KINGSLAND.

AUTOMATIC FEEDER FOR HORSESHOE NAIL BLANK FINISHING MACHINES.

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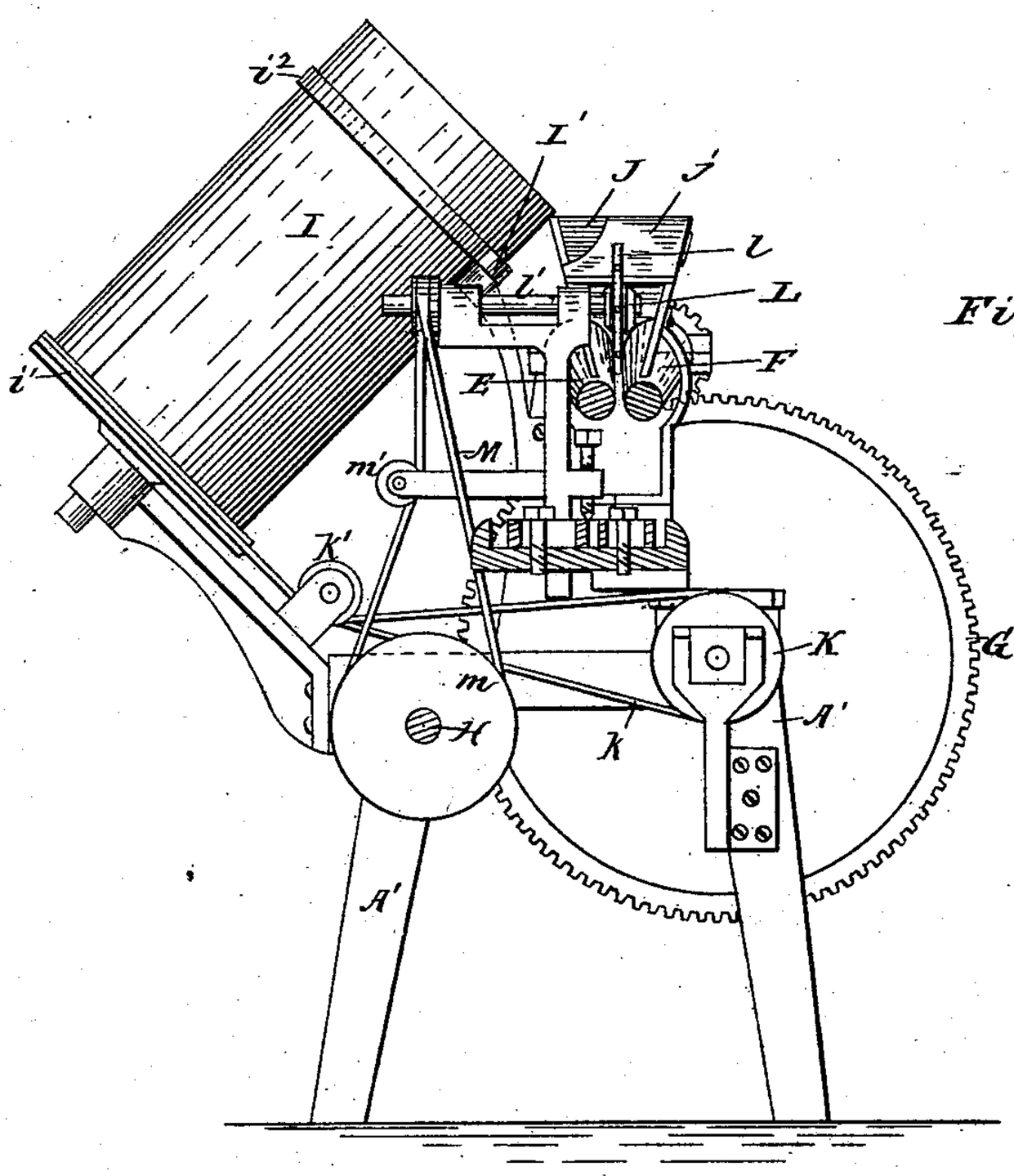
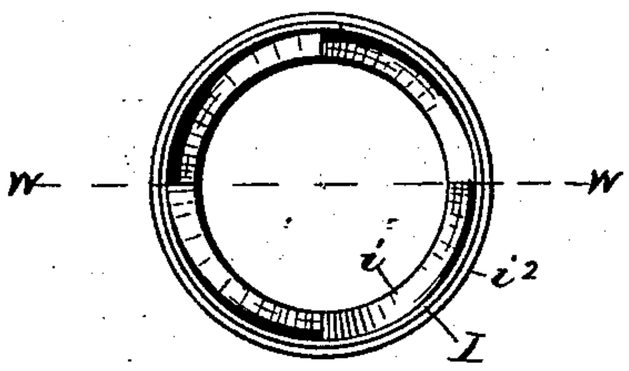


Fig 8

Fig 9



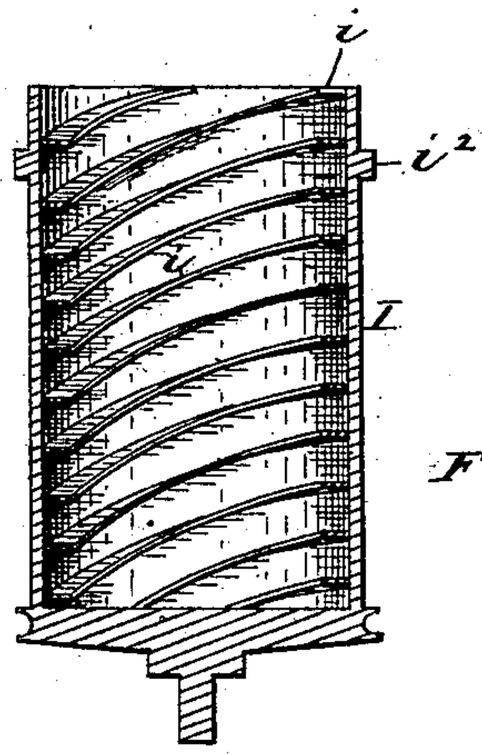


Fig 10

Witnesses
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UNITED STATES PATENT OFFICE.

HARRY A. WILLS AND JACOB D. KINGSLAND, OF CHICAGO, ILL., ASSIGNORS TO THE NORTHWESTERN HORSE NAIL COMPANY, OF SAME PLACE.

AUTOMATIC FEEDER FOR HORSESHOE-NAIL-BLANK-FINISHING MACHINES.

SPECIFICATION forming part of Letters Patent No. 275,558, dated April 10, 1883.

Application filed June 26, 1882. (No model.)

To all whom it may concern:

Be it known that we, HARRY A. WILLS and JACOB D. KINGSLAND, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Feeders for Horseshoe-Nail-Blank-Finishing Machines, which are fully described in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a plan view of a machine embodying our improvements; Fig. 2, a detailed section on an enlarged scale, taken on the line *v v*, Fig. 1; Fig. 3, a detailed section on an enlarged scale, taken through the ring-carrier just in front of the nail-guide; Fig. 4, a detailed plan, on an enlarged scale, of the lower ends of the feed-rollers and adjacent parts; Fig. 5, a detailed section on enlarged scale, taken on the line *x x*, Fig. 4; Fig. 6, a front side elevation of the machine on the same scale as Fig. 1; Fig. 7, a transverse section of the same, taken on the line *y y*, Fig. 1; Fig. 8, a transverse section of the same, taken on the line *z z*, Fig. 1; Fig. 9, a plan of the feed-cylinder; and Fig. 10, a vertical section of the same, taken on the line *w w*, Fig. 9.

Our invention relates to feeding mechanism for automatically feeding the blanks to horse-nail-finishing machines, being especially adapted for use in connection with that class of machines provided with a ring-carrier, of which the machine shown in several patents heretofore granted to Harry A. Wills are examples. Heretofore the carrier of these finishing-machines has been fed by boys, who placed the blanks in the notches of the carrier. This makes the work of the finishing-machine dependent upon the attendant, and also involves a constant expense in the payment of wages to this attendant.

Our invention is intended to provide a mechanical or automatic feeder for the ring-carrier, so that after the blanks are dumped into a hopper or feed-cylinder they will be taken care of by mechanical devices, which properly deliver them into the notches of the ring-carrier of the finishing-machine, and thus the attendant feeders are dispensed with and the capacity of the machine somewhat increased.

We will proceed to describe in detail one way in which we have carried out our invention in practical form, and will then point out definitely in the claims the special improvements which we believe to be new and desire to protect by Letters Patent.

The construction and operation of the finishing-machine is now well known, and hence we have shown in the drawings only such parts as are necessary to illustrate our present invention, and in the description reference will be made to such parts only of the finishing-machine as are necessary for the same purpose.

In the drawings, A represents the main or supporting frame of the finisher, on which is suitably mounted a ring-carrier, B, provided with side peripheral notches, *b*, for the reception of the nail-blanks and crown-ratchet notches *b'*, by which the carrier is moved in the usual way. A ring, B', surrounds the carrier, serving to retain the blanks within the notches of the carrier. The usual intermittent motion is given to the carrier by means of a pawl, C, attached to the upper end of a lever, *c*, the lower end of which is vibrated by means of a cam, *c'*, on the main shaft D, mounted below the bed-plate of the frame. A pawl, C', is also provided to engage with the ratchet-teeth for the purpose of holding the carrier against backward motion. The main shaft D is driven in any suitable way, and at its end, on the front side of the machine, is provided with a beveled pinion, *d*, the purpose of which will be presently described. In the drawings this shaft is shown provided at the opposite end with a band-wheel, *d'*, by which it is driven.

Two tapering rollers, E and F, are arranged in an inclined position, extending out at one side of the machine, and mounted at their lower ends in suitable bearings on the main frame and at their upper ends in similar bearings on a supplementary supporting-frame, A', standing at one side of the frame A. These rollers are for the purpose of feeding the blanks to the carrier. The surface of one of them, E, is plain the entire length, except a short distance at the lower or smaller end, on which is cut a spiral thread, *e*, the depth of which gradually increases toward the point, as shown in Fig. 4 of the drawings. The thread does not run entirely to the end of the roller; but a short head,

e', at the extreme end is left entire. This roller is arranged with reference to the ring-carrier, so that at each revolution of the roller, when the end of the thread is on the side next to the carrier, it will come directly opposite one of the notches in the carrier, which is then at rest, and holds a notch at the side of the roller. This arrangement will be seen and readily understood from Fig. 4 of the drawings. The roller F is plain-surfaced throughout its entire length, and is arranged on the inside next to the carrier. At its lower end it is cut away on one side, so as to provide a short eccentric pin, f, at this extremity. The movement of the rollers is so timed that this pin will move away from the other roller about the time the end of the spiral groove is brought opposite the notch of the carrier, so as to leave an opening to permit the blank to enter the notch, as shown in Fig. 4 of the drawings, while during another portion of its revolution the pin is brought in next to the roller E and prevents the irregular delivery of a blank if accidentally one should become misplaced. The lower end of the roller F is set a little higher than the roller E, as the latter is arranged about opposite the edge of the ring-carrier. This is the preferable arrangement of the extremities of these rollers for securing the accurate delivery of the blanks; but it is not absolutely necessary, as there may be some change in their relation and yet a very fair operation obtained. The rollers are set so that a slight opening will appear between them sufficient to accommodate the blanks which are delivered upon the rollers. At their lower ends, however, they are brought nearly together, so that the space between the spiral groove and the opposite roller will only accommodate the blank, and not permit it to fall through. At their upper ends the rollers are provided with pinions e^2 and f', which engage with each other, and outside of the latter is a second and smaller pinion, f^2, with which a large gear-wheel, G, mounted on the supplementary frame, is arranged to engage, the latter being driven by a pinion, g, on a shaft, H, which is mounted in suitable bearings at the side of the machine, and at its lower end is provided with a beveled pinion, h, engaging with the similar pinion on the drive-shaft, and so receiving motion from the latter. Through this mechanism it will be seen that a rotary movement will be communicated to the feed-rollers. This movement is outward from each other, and is timed so as to move the rollers in relation to the carrier as described above.

It will of course be understood that the blanks are delivered to the feed-rollers at their upper ends; but it is necessary to provide some means for delivering them with comparative regularity; otherwise the operation of the feed-rollers will be impaired by choking. For this purpose we employ a cylinder, I, which is provided with a series of spiral wings or flanges, i, arranged around the inside of the cylinder, and running from top to bottom, as shown in Figs. 1 and 10 of the drawings. In the drawings these flanges are shown four in number, which is the number we have found producing the most satisfactory result, though a variation may be made in this respect. The cylinder is mounted outside of the upper end of the rollers, being arranged at an inclination thereto, as shown in Fig. 8 of the drawings. At its lower end it is provided with a band-pulley, i', and near its upper end with a collar, i^2, which rests on small rollers I', mounted on suitable diverging brackets on the supplementary frame. The upper end of the cylinder is arranged so as to deliver the blanks just over the edge and into a hopper, J, and arranged just above the rollers. If desired, it may be provided with a lid, j, which, however, must be cut away at the upper end, as shown in Fig. 1 of the drawings, to permit the blanks falling from the cylinder to enter the hopper.

A band-pulley, K, is mounted on the shaft of the wheel G, and from this pulley a band, k, is run to the like pulley on the cylinder, passing underneath suitable guide-pulleys, k', below the cylinder, and by this means a suitable rotary motion is communicated to the feed-cylinder. The latter is also provided with means for adjusting the angle of its inclination, whereby the feed may be regulated, for obviously the nearer the cylinder is brought to the horizontal position the more rapidly will the blanks be delivered to the feed-rolls. This adjustment may be effected by making either the upper or lower bearings of the cylinder adjustable in any ordinary way, or by any other device which is suitable for this purpose.

The blanks are placed in the cylinder in quantity, when, obviously, by the rotation of the latter, a portion of the blanks will be brought up by each spiral section, and finally delivered at the upper end into the hopper of the feed-rollers, in this operation the blanks slipping down the incline of the flange into the hopper as the flange is turning away from the latter, and therefore the number of blanks falling into the hopper will depend upon the angle at which the flange stands. Some of the blanks will fall back into the cylinder, and the number of these will depend upon the inclination of the latter, being increased as the axis of the cylinder approaches a perpendicular. The blanks falling upon the feed-rolls will be carried down gradually, in the meantime slipping in between the rollers point downward and held by their heads, the space between the rollers not being large enough to permit the heads to pass through. This space is only a little greater than the thickness of the blanks, so that the latter will always hang in the rollers with their wider faces next the surfaces of the former. In this position they are carried down gradually by the rotation of the feed-rollers, reaching successively the spiral groove at the lower end of the outer one. Each blank, as it reaches this groove, is crowded into it by the contraction of the space between the rollers, so that the blanks are car-

ried down at a regular rate at this end of the rollers, and are brought regularly one after another at the lower end of the spiral groove, directly opposite the respective notches of the feed-carrier. The carrier is standing at rest at this moment, and the continued rotation of the threaded roller will of course crowd the blank into the notch opposite, into which it drops by the action of the unthreaded section at the extremity of the roller, the eccentric pin on the opposite roller moving in proper time to permit this action. Sometimes the blanks will be fed down too rapidly, or in such quantity as not to all of them drop down between the rollers; and to prevent the action of the feed being impeded in this way, we provide a wire brush, L, which consists of a hub and radially-arranged pieces of wire, *l*, and is mounted on a shaft, *l'*, standing at right angles to the feed-rollers, a short distance above the spiral. This brush stands so that the ends of its wires will just enter the space between the rollers. On the other end of its shaft is a band-pulley, l^2, over which a band, M, runs to a similar pulley, *m*, on the shaft H, a guide-pulley, *m'*, being arranged to direct the band properly to these pulleys, which stand at about right angles to each other.

It will be seen that a rotary motion is thus communicated to the brush. This movement is backward, and therefore any blanks which are fed down irregularly by the rollers will be pushed back by the wires of the brush, and kept back until they finally come down in proper position. Just below the brush is a short guide, N, arranged just above the opening between the rollers under which the heads of the blanks must pass, and which serves, in connection with the brush, to fix the blanks in proper position as they are brought to the spiral groove just below. This guide is shown in the drawings as a loose piece, which is held in position by a spring, *n*.

At the lower end of the rollers is another guide, *n'*, which is mounted on the stationary ring and projects back over the end of the roller E a short distance, as shown in Fig. 4 of the drawings, and serves as a further device to insure the proper position of the blanks as they come down to the point of delivery.

Now, it will be seen from the above description that the blanks will be brought down regularly by the feed-rollers and delivered one after the other in proper succession into the notches of the ring-carrier; but the blanks of horseshoe-nails are curved, and in the ring-carrier, as they are brought to the several devices for finishing, they must stand with their curves all one way, preferably with their convex surfaces outward, which is the arrangement in the Wills finisher referred to above.

It is obvious that no provision is made in the operation of the feed-rolls to insure the delivery of the blanks to the carrier in uniform position in this particular; but they will come down through the feed-rolls with their convex sides some one way and some the other, and will be delivered in this position into the notches of the carrier. This irregularity must be corrected or the blanks will not all be properly finished by the machine. We have devised mechanism to accomplish this result, which we will now proceed to describe.

It will be readily understood by those familiar with the shape of horseshoe-nails that as the blanks hang in the carrier the points of those having their convex sides outward will be turned inward, while the points of the others will be turned outward. Below the ring-carrier is a guide or switch, O, mounted on a post, *o*, and extending forward, so as to catch the blanks soon after they commence their travel around with the ring. The forward end of this guide is bent outward slightly, and is placed in the line between the blank points swinging inward and those swinging outward, so that all those swinging inward will pass inside of the switch, while those swinging outward will pass outside of the switch, as shown in Fig. 6 of the drawings, in which position it is carried along to a lifting-rod, P, which in this instance is mounted in the post *o*, down through which it passes, and through the bed-plate, being held loosely in its bearing, so as to slide freely up and down. The lower end of this lifter rests upon the inner end of a lever, Q, pivoted to the main frame, and extending outward at the side of the machine, its outer end being bent downward where it comes in contact with a cam, *q*, on the shaft H, to which it is held by a suitable spring, *q'*, the end of the lever being also provided with a roller, q^2, to relieve friction, if desired. This lifter is underneath one of the notches of the ring-carrier whenever the latter stops, but a little outside thereof, so that it will be about underneath the outwardly-swinging point of a misplaced blank, which may be held in the notch above. Immediately above this notch in the carrier is a a short vertical shaft, R, mounted in a post, R'. At the lower end of this shaft is a head, *r*, with a notch, *r'*, cut across it, and at the upper end of the shaft is a pinion, r^2, which engages with a segmental rack, S, mounted on a post, *s*, so that it may be oscillated back and forth.

The oscillation of the rack is accomplished by means of a lever, T, pivoted to the outside of the main frame, and connected at its upper end by a pitman, *t*, to the rack, while at its lower end it is brought into contact with a cam, *t'*, on the shaft G, to which it is held by the action of a suitable spring, t^2, the cam end of this lever being also provided with an anti-friction roller, t^3. The pin by which the pitman is connected to the rack is adjustable in a slot, t^4, therein, so that the throw of the rack may be properly regulated to secure just the required movement of the shaft, which will obviously be rotated back and forth by the oscillation of the rack.

The upper end of the sliding lifter is recessed slightly, as shown in Fig. 2 of the drawings, so as to secure certainty of action, and the opera-

tion of this mechanism is as follows: The parts are all timed, so that as soon as the ring-carrier stops the lifter is raised, and if a misplaced blank hangs above it, as shown in Fig. 2 of the drawings, it will of course be lifted up. The notch in the head of the shaft above, when at rest, stands lengthwise over the notch in the carrier in the line of progression of the latter, as shown in Fig. 2 of the drawings, so that the head of the blank will be carried into this notch by the operation of the lifter just described, and as soon as this is accomplished the rack begins to move, thereby turning the pinion with which it engages half-way around, and so turning the blank half-way around, which brings it into proper position, with its point turning inward. The lifter is at once withdrawn, when the blank drops back in its notch in the carrier in the proper position for further operation, and the turning head is moved back into its former position by the oscillation of the rack in the opposite direction. It will be seen, therefore, that all the blanks are brought into proper position in the carrier before they are passed to the finishing mechanism ordinarily used in machines of this kind.

The operation of the feeding mechanism has been fully set forth in connection with the description above, and need not be repeated, except to say that it must of course be understood that all the parts are timed so as to operate relatively to each other in a manner to accomplish the successive results which have been specified.

We also have shown in the drawings a short guide, U, arranged underneath the lower end of the threaded feeding-roller, being fastened to the outside but stationary ring of the finisher, with its inner end just outside of the notches of the ring-carrier at this point and with its outer end bent considerably outward from this line, thereby guiding all the points of the blanks in toward the carrier and assisting in securing the certain delivery of a blank at its proper point into the notch of the carrier in readiness to receive it. By this mechanism we are enabled to successfully feed the blanks to the finisher automatically, and so dispense with the attendant who has heretofore been necessary for this purpose at each machine. One person can look after several machines provided with these attachments.

We do not wish to be understood as limiting ourselves to the specific devices and specific construction and arrangement of devices as specified above, for many changes may be made in these particulars without affecting the essential principles and operation of our invention. Even the construction of the feed-rollers may be changed, and yet the same result secured, as it is only necessary that these rollers shall be so constructed as to bring the blanks successively into proper position in front of the respective notches of the carrier, and then in some way deliver them into the notches.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a horseshoe-nail-finishing machine, the combination of a carrier in which the blanks are suspended by their heads with a pair of tapering feed-rollers constructed and operating to deliver the blanks into the carrier, substantially as described.

2. In a horseshoe-nail-finishing machine, the notched ring-carrier, in combination with the tapering feed-rollers E and F, the former being provided with a spiral groove at its lower end, substantially as and for the purposes set forth.

3. In a horseshoe-nail-finishing machine, the notched ring-carrier, in combination with the tapering feed-rollers E and F, the former provided with a spiral groove at its lower end, running not quite to the extremity of the roller, and the latter with an eccentric pin at its extremity, substantially as and for the purposes set forth.

4. In a horseshoe-nail-finishing machine, a carrier in which the blanks are suspended by their heads, in combination with a pair of tapering feed-rollers by which the blanks are fed into the carrier, and mechanism whereby the blanks are automatically and regularly delivered to the feed-rollers, substantially as described.

5. The tapering feed-rollers, in combination with the inclined feed-cylinder provided with spiral flanges around the inside thereof, substantially as and for the purposes set forth.

6. The feed-rollers, in combination with the inclined feed-cylinder provided with inside spiral flanges, and adjusting mechanism whereby the inclination of the cylinder may be changed, substantially as and for the purposes set forth.

7. The tapering feed-rollers E F, in combination with the revolving brush, substantially as and for the purposes set forth.

8. The notched ring-carrier, in combination with the feed-rollers E F and the guides above and below the lower end of the roller E, substantially as and for the purposes set forth.

9. In a horseshoe-nail-finishing machine, a carrier in which the blanks are suspended by their heads, in combination with a pair of tapering feed-rollers which deliver the blanks into the carrier, and mechanism whereby misplaced blanks are adjusted and turned into proper position after they have been received into the carrier, substantially as described.

10. The notched blank-carrier, in combination with the sliding lifter and the notched blank-turner, substantially as described.

11. The notched blank-carrier, in combination with the sliding lifter P and the switch-guide O, substantially as described.

12. The sliding lifter P, in combination with the lever Q, cam *q*, and notched ring-carrier, substantially as described.

13. The notched blank-turner *r*, in combination with the oscillating rack S, lever T,

cam t', and notched ring-carrier, substantially as described.

14. The feed-rollers E F, in combination with the revolving regulating-brush L and the guide N, substantially as described.

15. The feed-rollers E F, in combination with the brush L, mounted on the shaft l', the band-pulley m on the shaft H, and the band M, substantially as described.

16. The feed-rollers E F, in combination with the wheel G, inclined feed-cylinder, band-pulley K on the shaft of the wheel G, band k, and band-pulley on the cylinder, substantially as described.

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