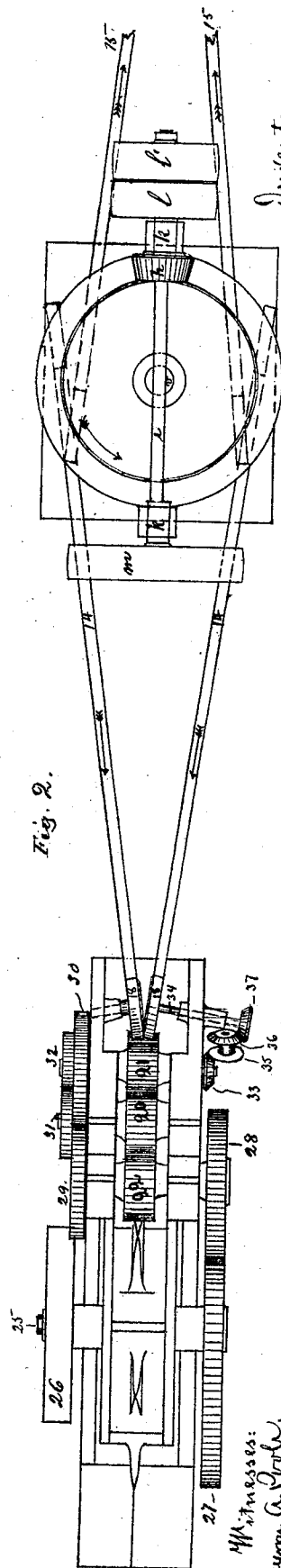
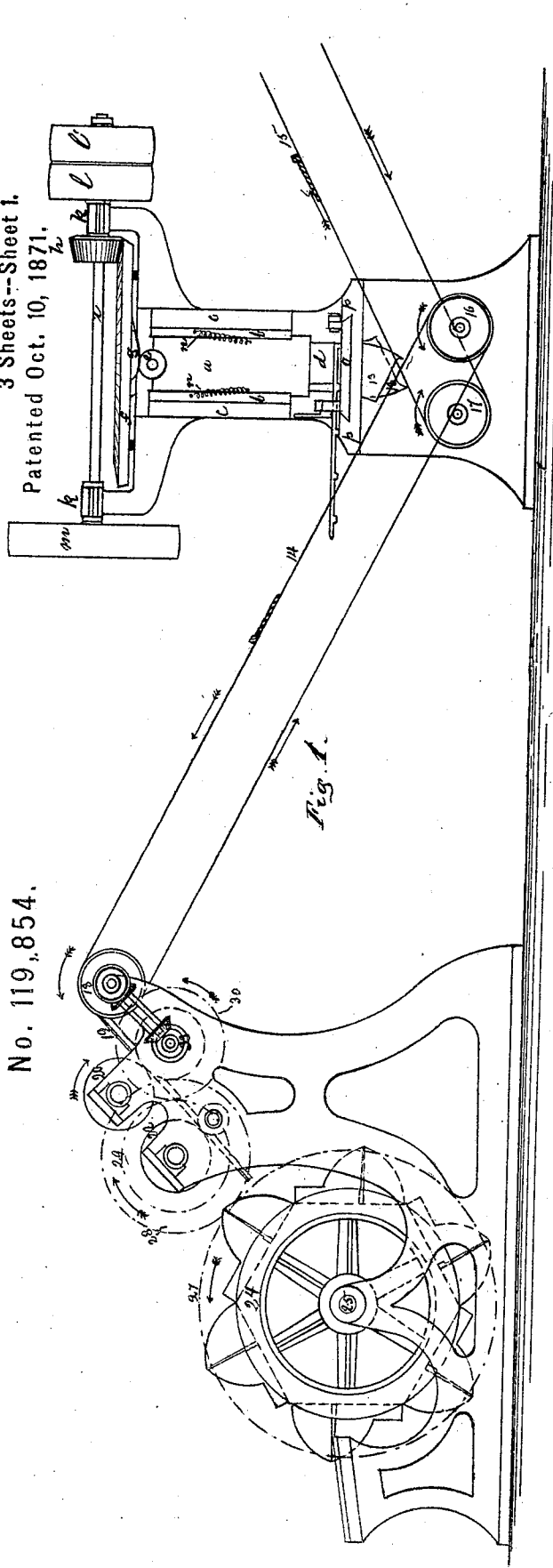


E. W. Kelley's Improved Horse Nail Machine.

No. 119,854.

3 Sheets--Sheet 1.
Patented Oct. 10, 1871.



Witnesses:
Myron A. Grobe,
Wm. H. Hutchinson

Inventor:
Edward Watson Kelley,
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E. W. Kelley's Improved Horse Nail Machine
 No. 119,854.
 Patented Oct. 10, 1871.

3 Sheets--Sheet 2.

Fig. 3.

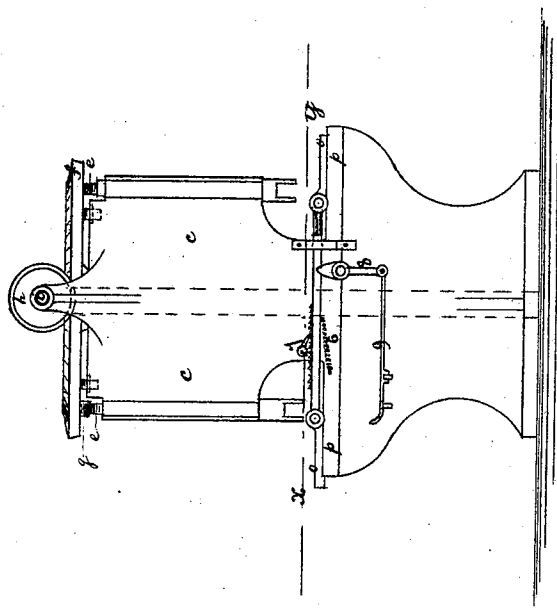


Fig. 5.

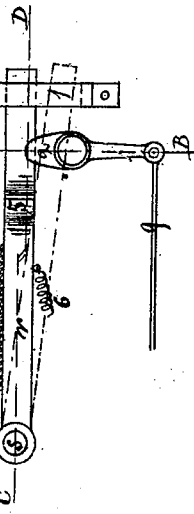


Fig. 6.

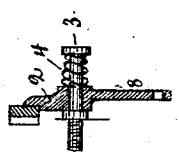


Fig. 7.

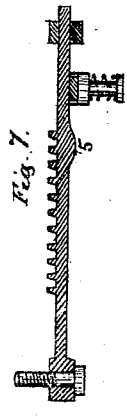


Fig. 11.

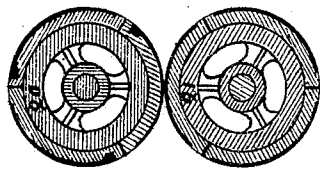


Fig. 12.

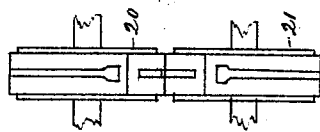


Fig. 13.

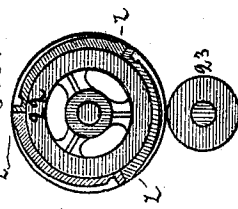


Fig. 8.

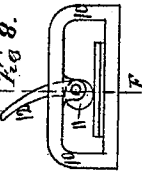


Fig. 10.

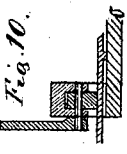


Fig. 9.

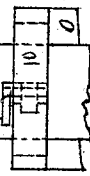
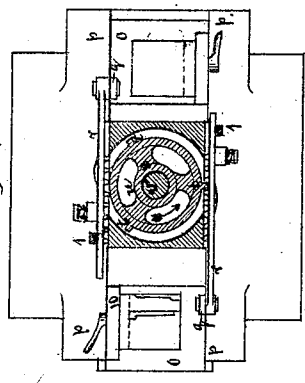


Fig. 4.



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 Wm. O. Hutchinson.

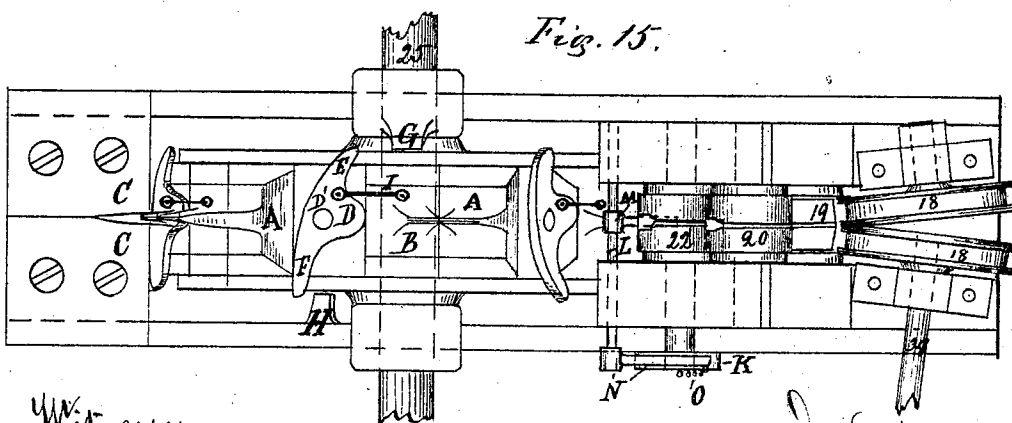
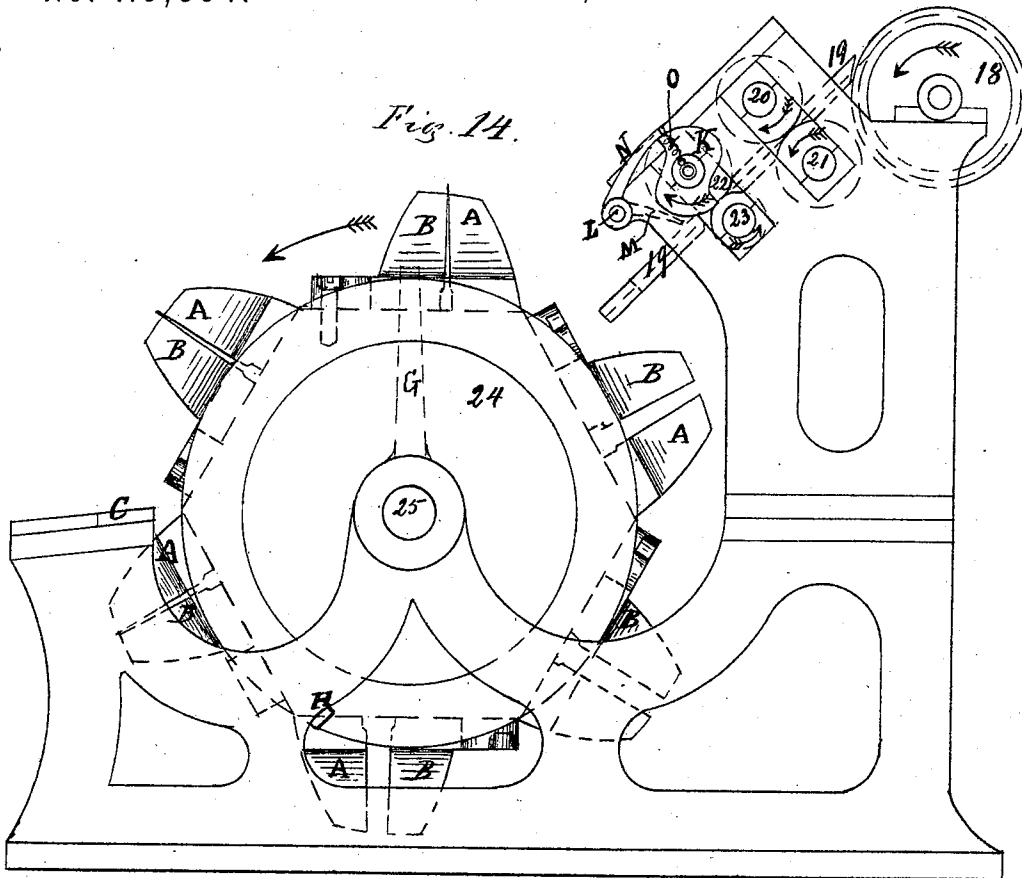
Inventor: E. W. Kelley.
 by Albion H. H. H. H.

EDWARD WATSON KELLEY.
Improved Horse Nail Machine.

3 Sheets--Sheet 3.

No. 119,854.

Patented Oct. 10, 1871.



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Inventor:
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UNITED STATES PATENT OFFICE.

EDWARD WATSON KELLEY, OF HAMILTON, SCOTLAND.

IMPROVEMENT IN HORSE-NAIL MACHINES.

Specification forming part of Letters Patent No. 119,854, dated October 10, 1871.

To all whom it may concern:

Be it known that I, EDWARD WATSON KELLEY, of Hamilton, Scotland, have invented certain new and useful Improvements on Horse-Nail Machines, of which the following is a specification:

The nature of my invention relates to an improved machine for making horse-nails from cold iron; the machine being so constructed that no manual labor is needed save the feeding of the raw material to produce a nail punched, shaped, rolled, pointed, and clipped, as will now be fully shown and described.

On the drawing, Sheet 1, Figure 1 is a side elevation, and Fig. 2 is a ground plan of the machine. Sheet 2, Fig. 3 is an end view of the punching-machine, and Fig. 4 is a cross-section over the line X Y taken on Fig. 3. Fig. 5 is an enlarged view of the feeding apparatus for the punching-machine. Fig. 6 is a cross-section over the line A B taken on Fig. 5. Fig. 7 is a longitudinal section over the line C D taken on Fig. 5. Fig. 8 is a side view of the stock-holder. Fig. 9 is a ground plan of the same, and Fig. 10 is a cross-section over the line E F taken on Fig. 8. Fig. 11 is a cross-section over the rollers 21, 22, as shown on Fig. 1. Fig. 12 is a side view of said rollers. Fig. 13 is a cross-section over the rollers 22, 23, also shown on Fig. 1; Figs. 11, 12, and 13 are drawn on an enlarged scale. In Sheet 3, Fig. 14 is an enlarged detailed side view of the clipper and rolling-machine, and Fig. 15 is a ground plan of the same. The gearing is not shown in the latter two figures, but the direction of the different rollers' motions is indicated by arrows, as shown.

Similar letters refer to similar parts wherever they occur on the drawing.

a a, on Figs. 1 and 3, show the punches movable up and down in bearings *b b* attached to the frame *c c*. In the lower ends of the punches *a a* are attached the cutting-dies *d d* in a suitable way. In the upper end of each punch *a a* is a movable roller, *e*, attached. The punch *a* is operated by means of a bevel-gear, *f*, provided on its under side with a number of inclined planes, *g g*, as shown. The bevel-gear *f* is attached to a perpendicular shaft, shown in dotted lines in Fig. 3, around the center of which the bevel-gear *f* is revolving and set in motion by means of the pinion *h* attached to the horizontal shaft, *i*. The shaft *i* is movable in bearings *k k*

and provided in one end with a fixed pulley, *l*, and loose pulley *l'*, and in the other end with a fly-wheel, *m*, as shown in Fig. 1. From this will be seen that when power is transmitted to the pulley *l* so are the pinion *h* and bevel-gear *f* also set in motion around their axes. The inclined planes *g g g* press down the punches *a a* very powerfully when they strike the rollers *e e*. The punches *a a* are drawn upward automatically by means of the coiled springs *n n* attached in their upper ends to the guides *b b*, and in their lower ends to the punch *a*, as shown. *o* is a movable plate or table, under which the female dies are attached firmly. The plate *o* is movable in V-shaped guides *p p*, in which the plate *o* is made to move without any play sidewise. To each plate *o o* is firmly attached an ear, *q q*, to which the feeding mechanism is connected. This feeding mechanism consists of a bar, *r*, provided in one end with an eye, *s*, through which and the ear *q* a bolt is inserted, around which the bar *r* is made to swing. The bar *r* is provided on the inside with teeth, as shown in Fig. 7, that engage into the projections *t t t* on the wheel *u*. The wheel *u* is keyed on firmly to the upright shaft *v*, as shown on Fig. 4. The bars *r r* are drawn automatically toward the middle of the machine the distance of the pitch of the teeth on the said bars for every time one of the projections *t t t* engages with the racks *r r*. The racks *r r* are guided in their outer ends in slotted bearings *1 1*, secured to the frame of the machine. A finger, *2*, movable around a pin, *3*, and provided in its upper end with a lip and flange, as shown in Fig. 6, is made to form a support for the rack *r*. The finger *2* is pressed close up to the side of the rack *r* by means of the coiled spring *4*, fully shown in Fig. 6. The rack *r* is also provided on the outside with a projection, *5*. The object of this projection and the finger *2* is to disengage the feed-wheel *u* from the rack *r* when the whole width of the plate is punched, and this disengagement is automatically performed in the following manner: When the projection *5* reaches the finger *2* it presses the upper end of the finger *2* outward when rack *r*, being unsupported, drops down to a position as shown in dotted lines on Fig. 5. The rack *r* is now disengaged from the wheel *u* and is also drawn backward automatically by means of the coiled spring *6*, attached in one end to the rack *r*, and in the other to the frame of the punching-

machine, as shown in Fig. 3. The upper side of the rack *r* is toothed and a catch, 7, engages therein, whereby the rack is prevented from sliding backward before the whole width of the material is punched. The finger 2 projects downward in an arm, 8, hinged to the rod 9 provided with a handle, whereby the rack *r* can be operated to engage with the wheel *u* when a new plate is to be punched.

The material to be punched is held firmly in place by means of the stock-holder, shown in enlarged views in Figs. 8, 9, and 10. This consists of a frame, 10, secured to the sliding carriage *o*; an eccentric cam is moved in bearings on the frame 10 and attached to a handle, 12, in a suitable way. The material to be punched can thus simply be pressed down on the carriage *o* by turning the eccentric-cam 11 to a position as shown in Fig. 8, and disengaged simply by throwing back the lever 12.

To be able to save stock from the material used for the manufacture of horse-nails I punch every other nail with its head in an opposite direction to the next one, as shown on the left-hand side of Fig. 4. Under the sliding carriage *o* are placed guides 13 13, through which the nails are guided from the punching-machine to the endless belts 14 14 and 15 15. The nails are carried on the endless belts 14 and 15 in such a manner that their heads advance during their progress. Thus, half the number of nails punched is carried on the belts 14 14 and the other half carried on the belts 15 15 to the rollers. The endless belt 14 is carried in its lower end over a pulley, 16, and in its upper end over a pulley, 18, as shown in Figs. 1 and 2. The belt 15 is carried in a like manner over the pulley 17 to a second rolling and clipping-machine, similar to the one as shown on the left-hand side of Fig. 1. After the nails have been carried on the endless belt 14 over the pulleys 18 18 they drop into a conducting-groove, 19, and are caught by the rollers 20 and 21, shown in enlarged views in Figs. 11 and 12. The roller 21 is put in stationary bearings, but the roller 20 is movable in adjustable bearings, so that by this means the rollers may be brought in close contact to each other as their surfaces wear away. The rollers 20 and 21 have on their peripheries engraved half the thickness and shape of the nails, as fully shown in Figs. 11 and 12; but, as it often happens that part of a roller is accidentally damaged, and, consequently, the whole roller must be thrown aside as useless, I construct the engraved surfaces of said rollers in different and independent segments, each of a length a little longer than the length of a nail, and secure these segments to the body of the rollers by means of screws, rivets, or similar way, whereby I am able to replace part of a roller without destroying the whole of it. When the nail has passed the rollers 20 and 21 it is still conducted on a continuation of the groove 19 to a secondary pair of rollers, 22 and 23. The object of these rollers is to point the nail, for which purpose the roller 22 has engraved upon its surface the whole of the nail or nails, the extreme end of which is pointed, as indicated at *Z Z Z*

on Fig. 13. The roller 22 is constructed on the same principle as heretofore described for the rollers 20 and 21. The roller 23 may, however, be solid without either engravings or segments, as shown in Fig. 13. The roller 23 rests in stationary bearings, but roller 22 moves in adjustable bearings in a similar way as described for the rollers 20 and 21. When the nail has passed between the secondary pointing-rollers 22 and 23 it is carried to the clipper 24, constructed substantially as heretofore described in my previous patent, dated May 23, 1871, and to which reference is made.

The clipper and rolling-mill are connected together and motion is carried on from the one to the other in the following manner: On the shaft 25 is secured a driving-pulley, 26, to which power is transmitted by means of a belt in the usual way. On the opposite end of said shaft is secured a spur-wheel, 27, that engages with a similar wheel, 28, secured to the end of the shaft to which the roller 22 is keyed. The rollers 21 and 22 are also geared together by means of the spur-wheels 29 and 30 secured to their axles; lastly, the rollers 20 and 21 are also geared together by means of spur-wheels 31 and 32, shown in Fig. 2. Power is also transmitted from the roller 21 to the pulleys 18 18 in the following manner: On the end of the shaft to which the roller 21 is secured is a bevel-gear, 33, keyed. From this power is transmitted to the shaft 34 by means of the bevel-gears 35, 36, and 37, as fully shown in Figs. 1 and 2. The drums 18 18 come in close contact to each other and are provided on the inside with teeth or friction-faces, whereby the velocity is transmitted from the one to the other; or they may each have a separate gearing, similar to the one as described in 33, 34, 35, 36, and 37.

In Fig. 1 is shown the belts 14 and 15 as being inclined to the horizontal plane; but this is not necessary, as I may choose to raise my punching-machine or lower my rolling-mill and clipper, so that I may be able to use a horizontal endless belt or nearly so instead of an inclined one. 24 is a polygonal drum or head on the circumference of which are stationary male dies *A A* secured. Similar male dies *B B* are made to slide in guides forward and backward on the circumference of the polygonal head 24. The outer end of the dies *A A B B* are made of a section exactly like the nail when finished. The nails drop in between the dies *A B* from the rolling-machine and are held firmly between said dies, that are made to pass between stationary female die-plates *C C* of a shape like the nails when finished. The superfluous parts of the nails are thus sheared off and the dies *A B* open automatically when the nails fall out from between them and may be collected in a suitable receptacle.

The operation of the dies *B B* is as follows; Behind each die *B B* is an eccentric block, *D*, movable around a pin, *D'*, as shown. The eccentric *D* is provided with two projecting arms, *E* and *F*; *E* is the locking-arm and *F* is the unlocking-arm. As the head 24 moves onward after taking a nail from the rolling-machine between the jaws *A B* the arm *E* strikes a projection, *G*,

attached to the frame of the clipper, and thus turns the eccentric D around the pin D', when the die B is pressed firmly against a nail and the stationary male die A. The nail is thus held firmly between the dies A B until they have passed between the stationary female dies C C, where the nail is clipped. After the nail is clipped the head 24 continues to move onward till the arm F strikes a secondary projection, H, attached to the lower part of the frame for the clipper, by which arrangement the eccentric D is turned back around the pin D' and the movable die B is drawn from the die A by means of the connecting-link I, as shown, when the nail is at liberty to drop out from between the jaws A B to leave room for another nail in succession. The nails are carried by means of endless belts from the punching-machine to the drums 18 18. When they fall on the guide-plate 19, as shown, the lower end of the guide 19 must, of course, be forked so as to allow the dies A B to pass. After the nails have passed between the rollers 20 and 21, where they are shaped, they drop between the rollers 22 and 23 where the nails are pointed, and afterward each nail drops between each pair of dies A B as the head 24 moves on; but to prevent the nails from dropping all over the clipper 24 I attach a duplex cam, K, to one end of the shaft on which the roller 22 is secured; I also place a small rocker-shaft, L, in suitable bearings and secure on the middle of it a finger, M, and on the end of it a lever, N, which is operated by the cam K, and a coiled spring, O, that keeps the lever N in close contact with the cam K, as shown. By this arrangement a nail is picked from the rollers 22 and 23 by means of the finger M as soon as ready, and is pushed down between the jaws A B when said jaws are in one line with the guide 19. If two nails are engraved on each roller I use a duplex cam, K, and if three nails are engraved on

each roller I use a triple cam, and so in proportion. Any other suitable arrangement for picking the nails from the rollers 22 and 23 may also be used to accomplish the same purpose.

From this it will be seen that I make my nails complete, without any hand labor save the feeding of the raw material, from cold iron on my machine, and the nails are punched, carried, rolled, pointed, and clipped automatically without any attention from the operator.

Heretofore machines have been used for performing the one or the other of the separate operations; but on my improved machine I perform the whole at one operation.

Having thus fully described the nature, construction, and operation of my invention, what I wish to secure by Letters Patent, is—

1. The construction and arrangement of the bevel-gear *f*, inclines *g g g*, rollers *e e*, springs *n n* or their equivalents, and the punches *a a*, and dies *d d*, for the purpose set forth.

2. The combination of the toothed racks *r r*, projection 5, finger 2, bolt 3, coiled springs 4 and 6, slotted bearing 1, pawl 7, arm 8, and connection 9, with the toothed wheel *u*, as and for the purpose set forth.

3. In combination with the table *o* the arched frame 10, eccentric 11, and the arm or lever 12, as and for the purpose set forth.

4. The combination of the polygonal head 24 with its fixed male dies A A and movable male dies B B, stationary female dies C C, shaping-rollers 20 21, pointing-rollers 22 23, and the guide-way 19, when all are combined, as and for the purpose set forth.

EDWARD WATSON KELLEY.

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CHAS. E. BARKER.

(103)