



(No Model.)

4 Sheets—Sheet 2.

J. S. DICKSON.

NAIL MACHINE.

No. 332,062.

Patented Dec. 8, 1885.

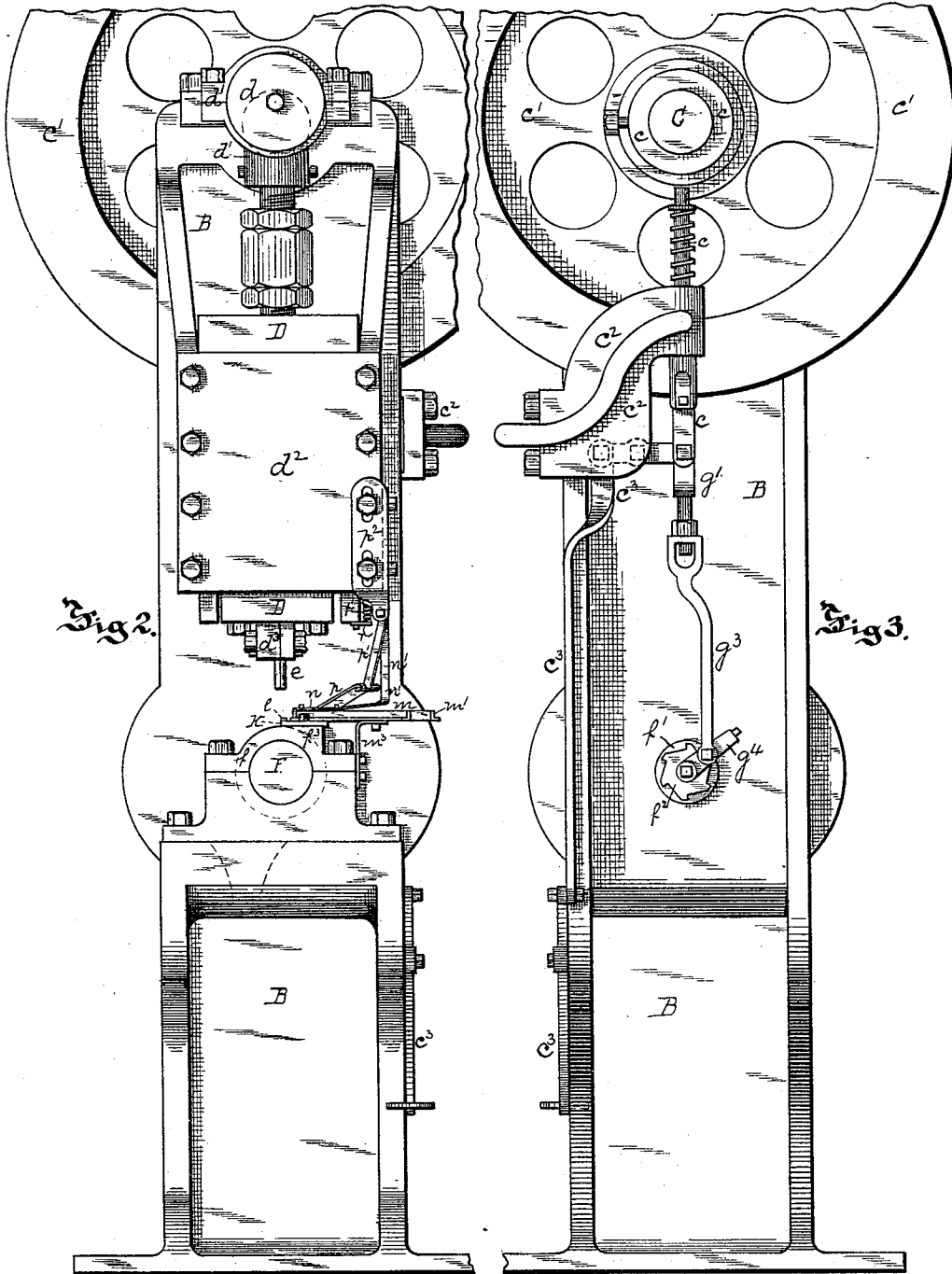


Fig. 2.

Fig. 3.

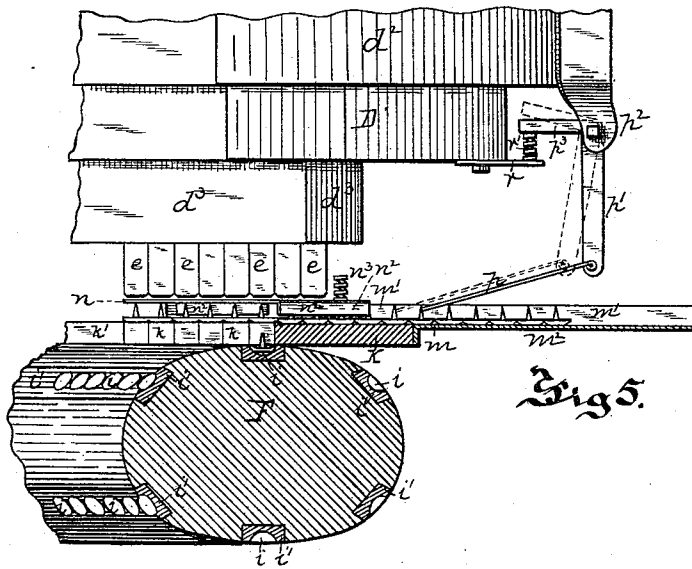
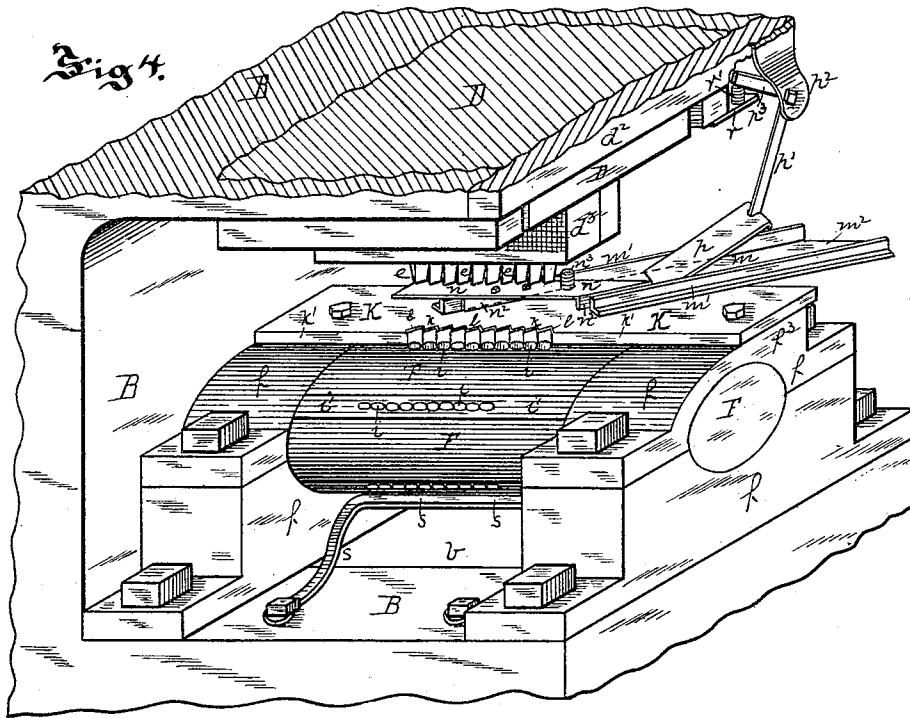
Witnesses.  
 J. Coakley  
 John Bobbett

Inventor.  
 John S. Dickson  
 By James S. Kay  
 Attorney.

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Witnesses.

*Lucas*  
*John Cobbett*

*Inventor.*  
*John S. Dickson,*  
*By James J. Gray*  
*Attorney*

(No Model.)

4 Sheets—Sheet 4.

# J. S. DICKSON. NAIL MACHINE.

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Fig 9.

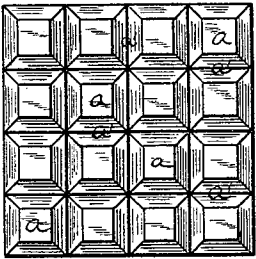


Fig 6.

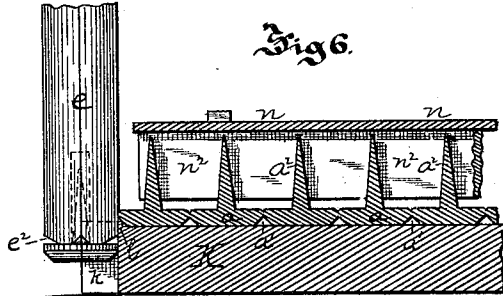


Fig 10.

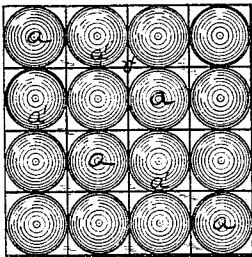


Fig 12.

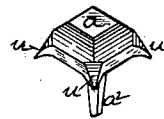


Fig 7.

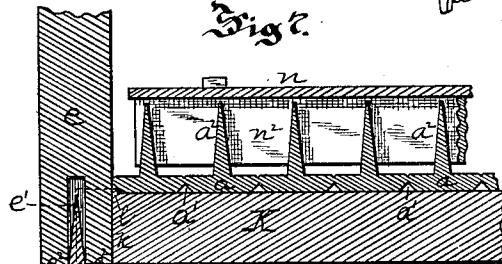


Fig 11.

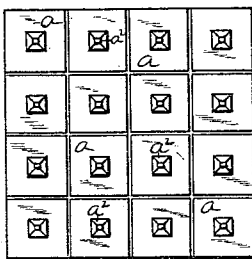
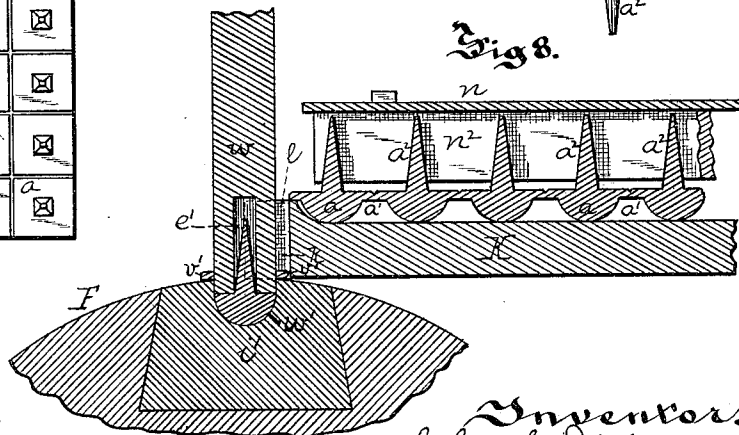


Fig 13.



Fig 8.



Witnesses:  
*Lucas K.*  
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# UNITED STATES PATENT OFFICE.

JOHN S. DICKSON, OF PITTSBURG, ASSIGNOR TO THE PITTSBURGH HOB NAIL MANUFACTURING COMPANY, OF BRIDGEWATER, PENNSYLVANIA.

## NAIL-MACHINE.

SPECIFICATION forming part of Letters Patent No. 332,062, dated December 8, 1885.

Application filed August 12, 1885. Serial No. 174,172. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN S. DICKSON, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Nail-Machines; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to machines for finishing hob, upholsterers', carriage, and other nails, its object being to provide apparatus for rapidly separating the nails from sheets of nails in which the heads are united along their edges, and finishing the heads of the nails. These nails have previously been made by casting the sheets of nails and separating them from each other, and subsequently decarburizing them, as fully described in Letters Patent No. 288,958, granted to W. W. Titzell, November 20, 1883, and as described by me in a separate application of even date herewith, Serial No. 174,173. They are now made by first casting the sheet of nails, then decarburizing the sheet of nails, and finally separating the nails from the sheet and finishing them, my present invention relating to the machine by which the nails are so separated from the sheet and finished.

It consists, essentially, in such apparatus provided with a reciprocating punch and a stationary knife or shearing device having cutting or breaking edges at right angles to each other and adapted to sever two sides of the nail-head at each operation of the reciprocating mechanism.

It also consists in forming the edge of this knife of a series of these cutting or breaking edges, thus forming a zigzag shearing-edge on the knife, and guide apparatus to feed the nail-sheets diagonally to the knife, so that two edges of the nail-head will be severed at one stroke of punch and the other edges at the next stroke thereof.

It also consists in combining with the knife a punch having a central hole to receive the shank of the nail when it is severed from the sheet.

It also consists in combining with the mechanism for severing the nail from the sheet an anvil having a suitable seat therein within which the head of the nail is compressed by the punch and so finished.

It also consists in forming this anvil of an intermittently-rotating cylinder having these seats formed therein at intervals, so that as soon as the nail head is formed therein it may be carried away to the point of delivery.

It also consists in certain details of construction hereinafter set forth.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a side view, partly broken away, illustrating my invention. Fig. 2 is a face view. Fig. 3 is a rear view. Fig. 4 is an enlarged perspective view of the operative parts of the machine. Fig. 5 is a detail cross-section diagonally of the machine on the line *xx*, Fig. 1. Figs. 6, 7, and 8 are enlarged detail views showing the operation of the dies. Figs. 9, 10, and 11 are views of the nail-sheets as cast, and Figs. 12 and 13 are views of finished nails.

Like letters of reference indicate like parts in each.

The sheets of nails from which the finished nails are formed by my improved machine are illustrated in Figs. 9, 10, and 11, and in section in Figs. 6, 7, and 8, these sheets being cast to shape and having the heads *a* united along their edges, the grooves or creases *a'* indicating the divisions between the nail-heads and the shanks *a''*. The sheets of nails are first decarburized, so rendering them soft and tough, and they are then fed to the finishing-machine.

The machine has the cast-metal body B, in the upper part of which is journaled the punch-shaft C, which connects by the clutch mechanism *c* with the band-wheel *c'*, mounted loosely thereon, the clutch mechanism being supported by the bracket *c''* and operated by suitable lever mechanism, *c'''*, extending to the front of the machine. At the forward end of the shaft C is the eccentric *d*, the box *d'* whereof is connected to the punch-slide D, which has a vertical reciprocating motion within the guide-box *d''* on the body B. At the base of the punch-slide D is the series of punches, *e*, these punches being secured in place within the clamps *d'''* at the base of the slide. The punches are set close to each other, with their

faces or sides diagonal to the body of the machine, and the corners or edges touching or nearly touching, as shown in Figs. 1 and 4, their side faces forming a zigzag corresponding to the zigzag shearing-edge of the knife or shearing-plate hereinafter referred to. Within each punch is the central hole,  $e'$ , which the shank  $a^2$  of the nail enters when the punch descends to sever a nail from the sheet, as shown in Figs. 7 and 8.

Where the machine is employed in making hob-nails, the end of the punch is beveled at the corners, as at  $e^2$ , for the purpose of allowing the corners of the nail-heads to be bent upward, as hereinafter referred to.

Journalled in the body B below the punches  $e$  is the anvil-shaft F, which works in journal-boxes  $f$ , one bearing,  $f'$ , of the shaft extending back through the body B and carrying the ratchet-wheel  $f^2$ . The shaft F has an intermittently-rotating motion imparted to it, so as to bring the anvil-seats  $i$  under the punches to receive the nail-heads, remaining stationary while the nail-heads are being compressed by the punches  $e$  within the seats to finish them, and to then carry the finished nails away, bringing another series of anvil-seats under the punches. This is accomplished by means of pawl mechanism G, operated by the cam  $g$ , through the bar  $g'$ , sliding in the journal-box  $g^2$ , this bar being connected by the rod  $g^3$  with the lever  $g^4$ , mounted on a pin extending out from the rear neck,  $f'$ , of the shaft F, and carrying a spring-pawl,  $g^5$ , engaging with the ratchet-wheel  $f^2$  on the shaft F. When the cam  $g$  presses down the bar  $g'$  through the pawl  $g^5$ , it turns the shaft the required distance, thus rotating it intermittently, the necks  $f'$  of the shaft being bound tightly within their boxes, so that they remain stationary, except when so rotated. The pawl mechanism G is raised by the spring  $g^6$  as soon as the cam  $g$  passes the bar  $g'$ . The dies  $i$  are formed in slides  $i'$ , having dovetailed sides or edges, and they fit in correspondingly-dovetailed recesses in the rotating anvil F, these slides being held in place by the journal-boxes  $f$ .

The shape of the seats corresponds, substantially, to the shape of the upper face of the finished nail-head, though where a heavy compression is not required, as in forming hob-nails, the seats have concave walls, the wall-head being only compressed sufficiently to bend up and point the corners between the walls of the seats and the beveled corners  $e^2$  of the punches.

Supported on the journal-boxes  $f$  is the knife or shearing plate K, which is bolted to the flat upper faces,  $f^3$ , of the boxes and fits closely to the anvil. This knife has a series of cutting or breaking edges,  $k$ , at right angles to each other, and formed in the plate diagonal or at an angle of forty-five degrees to its face  $k'$ , thus forming what may be termed a "zigzag shearing-edge" on the knife, the faces of which are all at right angles to each other. As the nail-sheet is fed to the shear at a line diagonal

to the line of punches, it is evident that the creases or depressions  $a'$ , forming the separating-lines of the nail-heads, correspond to the line of zigzag cutting-edge  $k$ , and that the nails are therefore sheared from the sheet along these creases, each knife-edge parallel to the length of the plate shearing one side of the nail-head and each knife-edge at right angles to the length of the plate shearing the other side of the nail-head across the plate. Along the top of the cutting-edge  $k$  is formed the lip  $l$ , which fits into the creases  $a'$  of the sheet, and supports it during shearing, as well as forms a guide for the feeding of the sheet. Secured to the plate K is the guide  $m$ , the side edges,  $m'$ , of which extend over the plate K, and beyond the plate K are bolted to the bottom plate,  $m^2$ , of the guide, the guide being supported by the bar  $m^3$ , bolted to the forward bearing,  $f$ . This guide is at an angle of forty-five degrees to the shearing-plate, so that it may feed the nail-sheet properly to the zigzag shearing-edge  $k$ . Across the front of the guide is the guard-plate  $n$ , under which the nails are fed, the plate  $n$  being supported by the bent arm  $n'$ , bolted to the guide-box  $d^2$  and extending back of the guide apparatus, the guard-plate being employed to press the nail-sheet down upon the shearing-plate and force the creases  $a'$  on the top face of the sheet over the lip  $l$  along the top of the shearing-edge, and so hold the sheet in proper position, the guard-plate pressing on the points of the nails, and also preventing the rising or canting of the sheet when the nails are severed from it. The bent arm  $n'$  has a slight spring, so that it allows the nail-plate to be fed under the guard-plate, and to hold the guard-plate down on the nails the spiral spring  $n^3$  is secured on the top of the guard-plate, and when the punch-slide D descends it strikes the spring, and so presses down the guard-plate and forces the creases of the nail-sheet over the lip  $l$ , as above described, holding the guard-plates down until the punch-slide rises. The guard-plate carries the guide lip or lips  $n^2$ , which fit between the shanks  $a^2$  of the nails and hold them in proper line relatively to the shearing-edge  $k$ . Two of these guide-lips  $n^2$  are preferably employed—one at each side of the guide  $m$ —and the lips fitting close on opposite sides of different rows of shanks and on different sides of the nail-sheet, so as to guide it properly to the shearing-edge. The nail-sheets are fed forward by the feeding-plate  $p$ , which has a reciprocating motion within the guide  $m$ , above the nail-sheet, its lower edge catching against one transverse row of nail-shanks and pressing the nail-sheet forward and then drawing back over the next row, so as to catch against it and feed it forward. The feeding-plate is pivoted to a bent lever,  $p'$ , hung from the box  $d^2$  by the bracket  $p^2$ , the upper arm,  $p^3$ , of the lever extending over the lug  $r$ , attached to the reciprocating slide D, which is preferably provided with a spring,  $r'$ , to prevent jarring of the parts, and as the slide D is raised when it ap-

proaches the highest point of its movement, the lug  $r$  or its spring  $r'$  strikes the bent lever  $p'$ , and so causes the forward movement of the feeding-plate  $p$  within the guide  $m$ , and feeds one diagonal row of nails under the punches. The nails are removed from the seats  $i$  by the bar  $s$ , against which the shanks of the nails strike as they are carried around by the rotating anvil, the bar drawing the nails out, and the finished nails dropping through the opening  $b$  in the body B into a suitable receptacle.

The operation of my machine is as follows:

The sheet of nails previously cast, and rendered soft and tough by malleableizing or similar process, is fed over the guide  $m$  until one row passes under the feeding-plate  $p$ , and upon the upward movement of the reciprocating punch-slide D the plate automatically feeds forward the nail-sheet, the operator's work being only to place the nail-sheets in position to be caught by the feeding-plate  $p$ . The nail-sheet is thus gradually fed forward until the nail at one corner of the sheet is brought under the forward punch  $e$  of the series of punches secured to the reciprocating slide D, and upon the descent of the punch the shank  $a'$  of this nail enters the central hole,  $e'$ , of the punch, and the punch severs the nail from the sheet along the lines of the zigzag shearing-edge  $k$  and carries the nail down with it, forcing its head into the seat  $i$ , and so finishing the head, according to the class of nail made and the finish desired. In making hob nails, as shown, the punch cuts off the nail-head square and within the die  $i$  simply bends the corners to form the prongs  $u$  on the under face of the nail-head. The punches are then raised, the anvil-die rotated to carry away the nail, and the nail-sheet again fed forward, and upon the descent of the punch two nails in a line diagonal to the sheet are separated therefrom and finished, the operation continuing until an entire row extending diagonally across the sheet is separated therefrom and finished at each operation of the punches. The central hole,  $e'$ , in the punches allows the nail-heads to be separated from the sheet and finished without in any manner injuring the shanks, which can be cast to their finished shape, this feature of the punch having a hole for the reception of the shank being important to the operation of the machine. The shearing-edge  $k$ , having faces at right angles to each other, enables me to shear two sides of the nail-head at each operation of the punch, one shearing-edge acting to sever the front face of the next nail to the one removed, and the side face of the nail beside the one removed, so that when these nails are fed forward they have two sides sheared, and the other two sides are severed on the next operation of the punches, thus removing the nails. The nail-sheets are guided to place by the side walls of the guide  $m$ , and also of the guide-lips  $n'$  on the guard-plate  $n$ , fitting between the rows of nail-shanks. They are also pressed down upon the zigzag lip  $l$  by the guard-plate, so causing the creases  $a'$  of the

sheets to fit around said lip, and this pressure is increased by the pressure of the punch-slide D upon the spring  $n^3$  upon the descent of the punches. The guard-plate has, however, sufficient spring to permit the feeding of the nail-sheet under it, its strongest pressure on the sheet being caused by the descending punch-slide, and it then acts to prevent the canting of the nail-sheet during punching. Upon the rotation of the anvil the nail-shanks  $a^2$  strike the bar  $s$ , and thus draw the nail-heads out of the seats, and the finished nails drop through the opening  $b$  into a suitable receptacle.

In order to change the machine for making other sizes or styles of nails, it is only necessary to remove the forward bearing-box,  $f$ , slide out the seat-slides  $i'$ , and insert proper ones, and substitute a proper clamp,  $d^3$ , at the base of the punch-slide.

In Fig. 8 are illustrated dies for forming upholsterers' nails, in which the punch, after separating the nail from the sheet, also shears off the waste material. The nail-sheet (shown in Fig. 10) has the waste metal  $v'$  between the nail-heads  $a$ , and the end of the punch  $w$  is circular, corresponding in size to the finished nail, while the anvil-seat  $w'$  is sufficiently deep to allow the punch to enter the seat and shear off this waste metal. These are the only changes in the machine, the punch first severing the nail from the nail sheet, and then shearing off any waste metal, as at  $v'$ , and then compressing the nail within the seat to finish it.

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

1. In apparatus for the manufacture of nails, the combination, with a reciprocating punch, of a shearing-plate having cutting edges at right angles to each other and acting to shear two sides of the nail-head at each operation of the apparatus, substantially as and for the purposes set forth.

2. In apparatus for the manufacture of nails, the combination, with a series of punches, of a shearing-plate having a zigzag cutting-edge, and a feeding-guide in a line diagonal to the punches and cutting-edge, substantially as set forth.

3. In apparatus for the manufacture of nails, the combination of a shearing-edge and a punch having a hole therein to receive the shank of the nail during the shearing of the nail-head, substantially as and for the purposes set forth.

4. In apparatus for the manufacture of nails, the combination of a punch having a hole therein to receive the shank of the nail, a shearing-edge, and an anvil-seat in line with the punch to receive the head of the nail, substantially as and for the purposes set forth.

5. The combination of the punch, the shearing-edge, and the rotating anvil, substantially as and for the purposes set forth.

6. In apparatus for the manufacture of nails, the combination of a punch, a shearing-edge, a rotating anvil having dies to receive the nail-heads, and stripping apparatus to with-

draw the nails therefrom, substantially as set forth.

7. In apparatus for the manufacture of nails, the combination of the rotating anvil having dies to receive the nail-heads and the stripping-bar adapted to withdraw the nails, substantially as set forth.

8. In apparatus for the manufacture of nails, the combination of a punch having a hole therein to receive the nail-shanks, an intermittently-rotating anvil having a seat to receive the nail-head, and apparatus for imparting motion to said anvil, substantially as and for the purposes set forth.

9. The anvil  $f$ , mounted in bearings, and having the ratchet-wheel  $f^2$ , in combination with the cam  $g$ , sliding bar  $g'$ , connecting-rod  $g^3$ , lever  $g^4$ , and spring-pawl  $g^5$ , substantially as set forth.

10. In apparatus for the manufacture of nails from nail-sheets, the combination of a shear, an anvil-die, and a reciprocating punch adapted in co-operation with the shear to sever the nail from the sheet, and in co-operation with the anvil-die to shear off waste metal on the edges of the nail-head, substantially as and for the purposes set forth.

11. In apparatus for the manufacture of nails from nail-sheets, the shearing-plate having a lip along the shearing-edge to fit within a crease on the sheet and hold it in place, substantially as set forth.

12. In apparatus for the manufacture of nails from nail-sheets, the combination of a line of punches, a shearing-plate having a shearing-edge, a guide extending back from said shearing-edge, and reciprocating feeding apparatus operating within said guide, substantially as and for the purposes set forth.

13. In apparatus for the manufacture of nails from nail-sheets, the combination of the line of punches  $e$ , the shearing-plate  $K$ , a guide extending back from the edge of said plate, and the reciprocating feeding-plate  $p$ , adapted to catch against the nail-shanks and push the sheet forward, substantially as set forth.

14. In feeding apparatus for nail-machines, the combination of the guide  $m$ , feeding-plate  $p'$ , bracket  $p^2$ , and the reciprocating slide  $D$ , having the lug  $r$ , substantially as and for the purposes set forth.

15. In feeding apparatus for nail-machines, the combination of the guide  $m$  and guard-plate having guide lip or lips  $n^2$ , substantially as set forth.

16. In feeding apparatus for nail-machines, the combination of the shearing-plate having the lip  $l$  along its shearing-edge, the guide  $m$ , feeding-plate  $p$ , and spring guard-plate  $n$ , substantially as and for the purposes set forth.

17. In feeding apparatus for nail-machines, the combination, with the guide  $m$ , of the guard-plate  $n$ , extending over the guide, and supported on the bent arm secured to the body of the machine, substantially as and for the purposes set forth.

18. In nail-machines, the combination, with the reciprocating slide  $D$ , carrying one or more punches, of the guard-plate  $n$ , having the spring  $n^3$  in the course of the slide, substantially as and for the purposes set forth.

In testimony whereof I, the said JOHN S. DICKSON, have hereunto set my hand.

JOHN S. DICKSON.

Witnesses:

A. M. IRWIN,  
JAMES I. KAY.