

W. Wickerham, 3. Sheets, Sheet. 1.

Horseshoe Nail Machine.

No. 97,141.

Patented Nov. 23. 1869

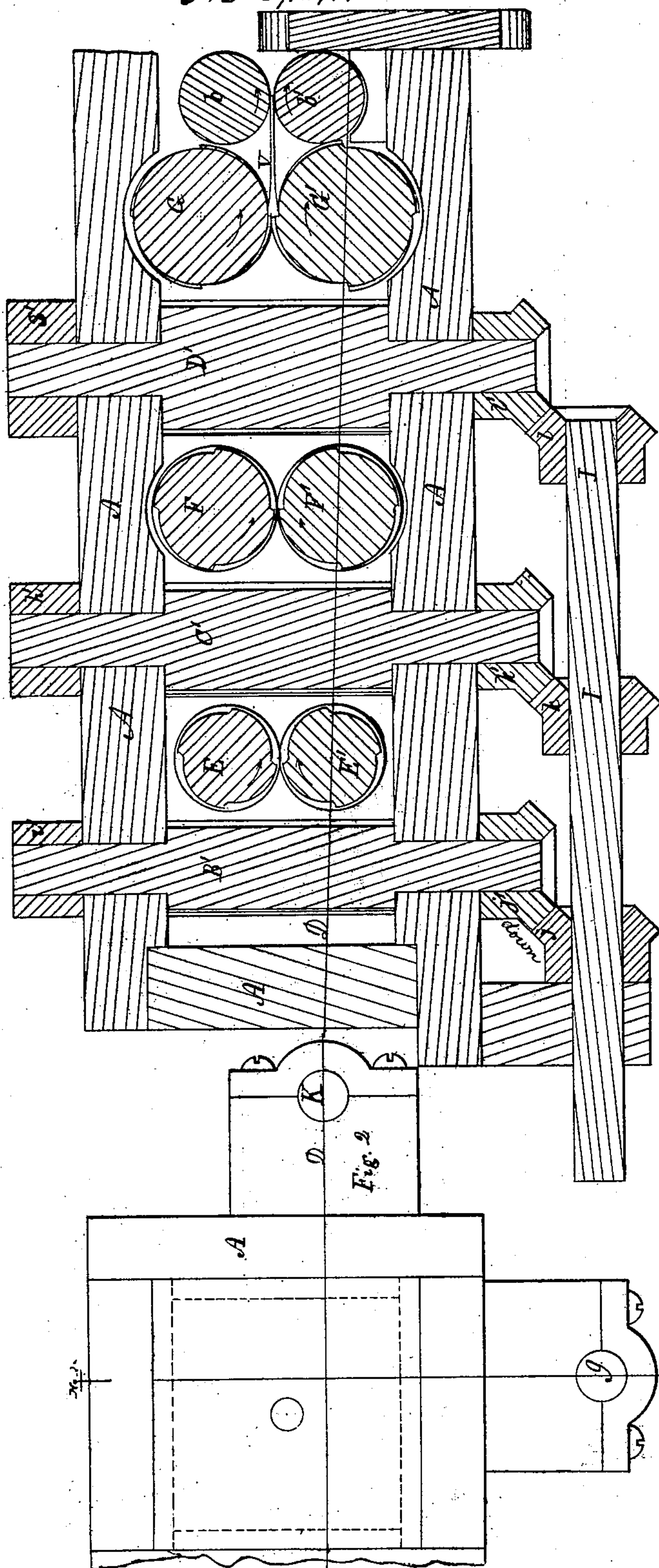


Fig. 3



William Wickerham

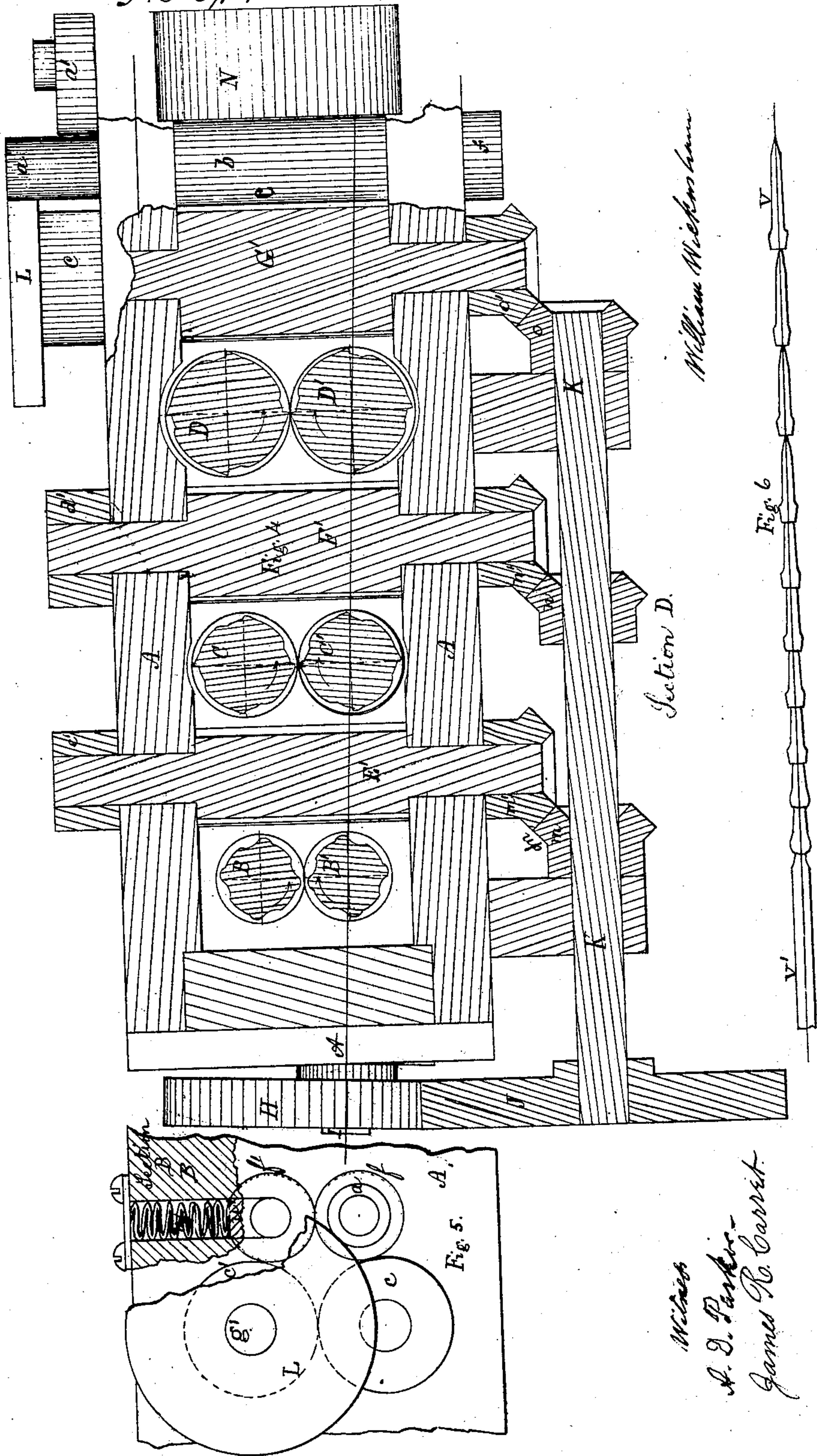
Witness  
A. D. Foster  
James R. Barrett

W. Wickersham, 3. Sheets, Sheet 2.

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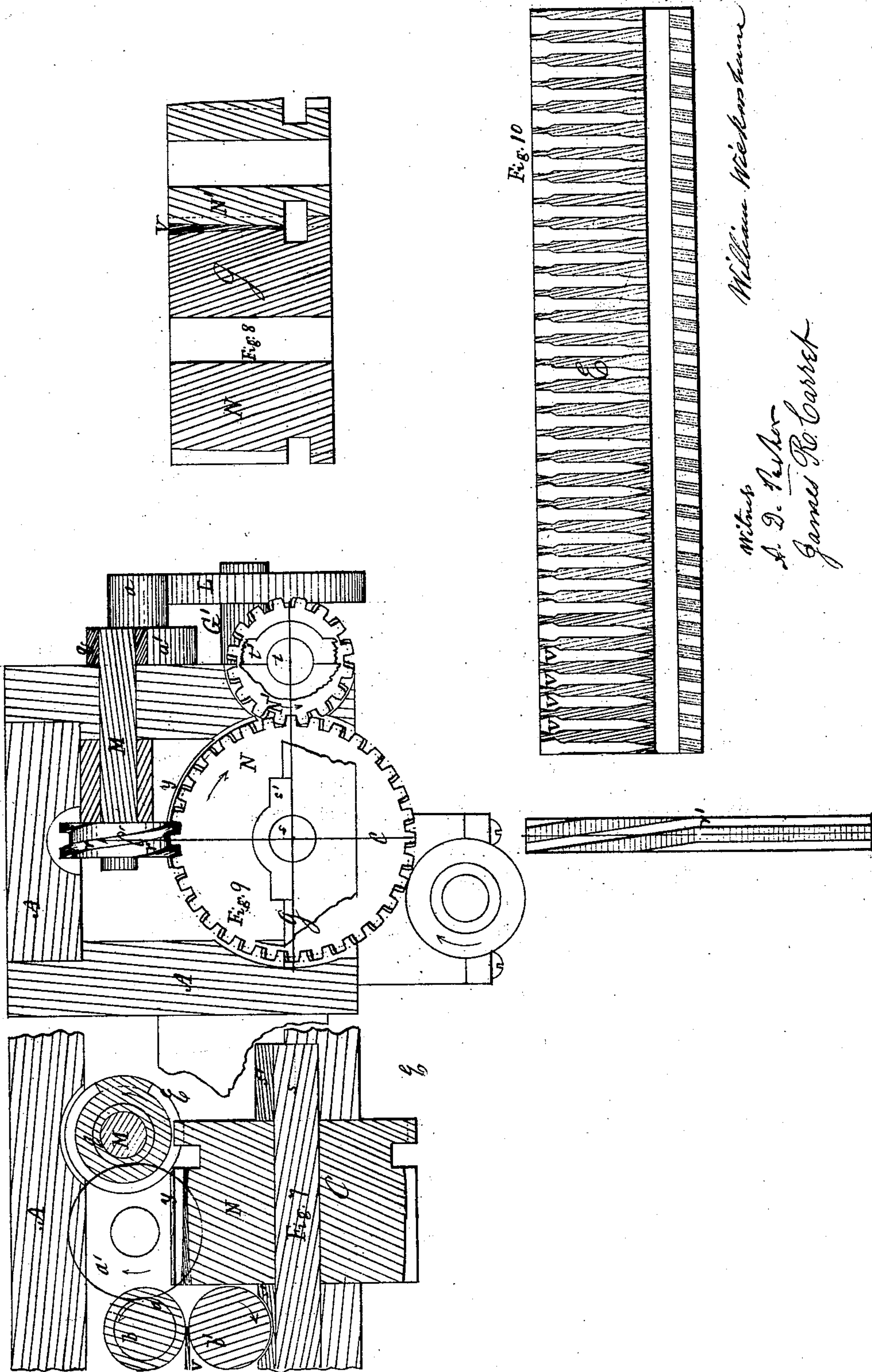


W. Wickersham, 3, Sheets, Sheet 3.

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Witness  
A. D. Parker  
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William Wickersham



# United States Patent Office.

WILLIAM WICKERSHAM, OF BOSTON, MASSACHUSETTS.

Letters Patent No. 97,141, dated November 23, 1869.

## IMPROVED MACHINE FOR MAKING NAILS FOR HORSESHOES.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern:*

Be it known that I, WILLIAM WICKERSHAM, of Boston, in the county of Suffolk, and State of Massachusetts, have invented a new and useful Improvement on the Horse-Nail Machine; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention consists in an improved machine for making horse-nails, so contrived that a bar of metal of indefinite length may pass continuously through it, and thereby be formed into complete nails, straightened and pointed, all ready for use, by means of two series of pairs of working-rolls, one series for the side, and the other for the edge of the nail, the rolls of each successive pair being larger than the preceding ones, in proportion to the increasing length of the forming nail, as it advances through the machine, toward its completion, and by means of a pair of gears, having their teeth and spaces so formed that a nail, being placed into one of the spaces, will be pressed by a tooth of the other gear of the pair, into the proper form for use, pointing, so called, included.

By means, also, of a suitable device, consisting of two rolls, to take the nail as it leaves the working-rolls, and throw it into the press-gear.

The first feature of my invention relates to the working-rolls, and consists in making each successive pair of working-rolls in each series larger than the preceding pair, in proportion to the increasing length of the forming nail, as it advances through the machine, while the number of spaces in the sides of the rolls, for the formation of the nails is the same in each roll of the machine.

The second feature of my invention relates to the device for straightening and pointing the nails, and consists in so constructing a pair of press-gears, that when a nail is placed in one of the spaces between the teeth of one of the gears, and one of the teeth of the other gear presses on to it, as the two gears mesh together, that the nail shall be thereby straightened, and the point bent into the proper form for use.

The third feature of my invention relates to the device for throwing or carrying the nail from the working-rolls to the press-gears, and consists in two rolls, placed between the last pair of working-rolls and the press-gears, so arranged that they will receive the nail from the working-rolls, and throw it into one of the spaces between the teeth of the press-gear.

Referring to my drawings, I will here state that each letter of reference denotes the same part, where-

ever it may occur in the several drawings; that the place of each section is marked by a red line, and each section is marked by a red letter, corresponding to the one on the line, and that the gears, except the press-gears, are drawn to the pitch-line only.

Figure 1, sheet 1, is a perpendicular section of the part of the machine which converts the bar of metal into nails, through the red line A; also shows a cross-section of the rolls, which carry the nails from the working-rolls to the press-gears.

Figure 2 shows a view of the end of the machine where the nail-bar enters.

Figure 3 is an edge view of the bar, in its different stages of conversion into nails.

Figure 4, sheet 2, is a horizontal section of the machine, in the red line D.

Figure 5 is a side elevation of the part of the machine containing the device for throwing or carrying the nail from the working-rolls to the press-gears.

Figure 6 is a side view of the nail-bar, showing the different stages of formation into nails, as it passes through the machine.

Figure 7, sheet 3, is a perpendicular section in the red line C, through the large press-gear, the carrying rolls, and the screw-feed.

Figure 8 is a horizontal section in the red line G, through the two press-gears, and a nail in its place, receiving its proper form by the pressure of the gears.

Figure 9 is an end view of the machine, showing the press-gears, feeding-arrangement, &c.

Figure 10 is a section in the red lines E, in the pitch-line of the large press-gear, showing the form of the spaces to receive the nails, also showing the nails in part of these spaces.

A is the frame, to which the machinery is attached.

B B' C C' D D' compose the series of working-rolls, which form the edges of the nails.

E E' F F' G G' compose the series for the formation of the sides of the nails.

H is the gear on the shaft I, which runs the working-rolls, which form the edges of the nails.

J is the gear on the shaft K, connected with the gear H, and running the working-rolls, which form the sides of the nails.

L is a gear, attached to the working-roll g, and operating the gear a on the carrying-roll b.

b b' are the two carrying-rolls.

c c', d d', e e', are the gears connecting the two rolls of each pair of one series of the working-rolls.

f f' are two gears, connecting the carrying-rolls at the opposite end from the gear a.

The gears g g', h h', i i', connect the two rolls in each pair of the other series of working-rolls.

The cone-gears j k l on the shaft I work into the



gears  $j' k' l'$ , thereby giving motion to one series of the working-rolls, and the cone-gears  $m n o$ , on the shaft K, work into the gears  $m' n' o'$ , thereby giving motion to the other series of working-rolls, and the gear  $a$ , on the shaft of the roll  $b$ , works into the intermediate gear  $a'$ , which moves the gear  $q$  on shaft M, on to which is fastened a feed-screw,  $r$ , which gives an intermittent motion to the press-gears N N'.

The pitch-line size, and the relative positions of these gears  $a a'$  and  $q$ , are shown in red in fig. 7.

$s$  is the shaft of the press-gear N, and  $s' s'$  are the boxes for the same.

$t$  is the shaft, for the press-gear N', and  $t' t'$  are the boxes for the same.

$u$  is a spring, pressing the box  $u'$  on to the shaft of the carrying-roll  $b'$ .

$v v v$ , &c., are the nails.

$r'$ , the nail-bar.

In describing the operation of my machine, it is proper here to say that each working-roll of any pair is so connected to the other by gears at their ends, that they must turn the same number of rounds, and this may be said of every working-roll in the machine, as they all revolve on their axes with a uniformity of motion, and, in the same time, as the two gears H and J on the shafts I and K are the same size, and all the cone-gears on these shafts, and all the cone-gears into which they work on the working-rolls, are alike in size.

The two rolls  $b b'$  are connected at one end by two gears  $f f'$ , of the same size, to insure uniformity of motion.

At the other end the roll  $b$  is connected with the working-roll  $g'$ , through the gears L and  $a$ , in such manner as to give these carrying-rolls a greater speed than the working-rolls.

An intermittent motion is given to the press-gear N, for the purpose of having it at rest, while the nail is thrown into the space between its teeth, by the carrying-rolls  $b b'$ , and it moves around the space of one tooth, in the intermediate time between the throwing of the nails.

This intermittent motion is effected by having the feed-screw thread  $r$  straight or parallel to its motion, through half of its circumference, and the other half in the form of a screw, as shown in the surface view at  $r'$ , fig. 9, and the screw part also at  $r$ , thereby imparting motion to the gear N, during half the revolution of said feed-screw.

There is a thin metallic plate,  $y$ , shown at figs. 7 and 9, fitted close against the teeth of the gear N, and extending from the place where the nails are thrown into the gear to the gear N'.

The purpose of this is to hold the nails in their places between the teeth, until they reach the other press-gear.

A view in section of the press-gears is shown at fig. 8, showing the forms and positions of the parts which do the pressing; also, showing a nail in the gears while being pressed into its proper form.

The roll  $b$  receives its motion through the gear  $a$ , which is driven by the gear L, attached to the roll  $G'$ , and the two rolls  $b b'$  are connected by the gears  $f f'$ , of the same size, the pitch-lines of which are shown in red ink in fig. 5. The gear L is much larger than the gear  $a$ , giving the rolls  $b b'$ , a greater motion than the working-rolls.

The working-rolls B B', C C', D D', have four grooves or spaces cut out in the sides, from one end to the other, suitable for the length and shape of the edges of the forming nails, corresponding to the length of four nails, around the circumference of the rolls, and as the nails (or metal of which they are forming) are drawn longer, by passing between the rolls B B', the rolls C C' must be larger, and their four spaces wider than these to correspond to the increased length of the nails, in order that these second rolls in the series contribute

to the formation of the nails, by said forming-nails passing between them, and for the same reason the rolls D D' must be larger than the rolls C C', and in like manner in the other series E E', F F', G G', for the formation of the sides of the nails, the size of the rolls must increase, to correspond to the increasing length of the forming nails, as they advance between the rolls from one end of the machine to the other.

This varied size of the different working-rolls from one end of the machine to the other should agree accurately with the increasing length of the nail, so that when a nail approaches any pair of rolls, it will agree in length with the width of any space it meets in the sides of said rolls.

Having described the different parts and various devices of my machine, I will describe its general operation.

The iron used for horse-nails should be of the best quality. Swedish iron is commonly used. It should be accurately rolled or drawn through a wire plate, to about the size of the head part of the nail, and then well annealed, and the scale taken off by placing it in a bath, made of a solution of sulphuric acid and water, and afterward cleaned from all remains of acid by lime-water, or any other known way.

Being thus prepared, the iron may be wound on to a reel, and from that run through the machine, by passing first through between the working-rolls B B', thereby doing the first work in the formation of the edges of the nails.

Next, it is passed between the rolls E E', which do the first work in the formation of the sides of the nails. Then, successively, it passes between the rolls C C', F F', D D', and G G', which last finishes the nails, so far as the size of each part of the nail is concerned, but they may not be straight, and the point needs to be bent a little to one side, to give it an incline outward, toward the outside of the hoof, as it passes into the same, in nailing on the shoe, therefore, I have invented the device before described, for straightening and pointing the nails, after they pass through the working-rolls.

The head of each nail is separated from the point of the one which follows it by the rolls G G', by a device previously patented by me, and when so separated, it is taken between the rolls  $b b'$ , carried into one of the spaces between the teeth of the press-gear N.

One of these rolls,  $b$ , has boxes  $u'$  over its bearings, which are pressed on to the bearings by springs  $u$ , as shown in section in fig. 5.

When the nail is thrown into the space in the gear N, it is held in its place by a shield,  $y$ , and kept there as the gear turns, until it is pressed into its proper form by a tooth of the other press-gear N', after passing between these press-gears, and thereby straightened and pointed, it is dropped out as finished and ready for use.

The working-rolls may have three, four, five, or any convenient number of spaces in their sides, for the formation of nails, but in each case all of them have the same number of spaces.

I do not confine myself to three pairs of working-rolls in each series, as some kinds of iron may require a greater number of rolls than other kinds, and again, it may be needful, in some cases, to have two or three machines to complete the work, giving the opportunity of annealing the iron, after running through one or more machines, and the work being partly done before the nails are completed by a second or third machine.

Having thus fully described my invention,

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

1. In horse-nail machines, two series of pairs of working-rolls, one series placed at right angles to the other, each with a progressive increase of size



from the beginning pair, and formed and constructed with longitudinal grooved surfaces, as described, so that they shall have the same size and form throughout their whole length, and having working-surfaces such, that each pair shall work on the opposite sides only, or opposite edges only, of the nail, while it is being formed, as it passes between them, substantially in the manner described, and for the purpose set forth.

2. The combination of the cutting-rolls *G G'*, transferring-rolls *b b'*, and press-gears, as described, and for the purpose set forth.

3. In machines for making nails for horseshoes, the

intermittingly rotary press-gears *N* and *N'*, operating in conjunction to form a series of dies, in which to straighten and incline the point of a nail, otherwise completed, substantially as set forth.

4. In horse-nail machines, the irregular screw *f*, in combination with the press-gears *N* and *N'*, for imparting to said gears an alternate motion and rest, as and for the purpose set forth.

WILLIAM WICKERSHAM.

Witnesses:

A. D. PARKER,  
JAMES R. CARRET.