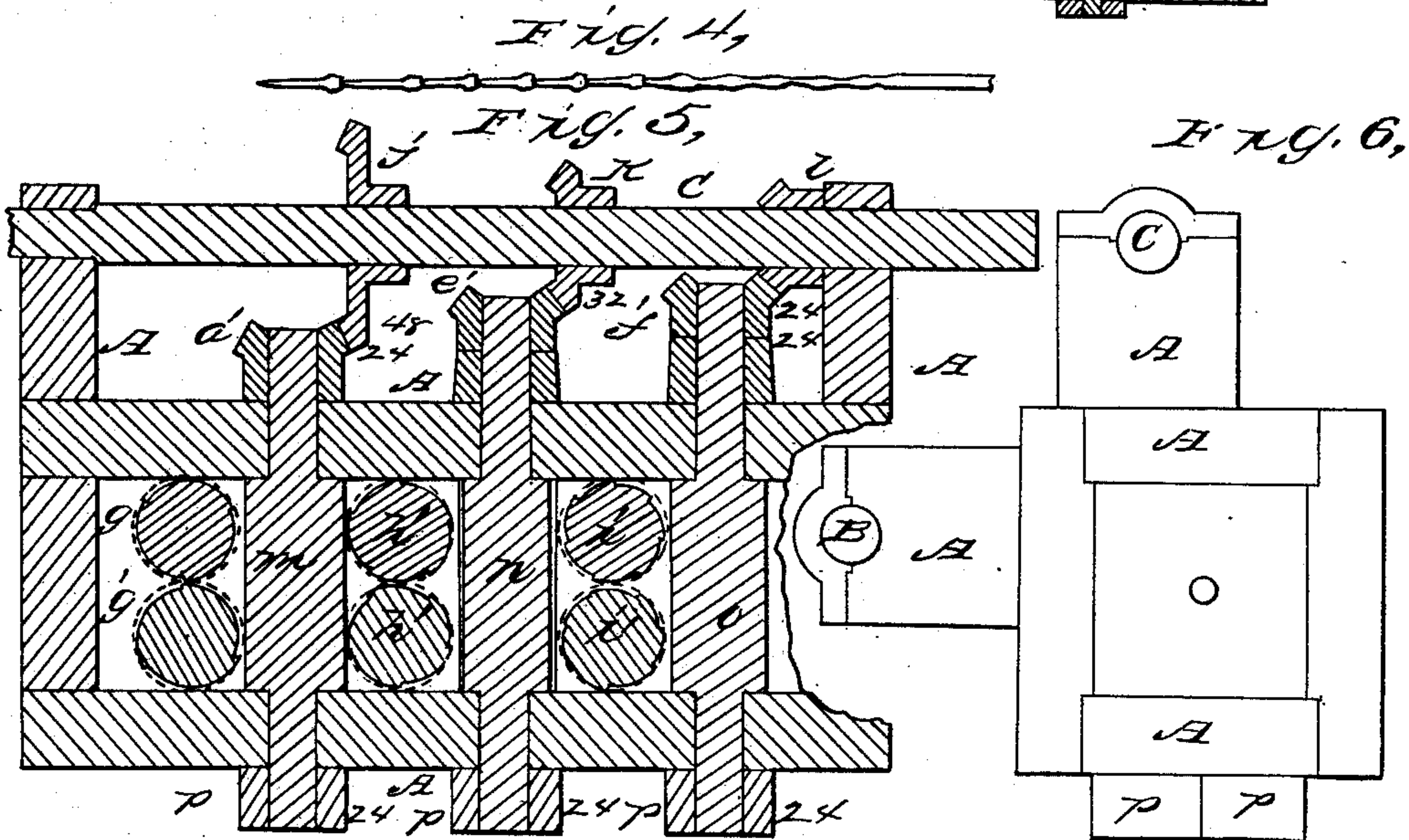
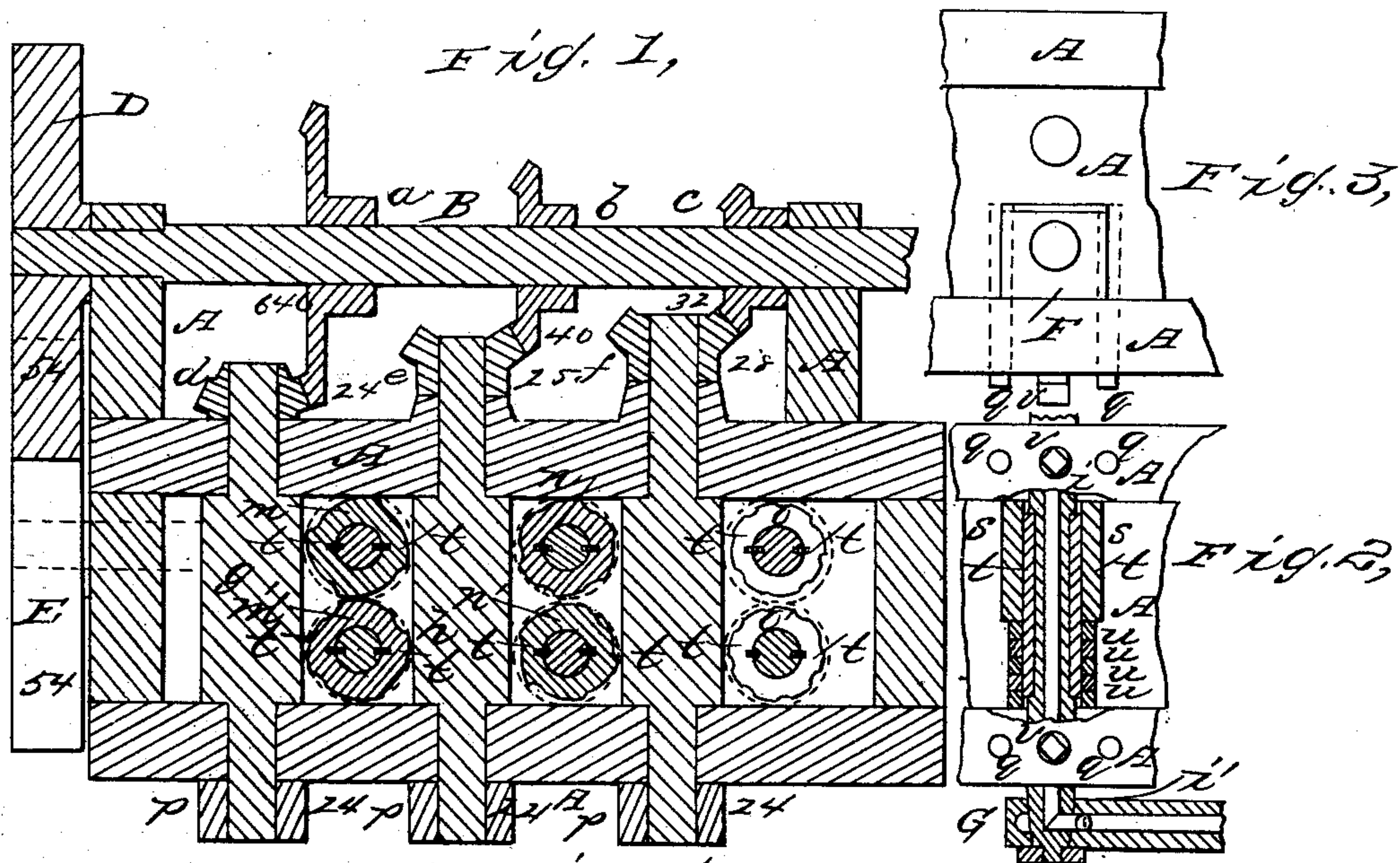


W. WICKERSHAM.
Horseshoe Nail Machine.

No. 69,734.

Patented Oct. 8, 1867.



Witnesses:
A. D. Parker
John F. Bond.

Inventor:
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UNITED STATES PATENT OFFICE.

WILLIAM WICKERSHAM, OF BOSTON, MASSACHUSETTS.

IMPROVED MACHINE FOR MAKING NAILS FOR HORSESHOES.

Specification forming part of Letters Patent No. 69,734, dated October 8, 1867.

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 the figures and letters marked thereon.

The nature of my invention consists in making horse-nails by means of two series of rolls, one of these series forming the edges of the nails, and the other series forming the sides of the same; one series being at right angles to the other, and so arranged that when the bar of metal or wire coming from a reel passes between the two first rolls of the first series, and has part of the work done thereby in the formation of the edges of the nails, it shall next pass between the two first rolls of the second series, and in like manner have part of the work done in the formation of the sides of the said nails, and thus passing from the rolls of one series to those of the other, alternately, each successive pair contributing something to their formation, until the last pair finish the nails and separate them from each other.

The first feature of my invention relates to such construction and arrangement of the machine as will allow a wire or bar of metal of indefinite length (without being previously cut or formed into "blanks," so called) to pass continuously through, and, by the operation of the machine while thus passing, be converted into nails by means of two series of rolls—one for the edges and the other for the sides of the nails—each successive pair of rolls having a greater motion than the preceding ones, the increase of motion being suited to the increased length of the metal of which each nail is being formed.

The second feature of my invention relates to the form and construction of the rolls, and their relation in the series; and consists in forming spaces or grooves having the same form and depth from one end to the other in cylindrical rolls, the form being such that a bar of metal passing through between two such rolls as the first pair of a series will receive a form approaching to that of horse-

nails, and the second pair of the series of rolls being of such form that the same metal passing between them shall approach still nearer to the form of a horse-nail, and the whole series working conjointly with a second series having the spaces cut in each pair of rolls, so successively varied in form and width as to completely form the bar or wire into horse-nails by its passage through said series.

The third feature of my invention relates to the manner of arranging the working-rolls on their shafts, by which each part of said roll, when too much worn for use, may be shifted from the work and a new part shifted in its place, and thereby each part of the roll successively used.

The fourth feature of my invention relates to the method of preventing the working-rolls from becoming too hot for use while the heated bar of metal is running through the machine; and consists in making the shafts on which the working-rolls are placed hollow, and having such a faucet arrangement on one end as will admit a constant stream of water through said shaft while it is turning.

The fifth feature of my invention relates to the method of cutting or separating the nails from each other; and consists in having the projections on one of the rolls of the last pair longer than they are on the other roll, by means of which arrangement, while each head is held firmly between the rolls, the point of next nail adjoined thereto will be separated from said head.

Referring to my drawing, Figure 1 is a perpendicular section from one end to the other of my machine, showing a cross-section of the working-rolls of the first series, or those which form the edges of the nails, and a longitudinal section of one of each pair of the rolls of the second series, or those which form the sides of the nails, together with the shaft and gears which give them motion. Fig. 2 is a longitudinal section of one of the working-rolls, with a faucet at one end to transmit water through said roll, also showing the arrangement by which the roll is shifted on the shaft when one part is worn. Fig. 3 shows a side view of the plan for adjusting the working-rolls as to their distance from each other. Fig. 4 is a side view of the bar of metal as it is

passing through the machine and in its different stages of formation into nails. Fig. 5 is a horizontal section at right angles to the section shown in Fig. 1, showing a cross-section of the working-rolls of the second series, and a longitudinal section of one of each pair of the working-rolls of the first series, together with the shaft and gears operating them. Fig. 6 is an end view of the machine, showing the location of the two shafts B and C, which operate the two series of working-rolls. Fig. 7 is an edge view of a bar of metal as it is passing through the rolls of the second series in the machine, showing the different stages of its formation into nails.

The same letter will denote the same part in whatever figure it may occur.

A is a frame, to which the machinery is attached. B is the shaft containing bevel or cone gears *abc*, which drive the working-rolls *ghi* of the second series through their gears *def*. C is the shaft containing the cone-gears which drive the working-rolls *mno* of the first series through their gears *d'e'f'*. These two shafts are connected together by gears D and E, of equal size, so as to insure uniformity of motion in the working-rolls of both series.

I have marked numbers on the drawings of all the gears in my machine, which indicate the number of teeth which each gear contains; also, the gears are shown merely to the pitch-line, the teeth not being drawn. The gears *p p*, &c., have twenty-four teeth each, and connect the two working-rolls of each pair together to insure their concurrent working.

F, Fig. 3, is an adjustable box for the bearings of one of each pair of rolls, a top view of which is shown in Fig. 2. *q q* are two pins, which hold the box in its place, and on which it slides. *r r* are screws for the adjustment of the two rolls of a pair as to the distance between them. *s s*, Fig. 2, show the working-roll when it is made hollow and placed on a shaft. *t t* are two splines in the shaft *i*, which insure the rolls turning with it. *u u u*, &c., are washers for the double purpose of filling up the space and for changing to the other end of the working-roll from time to time, so that when one part of the roll is too much worn to do good work said roll can be shifted on the shaft and a new part presented to the work.

At G is a faucet arrangement, by which a stream of water can be thrown through the hollow of the shaft at *i* while it is turning. The hollow in the shaft for a current of water and working-roll, as fitted onto the shaft with the washers *u u u*, &c., for adjustment, are shown in the drawings at Fig. 2, and the adjustable box is shown on one of the rolls in the drawings at Fig. 3.

I have shown all of the working-rolls of the same size, though they may be of different sizes, if found an advantage, and as the portion of metal for each nail increases in length as it is wrought on successively by passing between the different pairs of rolls in the machine, I have the spaces for the forming nail

in the successive rolls increased in the same ratio; and as this cannot be done while the rolls are of the same size without diminishing the number of these spaces in each successive pair, I do this, and make eight spaces in the first pair, seven in the second, six in the third, five in the fourth, four in the fifth, and three in the sixth and finishing pair, though I do not confine myself to these numbers of spaces, for other numbers, and, indeed, any number of spaces in the successive rolls which will be suited to the lengthening of the metal as it passes through the machine, will answer the purpose. These spaces are cut out of the sides of cylindric rolls, having the same depth and form from one end of the cylinder to the other, and are made of such form and depth and length, measured in the circumference of the cylinder, as is necessary for each successive pair of rolls to do its share of the work.

I have constructed and arranged the cone-gears which move the working-rolls in such manner as to give motion or speed to these rolls in the inverse ratio to the number of spaces in their sides for the formation of the nails. For instance, the rolls *o o* have eight spaces and the rolls *m m* have four spaces, and the latter turn twice round to the former's single revolution, or, in other words, one space in any of the rolls, however long or short, moves past a given point in the same time.

It will be seen that the projections on the roll *g'*, Fig. 5, are longer than those of the roll *g* of the same pair. These longer projections (but not those on roll *g*) operate as cutters for cutting the heads from the points or separating the nails from each other, the head being held firmly between the two rolls at the time this separation takes place.

My machine operates as follows: The iron should be rolled into a wire of suitable size—about the thickness and width of the head of the nail when finished—and then, to secure better uniformity, it should be drawn through a wire-plate and wound onto a reel. There are two ways of heating the wire. One is to place the reel containing the wire in an oven suitably constructed, and, when hot, the wire may be drawn from the reel and run through the machine; or the reel may be placed behind a furnace in such manner that the wire can pass from the reel through the furnace to the machine, and in either case it will pass through between the rolls *o o*, which partially shapes the edges of the nails, and then between the rolls *i i*, partially forming the sides of the same, then between the rolls *n n'*, the rolls *h h'*, *m m'*, and finally between the finishing-rolls *g g'*, which finish their form and separate them from each other, as before described, the machine turning in the direction to carry the iron through, as just indicated.

Nails may be made of the best quality of iron without heating the wire, and in this case it may be found an advantage, after a longer experience, to have two machines—the first one to do part of the work, and the second machine,

after annealing the iron, to completely finish the nails. Indeed, a third machine is in some cases advantageous, allowing the iron to be annealed twice during the process.

With this description of my machine and the method of using it, I will state my claim to be—

1. In horse-nail machines, the device of two series of working-rolls—one series for the side and one for the edge of the nails—so arranged that each succeeding pair of rolls from the first shall have a greater motion than the preceding pair, suited to the increasing length of metal as it passes through the machine, and so arranged that where the rolls are formed as described a wire of indefinite length, in passing continuously through the machine, will be completely formed into nails, or partially so formed, ready for another similar machine to finish, as described.

2. The construction of a series of pairs of working-rolls, in horse-nail machines of cylindrical form, with grooves or spaces on the outside having the same form and depth, extending from one end to the other of the rolls, and

suited for the side or edge of the forming nails, and so arranged in the series that each succeeding pair shall have wider spaces than the preceding ones, and suited to the increasing length of the forming nails as they pass from the first to the last of the series, substantially as described.

3. The arrangement of the working-roll on the shaft with washers which are transferable from one end of the roll to the other in such manner that all parts of the roll may be successively used, as described.

4. I claim the application to the rolls herein described of a stream of water, in the manner and for the purpose set forth.

5. I claim the device herein described for separating the head of the nail from the point of the succeeding nail, in the manner and for the purpose set forth.

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Witnesses:

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