Sheet 1, 3 Sheets.

L. H. Dwelley.

Horseshoe-Nail Machine.

No. 48,798. Patented Jul. 18, 1865.

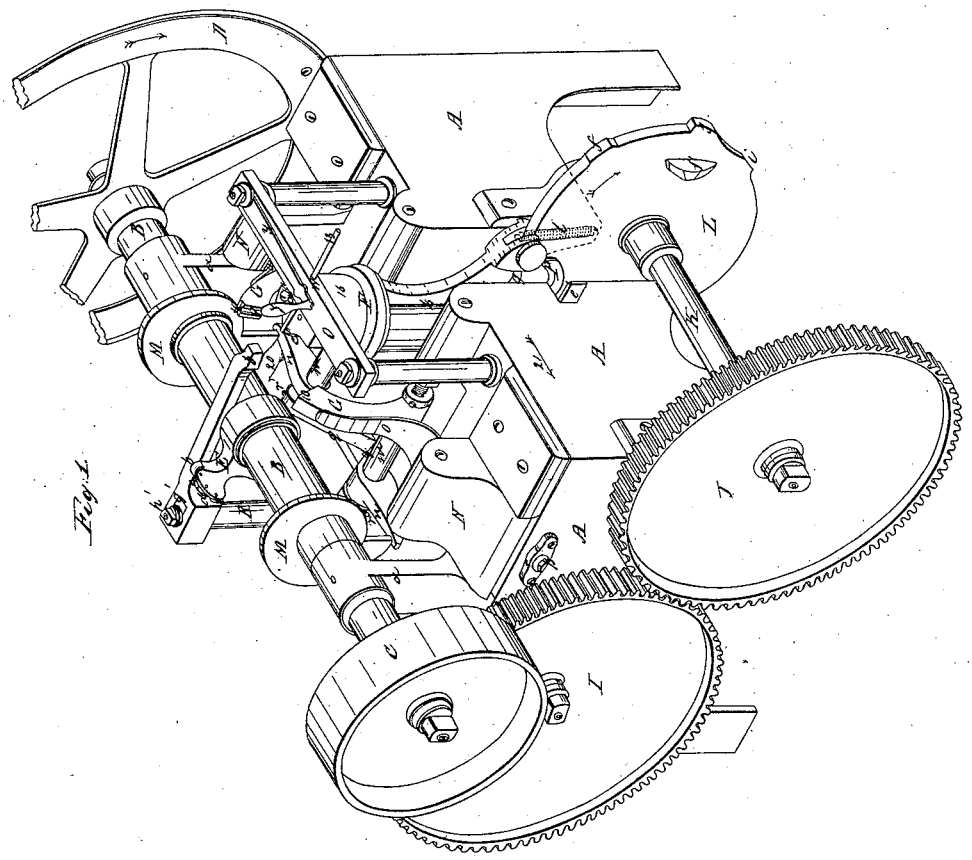

Fig. 1.

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Sheet 2, 3 Sheets.

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Fig. 5.

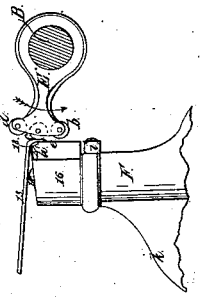

Fig. 6.

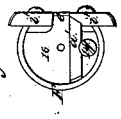

Fig. 7.

Fig. 2.

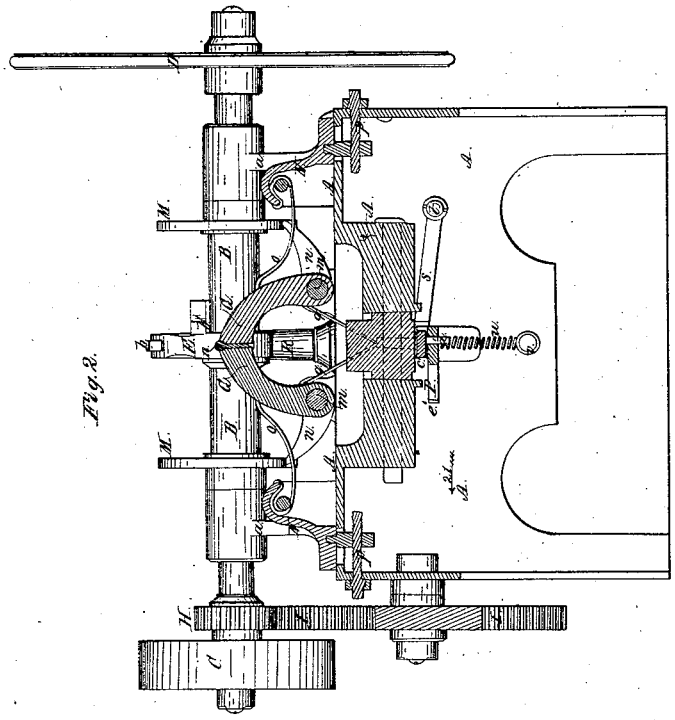

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Fig 4.

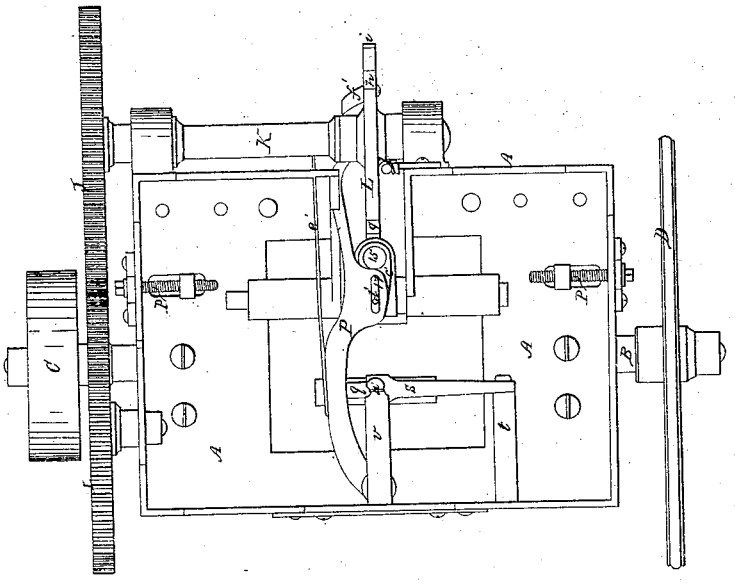
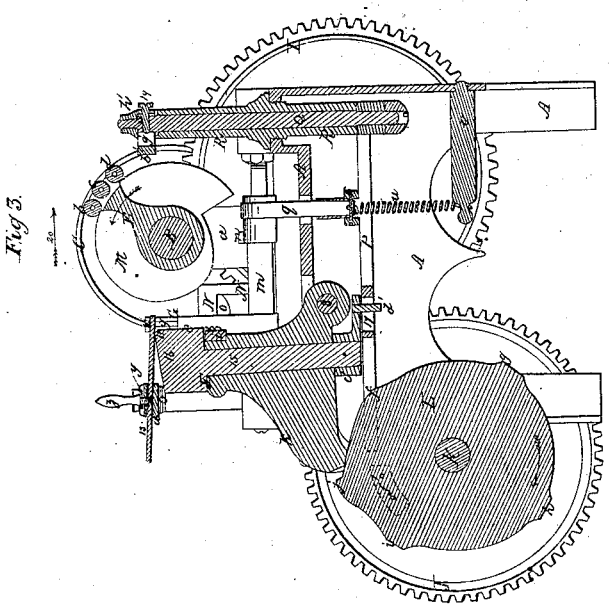


Fig 3.



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UNITED STATES PATENT OFFICE.

LUCIUS H. DWELLEY, OF DORCHESTER, MASSACHUSETTS.

MACHINE FOR MAKING HORSESHOE-NAILS.

Specification forming part of Letters Patent No. **48,798**, dated July 18, 1865.

To all whom it may concern:

Be it known that I, LUCIUS H. DWELLEY, of Dorchester, in the county of Norfolk and State of Massachusetts, have invented an Improved Machine for Making Horseshoe and other Wrought Nails, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a perspective view of my improved machine. Fig. 2 is a longitudinal vertical section through the same in a plane passing through the center of the side hammers, looking in the direction of the arrow 20. Fig. 3 is a transverse vertical section through the center of the machine, looking in the direction of the arrow 21. Fig. 4 is a plan of the under side of the machine; Figs. 5 and 6, details to be referred to. Fig. 7 is a view of a horseshoe-nail.

My invention relates to that class of machines in which the nail is made from a continuous rod or bar, and consists in forming the nail on two sides by means of a revolving arm or segment, furnished with a succession of rolls placed at unequal distances from the center, around which they are carried in connection with a vibrating "former" having an intermittent progressive or gaining motion, while the alternate sides are formed by means of spring-hammers; and my invention also consists in feeding in the rod by means of the cutter or other device, so arranged as to draw it forward into the machine a sufficient distance to form the next nail previous to cutting off the nail already formed on the end of the rod; and my invention furthermore consists in certain details which will be more fully set forth hereinafter.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawings, A is the frame-work of the machine, in suitable bearings, *a*, rising from which runs the driving-shaft B, which carries at one end the driving-pulley C and at the opposite end the fly-wheel D.

E is an arm or segment projecting from the driving-shaft, which carries at its outer end three rolls, *b c d*, placed at gradually-increasing distances from the center of the driving-shaft, around which they are carried, for the purpose of gradually reducing the nail, and thereby preventing the grain of the iron from being injured, as will be more fully described hereinafter.

F is a vibrating former, pivoted to the frame-work at 8, and against the front face, *e*, of which the nail-rod is bent down and drawn out by the rolls *b c d* as the arm E revolves, as seen in Fig. 5. I will now proceed to describe the manner in which this former F is advanced at each revolution of the arm E, so as to gradually contract the space between its face *e* and the rolls *b c d*, for the purpose of causing them to gradually draw down the nail to the required form on two of its sides, (the alternate sides being formed by means of spring-hammers G, as will be afterward described.)

H is a pinion on the driving-shaft B, which gives motion through the intermediate wheel I to a gear, J, on the shaft K, which runs in bearings projecting from the side of the frame-work. This shaft carries at its inner end the cam-wheel L, on the periphery of which are five projections, *f g h i j*, of the form seen in Fig 3, which are formed at gradually-increasing distances from the center around which they revolve.

k is an arm projecting from the former F, and having its lower end bifurcated, so as to embrace the periphery of the wheel L, against which it is constantly held by means of the spiral spring *l*, (shown dotted in Fig. 1,) one end of which is attached to the frame-work. It will thus be seen that as the wheel L is revolved the projections on its face will strike successively against the arm *k* and vibrate the former F, (each time farther forward,) and these vibrations take place just previous to the arrival of the rolls *b c d* opposite to its face *e*, by which means the gradual reduction of the nail is effected on two of its sides. As soon as the projections on the wheel L pass from under the arm *k*, the former F is carried back a short distance by the spring *l*, so as to allow the hammers G to operate on the alternate sides of the nail. These hammers are of the form seen in Fig. 2, and are attached to the horizontal shafts *m*, which have their bearings in the frame-work, and from these shafts project the tappets *n*, which are operated by the cams M, (on the driving-shaft B,) of the form seen in Figs. 1 and 3. These hammers, when released, are thrown toward each other by means of the springs *o*, the

lower ends of which are secured to carriages N, which slide back and forth in dovetailed ways in the frame-work, and are operated by means of the screws *p*, which pass through lugs projecting down from the carriages through slots in the frame-work, as seen in Figs. 2 and 4, and thus the force with which the springs are made to bear upon the hammers, and the consequent force of their blows, may be adjusted with a great degree of nicety, and the removal of the springs from the machine also facilitated.

An auxiliary device is also employed to regulate the motion of the hammers G and cause them both to strike the object at the same instant, which I will now proceed to describe.

q are two belts or straps, of leather or other suitable material, which are secured to the shafts *m* at *r*, their lower ends being brought together and secured to an arm, *s*, which is pivoted to a stud, *t*, projecting from the inside of the frame-work, and this arm *s* is drawn down by a spring, *u*, attached to a stud, *v*, also projecting from the inside of the frame-work. The force of the spring *u* is thus transmitted (through the arm *s* and strap *q*) to the shaft *m*, and in case one of the springs *o* should drive its hammer faster than the one opposite, the whole force of the spring *u* will be brought to bear upon the shaft of the latter, thus increasing its speed, and causing both hammers to strike evenly at the same instant. By making the spring *u* of sufficient strength this device may be used to operate the hammers without the use of the flat springs *o*. I prefer, however, to use both.

In the face of each of the hammers G is formed a groove, 9, of a form corresponding to one side of the shank of a finished nail, the head being formed in the groove 10, which is made by cutting away the upper edge of the hammers, so as to leave a space corresponding to the width of the head of the nail, and the upper edge, 11, of the former F is cut away, so as to form the inclined side 12 of the head of the nail, Fig. 7. The nail is thus operated upon alternately on opposite sides—first, by the rolls *b c d*, in connection with the former F, and afterward by the spring-hammers G—it being subjected four times to the action of the rolls and former and three times to the action of the side hammers, to draw it down sufficiently to form a finished nail.

The nail-rod 13 is fed into the machine through an aperture, *w*, in a cross-bar, O, supported on standards rising from the frame-work, the required amount of friction being produced on the rod by means of a pin, *x*, projecting into the opening *w* and operated by a flat spring, *y*, a hand-lever, *z*, being employed to raise the end of the spring when it is desired to relieve the friction on the nail-rod.

The manner in which the finished nail is cut off and the rod fed forward sufficiently far to form the next nail will now be described.

a' is a cutter secured in a groove in the upper face of the former F by means of a screw, 14, as seen in Figs. 1 and 6. This cutter has a knife-edge, and operates in connection with a square-edged cutter, *b'*, placed opposite, and these cutters are vibrated to one side, so as to bring them into a line with the nail-rod, in the following manner: A portion of the former F is constructed in the form of a hollow sleeve, within which is fitted the shaft 15, projecting down from the upper portion, 16, of the former, and to the lower end of this shaft 15 is secured a crank, *c'*, from which projects a pin, *d'*, which works in a slot, 17, in a lever, P, one end of which is attached to a vertical shaft, Q, to the upper extremity of which is secured the cutter *b'*, and this lever P is vibrated against the resistance of a spring, *e'*, by the cam *f'* on the side of the wheel L, which thus causes the cutters *a' b'*, through the connections explained, to be vibrated to one side into the required position opposite the nail to be cut off, the former F being drawn back slightly by the spring *l* just previous to the lateral vibration of the cutters, so as to clear the nail and prevent its being bent or twisted by the face *c* of the former as it turns. The former F, and with it the cutter *a'*, is now moved forward by the projection *j* on the wheel L striking the arm *k*, the projection *j* being of such a height as to raise the arm *k* sufficiently to cause the cutter to strike the nail-rod on the bent portion 18 and carry it forward into contact with the cutter *b'*, and thus sever the finished nail from the rod, which then falls down into a receptacle beneath, placed to receive it. The moment the cutter *a'* strikes the rod on the portion 18 it commences to draw it forward through the aperture *w* against the friction of the pin *x* until it is arrested by striking the cutter *b'*, the distance which it is thus carried forward leaving a sufficient amount of the rod projecting over the edge of the former F on its return to form the next nail, as seen in Fig. 3. The bent portion of the rod, against which the cutter *a'* strikes, and by which the rod is drawn forward, thus serves as a handle, and avoids all necessity of employing nippers, dogs, or other devices to grasp the rod when it is to be fed in. As soon as the nail is cut off, the cam *f'* passes off the end of the lever P, which is then retracted by the spring *e'*, which causes the cutters *a' b'* to be carried back to their original position, the projection *j* at the same time passing from under the arm *k* and allowing the spring *l* to draw back the former F into the position seen in Fig. 3. The nail is thus cut off from the rod without moving it to one side or the other, and it will be seen that the cutter *a'*, in addition to cutting off the nail, also feeds in the rod for the next nail, thus making the machine self-feeding, and economizing labor.

The cutter *b'* is attached to its shaft Q, which passes through a hollow post, R, by means of a slot, *g'*, and nut *h'*, by which means it can be moved farther forward or back by turning

a screw, 19, which passes through the cutter into the end of the shaft Q, so as to allow more or less stock to be fed into the machine, as may be desired, the cutter a' feeding in the rod until it is arrested by contact with the cutter b', and therefore the greater the distance back of the cutter b' the greater the length of rod drawn into the machine for the next nail by the forward movement of the former F, and vice versa, the cutter b' thus acting as a gage to measure the exact length required for the next nail.

By thus drawing the nail-rod into the machine, instead of pushing it in against a gage, as heretofore, all liability is avoided of bending or crippling the rod, and thus varying the amount of stock fed in—an event of frequent occurrence in nail-machines as ordinarily constructed.

i' is a bar attached to the inner face of the former F for the purpose of intercepting the hammers G on their being released just after the finished nail has been cut off, and preventing them from operating until the portion of the rod for the next nail has been bent down against the face e of the former F and operated upon by the rolls b c d on the arm E as it is revolved.

By changing the relative size of the gears by which motion is communicated from the driving-shaft to the shaft K, and substituting for the wheel L one having a different number of projections on its periphery, the number of times that the nail is submitted to the action of the rolls and hammers before being cut off may be varied as desired, and instead of being operated upon a less number of times by the side hammers, G, than by the rolls b c d and former F, as described, the machine may be so timed as to cause it to be struck an equal number of times by the side hammers.

It is evident that this machine may be employed to advantage for forging other articles besides nails. I do not therefore limit myself to its use for this purpose alone.

Operation: The parts being in the position represented in Fig. 3, and the machine being set in operation, the nail-rod, properly heated, is fed in through the aperture w in the cross-bar O until a sufficient amount to form a nail is projected over the edge of the former F, the rod being held in place by the friction of the pin x, operated by the spring y. The roll b on the arm E now strikes the end of the rod, bending it down, as seen in Fig. 5, and pressing it against the face e of the former F. The rolls c and d, which are set at gradually-increasing distances from the center, around which they are carried, as before explained, now follow, pressing it still harder against the face e of the former F, so as to draw it out slightly. The projection f on the wheel L now passes from under the end of the arm k, which allows the spring l to draw back the former F and clear its face e from the bent portion of the nail-rod, which is thus left free to be operated upon by the hammers G as soon as they are thrown forward by the springs o. These hammers, with their grooves 9 and 10, serve to draw down the nail to a point and form it on two of its sides. The cams M on the driving-shaft B now commence to depress the tappets n and draw back the hammers G, when the projection g on the wheel L passes under the end of the arm k, raising it and moving forward the former F a little farthan before, (the projection g being of a little greater height than the projection f,) thus contracting the space between the face e and the rolls b c d, which now pass into contact with the nail and draw it out still farther. The former F is now drawn back by the spring l, as before, and the operation of the side hammers is repeated, after which the former F is again carried forward (a little farther than before) by the projection h, and the nail still farther drawn down by the rolls b c d, after which it is operated upon by the side hammers, G, for the third and last time. The former F is now carried forward for the fourth time by the projection i still farther than before, leaving a space between the rolls and the face e corresponding to the thickness of a finished nail, and this last operation of the rolls b c d finishes the nail and gives it the required form. The former F is now drawn back by the spring l, so as to clear the nail, and the cam f' then strikes the end of the lever P and vibrates it to one side, causing the cutters a' b', through the connections explained, to be vibrated to one side into a line with the nail-rod. The projection j on the wheel L now strikes the lower end of the arm k and rocks the former F, causing the cutter a' to strike the nail-rod on the bent portion 18 and carry it forward until it strikes against the square-edged cutter b' by which it is severed and the feeding forward of the rod arrested. The height of the projection j on the wheel L is such as to cause the former F and cutter a' to be carried forward sufficiently far to meet the cutter b' and sever the nail when the cutter b' is adjusted at its greatest distance from the cutter a', which latter is also made adjustable in its groove by means of the screw 14. This forward movement of the cutter a' thus draws the rod forward the exact length required to form the next nail. The projection j now clears the arm k, allowing the spring l to draw back the former F, and at the same time the cam f' passes off the end of the lever P, which is then retracted by the spring e', carrying with it the cutters a' b' into their original position. Just after the former F commences to be retracted the hammers G are liberated, when they strike against the bar i', by which they are intercepted and prevented from striking each other, the form of the cams being such that the hammers commence to be drawn back before the withdrawal of the stop i'. On the former F arriving in its normal position the portion of the rod which was drawn in by the forward movement of the cutter is left projecting over the edge 11, as seen in Fig. 3, when it is struck by the rolls b c d as the arm E revolves, and

bent down, and the operation continues as before, the nail being drawn down alternately on opposite sides, first by the rolls *b c d* in connection with the former F, and afterward by the side hammers, G, and by thus reducing it gradually all liability of injuring the grain of the iron is avoided.

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

1. The former F, having a gaining or progressive motion, substantially as set forth.

2. The vibrating cutters *a' b'*, operating substantially as described.

3. Causing one of the cutters by the act of carrying the rod forward to the other cutter, or by any other moving part of the machine brought up against the bent portion of the rod, to feed in a sufficient length of rod for the next succeeding nail.

4. Feeding in the rod previous to the nail already formed on its end being cut off.

5. Gaging or determining the length of rod fed into the machine by means of the cutter *b'*, substantially as described.

6. Making the cutter *b'* adjustable, so as to allow more or less of the rod to be drawn forward previous to cutting off, substantially as described.

7. Equalizing the throw of the hammers G by means of the belts *q*, arm *s*, and spring *u*, so as to cause them to strike at the same instant upon the nail, substantially as set forth.

8. The revolving arm or segment E, carrying a succession of rolls placed at unequal distances from the center around which they are carried, in combination with a movable former, substantially as set forth.

9. The revolving arm or segment E, carrying a succession of rolls placed at unequal distances from the center around which they are carried, in combination with the hammers G and a movable former, substantially as described.

10. Attaching the springs *o*, which operate the hammers G, to movable carriages, as set forth, for the purpose specified.

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