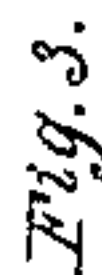
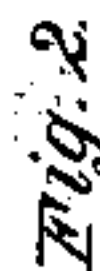


Horseshoe-Nail Machine.

Patented June 11, 1861.



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UNITED STATES PATENT OFFICE.

SILAS S. PUTNAM, OF DORCHESTER, MASSACHUSETTS.

HORSESHOE-NAIL MACHINE.

Specification of Letters Patent No. 32,531, dated June 11, 1861.

To all whom it may concern:

Be it known that I, SILAS S. PUTNAM, of
Dorchester, in the county of Norfolk and
State of Massachusetts, have invented cer-
tain Improvements in Machines for Forging
Horseshoe-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 a nail
machine having my improvements attached;
Fig. 2, a partial longitudinal section on
the line *x, x*, of Fig. 1; Fig. 3, a partial hori-
zontal section on the line *y, y*, of Fig. 1; Fig.
4, a partial vertical section on the line *z, z*,
of Fig. 2; Fig. 5 shows a modification of
my plan of operating the hammers.

The first part of my invention has for its
object to cause the different hammers of each
pair to strike simultaneously and with
equal force around a central line and consists
in connecting the two hammers of each pair
to a single lever or cross head, to which the
power that actuates them is applied, and my
invention also consists in certain details
which will be more fully described hereafter.

That others skilled in the art may under-
stand and use my invention I will proceed
to describe the manner in which I have car-
ried out the same.

In the said drawings A is the bed of the
machine, supported on legs *a*. From this
bed near one end, rise two standards B,
which serve as bearings for a horizontal
shaft C, which carries two double cams *b*
near its middle, a driving pulley D at one
end, by which the machine is operated from
any suitable power, and at its other end a
fly wheel E, and an eccentric *e* which oper-
ates a connection rod F, whose office will be
presently explained. Below the shaft C is
another shorter shaft *d*, which serves as a
fulcrum for two levers G and H which are
vibrated by the two cams *b*, twice at each
revolution of the shaft C, the cams strik-
ing the upper ends of these levers; their
lower ends projecting down through an
opening in the bed A, as shown in Fig. 2,
where a connecting rod I is pivoted at *e* to
a lever *p*, which is hung on the shaft *d*, while
the end of the rod or a yoke *o*, projecting
therefrom bears against the ends of the le-
vers G and H, so that as this rod is moved
longitudinally in the direction of the arrow
1, it will vibrate the two levers G and H far

enough to carry their upper ends clear of the
paths of the two cams *b*.

Immediately in front of the shaft C, and
attached by screws 3 to the tops of the stand-
ards B, are two cross braces K, through
which play two stout rods *f, g*, each of which
is embraced by a spiral spring *h* which bears
against a collar *i*, attached by a screw 4 to
the rod, and against a double nut *k*, which
screws into the cross brace K, as shown in
Fig. 3. By turning the outer one of these
nuts the force of the spring may be regu-
lated. These springs tend to throw the rods
f and *g* in the direction of the arrows 2,
while the levers G and H which bear against
the ends of these rods serve when vibrated
either by the cams *b* or by the rods *i*, to
drive the rods in the opposite direction
against the resistance of their springs.
From the middle of the bed A rises a frame
L, which has an opening *l* through its center
and four slots formed in its opposite sides,
that is two horizontal ones *m* and two ver-
tical ones *n*, in each of which is placed the
helve of one of the hammers M or N, which
vibrate on pivots 5 passing through the
frame L. These hammers are arranged in
pairs, and each pair is operated alternately
in the following manner. A cross head *q*
attached at the middle of its length to the
rod *g* has attached to it at each end an eye
bolt *r* which screws into the cross head. To
each of these eye bolts is pivoted at 6 a con-
necting rod *s*, the other end of which is piv-
oted at 7 to the helve of one of the hammers
M between its head and its pivot 5, so that
when the rod *g* is thrown by its spring *h* in
the direction of its arrow 2 the faces of the
two hammers M are brought together with
a quick blow. By turning the eye bolts *r*
before the rods *s* are connected with them,
the throw of these two hammers may be
regulated so that their faces will strike to-
gether in a vertical plane passing through
the center of the frame L or the center of
the machine, the faces of the hammers be-
ing dressed true to this plane. In the same
manner another cross head *t* is attached in
a vertical position to the rod *f*. This head
has attached to it, eye bolts *u* and connect-
ing rods *v* which are each pivoted at 8 to the
helve of one of the hammers N. These ham-
mers are adjusted by the screw bolts *u* so
that their faces shall meet in the horizontal
plane in which the hammers M play. The

rod f being placed at a lower level than the rod g , allows the head t to play beneath the head q .

I will now describe the mechanism by which the nail rod is held until the nail has been formed by the hammers M and N when the hammers are caught and held distended (without stopping the revolutions of the cam shaft C,) until the nail rod has been carried to one side and the nail cut off, the nail rod is again returned to its central position and a fresh portion of it is fed up against a gage which has been thrown up between the hammers and which is again removed before the hammers are permitted to renew the operation of forging another nail.

A heavy stanchion O, rising from the bed A, lies transversely of the machine immediately in front of the hammers M and N. It has at its upper side a slot a' in which plays laterally the funnel shaped end or nozzle of a lever P, which carries the nail rod b' which projects beyond the end of the lever through a hole made to receive it, and is held down to this lever by a cam lever c' pivoted to a short standard d' rising from the lever P. This lever P is hinged at 9 to a block a' which turns freely in the head of a pillar Q which rises from the bed A. This permits both vertical and horizontal vibrations of the lever P, which are necessary as the slot a' in which the end of this lever moves, is somewhat inclined. Two standards R rising from the bed A serve as bearings for a horizontal shaft T, to which is secured a collar f' from which rises a pin carrying a friction roll g' which moves in contact with the curved or cam shaped side of the lever P, so that as the shaft T is turned a portion of a revolution, in the direction of the arrow 3, the roll g' by bearing against the side of the lever P, will vibrate it in the direction of the arrow 4 and carry its free end over to one side of the center of the machine. A partial revolution is given to the shaft T, in a manner which will be presently explained.

A shaft V has its bearings in two brackets k' , which project from the leg a beneath the bed A. To this shaft is attached a sleeve A^2 (Fig. 4) from which project two arms m^2 and u' set at right angles to each other; the arm m^2 shown in red Fig. 4 strikes the end of the rod I. The arm u' has pivoted to it at 17 a pitman v' , which passes up through an opening in the bed A, and is pivoted at 18 to an arm w' which projects from a collar B^2 (Fig. 4) attached to the shaft T, so that as the shaft V is rocked, a corresponding motion is given to the shaft T. The shaft V also has on it a sleeve C^2 (Fig. 4) which is free to turn on it, and to which are attached two arms i' l' (Fig. 2) set at right angles to each other. The shaft T has on it

a loose sleeve D^2 from which projects an arm S, to which is pivoted at 11 a pitman h' the other end of which is pivoted at 12 to the arm i' . To the arm l' is pivoted at 13 the connection rod I.

A crank m' on the outer end of the shaft U has projecting from its inner face a pin 14 which is caught in a notch 15 in the end of the connection rod F, which as before stated is moved to and fro by the eccentric c on the shaft C. The rod F is raised to engage with the pin 14 in the following manner. A rock shaft V, which has its bearings in brackets q' pendent from the underside of the bed A, has a hand lever W secured to it, which rises through an opening in the bed A. There is also attached to its outer end a curved arm n' on which rests a pin o' projecting from the inner side of the rod F. The rod being drawn down toward this arm by a spring p' attached to the leg a . As the hand lever W is drawn in the direction of the arrow 5 or toward the operator who stands at this end of the machine, the shaft V, is rocked and the arm n' raises the end of the rod F so that the notch 15 embraces the pin 14, and as the shaft C revolves in the direction of the arrow 6, the shaft U is rocked and through the connections u' v' w' the same motion is given to the shaft T. The shaft V also serves as a fulcrum for a bent lever r , which turns freely on it, and one end of which is drawn up toward the bed A by a spring s' , and the other end of which rests on the top of the arm l' until the revolution of the shaft U in the direction of the arrow 7 allows this end of the lever r' to drop into a notch 16 in the end of the arm l' ; this prevents the return of the rod I in a direction counter to the arrow 1 and holds the hammers open as before explained, until the lever r' is raised from the notch 16 by the operator, who vibrates this lever by applying his foot to a loop in a rod t' attached to the outer end of the lever, as shown in Fig. 2, drawing it down against the resistance of the spring s' .

To the arm w' on the shaft T is pivoted at 18 a connecting rod x' the other end of which is pivoted at 19 to a heavy lever X. This lever is pivoted at 20 to a standard Y, rising from the bed A, (this standard and one of the standards R are braced together), and carries at its outer end a cutter y' which as the lever X descends, cuts off the finished nail, which has been carried by the vibration of the lever P over an anvil or stationary cutter z' attached to the stanchion O.

As it is requisite that the cutting edge of cutter y' should strike close in line with the edge of the anvil z' —and it has to be often removed for grinding, I have adopted the following plan of readily adjusting it in position on the end of the lever X. A block or head a^2 to which the cutter y' is

secured by screws 21—is pivoted at 22 to the end of the lever X. A curved block b^2 is attached to the top of the lever X immediately over the head a^2 and has two set screws 23 passing through it, and bearing on the top of the head a^2 , so that by turning these screws, the angle at which the cutter y' is set to the lever X may be varied and a nice adjustment be had. A striker c^2 is attached in front of the cutter y' by the screws 21, its office is to strike the nail as it is cut off and throw it down and out of the machine. To more effectually secure this end and to prevent the nails from flying into the machine as they are liable to do, I sometimes make this striker forked so as to embrace the nail.

To assist the operator in gaging the length of nail rod b' to be thrust out beyond the end of the lever P, which must be just sufficient to make a nail, I have arranged a gage d^2 , which is carried up opposite the end of the lever P, by the partial revolution of the shaft U, in the direction of the arrow 7 in the following manner (the hammers M and N at this time being held open out of its way.) The gage d^2 is attached by a screw 24 to the end of a bent lever Z, which is pivoted at 25 to a metal standard e^2 , which rises in an inclined position from a plate f^2 which is secured to the bed A by a screw and slot at 26, and is regulated in position by a set screw 27, which bears against the end of the bed. This adjustment allows me to regulate the distance of the gage d^2 from the end of the lever P, and consequently the distance to which the nail rod will be thrust out. (If preferred the gage d^2 may be adjusted on the end of the lever Z.) The lever Z passes through the stanchion O in an inclined slot g^2 . A hook h^2 which is attached at 11 to the arm S, serves to vibrate the lever Z in the direction of the arrow 8 when the shaft U is revolved in the direction of the arrow 7; while a spring i^2 draws it down in the opposite direction when the motion of the shaft U is reversed.

A spring l^2 attached to the pillar Q and to the lever P serves to bear this lever over against the roll g' on the shaft T—and to vibrate it in a direction counter to the arrow 4, when the shaft T is revolved counter to the arrow 3. I will here call attention to the fact that the sleeve C^2 being loose on the shaft U permits this shaft to be revolved counter to the arrow 7, while the arm l' is still locked by the lever r' ; this is necessary as the lever X is to be raised and the cutter y' lifted out of the way of the hammers, and also the lever P is to be brought back to its central position, before the hammers are set free. I will also explain, that the rod F is so formed with one side of the notch 15 higher than the other, and the curved arm n' , which guides its motions is

allowed to fall just so low, when the hand lever W is released, and it is drawn down by the spring p' —that the pin 14 will clear the lower side of the notch 15, but will still be in the path of the shoulder 2 on the high side of the notch. The effect of this is that as the shaft C revolves, and the rod F is engaged with the pin 14 by the vibration of the lever W in the direction of the arrow 5—the shaft U is carried a partial revolution in the direction of the arrow 7, and back again into its normal position or that shown in the drawings, where it is left by the rod F, which is drawn away from the pin 14—by the spring p' —when the operator releases the lever W.

Operation. The following is the operation of this machine. The shaft C being driven continuously in the direction of the arrow 6—the rod F is moved to and fro by the eccentric c —the cams b by their revolutions vibrate alternately the levers G and H—which striking the rods f g compress the springs k and open alternately each pair of hammers M or N, the springs k closing them with quick blows, as the levers G and H fall off from the shoulders of the cams b . The operator standing at the left hand end of the machine as in Fig. 2, supplies the machine with a nail rod b' , which has been previously heated. When the hammers have forged or drawn down the body of the nail to the required dimensions (the rod being of the size intended for the head), he draws the hand lever W toward him in the direction of the arrow 5, this vibrates the shaft V and raises the curved arm n' , this raises the outer end of the rod F, which (when the shaft C has revolved far enough) engages with the pin 14 on the crank m' , (the pin falling into the notch 15) and gives a partial revolution to the shaft U in the direction of the arrow 7, this carries the arm m^2 on the fast sleeve A^2 against the end of the long connection rod I and throws it in the direction of its arrow 1, vibrating the arm p on which it is hung; this presses the end of the rod I against the lower ends of the levers G and H and causes their upper ends to force the rods f and g in a direction counter to the arrows 2. This motion of the rod I carries the arm l' on the loose sleeve C^2 with it, and permits the bent lever r' to fall into the notch 16—whereby the rod I is prevented from returning and the hammers M and N are held open as long as the lever r' remains in the notch 16. This as before stated does not prevent the rod F from carrying the shaft U back into its normal position where it is left by it. This movement of the shaft U in the direction of the arrow 7 has through the connections u' v' w' given the same motion to the shaft B. This by the fast collar f' has carried the roll g' against the projecting part of the

cam 10 on the lever P and vibrated this lever in the direction of the arrow 4, carrying the finished nail over the anvil or stationary cutter z' . When through the connections $w' x'$ the lever X is vibrated and the cutter y' cuts off the nail from the nail rod b' . The return movement of the shaft U now restores the levers P and X to their normal positions; the spring l^2 bringing back the lever B. When the rod I was thrown forward in the direction of its arrow 1 by the arm m^2 it revolved by its connection with the arm l' the loose sleeve C^2 ; this through the arm i' attached to the sleeve C^2 and pitman h' vibrated the arm S on the loose sleeve D^2 ; raising the hook h^2 and vibrating the lever Z in the direction of the arrow 8. By this movement of the lever Z the gage d^2 was raised up between the hammers, and opposite to the end of the lever P. The operator now throws over the cam lever c' to free the nail rod b' —pushes forward the rod against the gage d^2 , which has been set to give the required length to the nail, presses down with his foot on the rod t' , (as shown in Fig. 2,) vibrates the lever r' and lifts its end out of the notch 16. This permits the arm l' to be vibrated by the rod I, which is moved in a direction counter to the arrow 1 by the springs k on the rods f and g , vibrating the levers G and H, leaving them again free to be operated by the cams b . Before however the hammers have come together, the vibration of the arm l' has carried down the arm S and hook h^2 and permitted the spring i^2 to draw the gage d^2 down out of their way, the various movements being properly timed. The operation of forging a nail is then repeated.

In Fig. 5 is shown a modification of my plan of connecting the hammers with the power which actuates them, which I consider to be the entire equivalent of the one already described. In this case the connecting rods v are pivoted directly to the lever G, and the rods s are connected with an intermediate lever F^2 , which is actuated by the lever H. An adjustable spring k^3 which carries a friction roll 30 bears against the lever G; and a spring k^4 attached at 32 to the frame work, bears with its friction roll 33 against the lever F^2 which is pivoted at 31 to the frame. The upper end of the ver-

tical lever H bears against this lever F^2 and the cams b operate the levers G and H as before. The connecting rods s and v have the same adjustable attachments where they are connected to plates q and t on the levers F^2 and G. The advantages which I consider this plan as possessing over the former are, that the machine may be shortened and made more compact, and the friction of the rods f and g in the stanchions K may be avoided. It is obvious that three or more hammers may be caused to strike simultaneously, also that other articles besides nails may be made in such a machine.

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

1. Connecting each pair of hammers to a single lever or cross head, through which they are operated, and by means of which, they may be made to strike simultaneously and accurately around a line passing through the center of the nail rod.

2. In combination with the above, the connecting rods s and v and eye bolts r and u or their equivalents, operating as set forth for the purpose specified.

3. Interrupting the action of the hammers, while open, and holding them open at the will of the operator for the purpose specified.

4. The rod I, in combination with the levers G and H, and with the hand lever W, and lever r' , or their equivalents, whereby the hammers may be stopped and started at the will of the operator as set forth.

5. The gage d^2 which is brought into position to gage the nail rod, while the hammers are stationary, and is withdrawn out of their way, before they are again started, by devices acting by the power of the machine itself, but brought into action by the operator as set forth.

6. The rod F, with its notch 15 and shoulder 2, in combination with the shaft U, and the parts immediately connected therewith; whereby the nail rod is always returned to its position, and the center y' is raised out of the way of the hammers, before they are started, as set forth.

SILAS S. PUTNAM.

Witnesses:

THOS. R. ROACH,

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