8535X

W. C. Grimes,

Making Wrought Nails,

Patented Dec. 17, 1834.

Fig. 2.

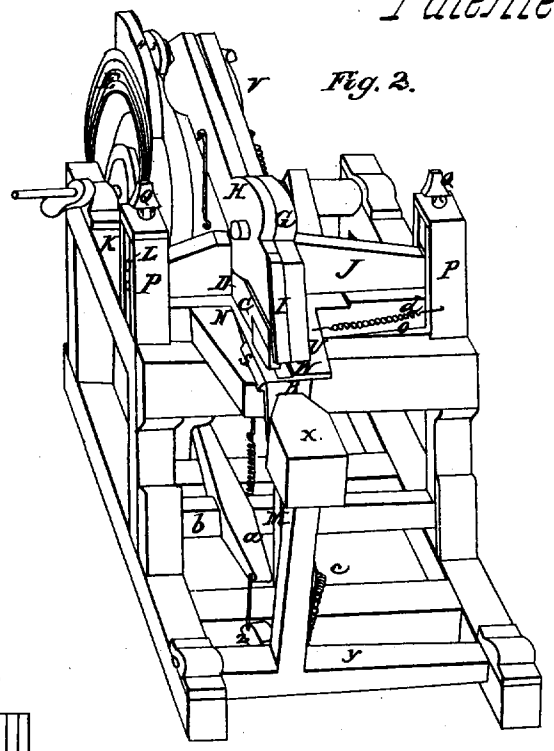


Fig. 1.

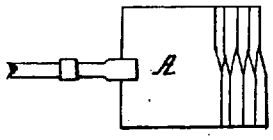


Fig. 3.

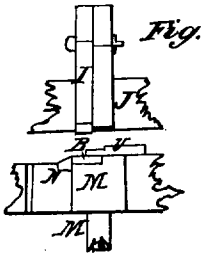
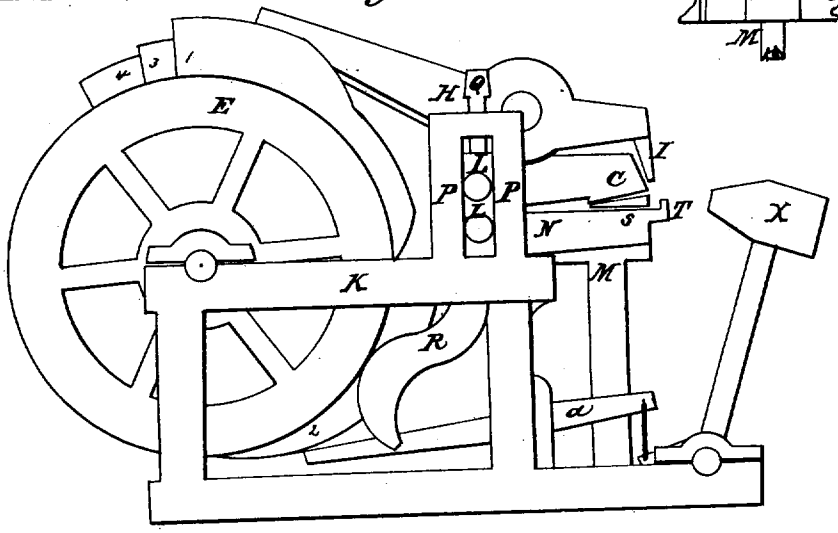


Fig. 4.



N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

X2255X Dec. 17. 1834 2

William C. Grimes, York Pennsylvania

Letters Patent.

The Schedule referred to in these Letters Patent and making part of the same, containing a description in the words of the said William C. Grimes, himself, of his improvement in the mode, and Machine for making wrought Nails, tacks, or Spikes.

To all to whom these presents shall come.

Be it known that I William C Grimes, of York, in the County of York and State of Pennsylvania, have invented a new and useful mode, and Machine for making wrought Nails, tacks, or spikes, and that and that the following is a full and exact description thereof, reference being had to the drawing which accompanies and makes part of this Specification. To make wrought nails by Machinery is an object that has been sought by numerous individuals, hence it may be useful in order to point out more clearly the novelty in the present plan, to refer to the general principles upon which preceding machines or process for that purpose, have been founded. One of the first, and it is believed an almost universal principle, that has been observed in previous attempts to make wrought nails, has been to make them from rods that were rolled or slit to the size of the larger part of the body of the nail. To taper or to give to the nail its requisite form, from such rods, various modes have been essayed; swaging, forging, and rolling have been tried, but the latter by far the most generally. Modifications of these principles to effect the object proposed, have been too numerous to be here detailed. But whatever has been the modification of the Machine, it has generally been moved or been constructed to operate upon only one of these principles. The novelty of the present Machine consists in its being constructed so as to combine several of these principles at the same time, viz cutting swaging or pinching, and forging, or percussion, and to make the

novelty

novelty more apparent, the nails we are not to be made from rods of the size of the body of the nail, but from broad plates, and these at a high red heat. These plates are to be prepared by rolling after the manner of plates for cut nails, but with this difference, they must be of perfectly sound iron, and two or three times as broad as the length of the intended nail, but of about the same thickness. These plates are to be cut off transversely into pieces about two thirds of the length of two nails. From the sides of these pieces or plates the nails are to be formed and cut, the length of the nail running with the grain of the iron, or parallel with the length of the original plate. These plates are held, turned over, and the nails cut from the sides or ends of them, in the same manner as practised in making cut nails but with this difference, in making cut nails the plate is either cold, or at what is called a black heat, whilst in my process the plates are to be at a high red heat. In making cut nails they are cut off with a regular taper from end to end, in this process they are tapered not more than half their length (see drawing marked A). In making cut nails the width of the plate is the length of the nail. In this process the plate is cut into lengths transversely, which length forms two nails by their points overlapping each other A. In making cut nails the first action upon the nail is to sever it from the plate, in this process the nail is nearly formed before it is severed from the plate.

As the plates are cut at a high red heat, they would soon destroy the temper of the steel cutters or dies if continually applied as in making cut nails, therefore to prevent such injury, I cut a few nails in rapid succession, and then allow a short intermission, when the plate is withdrawn, and a jet of water is applied for an instant to the dies which have been in motion, the plate and the jet of water being applied alternately to the dies. Two or more of these plates should be in the fire at a time, as only a part of one plate can be cut or formed into nails without reheating. The plates may be changed in the furnace, during the time that the jet of water is let on to the dies. The water in the pipe that conducts it to the dies should be under considerable head or pressure, and starting and stopping the jet may

may be done in various ways, the valves or cocks may be opened at regular intervals by the machinery, or a treadle may be applied for that purpose. When the nail is to be formed and cut from the plate, such a portion of the latter as shall be necessary, is placed between the jaws or dies B and C. constructed for the purpose, and which are parallel with the end or edge of the plate for about half or two thirds of the length of the nail. The remainder of the dies are turned off at a slight angle, running out to the edge of the plate, thus forming the taper or point of the nail; the plate is then turned over, and its opposite side brought into the same position between the jaws, and another nail is cut, the point of which commences at the same point in the plate that the taper began in the preceeding nail.

The jaws or dies B and C. are to clamp, press, and form the nail, one of them B. is stationary, whilst the other C, has a vertical movement, this die is attached to the underside of a jaw or the short end of a lever D, the other or long end has upon its extremity a projecting cam, which bears upon the periphery of a heavy fly wheel E, which is about two or three feet in diameter. The periphery of the fly wheel approaches to within a few inches of the fulcrum of the lever, which's axis is but a little below the horizontal plane of the said fulcrum, hence the long end of the lever D must be elevated to an angle of about thirty or forty degrees from the horizon, while the short end is in a horizontal position. The vertical breadth of this lever D, is much greater than its thickness in a horizontal direction, and in a part G, of its short end nearly over the fulcrum, it runs into a much greater width; through the centre of this part, passes a pin, which is the fulcrum of another lever H, of nearly the same dimensions as the one to which it is jointed by the aforesaid pin. The short end of the first named lever D, is so formed that a part of it lies directly beneath the short end of the second, the latter projecting about half an inch over or beyond the end of the first. To the underside of this projecting part is attached a piece of steel I, of such size and form as is best to lengthen the aforesaid die C, about three eighths of an inch (more or less). Surface the said die may be considered as consisting of two parts, each susceptible of a motion independent of the other. The length of these

levers

levers D and H, for a machine of ordinary size, may be about two feet
The fulcrum of the first lever D, is a strong shaft J, that rests it at
right angles a few inches back of the die c. This shaft lies across the
frame K of the machine, it has round tenons or gudgeons upon its ends,
which work in suitable boxes L L fixed in the frame. The lower jaw or die
B rests upon permanent fixtures M M M, to which it is made fast with
keys or screws. The contiguous faces of the dies B and C are parallel, or
nearly so for about half or two thirds of their length, the remainder
of their faces being inclined towards each other till they meet at
their inner ends, or in other words, their faces are so bent or curved,
and lie in that relative position, the one to the other, as to give the
proper taper, or requisite form to the nail, the latter laying with its point
towards the fulcrum of the lever D. The side or edges of the jaws or dies
next the nail plate, are in the same vertical plane, the one above the
other. The nail or edge of the plate being clamped or gripped between
the dies B and C, as in a vice, and with such a degree of pressure as
to give to that portion of the plate the required form or taper of the
nail, the jaws or dies biting into, and forcing down a portion of
the metal for the taper and point of the nail. The taper of the nail
in the other or vertical direction, being formed as aforesaid, by the
edges of the dies being curved or bent so as to run out to the edge of
the plate. A portion of the side of the plate a b, when gripped as aforesaid
projects out beyond the ends of the dies B and C, far enough to allow of
the formation of the head of the nail. By the side of the stationary jaw B,
there is fixed a strong movable jaw A, which is the short end of a lever
the fulcrum of which is a strong horizontal shaft O, lying directly be-
neath the fulcrum shaft J, and with similar journals and boxes,
which last are in the same vertical oblong openings with the before
named boxes L L. These oblong openings are formed by vertical
posts P P, which make a part of the frame K, of the machine. The tops
of each pair of these posts are united by a cross piece, through which
descends a screw Q of a suitable size, down upon the upper boxes
L L, by which means the fulcrum shafts J and O may be set at the
requisite

requisite distance, the one from the other. The lever R, or longer
of the last mentioned jaw, descends from its fulcrum at an
angle of about thirty or forty degrees from a vertical line, its lower
end bears upon it a steel cam that presses against the periphery of
the fly wheel E, which is made of the necessary width and has upon
it four cams 1.2.3.4, revolving in as many planes. The first cam acts upon
the cam or projection on the end of the last mentioned lever R causing
the jaw N, to rise and fall. A strong steel shear S is affixed to the
inside of this jaw N, the edge or upper side of which shear is even
or on a level with the upper face of the lower die B, aforesaid. The
shear is longer than the dies B and C, and projects about half an inch
beyond the ends of the jaws, which are all even at their ends, this
projecting part of the shear has but little vertical breadth (about
half an inch more or less) About the fourth of an inch (more or less)
beyond the end of the jaw, The projecting part of the shear turns up
T) at right angles, and rises about the fourth of an inch. This last
projection is a gauge against which the side of the nail plate is brought
when nails are being formed from it. A thin and broad lever or slide
jaw U working horizontally upon a pin in the stationary jaw, receives
motion from a cam V, upon the side of the fly wheel E, a part of the
shorter end of this lever (or rather a steel die W attached to said lever
U) passes in between the dies or jaws B and C. The said die attached
to the lever being of such form and thickness as just to pass in when
the jaws B and C are closed upon a nail. The side or edge of said die
is to be parallel with, and press upon the nail. A heavy hammer
X for sticking a head upon the nail, is placed in front of the
end of the jaws B and C. This hammer is fixed upon the end of an
upright rod or lever, the lower end of which is fixed to a horizontal
shaft Y, furnished with round tenons or gudgeons that work in suit-
able bearings on each side of the frame of the machine. From the side
of this shaft an arm Z projects being inclined downwards; This arm
may be about one third of the length of the said lever. A beam or
lever a, whose fulcrum b, is near its centre, lies nearly in a horizontal

position

position, with one end beneath the fly wheel, and the other abo
the said short arm to which it is jointed by a link. A cam D
the periphery of the fly wheel, acts upon the end of this lever or
beam, the latter being gradually borne down by it, while the oppo
end of the beam rises, and by its aforesaid connection with th
hammer X. The latter is thrown back to a proper distance, the said
D then terminates abruptly, and by a strong spring C, the hamm
is brought forcibly upon the iron which is to form the head of
the nail. The operation of the Machine is as follows. The plat
A is placed between the jaws B and C, the die W or side jaw
U, being a gauge against which it is put, while the projection on
end of the shear S is the gauge in the other direction. A cam b, upo
the periphery of the fly wheel now passes under the end of the
lever, and brings the jaw C down upon the edge of the plate. The
taper of the nail being formed as aforesaid, by the bend o
form of the jaws, which bite off or piep down a proper portion
of the edge of the plate to produce the requisite form and taper of
nail. When the jaws B and C, begin to piep upon the edge of the plate the
jaw U is made to recede from its contact with the edge of the pla
by its lever falling into a cavity in the side of the fly wheel, the lever being kept
in contact with the wheel by a suitable spring d. This side jaw recedes at th
time to allow of the swelling or flowing of the metal farther in between
the jaws as they close upon it. The nail being now partly formed, and
firmly griped between the jaws, a cam c upon the side of the fly wheel forces
side jaw in against the nail with great pressure, which assists in giving
to it the requisite form, and it is now firmly compressed on all sides.
The piece I, depending from the lever H which till now has had its low
side coinciding with the under surface of the jaw or die C, suddenly
rises from the part of the nail which is to form the head, upon which it then sta
and serving as a shear to cut this part of the nail from the plate. The sudd
rising of this piece or kind of shear I is effected by the end of the lever H,
falling abruptly from a cam L on the periphery of the fly wheel. The
height to which this piece rises is such as to prevent it from interfer
with

with the heading of the nail, the projecting part of the shear ha
previously risen to the same height, leaving an even surface
the projecting end of the nail, against which the hammer now
comes with a force that instantly forms the head of the nail; th
hammer immediately recedes a little, the jaw N and shear S, r
rise till they are above the nail, then the jaws B, and C, releas
their gripe upon it, the side jaw or die W is swung by the cam V
quite through between the jaws B and C, the nail is thus force
out sideways beneath the shear jaw N, and falls finished fro
the machine.— The jaws now instantly resume their former p
sition, the plate is again applied, when as before another n
is formed in like manner. I intend sometimes to form the hea
upon the nail by pressure, instead of percussion.

Any competent power may be employed to impel the machi
Machines greatly differing in form and in the particular a
rangement of the respective parts, may be constructed up
the preceding principle to produce similar results, or effe
the same end by similar means. I therefore, do not inten
to limit myself to the particular arrangement herein specifi
but to change such form and arrangement as I may think proper, whe
the principle remains unchanged.

What I claim as new, and as my invention and for which
I ask letters patent, is, 1st, the making or forming wrought
nails, tacks, or spikes, from or upon the edges or sides of metal
plates, by pressure and cutting, after the manner or upon the princip
herein specified. 2nd The manner of severing the plate from the
so that a part of the latter is left standing out beyond the end of
jaws, as hereinbefore described. 3rd the side jaw by which
plate is gauged, and the nail compressed and removed from
the jaws. 4th I also claim the general construction and combina
of the respective parts of the above described Machine, by which genera
combination of the respective parts of the above described Machine o
general combination it receives that character by which nai
com[illegible]

competent Machinist will readily distinguish it from any
of the various nail Machines heretofore in use.
But I do not claim as my invention, the fly wheel C, cams, levers
or any other part of the Machine taken seperately and in a
vidually; but as aforesaid, the combination of these parts
upon the principle herein fully set forth. Nor do I claim the
forming of nails from nail plates, by cutting them with
the grain, that having been already done, but in this par-
ticular. I confine myself to the peculiar manner in which
the cutting is effected.

Witnesses
Robt Clarke
Lib Webb

Wm C. Grimes

[3398 mods

Drawing