D. ARMSTRONG.

Improvement in Machines for Making Wrought Nails.

No. 115,267. Patented May 30, 1871.

Fig 1.

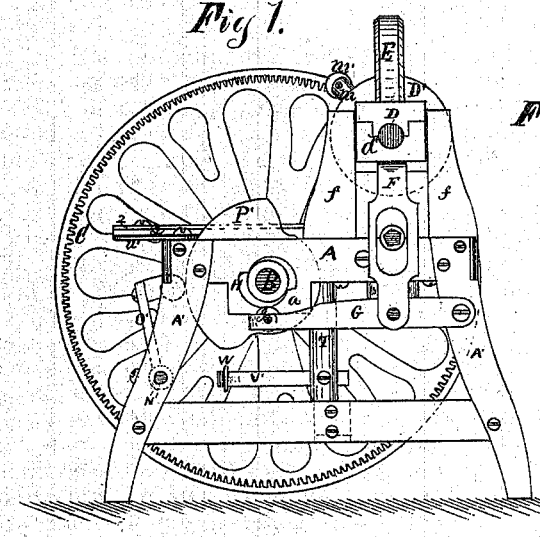


Fig 2.

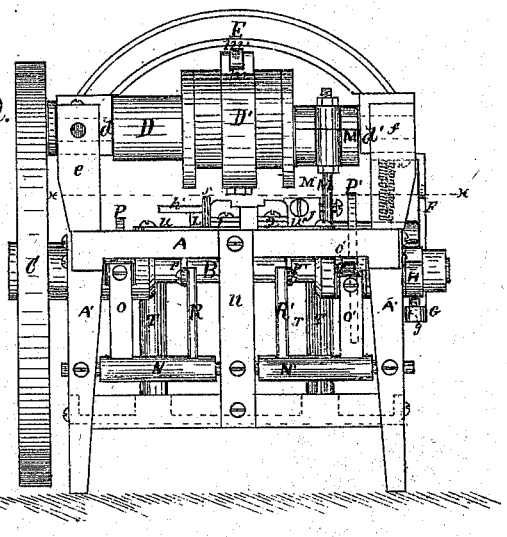
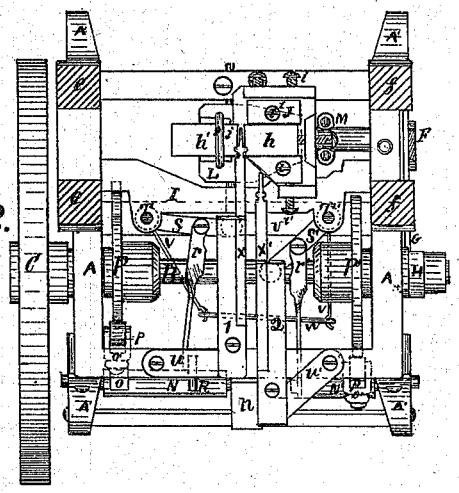
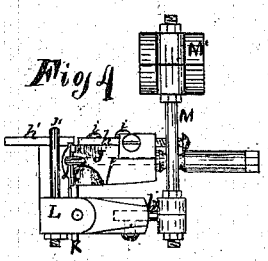


Fig 3.



Witnesses
N. C. Gidley
C. H. Sherburne

Fig 4



Inventor
Daniel Armstrong

# UNITED STATES PATENT OFFICE.

DANIEL ARMSTRONG, CHICAGO, ILLINOIS.

## IMPROVEMENT IN MACHINES FOR MAKING WROUGHT-NAILS.

Specification forming part of Letters Patent No. 115,267, dated May 30, 1871.

*To all whom it may concern:*

Be it known that I, DANIEL ARMSTRONG, of the city of Chicago, county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Making Wrought-Nails; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable others skilled in the art to which my invention appertains to make and use the same, reference being had to the accompanying drawing forming part of this specification, in which—

Figure 1 is a side elevation of my invention; Fig. 2 is a front elevation of the same; Fig. 3 is a general plan taken on line *x x*, with upper shaft and arch for supporting the same removed; and Fig. 4 is a side elevation of the hammers and the several parts connected therewith detached.

Similar letters of reference indicate corresponding parts in the several figures of the drawing.

My invention relates to that class of machines designed for manufacturing wrought-nails, but more especially horseshoe-nails; and has for its object to facilitate the operation of forging and finishing the nails, and to render the same more perfect; and the improvement consists, among others, in a shaft provided with a hammer fixed to and rotating with said shaft, supported in housings or bearings connected by an arch, and so arranged as that one of said bearings is automatically, and at regular intervals, elevated and depressed, and with it one end of said shaft; also in the mechanism for operating two gripers holding the nail-rods, by which an alternate forward and backward movement is imparted to the same at the proper time to allow one of the rods to enter the dies as the other recedes therefrom, whereby a continuous movement of the machine may be obtained.

In the accompanying drawing, A is the frame-work, which is substantially made of metal, and is supported upon legs A′ in the usual manner, and so formed as to receive the working parts of the machine, hereinafter mentioned. B is the main driving-shaft of the machine, which is supported in its bearings *a*, affixed to the lower side of and near the front of the frame. Upon the outer extremity of this shaft is mounted an internal gear-wheel, C, which engages a gear-pinion (not shown) on the outer end of the shaft D. The said shaft D is supported in bearings *d d′* affixed to the lower side of arch E, which extends across from side to side of the machine, and is pivoted at its end, near the pinion, to and between vertical uprights *e e* affixed to the frame. The opposite end of said arch is secured between like uprights *f f*, and is so arranged as to admit of an automatic tilting movement. Firmly affixed to the lower surface of bearing *d′* of arch E is a connecting-rod, F, to the lower end of which is connected a horizontal lever, G, one end of which is pivoted to one leg of the frame, and is provided at its opposite end with an anti-friction wheel, *g*, which traverses the periphery of a cam-wheel, H, affixed upon the outer end of shaft B; thus, as said shaft is rotated, an automatic tilting movement is imparted to the arch. Affixed to the inner side of and extending across the frame is a horizontal girt, I, to which, and to the inner side of the main frame, is firmly secured the fixed die-block J, upon which the die-plate *h* is attached, which die-plate *h* has its inner end shaped approximating the desired form of the nail side, and is so arranged as to admit of being adjusted laterally, or in the direction of its length, to any desired point, and is firmly secured in position by means of a series of set-screws, *i*, passing through and against the same. The inner end of said fixed die-block is provided with a vertical recess, within which is fitted the anvil K, which is secured in position by a stirrup-bolt, *j*, passing around the same and through the die-block. L is the movable die-block, which is formed as shown in Fig. 4, and is pivoted at its center to the lower side of girt I and the side of the main frame in such a manner as to admit of a vibratory rocking movement. To the upper surface of the vertical portion of said die-block is fitted the die-plate *h′*, which is secured in position by stirrup *j′* passing around and over the same, the inner end of which said die-plate is shaped approximating the form of nail side, and is so arranged as to allow the lower side, when in contact with the nail, to be in the same plane with the upper surface of the anvil, and also in the same general plane with the fixed die-plate *h*. Affixed to the shank of the die-block L is a connecting-rod, *b*, which is universally

jointed at its outer end, and is connected to the lower end of connecting-rod M, and extends upward to and through sleeve M′, secured on and around the eccentric of shaft D; thus, as said shaft is rotated, a vibratory rocking movement or motion is imparted to said die-block. Affixed upon shaft D, over the dies, is a cylindrical piece of metal, D′, to which is secured an arm, *m*, so arranged as to revolve over the anvil. To the outer extremity of the arm *m* is a roller, *m′*, the face of which has a corresponding width to that of the anvil. The said roller *m′* is so arranged as to bring the line of its axis parallel with the axis of shaft D, and is secured to the arm at the proper distance above the anvil to give the required vertical thickness to the nail as the same is rotated in contact therewith, the upper surface of the anvil being cut away or curved approximating the circle described by the rotation of the roller.

It will be noticed, on reference to the drawing, that the cylindrical piece of metal D′, carrying the roller or revolving hammer, has an eccentrical form, the object of which is to counterbalance the eccentric operating the movable die-block, thus producing a uniform steady motion.

N and N′ are horizontal rock-shafts, the outer ends of which are supported in bearings affixed to the inner side of the front legs of the machine, and are supported at their inner ends within bearings affixed to a vertical upright, *n*, secured to the outer side of the frame. Firmly attached to the upper sides of said rock-shafts are vertical arms O O′, to the upper ends of which are affixed stirrups *o o′*. Secured to and revolving within the said stirrups are auxiliary wheels *p p′*, so arranged as to traverse the periphery of cam-wheels P P′ affixed on the main driving-shaft B; thus, as said shaft is rotated, a reciprocal rocking movement is imparted to the rock-shafts. Affixed to the upper side of said rock-shafts, near their inner ends, are vertical levers R R′, to the upper ends of which are pivoted connecting-rods *r r′*, extending inward toward the center of the machine. To the inner ends of said connecting-rods are pivoted horizontal arms S S′, the outer ends of which are secured to the upper ends of vertical rock-shafts T T′, said shafts being stepped at their lower ends to and within suitable bearings affixed upon a cross-girt, *l*, and are supported in their upper ends by bearings secured to the side of girt I, the whole of which is arranged in a manner which admits of a free and easy rocking movement of the shafts. Firmly attached to the said rock-shafts are horizontal springs V V′, which extend forward toward the front of the machine, and are slightly curved at their outer or forward end, upon which is secured a connecting-rod, W, by which the movement of the shafts are made to correspond one with the other. Affixed upon the upper surface of the frame are the gripers 1 and 2, the outer ends of which are pivoted to the arms U U′, said arms being also pivoted at their opposite ends to the front rail of the frame, and are so arranged as to admit of a vibratory movement. The inner ends of said gripers are also pivoted to the inner ends of arms *s s′* in a manner admitting of a free and easy movement. To the upper surface of said gripers are secured the rods *x x′*, from which the nails are to be formed, the devices for holding the same in position upon the gripers being the same as now known and used, and does not constitute any part of my invention, and is not, therefore, fully shown and described.

It will be observed that the relative arrangement of cams P P′ of shaft B is such, together with the several parts connecting the gripers with the rock-shafts, as to move said gripers alternately forward and backward at the proper time to introduce the end of one rod, *x*, into and between the dies preparatory to forming the nail thereon, by relation of the hammer in contact therewith, as the other rod recedes therefrom after its nail has been formed, by which a continuous motion of the machine is obtained; as the arrangement of the mechanism holding the rods is such as to allow the rod upon which the nail is formed to be changed when the machine is in motion, thus greatly increasing the facility of the machine over those now in use, in which a single rod only is operated.

It will be noticed that the movable die-block L is pivoted at its center, by which means it is balanced upon its fulcrum, thus obviating the jarring motion heretofore produced by the pivoting of the die-block at or near its rear extremity.

I am aware that nail-machines have been previously known and used in which a rotating hammer and a fixed and movable die-block operated by an eccentric have been employed; but in such machines the shaft carrying the hammer has been secured in fixed bearings. Thus the vertical thickness of the nail must be formed by the first revolution of the hammer in contact therewith, which is more or less liable to impair the fibers of the iron, rendering the nail imperfect, while in my machine the shaft carrying the hammer is secured within the arch in such a manner as to allow the same to adjust itself to the thickness of the metal, thus forming the vertical thickness of the nail, by a series of revolutions of the hammer, by which the fibers of the iron are more perfectly drawn out and the nail more perfectly made.

I do not wish to confine myself strictly to the arch by which the bearings supporting shaft D are connected, as such bearings may be affixed to the shaft in such a manner as to admit of the automatic tilting movement of the shaft independent of the arch.

In operating my machine power is applied to the shaft B, imparting thereto a rotating motion, by which the requisite movement is imparted to all other movable parts of said machine, as hereinbefore described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with shaft D and hammer *m*, of the connected arch and bearings E *d d'* and mechanism to automatically and at regular intervals elevate and depress one of said bearings, and with it one end of said shaft, in the manner substantially and for the purpose specified.

2. The arch E provided with the bearings *d d'*, in combination with the shaft D provided with hammer *m*, connecting-rod F, lever G, and cam H of shaft B, substantially as and for the purpose described.

3. The gripers 1 and 2, arranged to operate alternately to and from the dies, in combination with rock-shafts N N', arms O O', levers R R', connecting-rods *r r'*, arms S S', rock-shafts T T', springs V V', connecting-rod W, arms *u u'* and *s s'*, and cams P P' of shaft B, substantially as and for the purpose described.

DANIEL ARMSTRONG.

Witnesses:

N. C. GRIDLEY,

N. H. SHERBURNE.