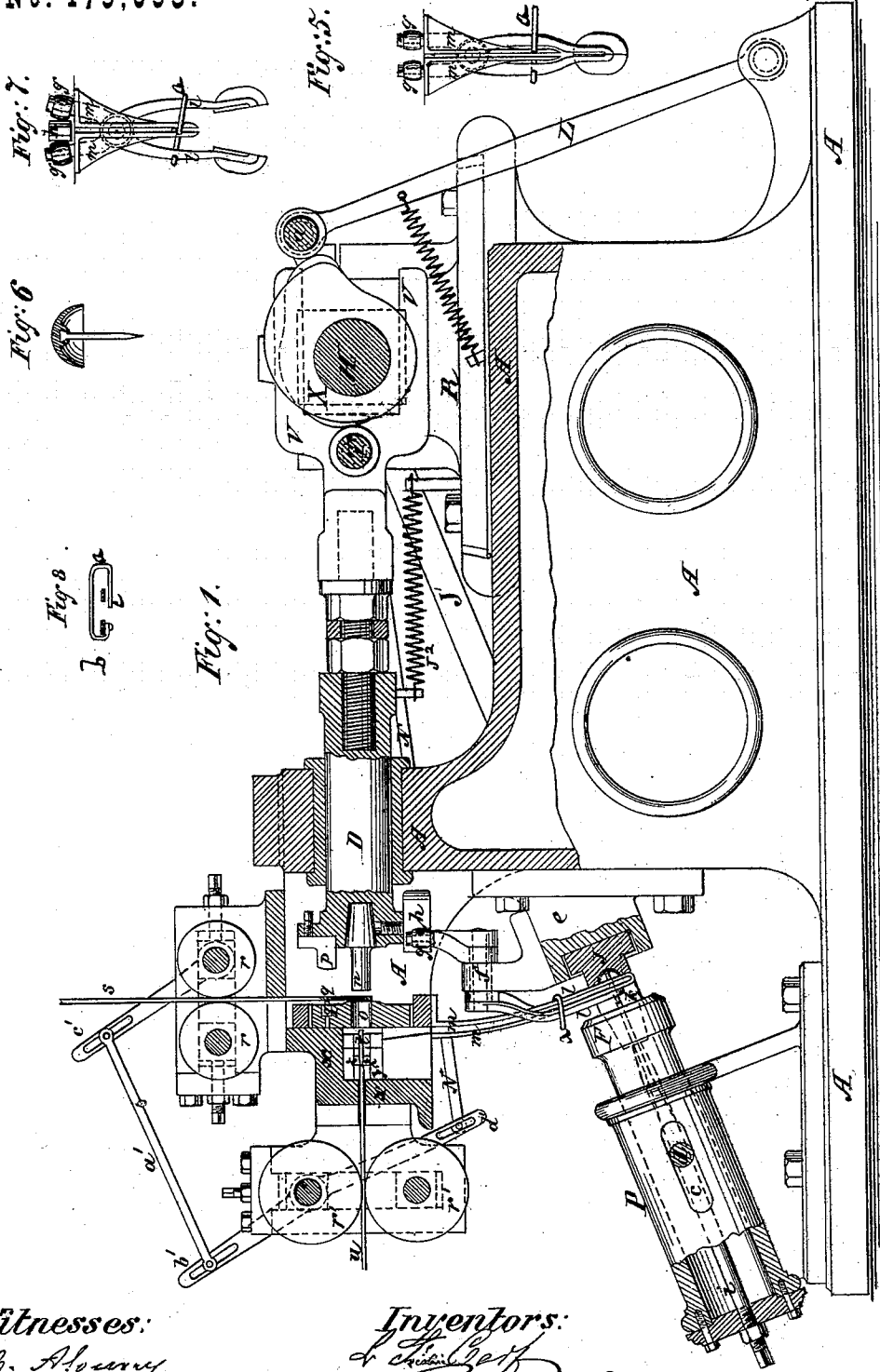


L. F. CERT & E. F. BONAVENTURE.

MACHINES FOR MAKING NAILS OF SEPARATE HEADS AND SHANKS.

No. 179,095.

Patented June 27, 1876.



Witnesses:

Ch. A. Brown
 Chas. M. Adams

Inventors:

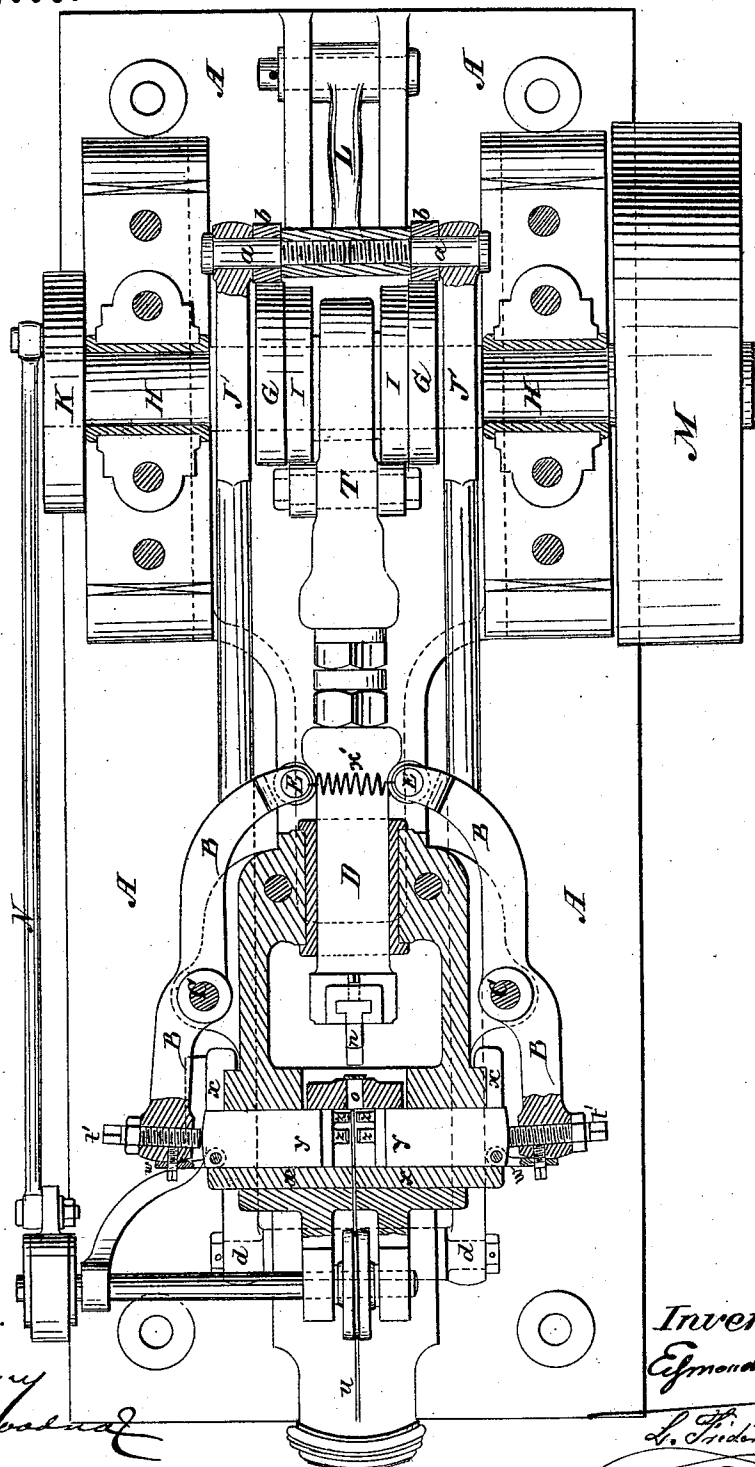
L. F. Cert
 E. F. Bonaventure

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Fig. 2.



Witnesses:

Ch. H. H. H.

[Signature]

Inventors:

[Signature]

[Signature]

UNITED STATES PATENT OFFICE.

L. FREDERIC CERF AND EDMOND F. BONAVENTURE, OF NEW YORK, N. Y.;
SAID BONAVENTURE ASSIGNOR TO SAID CERF.

IMPROVEMENT IN MACHINES FOR MAKING NAILS OF SEPARATE HEADS AND SHANKS.

Specification forming part of Letters Patent No. **179,095**, dated June 27, 1876; application filed February 23, 1875.

To all whom it may concern:

Be it known that we, L. FREDERIC CERF and EDMOND F. BONAVENTURE, both of France, but at present residing in New York city, county, and State, have invented a certain new and useful Nail-Machine, and which may also be adapted to and used for making rivets; and we do hereby declare the following to be a full, clear, and exact description of our invention as applied to making both nails and rivets, reference being had to the annexed drawings, making part of this specification, and in which—

Figure 1 is a longitudinal vertical section through a machine that embodies our invention; Fig. 2, a horizontal section through said machine, taken upon a plane cut through the center of the dies and punches in which the shank and head of the nail are cut, and where the rivet is made. Fig. 3 is a horizontal section through the dies and punches of the machine fitted to make rivets; Fig. 4, a front view of the cutting-off dies; and Fig. 5 is a front elevation of a pair of pliers whose function will be hereinafter more fully explained.

Our invention relates more especially to the manufacture of that variety of nails made of two distinct pieces of metal, and usually of two kinds of metal in distinct parts, the shank being made of iron, or other suitable metal, and the head being made of brass or other suitable metal, the two parts being appropriately formed and united by the operation of the machine and the formation of its parts, the form of the head being usually hemispherical or conical, and generally hollow, though the head may be made solid of one metal with the shank and then covered with a separate piece of metal, and the form may be modified as may be required; and although the principal object of the invention is the manufacture of this variety of nails, yet a part of the machine may be dispensed with, and another form of die substituted for the nail-die, by which the machine is quickly and cheaply converted into a rivet-machine, or, rather, adapted to making rivets.

To enable those skilled in the art to which our invention appertains to make and use the same, we will proceed to describe the con-

struction and operation thereof, as it is illustrated in the accompanying drawings.

Similar letters of reference represent corresponding parts of the several figures.

The main frame of the machine is shown in the drawings by A. It is composed of metal, and consists of a base-piece, rectangular in form, the length being about two and a half times its breadth, and of projections or parts cast or bolted on said base-piece of suitable form and strength to carry the operative parts of the machine.

In Figs. 1 and 2 of the drawings a machine is represented especially adapted to manufacture the variety of nails above referred to.

The shank of these nails is made of wire or rods of round metal, and the head is made of a strip of flat metal of any suitable composition, and the respective parts are formed and united as follows: First, a die is made consisting of two parts, each of which is made to form one-half of the external shape of the nail-shank, the two parts accurately fitting together, by which the complete form and size of the shank are determined by the dies. This die is shown in the drawings by *z*. Its two parts are fitted in the ends of a pair of reciprocating slides. (Shown in the drawings by *y*.) These slides are fitted in a bracket, *x*, bolted to the main frame, and said slides are actuated by two levers, B B, both of which move upon the same horizontal plane, and have their fulcrum at C, fixed in the main frame. The short ends of said levers are connected to the outer ends of the slide by means of links *w*, and the long ends of said levers are fitted with rollers, and arranged to ride against the side of the ram D, the rear end of which is made in the form of a cam, by which the slides *y*, that carry the dies, when the ram moves forward are pressed together, and when the ram moves back the said slides are drawn apart, and the dies opened by means of the link-connections *w* and a spring, *x'*, by which the long end of the lever is held against the sides of the ram, the cam upon the sides of which governs the movement of the dies.

By means of these dies, made and operated as above described, the end of a piece of wire or rod of metal is gripped, cut off, and pressed

in the desired shape for the shank of the nail, as shown by *t*, Fig. 1 of the drawings. The nail-shank is held in this position until the blank of which the nail-head is formed is cut and clinched upon it.

This head-blank is made and united to the shank as follows: The strip of flat metal *s* is fed in between the rollers *rr* until its end has traveled past the end of the punch *q* a distance equal to half the diameter of the head-blank. At this moment the ram moves forward and forces the die *P* against the strip of metal and upon the punch, making an indentation, to receive the head of the nail-shank. The ram then falls back, and the strip *s* moves forward, and is again punched as before, and then again, which brings the end of the strip over the die *o* and opposite the punch *n*, when, by a movement of the punch forward, a blank for the head of the nail is cut off and carried in the die on the end of the shank, which enters the indentation in the center of the head-blank previously made by the punch *q*, the end of the shank being clinched upon the head-blank by the action of the punch in carrying the blank forward against the dies that hold the nail-shank. The blank having been thus riveted upon the shank, the dies *z* open by the backward motion of the ram, as above described, and allow the nail to fall, with its head, which is still flat, in the guide *m*, down which it slides between a pair of pliers, *ll*, in front of the swaging-punch *k* in the ram *F*, which takes the point of the nail, the pliers at the same time opening, as shown by Fig. 7, leaving the way clear for the punch to force the head in the cavity of the die *J*, the end of the punch *k* and the dies conforming in shape and size to the required form and size of the nail-head. These pliers, which are shown by Figs. 5, 7, and 8, are fitted with a stop, *a*, for the purpose of arresting the fall of all the blanks in the guide *m* but the one to be finished. This stop is made in the form of a link or hook, arranged to embrace the pliers, as shown in Fig. 8, the end *b* being fastened to one leg of the plier, and the opposite end being bent around the other leg or side of the plier in the manner shown, the internal length of the hook being made at least equal to the distance traveled by the two legs of the pliers in their operation, and the end *c* of the hook being adjusted with reference to the motion of the pliers and the guide *m* in such manner as to leave the passage-way between the guide open, when the pliers close, as in Fig. 5, and shut when they are open, as in Fig. 7, the object being to stop the fall of the unfinished nail after it is discharged from the heading-die, and keep it from falling through the pliers to the swaging or finishing die before the pliers are ready to transfer it.

The head of the nail having been thus formed, the ram *F* moves back on the punch *i*, by which the nail is discharged from the machine. In this operation we assume that

there will be spring enough in the rod *s* to back it off of the punch *q* after it has been forced forward to make the indentation. Should that not be so, then it is our purpose to introduce a spring behind it, to press it back as soon as released by the punch *P*. A front elevation of the pliers is shown by Fig. 5. These pliers, it will be seen, form a continuation of the guides *m*, the guides terminating where the pliers begin. These pliers are opened at the proper time by means of a wedge-shaped cam, *h*, fastened to the head of the ram *D*, the cam working between the head-pieces *g g* of the pliers, as shown by Fig. 5. The cam, however, only opens the pliers. To draw them together, a spring is applied (not shown in the drawings—though it may be applied in any convenient manner) to accomplish the object of shutting the pliers and keeping the heads *g* against the cam, to insure the right movement at the right time. The pivot of the pliers is shown at *f*. It is carried in a bracket bolted on the top of the bracket *e* that supports the die *J*, which is bolted to the main frame.

It will be observed that the section of the nail-head is in the form of a crescent—that is to say, it is thicker at its junction with the shank than it is around its bottom or lower edge. This form is the result of two causes: first, because the rod *s* is thicker than the shell of the head is intended to be; and, second, because the punch *k* and die *J* are made and proportioned with reference to each other, so as to swage out the metal at the edge of the head, and full it in the center around the shank, in the manner shown by Fig. 6.

The ram *F* is supported in a cylinder, *P*, bolted to the main frame, and is operated by means of cams *G* on the main shaft *H*, which shaft is supported by the pillow-block bolted to the main frame in the manner shown. The connection between the cams and ram *F* is by means of the connecting-rods *J¹ J¹*, which reach down from the main shaft to pins *d d*, upon which they connect, as shown in Fig. 2, the pins passing through a slot cut in the side of the cylinder. (Shown by *c* in Fig. 1.)

The cams *G* are made to operate against friction-rollers *b b*, arranged on the pin *a*, to the center of which is also connected a supporting-rod, *L*, to hold the pin and rollers in their right relation to the cams, the ram *F* being moved or forced up by the action of the cams, and down or backward by its own weight and the weight of the several parts connecting it to the cams, or by a spring applied to the rod *L*.

The forward motion of the ram *D* is obtained by means of cams *I*, which also operate against friction-rollers arranged upon a pin, *T*, in the head of the yoke, and the backward motion is obtained by means of a spring, (shown in the drawings by *J²*.) and which may be applied in any convenient and effectual way to force back the ram, the rear end of which is guided and held in position by the box *X*, fitted in

the yoke V, and it should be observed that the ram is united to the yoke by means of a screw-connection, in the manner shown, to facilitate the adjustment of the ram with reference to the various motions depending upon it.

The rod *u*, out of which the shank of the nail is made, and the strip *s*, of which the head is made, are both fed to the dies by means of rollers—the rod *u* by the rollers *r' r'*, and the strip *s* by the rollers *r r*, both of which pairs of rollers are supported in suitable bearings bolted to the main frame, and are arranged in relation to each other substantially as shown in the drawings.

This feed motion is obtained by means of a connecting-rod, N, connected to a crank on the wheel K and to a lever, *d'*, hung on the end of the shaft that carries the upper roller *r'*, and upon the same shaft there is a second lever, *b'*, keyed, which is connected to the lever *c'* by means of a rod, *a'*, so that by the backward movement of the connecting-rod both rods *u* and *s* are moved forward. But by the forward movement of the rod N the rollers are not moved, the lever *d* being connected to a shaft of the upper roller *r* by means of a ratchet, which acts and moves the roller only when the rod moves back. The ratchet is not shown in the drawings, but is of the ordinary variety, and is applied in the usual way.

It should be observed that the short ends of the levers B B are fitted with adjusting-screws *t' t'*, to avoid any lost motion or rattling of the machine.

The foregoing description is confined to the machine as a machine for making the aforementioned variety of nails. Now, by changing the form of the dies and punches, and by omitting the feed-rollers *r r* and the ram F, the cylinder P, the guides *m*, the pliers *l*, and the connecting-rods and cams that operate these several parts, we have simply a rivet-machine. The dies suitable for a rivet-machine are shown in Figs. 3 and 4 of the drawings. The dies in this figure are shown by *z z*; the knives that sever the rod by *x*; and the slides that carry the dies and knives by *y*; and the levers that operate the slides by B B, as in the other figure of the drawings. In all other respects the rivet-machine is the same as the nail-machine. Indeed, to make rivets it is not necessary to change the nail-machine in any of its parts excepting the dies and punch, so that one machine can be used for either nails or rivets. But in constructing a machine for making rivets merely, it would, of course, be unnecessary to make and apply any of the parts necessary for making nails.

Having now described the construction and operation of our invention, we claim and desire to secure by Letters Patent—

1. A preparatory die and punch to indent the head-blank, combined with a die and punch to sever the head-blank, head the shank, and rivet it fast to the head-blank, substantially as described.

2. A machine fitted with a combination of dies and punches, arranged to operate substantially as described, by which a nail is made of two pieces of metal in a single machine automatically, substantially as described.

3. The rollers *r r*, combined and operating in combination with the dies *z z* and punch *n*, in the manner described, for the purpose of feeding at proper intervals the metal to the machine of which the nail-heads are made, as set forth.

4. The rollers *r' r'*, combined and operated in combination with the rollers *r r*, the slides Y, and the ram D, and with their respective motors, as described, for the purpose of feeding at proper intervals the iron or metal to the machine out of which the nail-shank or rivet is made, as set forth, at the same time and in combination with the metal for the head-blank.

5. The transfer-guide *m*, by which the blank or unfinished nail is transferred with the head-blank on a horizontal or oblique plane from the preparatory dies *z* to the finishing-dies *k*, in combination with said preparatory and finishing dies.

6. The cam *h*, in combination with the head of the ram D and the plier-heads *g g*, for the purpose of operating the said pliers, as set forth.

7. The pliers *l l*, in combination with the guide *m*, to aid in transferring the unfinished nail from the preparatory dies to the finishing-dies.

8. The pliers, in combination with the ram F and die J, for the purpose of transferring the nail-blank from the dies *z z* to said ram and die, and for the purpose of adjusting it in the punch and over the die, as set forth.

9. The combination, in the said machine, of the die and ram for making and cutting the blank shank and head of the nail, with the die and ram for swaging or finishing the head of the nail, substantially as set forth.

10. In combination with the guide and pliers by which the unfinished nail is transferred from the preparatory to the finishing dies, a stop, *a*, to stop the fall of the unfinished nail after it is discharged from the heading-die, and keep it from falling through the pliers to the swaging or finishing dies before the pliers are ready to transfer it.

L. FREDERICK CERF.

EDMOND F. BONAVENTURE.

Witnesses:

AMOS BROADNAX,

L. G. GARRETTSON.