3 Sheets—Sheet 1.

R. C. GRANT.

Rotary Cut-Nail Machine.

No. 198,844. Patented Jan. 1, 1878.

Fig. 1.

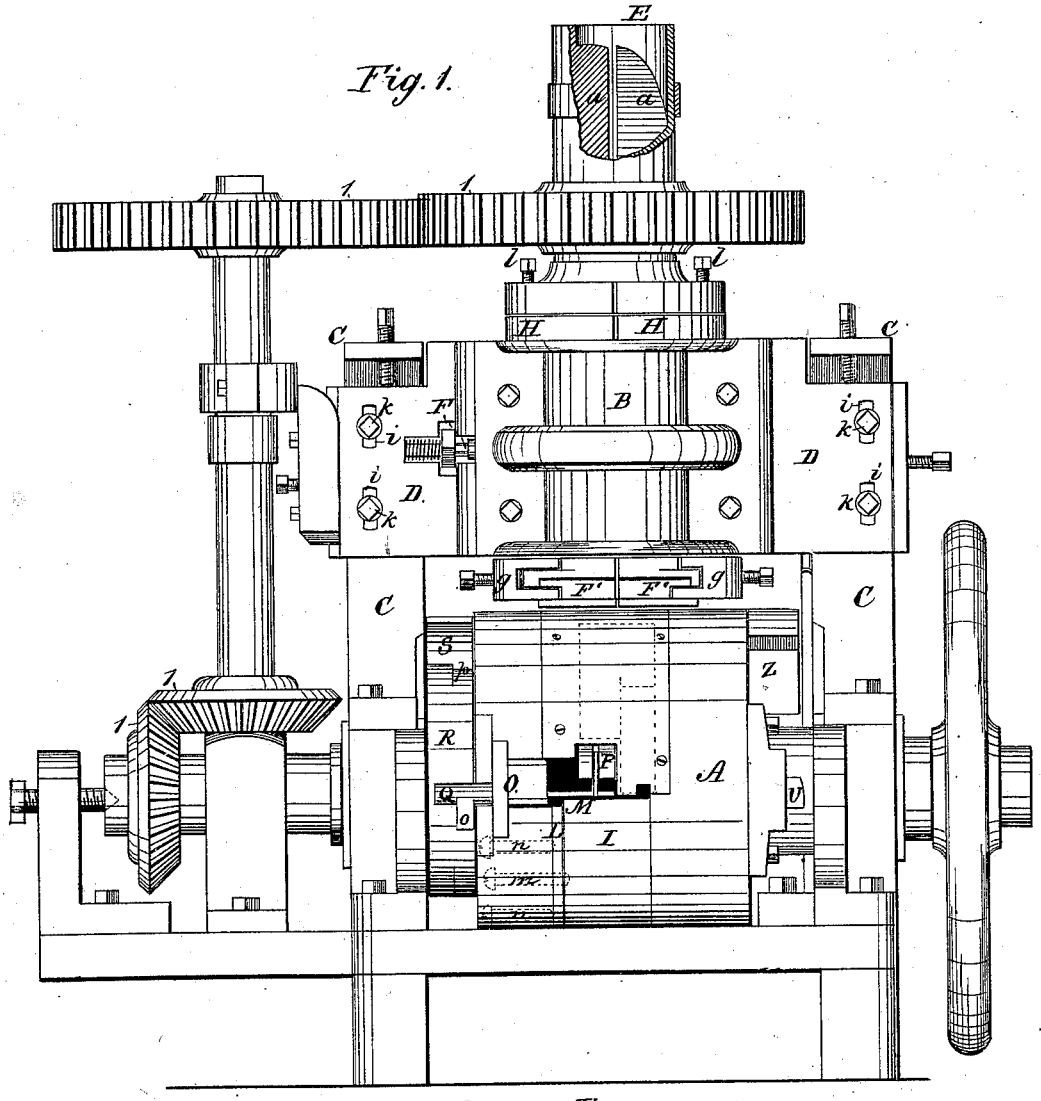

Fig. 10.

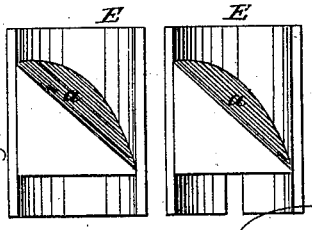

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Fig. 2.

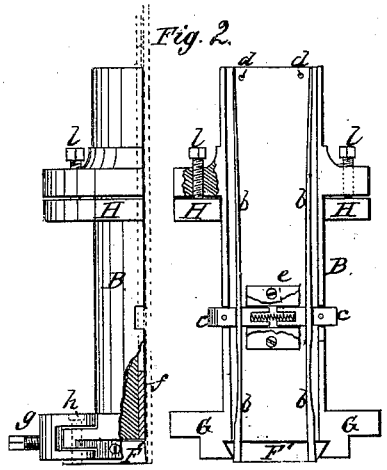


Fig. 4.

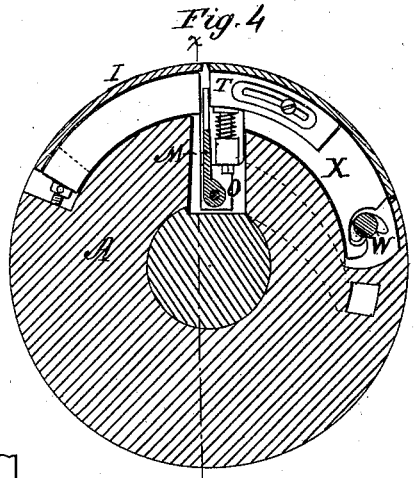


Fig. 3.

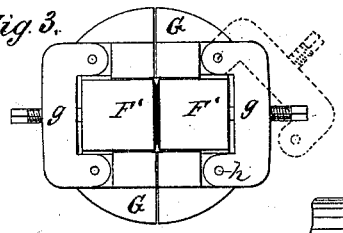


Fig. 5.

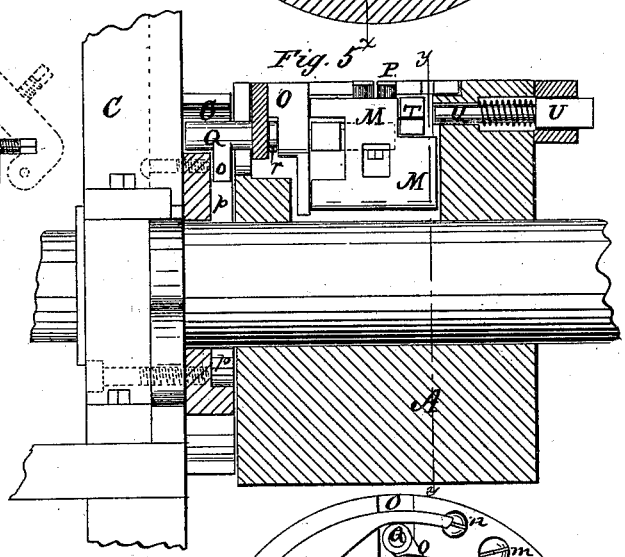
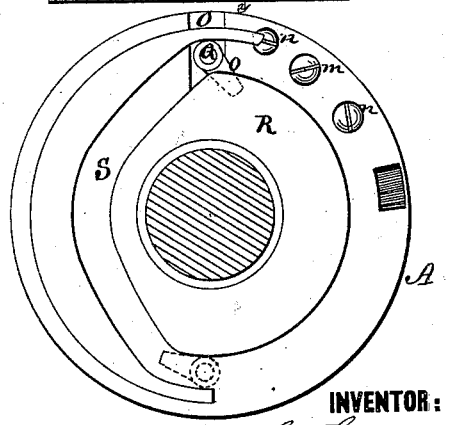


Fig. 6.



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3 Sheets—Sheet 3.

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Fig. 7.

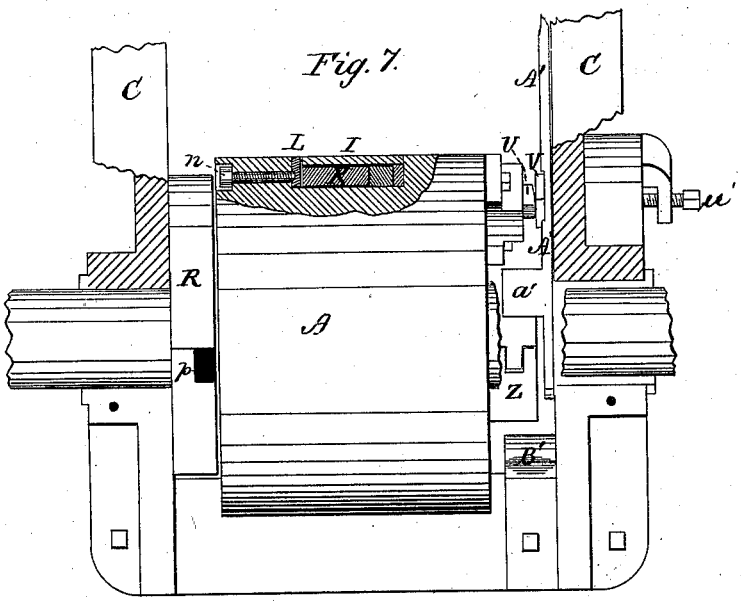


Fig. 8.

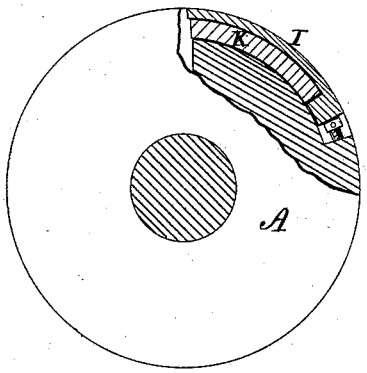
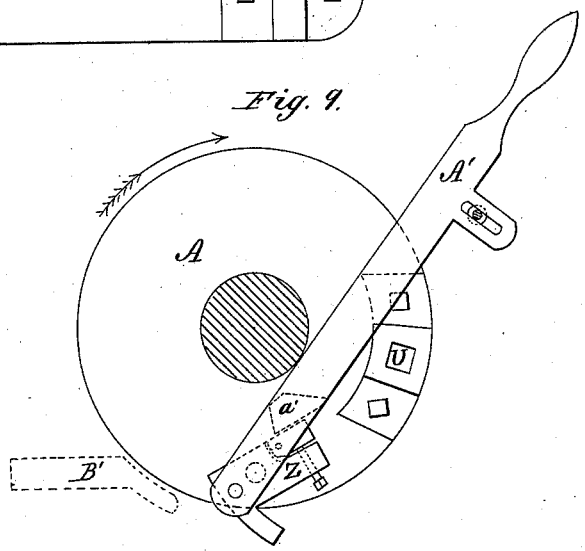


Fig. 9.



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UNITED STATES PATENT OFFICE.

ROYAL C. GRANT, OF MIDDLEPORT, OHIO.

IMPROVEMENT IN ROTARY CUT-NAIL MACHINES.

Specification forming part of Letters Patent No. **198,844**, dated January 1, 1878; application filed September 5, 1877.

To all whom it may concern:

Be it known that I, ROYAL C. GRANT, of Middleport, in the county of Meigs and State of Ohio, have invented a new and Improved Rotary Nail-Machine; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to certain improvements in machines for making cut nails. The nail-plates are held and rotated by a vertical feed-tube while being cut into blanks. Each plate is oscillated in a vertical plane, to change its inclination to the cutters, by means of spring-bars, which press against the side edges of the plate, and are oscillated by a tappet at each half-revolution of the feed-tube.

The cutting, griping, and heading devices are attached to a rotating cylinder located directly beneath the tube through which the nail-plate is fed and by which it is rotated. The end of the nail-plate is griped, the blank cut off, then lowered into alignment with the header, next griped by a die, and finally headed and released from the griping devices, and delivered from the cylinder into a suitable receptacle.

I will proceed to describe in detail the construction, arrangement, and operation of the machine by particular reference to the accompanying drawing, in which—

Figure 1 is a front elevation. Fig. 2 represents different views of the two parts of the feed-tube. Fig. 3 is an end view, showing the head of the feed-tube and the cutters attached thereto. Fig. 4 is a vertical cross-section of the cylinder on line *y y* of Fig. 5. Fig. 5 is a vertical longitudinal section on line *x x* of Fig. 4. Fig. 6 is an end view of the cylinder, and also the cam, (for operating the nipper-block,) which is shown detached from the frame of the machine. Fig. 7 is a partly-sectional elevation of the cylinder and connected parts. Fig. 8 shows a section of a portion of the cylinder. Fig. 9 is an end view of the cylinder, showing the hand-lever detached from the frame, but in the position it occupies with relation to the cylinder. Fig. 10 is a detail section of the hopper, showing the parts laid open.

The cylinder A, carrying the cutting, griping, and heading devices, is placed horizontally, and the feed-tube B, having the hopper attached, is placed vertically over the same, in the frame, whose housings or vertical portions C are connected by the up-and-down-adjustable yoke D.

The hopper E is preferably made in two parts, Figs. 1 and 10, the line of division being vertical and central. On the inner side of each half is formed a spirally-inclined shoulder, *a*, and, when placed together, the shoulders incline in opposite directions, but are separated by a slot of such dimensions as to allow the passage of a nail-plate between them.

The nail-plates are placed by hand in the hopper E, and each is fed downward by gravity, and guided into the feed-tube B by means of the inclined shoulders *a a*. While being cut each plate is held in tube B between the steel spring-bars *b b*, Fig. 2, which are held in slots in the short push-bars *c c*, arranged transversely of the tube B, and with their beveled ends projecting from the sides thereof.

The spring-bars *b b* extend the length of the tube B, and their upper ends are allowed but very limited play, being confined between the pins *d d* and the sides of the tube. A spiral spring, *e*, is placed between the inner separated ends of the push-bars *c c*, so that the latter will yield as they strike the tappet F, Fig. 1, which is fixed in the yoke D contiguous to the side of the tube B.

The tappet may be adjusted as required, to give the bars *b* a greater or less throw, by means of a screw-nut, and it is allowed to yield slightly by the spiral spring which encircles its shank, in order to accommodate nail-plates of different widths.

The tube B has a constant rotation in one direction, and hence the beveled ends of the push-bars *c* are brought successively in contact with the tappet F, one at each half-rotation of the tube. Thus the bars *b* are oscillated or moved laterally at each half-rotation of the tube, and the nail-plate, which is held between them, is thereby thrown into alternating positions, each of which is inclined to the vertical axis of the tube *b*, so that the nail-blanks cut off from the plate will be wider at one end than the other, as required.

I provide one side or half of the tube B

with a shoulder or offset, *f*, at the lower end, for the purpose of supporting a second plate, as shown in dotted lines, Fig. 2, so that when the plate being cut into blanks has been cut up, save a small portion, the second plate will drop from the shoulder and rest upon such portion yet remaining uncut, and by thus adding its weight thereto will hold it steady while being acted on by the knives or cutters.

The second nail-plate will ordinarily drop off the shoulder *f* by its own gravity when no longer held thereon by the first plate; but if not, the attendant may dislodge it.

The nail-plates pass between the knives F′, Figs. 1 and 3, which are set in a head or frame, G, attached to the lower end of the tube B, and are prevented from coming in contact by the wedge-shaped ends of bars *b*, that project between them.

It is occasionally necessary to remove the cutters for grinding and facing them anew, and to enable this to be done with ease and facility I construct said head G with removable angular sections *g*, which are pivoted to the head proper at one end, and are secured at the other by means of a detachable screw or pin, *h*. Thus by detaching said pin, a section, *g*, may be turned on its pivot, as shown in dotted lines, Fig. 3, to release the contiguous knife F′.

The knives are set up to the proper place or position by means of set-screws passing through the sections *g*, as shown.

The head G requires to be set closely to the periphery of the cylinder A, and for this purpose I provide the yoke D of the frame with vertical slots *i*, and secure the yoke to the vertical parts C of the frame by clamp-screws *k*. Thus the yoke, and with it the feed-tube B, may be adjusted downward when desired.

On the other hand, the head G may be held in close contact with the under side of the yoke D by means of adjusting-screws *l*, Fig. 1, and a wearing-plate, H, which is interposed between the angular flange of the tube and the upper side of the yoke D.

The rotating cylinder A has a knife or cutter, I, Figs. 1, 4, 7, 8, which rests upon a detachable bed-piece or block, K, placed in a suitable recess in the cylinder. The block K is held by means of a screw, *m*, Fig. 1, which presses against the lateral edge of the same. The cutter I is secured by friction with the thin side plate L, which is adjusted laterally by screws *n*, Figs. 1 and 7. The three screws *m n* are inserted at the end of the cylinder, Fig. 1.

The cutter I requires to be adjusted forward as it is worn away by grinding, and for this purpose I employ set-screws, which act against the boss or projection formed on its rear end, Fig. 4.

When a nail-plate descends through the tube B, and between the cutters F′ F′, it rests upon the periphery of the cylinder A, and as the latter rotates it falls upon the upper edge of the plate M, Figs. 1, 4, 5, which is hinged or pivoted to an arm of the nipper-block O, placed in a socket or recess in the cylinder. A small rod or arm extends from said plate M, Fig. 1, and rests in a groove in the head of nipper P, for the purpose of preventing the nail-plate from passing accidentally between the plate and nipper.

The hinging of plate M enables its upper edge to have slight play, so that it may be forced into close contact with the face of die T, or move against the beveled edge of cutter I.

The nipper P is next caused to come into action by the arm *o* of its shaft Q dropping or turning into a recess, *p*, behind the cam R, which is fixed to the housing C. The shaft, as will be seen, projects from the end of the cylinder, and it is turned to bring the nipper P against the end of the nail-plate, and hold the latter firmly against the edge of the cutter I, by means of a spring, *r*, Fig. 5, which is coiled around said shaft.

While the nipper thus holds the nail-plate, a blank is cut off, the knives I and F′ being set to act as shears, and thus reduce to a minimum the force required for the purpose.

The further rotation of the cylinder causes the end of the shaft Q to pass down in the cam-groove S, Figs. 1 and 6, in order to lower the nipper-block O, and carry the blank down to the score or groove in the die T, opposite the header U.

The nipper-block O slides radially in a recess in the cylinder, and the nipper and plate M necessarily follow its movements.

The header is a sliding spring-encircled bar, which projects from the end of the cylinder, and at each rotation of the latter comes in contact with the beveled block or fixed cam V, attached to the housing C. The header is thus forced in and upsets the end of the blank. Previous, however, to the action of the header the neck of the blank is griped by the movable die T.

The means for causing the die to advance and gripe the blank and recede and release the completed nail is a peculiar cam or eccentric, W, which is crescent-shaped in cross-section, and works in a recess in the rear end of the die-block X.

The eccentric W is operated by an L-shaped cam, Z, Figs. 1, 7, 9, fixed on the end of its shaft, which projects from the end of the cylinder. As the latter rotates, the small end of the cam Z comes in contact with the arm *a′* of the hand-lever A′, and thus causes the eccentric W to force the die T up against the blank. The toe or lateral projection of the cam next strikes the stud or fixed cam B′, and is turned back to its original position, whereby the die T is also drawn back to its original position.

The lever A′ is pivoted to the housing C, and is adjustable on its pivot, to cause the die T to gripe the blank more or less firmly, or according to the thickness of the nail-plates.

The die is made adjustable by means of its

slot and the clamp-screw, Fig. 4, by which it is attached to the block X.

The cam Z has a hinged section, Figs. 7 and 9, which may be adjusted, to vary the throw of the eccentric, in the same manner as the lever A′.

The beveled block or cam V may be adjusted inward by a set-screw, *w′*, Fig. 7, to vary the movement of the header, and cause it to upset the blank more or less.

To operate the machine, motion is communicated to the cylinder-shaft from any suitable motor, and from said shaft to the feed-tube by the connecting-gear 1 1 1, so that the cylinder and tube rotate correspondingly. The nail-plates are then placed in the hopper and fed downward, as before described.

The rotation of tube B brings the push-bars in contact with the tappet, and oscillates the bars and the plate which is held between them. The plate, whose lower end projects through the slot between the cutters F′ in the head G of the tube, enters the slot in front of the cutter I, and is at once clamped against it by the nipper. The blank is then cut off, the die T at once forced up by the action of the L-shaped cam upon the arm *a′* of the lever A′, and the header next upsets the contiguous end of the blank, which completes the nail.

The remaining operation is to release and expel the nail. For this purpose the die is moved back, the nipper released, and the nipper-block thrown out to its original position, so that the nail is delivered and the process begun *de novo*.

The first piece cut off from a plate is frequently too small to form a nail, and it is, hence, necessary to allow it to escape. To this end I provide a lateral passage leading out through the end of the cylinder, and through this the said piece (scrap) passes. The same passage also provides for escape of the scale from the nail-plate.

What I claim is—

1. In a nail-machine, the combination, with the cylinder, the movable block carrying the nipper, the shaft having an arm, *o*, and the cam for raising and lowering the nipper-block, for the purpose of carrying the blank down to the score in the dies, and subsequently expelling the same, as set forth.

2. In a nail-machine, the pivoted rest-plate M, the nipper-block, and the nipper, combined with the feed-tube and cylinder, as shown and described.

3. In a nail-machine, the movable die attached to the die-block X, the eccentric, the cam for operating them, and arms or projections, with which said cam comes in contact as the cylinder rotates, for the purpose of operating the die, as set forth.

4. In a nail-machine, the combination of the pivoted adjustable lever A′, having an arm, *a′*, the L-shaped cam Z, and the eccentric and movable die, as shown and described.

5. In a nail-cutting machine, the combination of a vertical rotating feed-tube and a horizontal rotating cylinder, each provided with suitable knives or cutters, substantially as shown and described.

6. In a nail-machine, the combination of the rotating feed-tube, the tappet device, and the bars for holding and oscillating the nail-plates, as shown and described.

7. In a nail-machine, the tappet proper, having a screw-nut and spring applied to its shank, in combination with the push-bars and plate-holding bars, as shown and described, for the purpose specified.

8. In a nail-machine, the combination of the spring *e* and the push-bars and plate-holding bars *b b*, as shown and described.

ROYAL C. GRANT.

Witnesses:

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SOLON C. KEMON.