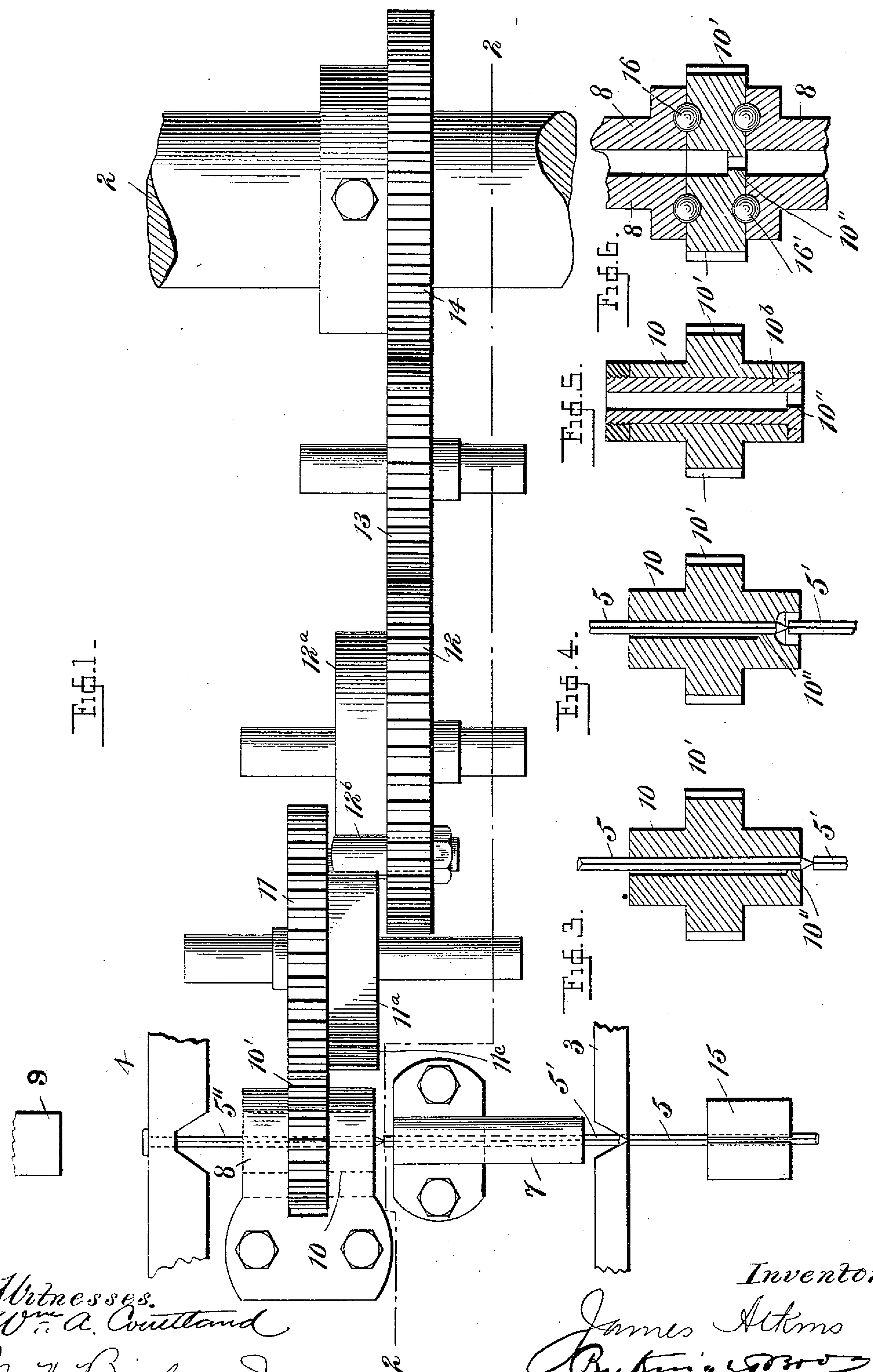
No. 641,255. Patented Jan. 16, 1900.

J. ATKINS.

NAIL MAKING MACHINE.

(Application filed Mar. 25, 1899.)

(No Model.) 2 Sheets—Sheet 1.



Witnesses.
Wm. A. Courtland
M. V. Bidgood

Inventor.
James Atkins
By Kerr, Page, Cooper & Hayward
Attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 641,255. Patented Jan. 16, 1900.

J. ATKINS.

NAIL MAKING MACHINE.

(Application filed Mar. 25, 1899.)

(No Model.) 2 Sheets—Sheet 2.

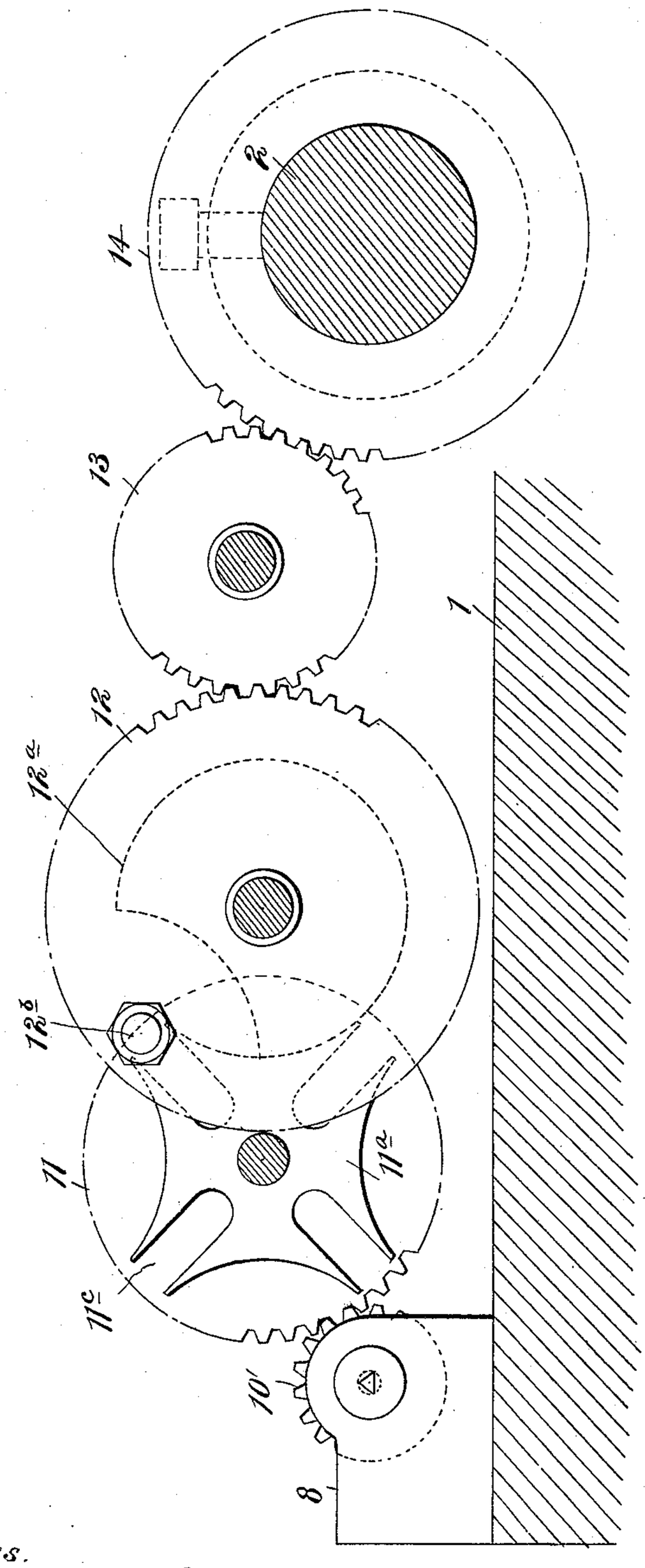


FIG. 2.

Witnesses.
Wm. A. Courtland
M. V. Bidgood

Inventor.
James Atkins
By Stevens & Bond
Attys

UNITED STATES PATENT OFFICE.

JAMES ATKINS, OF NEW YORK, N. Y.

NAIL-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 641,255, dated January 16, 1900.

Application filed March 25, 1899. Serial No. 710,444. (No model.)

To all whom it may concern:

Be it known that I, JAMES ATKINS, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Nail-Making Machines, of which the following is a specification.

This invention relates to improvements in machines for making twisted nails from wire of polygonal cross-section, as triangular or square, &c., and of any wire whose cross-section is not a circle. In the following specification wire whose cross-section is an equilateral triangle has been selected as an illustration.

My invention consists in means for twisting the wire or nail during the ordinary operation of a common nail-machine. My device for accomplishing this purpose is to be attached to any such machine, its cutting and heading devices being so arranged that my twisting device can be so placed as to twist the blank before heading or to twist the headed nail, as hereinafter described.

Referring to the accompanying drawings, which form a part of this specification, Figure 1 is a plan view of a machine embodying my invention. Fig. 2 is a sectional view thereof on the line 2 2 of Fig. 1. Fig. 3 is a horizontal section of the twisting die or device. Figs. 4 to 6 show modified forms of the twisting device.

Referring to Fig. 2, 1 represents the table of the machine, which may vary in form and position as made by different manufacturers.

2 is a side shaft through which the cutting and clamping devices are operated in some machines, and in this case through which also the twisting device is operated. This shaft makes one revolution during the cycle of the machine movements.

3 and 4 represent, respectively, the cutting-off devices and the holding devices for holding the wire while it is being headed.

5 5′ 5″ show, respectively, the wire coming from the feeder, the nail-blank cut from the wire and being guided by the tube 7, and the headed nail still held by the clamp and lying partly in the twisting-spindle 10 ready for twisting.

7 is a guide-tube whose bore corresponds, approximately, in shape and size with the cross-section of the wire used.

8 is a pillow-block supporting the twisting-spindle 10.

9 is the header.

11 is a gear driving the spindle 10 through pinion 10′ on said spindle.

11ª is a slot-wheel for a "slot-wheel and pin" movement and is firmly attached to the gear 11 or is made in one piece with it.

12, 13, and 14 is a train of gears driving the slot-wheel from the side shaft 2 through the pin 12ᵇ.

12ª is a stop-cam firmly attached to gear 12.

15 represents the feeding clamps or devices, which are operated, in any usual manner, alternately with the holding devices 4.

The above parts are all mounted in any usual or suitable frame; but the frame, transmitting shaft and gears, and other parts of a common nail-machine are not embraced in the drawings, they being of the usual and well-known constructions.

The proportions of the gearing members will depend on the amount of twist to be given to each nail, and this degree of twist will be governed to a slight extent by the form of the wire used. If the latter is square, the twist must be a multiple of the quarter-revolution. If triangular, it must be a multiple of the third of a revolution, as two-thirds, one, or one and one-third revolution, &c. This requirement rests on the necessity for the twisting-spindle at the completion of the twist lying in such position that the angular portion of its bore will receive and guide the wire as it advances another nail length. For the purpose of illustration I have selected triangular wire and a four-slot wheel, giving to a two-thirds four-inch nail a twist of two-thirds of a turn in its length from head to point. Then the spindle-pinion 10, with thirty teeth, must make two-thirds of a revolution, equal to twenty teeth, at each movement, and as the driving or slot wheel gear makes one-quarter of a revolution at the same time it must have eighty teeth. Also, as the driving-shaft 2 and the pin 12ᵇ must revolve in unison, the gears 12 and 14 must be equal; but they can be of any size and number of teeth which the design will allow.

The whole train is represented, in plan and elevation, as just at the point of beginning the twisting movement, the motion being in the direction indicated by the arrows. The spindle has its bore reduced for a small part of its length, as shown at 10″, to the shape and size of the cross-section of the wire used, approximately. This portion I will call the "clutch" or "chuck," and it may be located at any point in the length of the spindle. In Fig. 3 it is shown as located at the end of the spindle, facing the cutter, and the spindle is so placed that the clutch grasps the triangular point of the nail. The remainder of the spindle-bore is cylindrical to permit the twisting between the head and point and of such diameter as to act as a guide, together with the clutch or chuck, for the next advancing blank.

The operation of the device will be described, beginning at the point in the cycle represented in the drawings. The gear 12, carrying the cam 12^a and pin 12^b, rotating in unison with shaft 2, is at the point in its revolution when the pin 12^b is just entering one of the slots 11^c of the slot-wheel. As it advances it communicates its motion to the slot-wheel, the movement of the latter beginning without shock and gradually increasing until the pin reaches the medial line between the axes of wheels 11 and 12 and then decreasing in speed until the pin reaches the point where it leaves the slot and the movement of the slot-wheel ceases. The slot-wheel and its gear 11 have now made one-quarter of a revolution, which has given pinion and spindle 10 two-thirds of a revolution, the gear having, as illustrated, eighty teeth and the pinion thirty teeth, and the triangular clutch is left in the same angular relation to the advancing wire as at the beginning of the twisting. As the pin leaves the slot the next slot is in position to receive it on the succeeding revolution and the cam 12^a engages the adjacent concave portion of the periphery of wheel 11^a, thus preventing the further rotation of the latter until the pin next engages it. The freedom from shock at any speed makes this slot-wheel and pin movement peculiarly applicable to the purpose under consideration; but any other movement may be adopted which will give the spindle 10 the requisite degree of rotation at the proper point in the machine-cycle and within the necessary portion of the cycle time. It is evident that the twisting must be done between two succesive impulses of the feeding device and while the wire is held by the heading-clamps or their equivalent. The movement illustrated, performing the twisting in one-quarter of the cycle, gives ample latitude for adjustment as to the time of its action.

In the section Fig. 3 the triangular clutch is shown at 10″, the remainder of the bore being cylindrical. This clutch can be located as shown or in any other portion of the bore—as, for instance, shown in Fig. 4.

If it is desired to make nails of different lengths on one machine, a set of spindles can be provided, one for each length.

The clutch or chuck for twisting the wire may be formed in the spindle 10, as shown in Figs. 3 and 4, or the chuck-opening may be formed in any suitable rotating part. Thus in Fig. 6 the opening is shown as formed directly in the pinion 10′, which has in this case no spindle, but is supported by ball-bearings 16 16′ on each side in the manner indicated.

The design illustrated contemplates making the spindle of steel and hardening the clutch or chuck; but, if preferred, a hardened-steel bushing 10^b can be substituted, as shown in Fig. 5.

Provision for different lengths of nails can also be made by making the whole spindle and its pillow-block adjustable along the axis of the wire. It will be observed that the cutting device 3 and the guide 7 must also be adjustable for such change of nail lengths. While it seems advisable for simplicity of design and convenience of operation that the twisting should be accomplished while the nail is grasped by the heading-clamps, I do not confine myself to that construction. Any other means of holding the nail or nail-blank may be adopted. It is only requisite that my twisting device shall be so placed as to grasp the end of the nail or nail-blank and give it the desired twist after it has been cut from the wire and between the thrusts of the feeder. The twisting device is therefore placed between the cutting-off device and the holding device that keeps the said blank from turning as a whole, or, in other words, the holding device is located at a point beyond the chuck or twisting device.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a wire-nail machine, the combination of a cutting-off device, means for feeding non-circular wire through the cutting-off device, a holding device, an intermittently-rotating twisting device located between the cutting-off device and the holding device, and means for rotating said twisting device while the cut-off wire is being held by the holding device, substantially as set forth.

2. In a machine for making twisted non-circular wire nails, the combination of a cutting-off device, means for holding from rotation a cut-off wire section, a twisting device located between such holding means and the cut-off device, and a guiding device for guiding the cut-off wire section into the twisting device, such guiding devices engaging with the non-circular wire to present same in proper angular relation to the twisting means.

3. In a machine for making twisted non-circular wire nails, the combination of a cutting-off device, feeding and guiding devices for feeding the wire and the cut-off sections in definite angular position, a twisting device comprising a chuck conforming to the wire

and adapted to receive the wire when fed in such definite angular position, and to allow same to pass longitudinally through it, holding means for holding from rotation a part of a wire section that has passed through the said chuck, and means for rotating said twisting device while the wire section is so held and for maintaining said twisting device in fixed and definite angular position while the wire is being fed through same.

JAMES ATKINS.

Witnesses:
ARTHUR P. KNIGHT,
M. V. BIDGOOD.