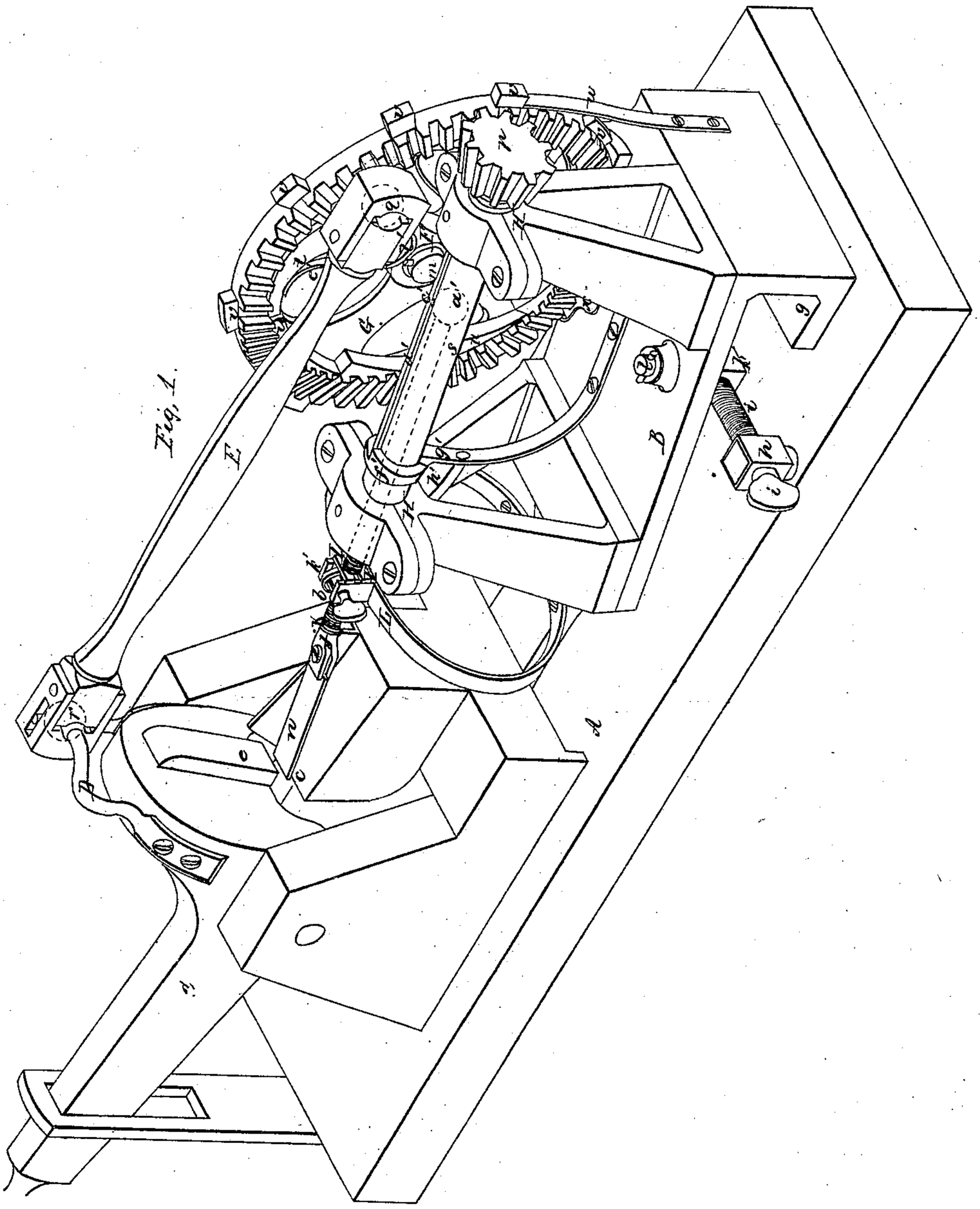
A. Heddaeus,

Making Cut Nails,

No. 15,515. Patented Aug. 12, 1856.

Fig. 1.



Sheet 2-2 Sheets.

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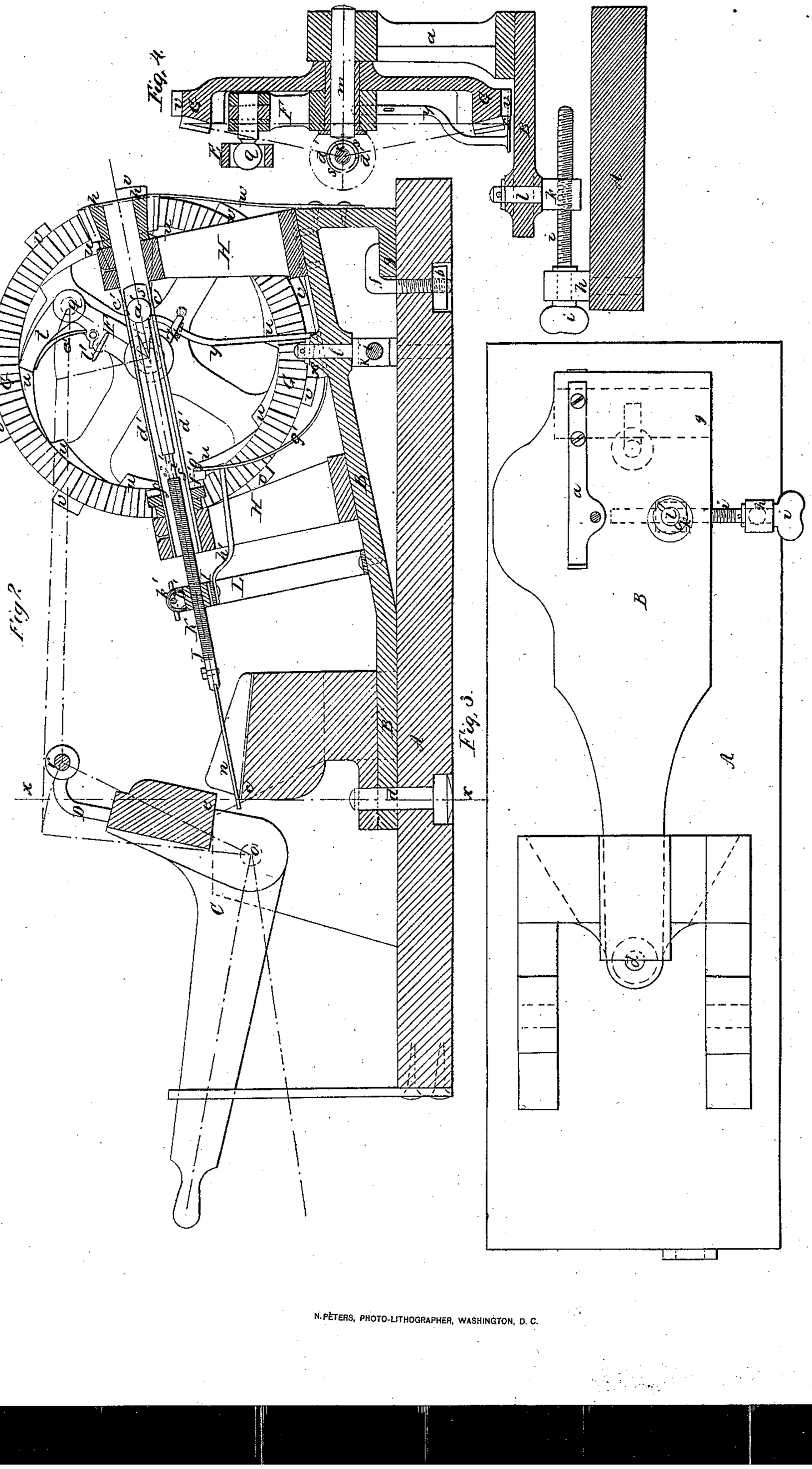

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ADOLPHUS HEDDAEUS, OF PITTSBURGH, PENNSYLVANIA.

NAIL-PLATE-FEEDING APPARATUS.

Specification of Letters Patent No. 15,515, dated August 12, 1856.

To all whom it may concern:

Be it known that I, ADOLPHUS HEDDAEUS, of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Feed Apparatus for Nail-Machines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawings, forming part of this specification, in which—

Figure 1 is a perspective view of my nail feeding apparatus. Fig. 2 is a side view thereof. Fig. 3 is a ground plan of the bed plate of my machine. Fig. 4 is an end view of my apparatus.

In the several figures like letters of reference denote similar parts of my apparatus.

My nail feeder is so constructed as to be applied to nail making machines of any ordinary kind, and is designed to do the work of feeding the machines, as the nails are made, by turning over the nail plate after each nail is cut off, and advancing the plate forward the thickness of one nail at each stroke of the machine, so as to place the end of the nail plate under the knives or cutters of the machine for the manufacture of another nail, and to repeat this action successively until the whole nail plate (excepting that part held by the nippers) is worked up into nails.

As the nails made by machinery taper, being larger at the head than at the point, it is necessary, so soon as one nail is severed from the nail plate, to turn the nail plate half round, so as to allow for the taper of the nails, and it is also necessary to withdraw the nail plate from its position between the cutters, while it is being turned, to prevent the injury which would ensue to the lower cutter if the plate were turned on the edge of the cutter; and in replacing the nail plate between the cutters, it must be advanced each time a uniform distance exactly equal to the required thickness of the nails otherwise the nails would be very irregular in size.

The slightest variation in the relative position of the nail feeding apparatus, and the nail machine, will make a difference in the taper of the nails, so that it is necessary to adjust the apparatus every time the cutters are ground, and as this point is of great importance, one great object of my apparatus is to admit of a nice adjustment of the apparatus, so as to accommodate the nail plate to the position of the cutters of the nail machine with great precision, even when the machinery is in operation, thus effecting a saving of the time which would be lost, if (as in similar apparatus) it were necessary to stop the machine each time the feeder required adjustment.

To enable others skilled in the art to make and use my machine I will proceed to describe its construction and operation.

In the several drawings A is the bed plate of the machine.

B is an inclined frame or carriage which supports the feeding apparatus. The lower extremity of the frame B passes under the lower cutter *c* of the nail machine and is fastened to the bed plate A by a single strong bolt or center pin *d*. This center pin is placed immediately under the front edge of the lower cutter *c*, a perpendicular line *x*—*x* passing through the center of the pin *d*, and through the center of the nail about to be severed from the nail plate by the upper cutter *e*. The frame B turns on the pin *d* as a center, the other extremity of the frame B being raised up, is held in place by a hooked bolt *f* which rests on a flange *g* so that where the frame B, is turned on its center *d* the hook of the bolt *f* will always rest on the flange *g* and keep the rear end of the frame B, in its place on the bed-plate A. The screw nut *b* on the hooked bolt *f* is loosened when the frame B is to be moved, and tightened again after its adjustment. The set screw *i* passes through a block *h* with a smooth bore, attached to the bed plate A and also through a swivel nut *k* attached by a pin or pivot *l* to the frame B, near to the rear end of the frame. By turning this set screw *i* (where the nut *b* on the hooked bolt *f* is loosened) the whole frame B which carries the feeding apparatus may be moved in an arc of a circle, of which the pin *d* is the center, the effect of which is, that as the extremity of the nail plate *n* is in the same exact perpendicular line as the center pin *d* that this motion of the frame B varies the taper of the nail by adjusting the angle which the nail plate bears to the face of the cutters *c* and *e*.

In Figs. 1 and 2 C is the cutting lever of the nail machine which moves on its center *o* communicating the proper up and down motion to the upper cutter *e*. From the top

of the short arm of this lever C projects a bent arm D fastened at both ends of the lever C, and in the center of the arm D immediately over the upper cutter *e* and (where the lever C is at half stroke) immediately in the perpendicular line *x*—*x* passing through the center pin *d* is a ball wrist *r*, which plays in the socket joint in one end of the shaft E which communicates motion from the nail machine to the feeding apparatus. The other extremity of the shaft E has likewise a ball and socket connection *q* with the crank F the ball being at the end of the crank arm F and the socket in the extremity of the shaft E. The shaft E forms the only connection between the nail machine and the feeding apparatus (excepting at the center pin *d* connecting the frame B with the bed plate A), and the ball and socket joint at either end of the shaft E permits the shaft E to move the crank F equally well whether the center of the ball *q* is in the same vertical plane as that in which the center of the cutting lever C moves, or in a different vertical plane, but parallel thereto, as will be the case whenever the frame B is moved by the set screw *i* to one side or the other, of a line passing horizontally through the center of the nail machine. To the frame B is attached the standard *a* which supports the wheel G. The crank F plays loosely on the shaft or axle *m* (which carries the large wheel G) with a backward and forward motion communicated to it by the shaft E from the cutting lever C (as shown by red lines on Fig. 2). The wheel G is made very light, so as to give it as little momentum as possible, because it is designed to have an intermittent and not a continuously rotating motion.

On the beveled edge of the wheel G are cogs, gearing into a small pinion *p*, so arranged that one complete up and down stroke of the lever C causing a partial revolution of the large wheel G will effect a half revolution of the pinion *p* and pinion shaft *s*. The intermittent rotary motion of the wheel G is caused by a spring pawl *t* (see Figs. 1 and 2) which works in the ratchet with *u u*, placed under the cog teeth on the inside of the rim of the large wheel G. If the number of cogs in the large wheel G are in such proportionate number to the cogs on the pinion *p* that one tenth revolution of the wheel will produce a half revolution of the pinion *p* (as in the drawings), then there are ten ratchet teeth on the rim of the wheel, and each complete up and down stroke of the cutting lever C causes a tenth revolution of the wheel G. On the outer edge or circumference of the wheel G are placed ten projections or stops *v*, *v*, which prevent the wheel being embedded too far, and hold it steadily in place when the nail is being made by means of the spring *w*, resting on the circumference of the wheel, and dropping under one of the stops *v* to prevent the backward motion of the spring pawl *t* from causing the wheel G to move back, and the spring catch *x* which prevents the wheel moving forward, excepting when it is pressed down by the lever *y* which is depressed the moment the wheel begins to advance by the action of a little arm *l* projecting from the crank F.

It is not necessary that each stroke of the lever should move the bevel wheel one tenth round, but the pinion *p*, wheel G and length of the crank F, may be adjusted to move it one twelfth or other desired fractional revolution. This will be regulated by the size of the machine.

The pinion shaft *s* is hollow forming a tube or sleeve *s* open at the end nearest to the nail machine and attached to the pinion *p* at the other end. This shaft or sleeve *s* is supported in bearings in the uprights H, H in which it turns on its axis. In the sleeve *s* is a ball *a'* working in the sleeve *s* as a socket, and prevented from turning round in the sleeve at right angles to its axis by two pins *c' c'* which project through longitudinal straight slots *d' d*, in the sleeve *s*. To this ball *a'* is attached the feed screw K, which projects outside of the sleeve *s* toward the nail machine, and terminates in the jaws or nippers *j* which hold the nail plate *n*. The feed screw K has screw threads cut on it to within a short distance of the ball *a'* and is supported at one end in the sleeve *s* by the ball *a'* and in front of the sleeve by the female screw I, I, set in the elliptical spring L, (shown more clearly in Fig. 1). The female screw I I is in two pieces, and when the cam *b'* is turned down, these two pieces close on the feed screw K, and cause the rotation on its axis of feed screw K, to draw it gradually out of the sleeve *s* and advance it, and the nail plate *n*, which it carries toward the cutters or knives of the nail machine. Thus when the upward stroke of the cutting lever C causes the pinion *p* to make a half revolution on its axis, the pinion shaft or sleeve *s* also revolves, and with it the feed screw K and nail plate *n*, and as the threads of the screw are cut so that the pitch of each thread is exact by double the thickness of one nail, it follows that the half revolution of the feed screw K advances the nail plate *n* forward just the thickness of the nail to be cut, so that when the cutting lever C again descends the nail plate will be just in the right position between the cutters *c* and *e* for the making of another nail.

The whole feed apparatus is as before stated, inclined to the horizontal at such an angle that the nail plate enters between the cutters of the machine with the proper dip or inclination.

The nail plate *n* rests on the lower cutter *c* of the nail machine, (as seen in Fig. 2), and if the lower bearing of the feed screw at I were fixed, so as to prevent the screw rising slightly, the nail plate could not be turned around at all without breaking the feed apparatus, or injury to the edge of the cutter *c*. To remedy this and allow of so much upward and sidewise motion of the feed screw as to permit the nail plate *n* to be turned with ease, I set the female screw I, I, on the top of an elliptical spring or steel hoop L (see Fig. 1) which when at rest, maintains its proper position with sufficient firmness and yet will yield upward, sidewise, backward and forward so as to allow the feed screw K to rise as the nail plate turns on its edge and when the semi-revolution is performed will bring the nail plate in its proper position between the knives. The ball joint *a'* at the end of the feed screw K permits the feed screw to rise and move sidewise in the sleeve *s* turning on *a'* as a center. It will be seen, however, by reference to the drawing (Fig. 2) that the side of the nail plate *n* rests on the edge of the lower cutter *c*, and as the turning of the nail plate *n* on the edge of the cutter would injure it, I draw the nail plate backward, at the moment of turning it by means of the cam *f'* which is placed on the sleeve *s*, and turns with it (see Figs. 1 and 2.) This cam *f* consists of two inclined planes, so as to act twice during each whole revolution of the sleeve *s*. Against the face of this cam *f'* rests the end of an upright spring *g'* which is connected by a horizontal rod *h'* with the elliptical spring L, and draws it back, just as the nail plate *n* is on the point of turning; the ball *a'* with its pins *c' c'* working in the slots *d' d'* in the sleeves and allowing the feed screw K, and its appendages to recede sufficiently. As soon as the nail plate is turned, the cam *f'* eases the spring *g'* and allows the nail plate *n* to be advanced to its proper position between the cutters by the reaction of the elliptical spring L.

The nail plate *n* will continue to advance with each half revolution of the feed screw *k*, as the nails are cut from it, until nearly the whole of the nail plate is cut up; and when the feed screw has advanced thus far through the female screw I the threads on the feed screw cease (at *i'* Fig. 2) so that the further revolution of the feed screw, no matter how long continued, will not avail to advance the feed screw K and nipper jaws *j* nearer to the cutters of the nail machine. When the feed screw arrives at this point, the boy who tends the machine can run the feed screw back into its sleeve *s* for the insertion of a fresh nail plate by turning the cam *b'* which holds down the jaws of the female screw I I, when they will open by means of the spring *k'* which rests on the top of the elliptical spring L. The feed screw K may then be easily pushed back into the sleeve *s* and then the cam *b'* being turned down compresses the jaws I, I, of the female screw over the threads of the feed screw K. As it might be difficult, however, to insert a nail plate between the jaws of the nippers *j* while they are turning around on every half stroke of the nail machine the motion of the wheel G (which communicates motion to the pinion *p* the pinion shaft or sleeve *s* and feed screw K) is temporarily stopped by turning the wrench *l'* which causes the spring *e'* under the pawl *t* to drop, and the pawl being no longer pressed upward by its spring, falls down, out of the ratchet teeth *u*, and the motion of the crank F no longer produces any motion of the wheel G. The wheel may be instantaneously set in motion again by turning the wrench *l'* so as to give the spring *e'* its proper pressure against the under side of the pawl *t*, when the apparatus resumes its operation as before. Thus every upward stroke of the cutting lever C, of the nail machine, draws the nail plate from the edge of the lower cutter *c*, turns it half around, and advances it again the right distance, equal to the thickness of the nail to be cut by the machine. During the down stroke of the cutting lever C by which the nail is severed from the nail plate *n* all the parts of the feeding apparatus are at rest, excepting the crank F which is moved backward until the spring pawl *t* catches into another ratchet tooth *u* ready to turn the wheel G on the upward motion of the cutting lever C.

During the backward motion of the crank F and spring pawl *t* the nail is severed from the nail plate *n* by the descent of the upper cutter *e*, when the lever C is raised and while the nail is being thus made, the wheel G is held perfectly still by the springs *w* and *x* acting on the stops *v*, *v*, as before described; which (as the pinion *p* on the sleeve *s* gears into the wheel G) holds the nail plate *n* rigidly in its place, between the cutters, until the upward stroke of the lever C sets the wheel G again in motion, and turns and advances the nail plate as before described.

I have described my feeding apparatus as if it were placed immediately in front of the nail machine, with the face of the wheel G and the axis of the feed screw K in a vertical plane exactly parallel with the plane in which the cutting lever *c* moves. This is the position which, in theory, it ought to occupy; but as it is impossible to set it exactly accurately in place, and as the knives will vary each time they are ground, and sometimes even while the machine is at work; and as the slightest relative variation will destroy the taper of the nail, it is necessary in order to make the feeding apparatus

do its work as well as it can be done by hand, to adjust it laterally so as to suit the taper of the nail by turning the set screw *i* as before described which moves the whole feed apparatus on its center pin *d* while the ball and socket joint *r* and *q* at each extremity of the connecting shaft E prevent the motion of the feed apparatus from interfering in the slightest degree with the motion either of the nail machine or feed apparatus.

Having thus described my improved nail feeding apparatus what I claim as my invention and desire to secure by Letters Patent is—

1. Connecting the feeding apparatus with the nail machine by ball wrists or universal joints, in some point or points situate in a vertical line through the center of the nail when cut, and in locating all the points of such connection in this vertical line, for the purpose of giving the feed apparatus a lateral motion in the arc of a circle, whose cutter is in that vertical line, whereby the feed apparatus may be accurately adjusted without stopping the operation either of the feeder or nail machine.

2. The use of an elliptical spring or steel hoop, as the bearing for the front end of the feed screw, in combination with the sleeve *s* ball *a′* cam *f′* and spring *g′* for the purpose of allowing the turning of the nail plate and drawing it back while turning.

3. The use of the large wheel G, constructed as described, in combination with the pawl *t* and pinion *p* for the purpose of communicating the requisite motion to the feed screw and nail plate together with the cam wrench *l′* to lower the spring *b′* of the pawl *t* whereby the feed apparatus may be instantaneously stopped, without interfering with the action of the nail machine or detaching the one from the other.

In testimony whereof I have hereunto set my hand this ninth day of July A. D. 1856.

ADOLPHUS HEDDAEUS.

Witnesses:

W. Banewell,

Thos. Steel.