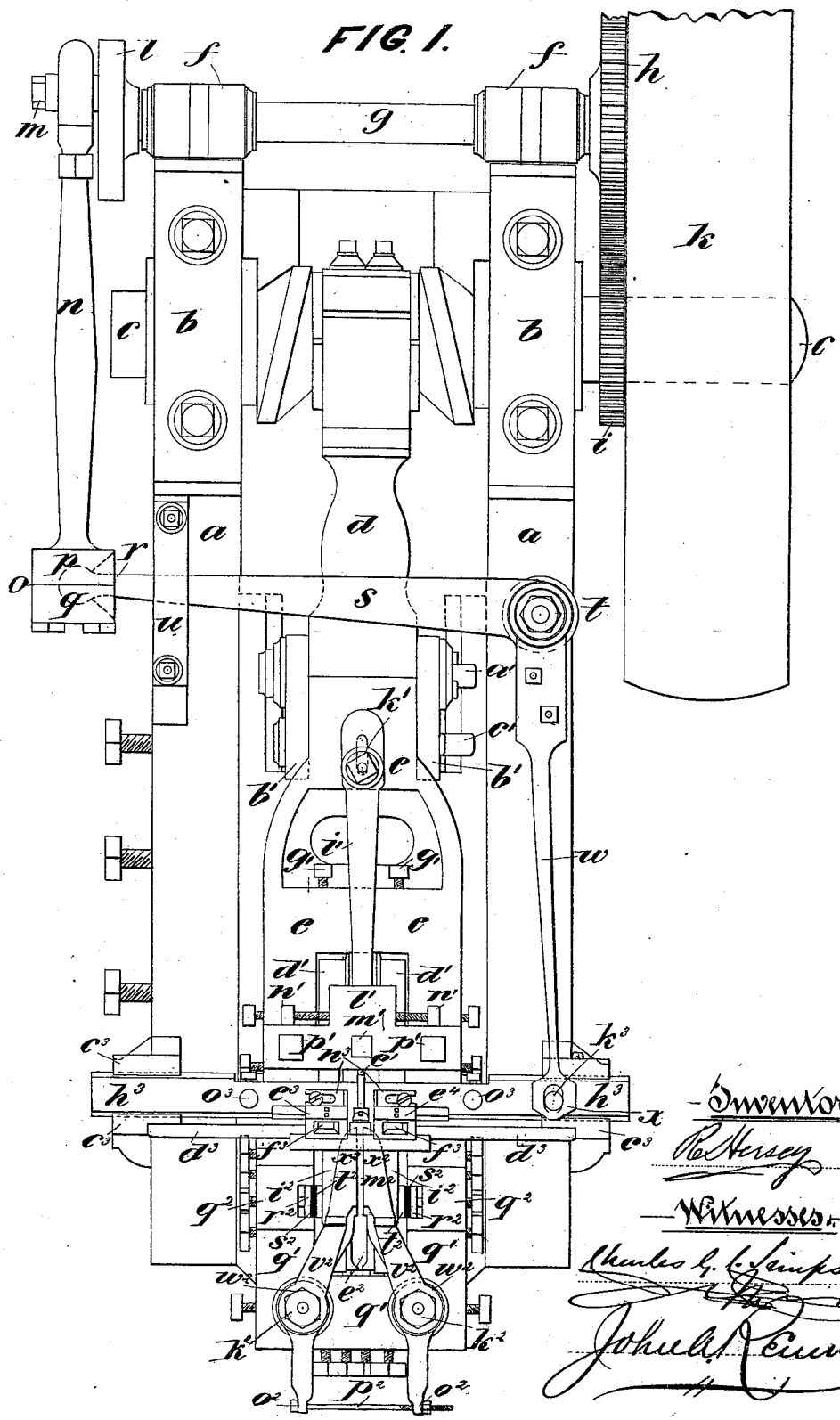
5 Sheets—Sheet 1.

R. HERSEY.

Horseshoe-Nail Finishing-Machine.

No. 196,227. Patented Oct. 16, 1877.

FIG. 1.



Inventor:
R. Hersey

Witnesses:
Charles G. L. Simpson
John A. Lewis & Co.

5 Sheets—Sheet 2.

R. HERSEY.

Horseshoe-Nail Finishing-Machine.

No. 196,227. **Patented Oct. 16, 1877.**

FIG. 2.

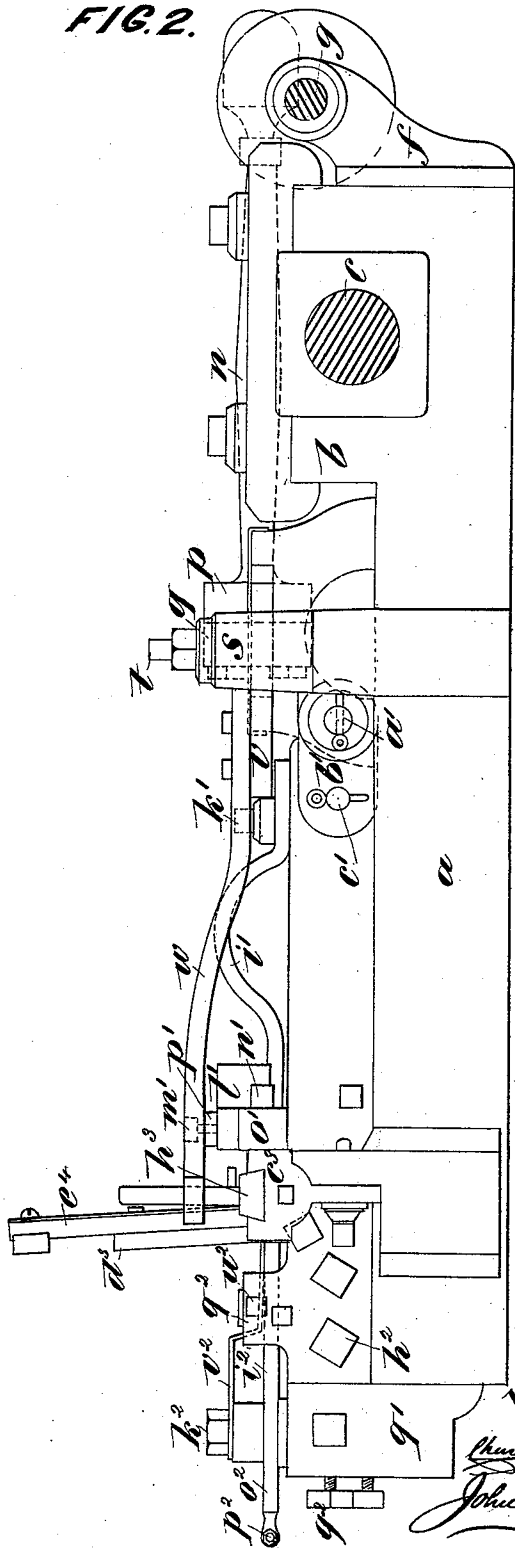
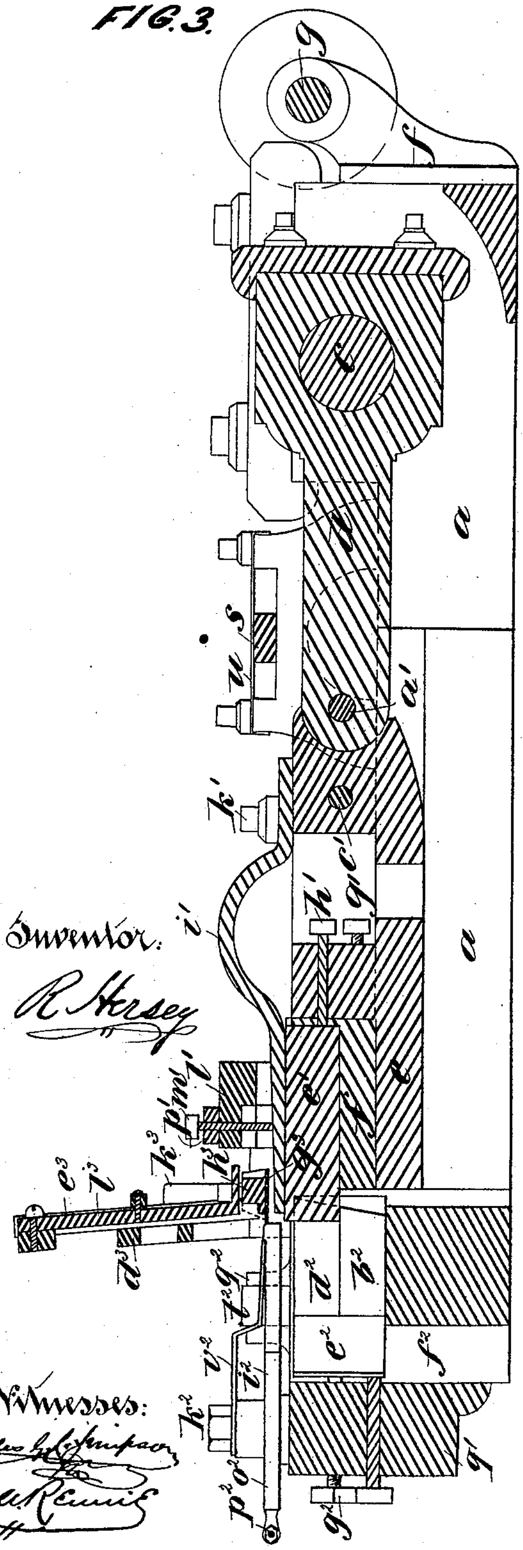


FIG. 3.



Inventor:
R. Hersey

Witnesses:
Charles G. Simpson
John W. Rennie

5 Sheets—Sheet 3.

R. HERSEY.

Horseshoe-Nail Finishing-Machine.

No. 196,227. Patented Oct. 16, 1877.

FIG. 4.

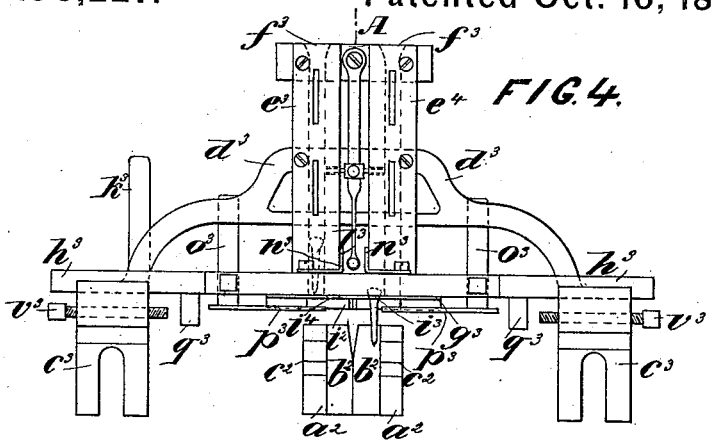


FIG. 6.

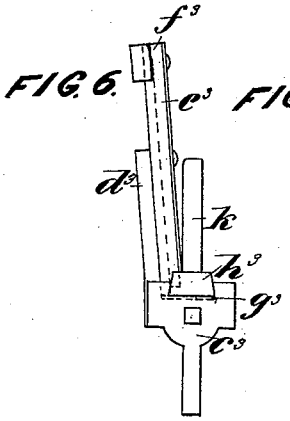


FIG. 7.

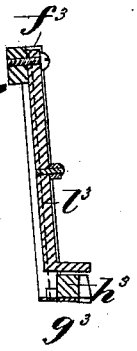


FIG. 8.

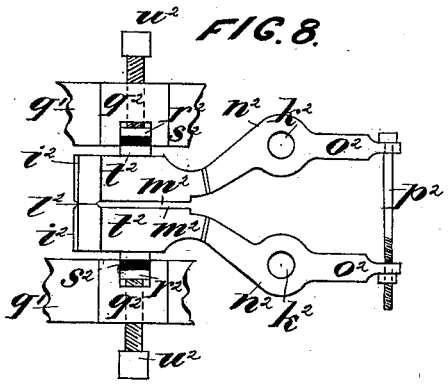


FIG. 12.

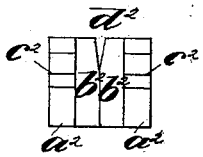
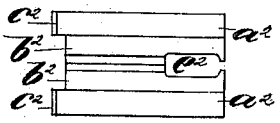


FIG. 13.

FIG. 14.



Witnesses:

Charles G. L. Simpson

John A. Rennie

Inventor:

R. Hersey

5 Sheets—Sheet 4.

R. HERSEY.

Horseshoe-Nail Finishing-Machine.

No. 196,227. Patented Oct. 16, 1877.

FIG. 5.

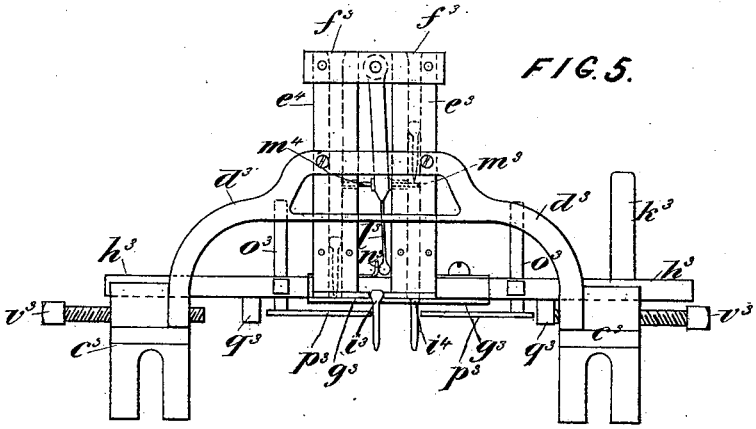


FIG. 10.

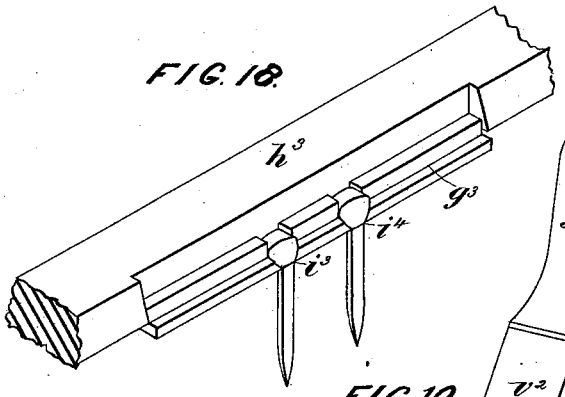


FIG. 9.

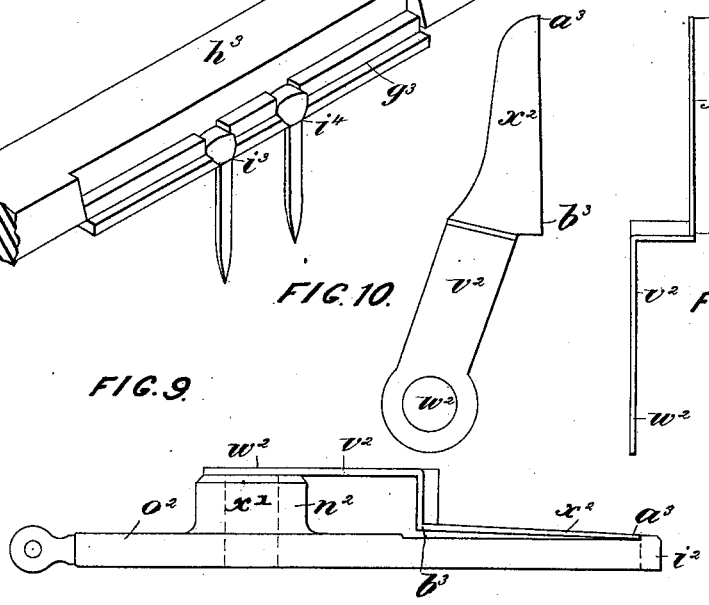
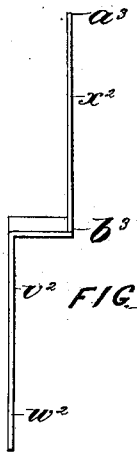


FIG. 11.



Witnesses:

Charles G. J. Simpson

John A. Rennie

Inventor:

R. Hersey

5 Sheets—Sheet 5.

R. HERSEY.

Horseshoe-Nail Finishing-Machine.

No. 196,227. Patented Oct. 16, 1877.

FIG. 15.

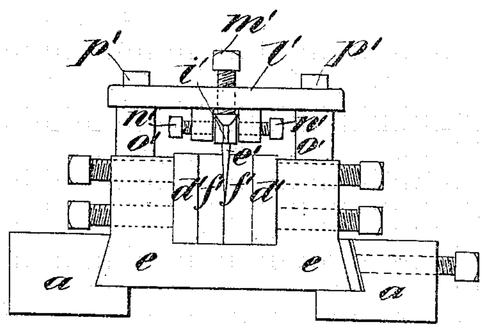


FIG. 16.

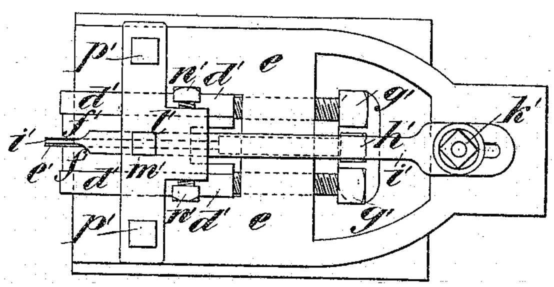
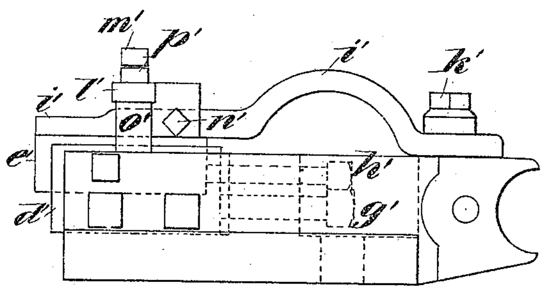


FIG. 17.



Witnesses:

Charles G. C. Simpson

John A. Rennie

Inventor:

R. Hersey

UNITED STATES PATENT OFFICE.

RANDOLPH HERSEY, OF MONTREAL, QUEBEC, CANADA.

IMPROVEMENT IN HORSESHOE-NAIL-FINISHING MACHINES.

Specification forming part of Letters Patent No. **196,227**, dated October 16, 1877; application filed May 1, 1877.

To all whom it may concern:

Be it known that I, RANDOLPH HERSEY, of the city and district of Montreal, Province of Quebec, Canada, have invented certain new and useful Improvements in Machines for Finishing Horseshoe-Nails; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention has reference to a machine to be used in completing the operation of manufacturing horseshoe-nails, by clipping and beveling the points of the same.

I would here explain that blank nails are first formed, either by shearing from a plate or working from a rod of iron a partly-formed nail which partly-formed nail is called a "blank nail". The blank nail is then elongated by suitable mechanism, forming it into an elongated blank. The elongated blank is then beveled and clipped at the point, forming it into a complete and finished nail; and it is for the purpose of performing these two last operations that my present invention is arranged.

In nearly all the machines at present in use for this purpose, wheels with notches in them are provided and arranged for the reception of the nails, or a band with notches in it, carried on wheels; and in a great measure the accuracy of the operation of such machines is dependent upon that with which these notches are cut or formed in the wheels or bands, as the case may be, and as these notches are very numerous, the machinery is very expensive and complicated.

By my invention a vibrating slide, requiring little comparative expense to construct, is arranged to accomplish the object of the above-mentioned wheels or bands, which is to present the nail to the beveling and clipping dies.

In the drawings hereunto annexed, similar letters of reference indicate like parts.

Figure 1 is a plan of a machine embodying my invention. Fig. 2 is a side elevation of Fig. 1. Fig. 3 is a longitudinal sectional elevation of Fig. 1. Fig. 4 is an elevation of vibrating slide, feed-tube, and rest for attaching the same to the frame of the machine, as removed from the same, and viewed on the side facing to the driving-shaft when in place. Fig. 5 is an elevation of vibrating slide, &c., showing the reverse side of Fig. 4. Fig. 6 is an elevation of Fig. 4. Fig. 7 is a sectional elevation taken on line A, Fig. 4. Figs. 8, 9, 10, and 11 are details of nail-guide. Fig. 12 is a front view of beveling and clipping dies. Fig. 13 is a side elevation of Fig. 12. Fig. 14 is a plan of Fig. 12. Fig. 15 is a front-end view of slide *e*, with dies, &c., in place. Fig. 16 is a plan of Fig. 15. Fig. 17 is a side elevation of Figs. 15 and 16. Fig. 18 is a detail of vibrating or sliding bar.

Letter *a* is any suitable frame-work for holding the moving parts together. *b* are plumber-blocks, or bearings formed in the same, for carrying the shaft *c*, the center part of which is set eccentrically, so that by attaching to it a connecting-rod, *d*, it will impart motion to a slide, *e*, guided by forming the frame *a* suitably for that purpose.

On the back end of the frame *a* are formed brackets *f*, for carrying a shaft, *g*, on one end of which is secured a gear-wheel, *h*, intermeshing with and revolved by a gear-wheel, *i*, secured on the shaft *c*, the proportions of the gears being two in diameter of *h* to one in diameter of *i*, so that the shaft *c* will make two revolutions for one of the shaft *g*. On the shaft *c* is also secured the ordinary pulley *k*. On the opposite end of the shaft *g* to that at which the wheel *h* is secured, a disk, *l*, is attached, having an adjustable crank-pin, *m*, arranged to be set or adjusted in distance of position from the center of the disk to suit the throw required. To this is attached one end of a connecting-rod, *n*, and the other end, *o*, of the connecting-rod *n* is thus constructed: It is provided with a butt-end, *p*, and cap *q*, attached together by screws, and having a ball-and-socket recess contained within the butt and cap to receive the ball end *r* of the lever *s*. This lever is pivoted to the frame *a* at *t*, and further supported and maintained in place by a guide, *u*, situated on the opposite side of the frame *a* to the pivot *t*.

On the lever *s* a projection, *v*, is formed, to which is attached a spring-arm, *w*. This is provided with an eye, *x*, at its extremity.

Returning to the connecting-rod *d*, it is provided with the ordinary brasses and straps for attaching it to the eccentric part of the shaft

e. Its other extremity has a pin, a^1, attaching to it two links, b^1, which are attached by a pin, c^1, to the extremity of the slide e. The method of carrying the slide e in the frame a is clearly shown in Fig. 15, the slide e and frame a having the ordinary dovetail form.

In the slide e are secured two adjustable hammers, d^1, and a punch, e^1. f^1 are blocks for securing and carrying the punch e^1, in the ordinary manner. The whole is arranged as clearly shown in Figs. 15, 16, and 17.

g^1 are back set-screws for supporting and adjusting the hammers d^1, and h^1 is a similar screw for adjusting and supporting the punch e^1.

i^1 is a follower, attached to the slide e by a screw, k^1, passing through the slotted end of i^1, thus allowing of longitudinal adjustment in the position of the follower. At the other end it is secured by a yoke, l^1, attached to the slide e by means of thimbles o^1 and bolts p^1, which hold and support the forward end of the follower.

m^1 is a set-screw, inserted in the yoke l^1 for holding down the follower i^1 and punch e^1. n^1 are side set-screws for adjusting and maintaining its position laterally.

The extreme point of the follower i^1 is arranged to enter between the ends of the nail-guides i^2, (shown in Fig. 8,) to be hereinafter more fully described.

q^1 is a rest formed in the bed a, to receive and hold in position the beveling and clipping dies. These dies themselves are more clearly shown in Figs. 12, 13, and 14.

a^2 are the two beveling-dies, and b^2 are two dies, placed together, and forming, conjointly, the clipping-dies, also forming distance-pieces between the two dies a^2. These dies a^2 are provided with beveled projections c^2, being the exact bevel that is required to be given to the point of the nail, and the elongated blanks are suspended, as will be hereinafter more particularly described, at a suitable height to bring their ends to be acted upon by these projections in conjunction with the movable hammers d^1, above described, to give the required length of the nail.

The position of the dies b^2 is also arranged for the same purpose. These consist of flat bars of steel with a bevel, d^2, formed on each, giving the exact shape that the point of the nail is to be clipped to. They are also formed so that when placed together an open space, e^2, will be formed for the nails to drop through. This space is continued in the rest q^1 by an opening, f^2, (see Fig. 3,) made to correspond, so that the nails at once fall through the space e^2 and f^2 out of the machine. g^2 are ordinary set-screws, one of which is provided at the end of each of the dies a^2 and each of the dies b^2, for adjusting and maintaining the same in position; and h^2 are set-screws for securing and adjusting the dies laterally, any number of which screws may be provided.

The nail-guides i^2 are attached by pivots k^2 to the die-rest q^1. Having the relative position with the dies shown clearly in Figs. 1, 2, and 3, their particular construction will be more clearly seen in Figs. 8 and 9. They consist of two flat plates of steel having a projection, l^2, on each of their ends. The edges m^2 of the nail-guides are made straight, with the exception of the projections at l^2, so that when a nail has passed the projections l^2 it is loose between the edges m^2.

To the guides i^2 necks and eyes n^2 are provided for attaching them on the pivots k^2. To each of the eyes n^2 a projection, o^2, is formed, each of which terminates in an eye, through which a bolt, p^2, provided with a nut, passes, the bolt and nut being for the purpose of holding the jaws i^2 at any desired distance apart to allow the nail to enter with the required amount of freedom, while the guides or jaws i^2 are acted upon by elastic springs arranged for the purpose, to give any desired amount of resistance.

These are constructed as follows: On the bed q^1 projections q^2 are formed, in each of which a recess is made for the reception of a follower-plate, r^2, a plate of elastic material, s^2, and a presser-plate, t^2. The plates r^2 are set up to compress the plate of elastic material s^2 between them and the plates t^2 (which rest direct upon the back of the guides i^2) by means of set-screws u^2, so that by the screws u^2 and the bolt p^2 the distance between the projections l^2 may be set to any amount required, whereby the nails passing in may be adjusted to meet with any desired amount of resistance.

It will be observed that the bolt p^2 is arranged to hold the guides i^2 apart, and that any slight variation in the size of the nails pushed into the projections l^2 by the end of the follower i^1 and punch e^1 will be compensated for by the elasticity of the cushions s^2.

Between the guides i^2 and v^2 is placed a collar or washer, x^1, so that the movement of the lower guide does not affect the upper guide; or, in other words, the movement of the lower guide is independent of the upper guide. Any equivalent means may be used to give the lower guides an independent movement from the upper guide.

By reference to Fig. 1, it will be seen that the ends of the guides i^2 come over the openings c^2 in the dies, and f^2 in the bed, so that at this point the nails are pushed out of the guides (after they are once filled with nails) at the one end by the nails coming in at the other end, and fall through the openings e^2 and f^2 out of the machine. v^2 are auxiliary guides placed upon the guides i^2. These are omitted in Fig. 8, but are shown in position in Fig. 9, and shown separately in plan in Fig. 10, and in side elevation in Fig. 11. They are provided with an eye, w^2, to be received on the pivot k^2, and with jaws x^2, to come over the guides i^2. The object of these jaws x^2 is to take up the nail passing through the projections l^2 of the guides i^2, and carry it free from any danger of displacement should a nail, by

accident, be forced in a wrong position between the projections l^2, (which, by actual experiment, I have found to take place at times, but not often,) and cause the guides i^2 to be forced apart farther than their proper amount.

The jaws x^2, as they extend back from their points a^3 to b^3, (see Figs. 10 and 11,) are slightly raised. This is for the purpose of clearing the nail from the clipping-groove formed between the two dies b^2.

I will now proceed to describe the feeding mechanism for conveying, supporting, or holding the elongated blanks to be acted upon by the above-described dies.

To the frame a are attached two brackets, c^3, which are united together by a yoke, d^3, and to this yoke two tubes, e^3 and e^4, are secured.

f^3 are passages formed in the tubes, of such size that the elongated blank can fall freely through them, but not larger than is required for that purpose. At the bottom of the passage f^3 is a plate, g^3, attached on a sliding bar, h^3. This plate might be made in one and the same piece with the bar, if desired, only for the extra expense. This sliding bar is carried in dovetail grooves formed in the bracket c^3, the bar being dovetailed to agree therewith in the parts sliding within the brackets.

The plate g^3 is provided with openings i^3 and i^4. These are situated so that when the opening i^4 is brought under the passage f^3 of the tube e^3 the opening i^3 will be opposite to the center of the clipping-dies b^2 and nail-guides i^2, ready to receive the action of the punch e^1, which now acts upon it.

k^3 is a pin, situated, as shown, on the bar h^3, to which the eye x of the spring-lever w is attached, so that by the action of the gears i and h, shaft g, crank-pin m, connecting-rod n, lever s, and spring-lever w, the slide-bar h^3 is moved back and forth once for two revolutions of the shaft c and two strokes of the slide e; or, in other words, the slide h^3 moves a stroke in one direction for each revolution of the shaft c, and consequent double stroke of the rest e.

The tubes e^3 and e^4 are shown as constructed with plates attached by screws to their faces, forming the front of the tubes. This is simply for the purpose of facilitating the construction of the tube, and for the removal of any malformed blanks that may have been wrongly placed in the tubes.

Between the tubes e^3 and e^4 is suspended a pendulum, l^3, of the configuration clearly shown in the drawings, provided with projections m^3 and m^4, which, by openings in the tubes e^3 and e^4, enter the tubes and form stops to the descent of the nail-blanks. This pendulum is actuated by knees or stops n^3, attached by screws to the slide-bar h^3, as shown clearly in Figs. 4 and 5.

It will be observed that the lower portion of this pendulum is made thin, to spring or yield in case any nail should be fouled in the tubes.

o^3 are standards passing through the bar h^3. They are adjustable, being secured in place by set-screws in the bar, and are provided with plates p^3, which are for the purpose of pushing over the nail to free it from the beveling dies and anvils, should the nails have any inclination to stick to the dies, &c.

q^3 are stops attached on the under side of the slide-bar h^3. These are acted upon by set-screws v^3, set in the brackets c^3 to govern and adjust the travel of the slide-bar h^3, the spring-lever w yielding according to the amount that these screws v^3 are set in and out.

The machine having been constructed as described, and set in motion, its operation is as follows: The shaft c, through the connecting-rod d, causes the rest e, with hammers d^1, punch e^1, and follower i^1, to move backward and forward at each revolution of the shaft c, thereby entering the end of the punch between the dies b^2 b^2 e^1, and the follower between the projections l^2 of the nail-guides i^2, thereby causing the clipping of the nail which stands in front of the punch-die and follower, as will be hereinafter more particularly described.

As the rest e slides backward and forward, the slide-bar h^3 vibrates or slides transversely from side to side of the machine, bringing the openings i^3 and i^4 alternately one to the center and one to the side. This sliding of the bar h^3 operates the pendulum l^3 by the knees n^3.

The elongated blanks to be treated are fed to the passages f^3 by hand; and supposing this part of the mechanism—*i. e.*, the feed apparatus—to be in the position shown in Fig. 5, the blank is stopped by the projection m^3 in the tube e^3 at about half-height, as indicated by dotted lines, while in the tube e^4 the blank is allowed to descend and rest upon the plate g^3. The slide-bar h^3 being now moved over to cause the opening i^3 to come under the passage f^3 of the tube e^4, the blank in it falls into the opening i^3. In the meantime the blank in the tube e^3 is allowed to descend and rest upon the plate g^3. The blank in i^3 being now opposite one of the beveling-dies c^2, the hammers d^1 on that side come forward with the rest e, and bevel the nail. The slide h^3 is then drawn back to the position shown in Fig. 5, bearing the blank that was in e^4 to the center, where it is exactly opposite the clipping-dies b^2, (see Fig. 5,) and opening between the guides i^2. The blank that was before in the tube e^3 now falls into the opening i^4, the slide e again coming forward, causing the blank in i^3 to be clipped and pushed into the guides i^2, thereby freeing the nail from the plate g^3, and emptying the recess in it to receive another blank, while the blank in i^4 is beveled, and by continuously feeding the tubes e^3 and e^4 with an elongated blank nail at each motion of the bar h^3, blanks are brought down, and one beveled and one clipped and pushed into the guides i^2 at each stroke of the machine or revolution of the shaft c.

It is evident that the machine might be made

with but one tube, e^3 or e^4; but such machine would only be able to do half the work of the double-tubed machine.

With regard to the stops q^3 and screws v^3, it will be seen that the travel of the bar h^3 may be governed by them, and adjusted to a very great nicety; and by setting the pin m in the disk l to have a little larger throw than that required for the travel of the bar h^3, it causes the spring-lever w to bring the stops q^3 forcibly up against the ends of the screws v^3, the extra motion being allowed for by the spring of the lever w. This causes a sufficient pause or stop of the bar h^3 at each end of its strokes to allow the rest e to bring forward the punch e^1 and hammers d^1 to perform their functions, and retire a sufficient amount before the bar h^3 begins to move in the opposite direction.

It will be well understood that, if the machine is constructed with only one tube, e^3 or e^4, the corresponding hammers d^1 will be dispensed with.

What I claim is as follows:

1. The combination of the rest e, having one or two hammers, d^1, and punch e^1, with the vibrating slide h^3, having openings i^3 and i^4, and with the beveling-dies a^2 and clipping-dies b^2, substantially as and for the purposes set forth.

2. The combination of the spring-arm w, sliding bar h^3, having openings i^3 and i^4, and tube e^3, substantially as and for the purposes set forth.

3. The combination of the sliding bar h^3, having openings i^3 and i^4, with plates p^3, substantially as and for the purposes described.

4. The combination of the guides i^2 with the auxiliary guides v^2 and cutting-die b^2, substantially as and for the purposes set forth.

5. The combination of the sliding bar h^3, pendulum l^3, having projections m^3 and m^4, and tube e^3, substantially as and for the purposes set forth.

6. The combination of the guides i^2 with springs s^2, substantially as and for the purposes set forth.

7. The combination of the guides i^2, springs s^2, and bolt p^2, substantially as and for the purposes set forth.

8. The dies b^2, having recesses forming the openings e^2, and rest q^1, having openings f^2, with guides i^2 and x^2, substantially as and for the purposes set forth.

9. In an elongated blank beveling and clipping machine, the combination of a sliding or vibrating bar, h^3, for holding the blank, substantially as described, with the beveling and clipping dies, substantially as set forth.

Montreal, 25th day of April, A. D. 1877.

R. HERSEY.

Witnesses:
CHARLES G. C. SIMPSON,
JOHN A. RENNIE.