3 Sheets—Sheet 1.

W. N. SEVERANCE.

MACHINES FOR CUTTING NAILS.

No. 191,477. Patented May 29, 1877.

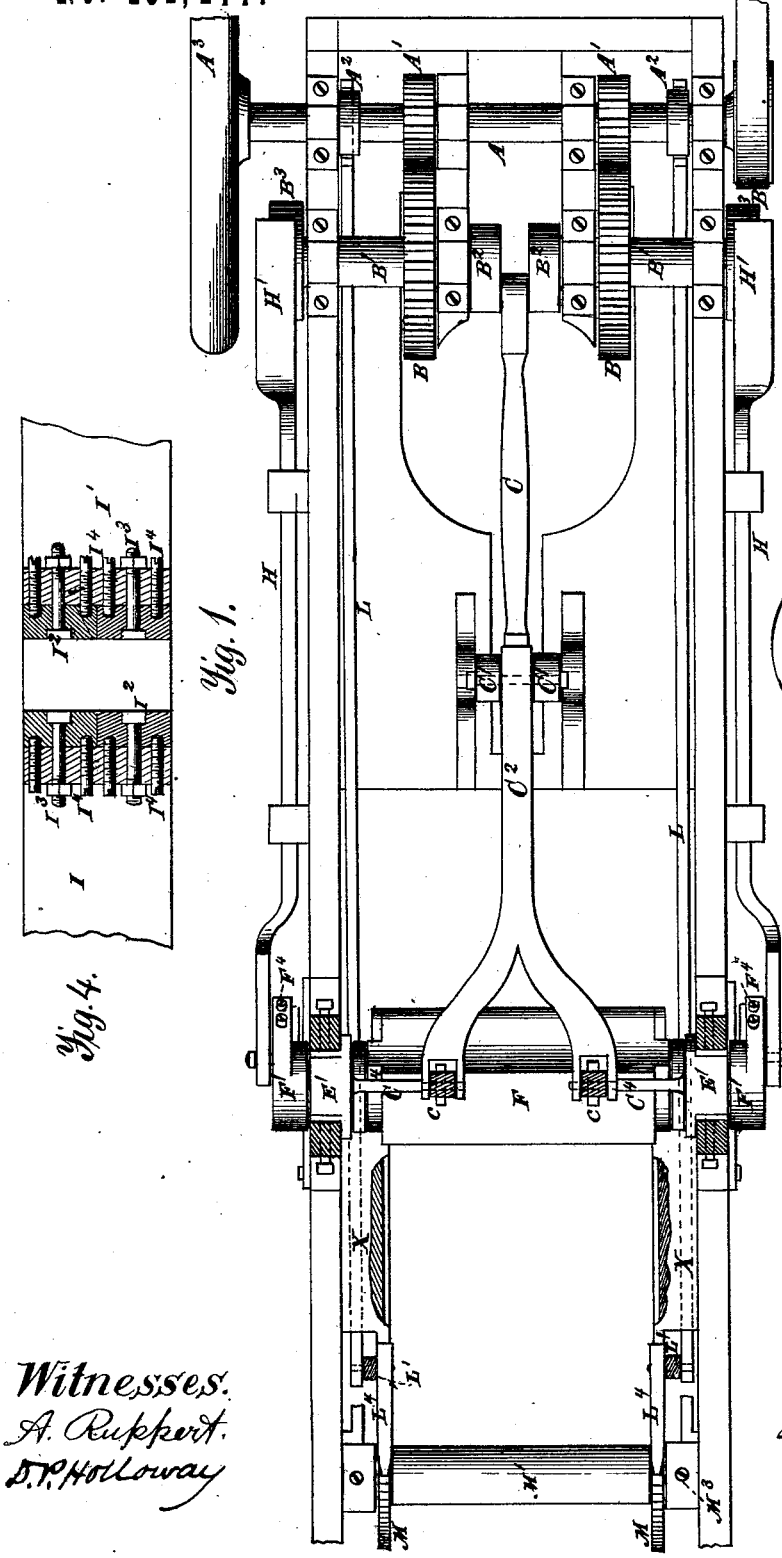

Fig. 1.

Fig. 4.

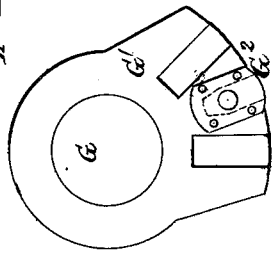

Fig. 5.

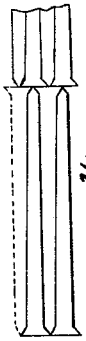

Fig. 6.

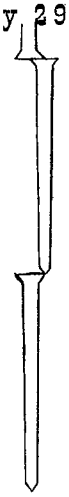

Fig. 7.

Witnesses.
A. Ruppert.
D. P. Holloway

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3 Sheets—Sheet 2.

W. N. SEVERANCE.

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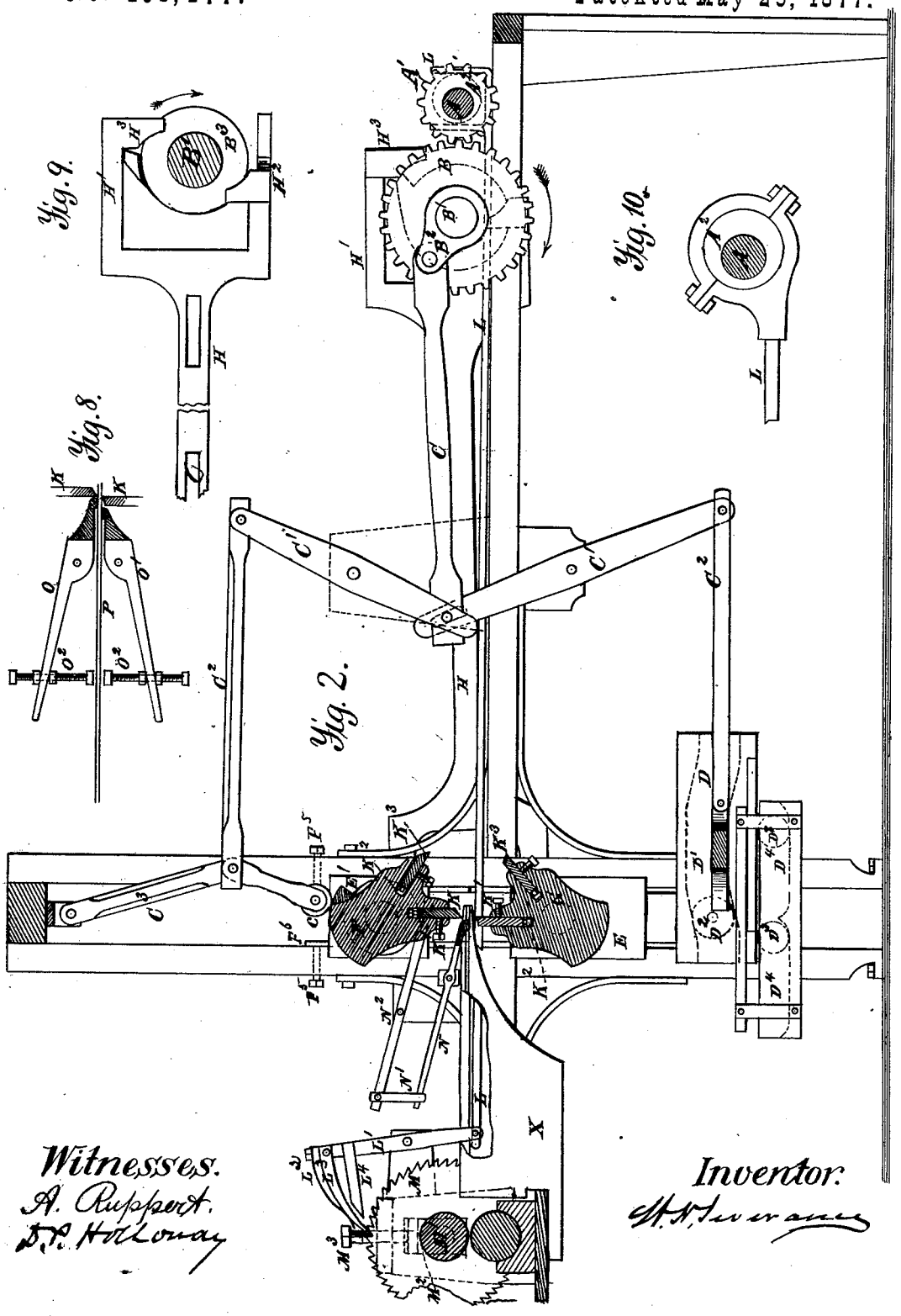

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3 Sheets—Sheet 3.

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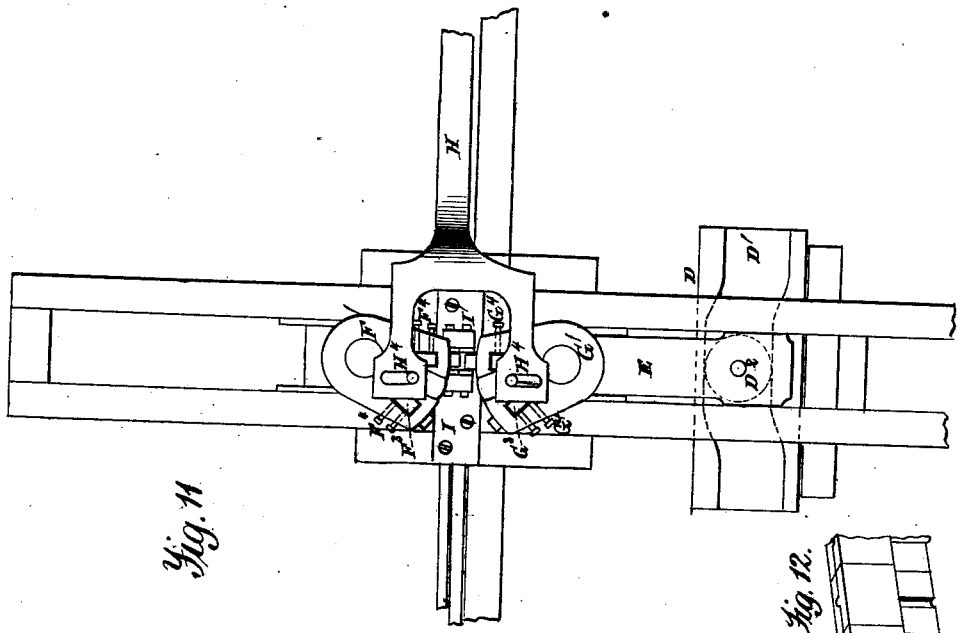

Fig. 11

Fig. 12.

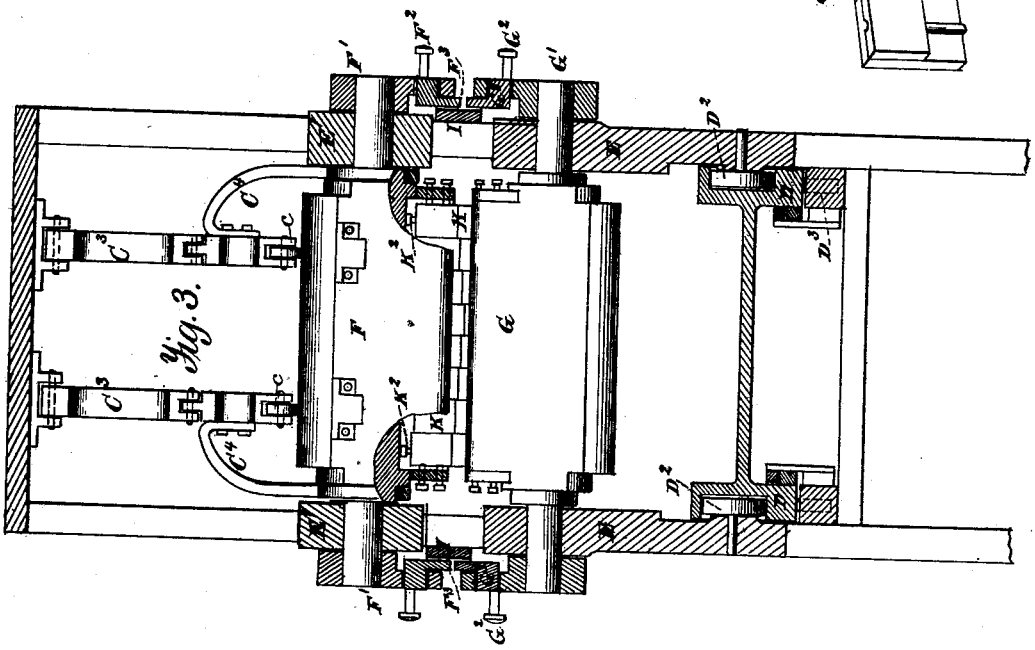

Fig. 3.

Witnesses.
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D. P. Holloway

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UNITED STATES PATENT OFFICE.

WILLIAM N. SEVERANCE, OF SOUTH BEND, INDIANA.

IMPROVEMENT IN MACHINES FOR CUTTING NAILS.

Specification forming part of Letters Patent No. **191,477**, dated May 29, 1877; application filed September 12, 1876.

To all whom it may concern:

Be it known that I, WILLIAM N. SEVERANCE, of South Bend, in the county of St. Joseph and State of Indiana, have invented new and useful Improvements in Machines for Cutting Nails, of which the following is a specification:

This improvement relates to that class of nail-cutting machines in which a series of nails are cut at the same time from a sheet of metal, the form and arrangement of the cutters being such that, after the first cut, the alternate operation of an alternating set of cutters shall give proper form to the sides of the nails without reversing the sheet. This is done by means of cutters giving a direct cut in a line at right angles to the plane of the sheet. To accomplish this, lower and upper series of cutters are used, the lower one being first brought up under the sheet and there held fixed, while the upper one is brought down to shear the nails, and then a set of reversed cutters, operated in the same manner, are brought into action to cut the other sides of the nails.

My improvement also relates to various combinations of mechanism by means of which the several parts are made adjustable so as to give corrrect action to the feeding and cutting mechanism.

In the annexed drawing, making part of this specification, Figure 1 is a plan view of the frame and principal parts of the operative mechanism. Fig. 2 is a sectional elevation, showing one side of the machine, with the feed-rolls, cutter-stock, and driving-shaft in section. Fig. 3 is a vertical transverse section, showing the cutter-stocks, and the parts connected therewith. Fig. 4 is a sectional elevation of the parts of the machine employed for confining and guiding the upper and lower cutter-stocks, showing the manner of adjusting them. Fig. 5 is an elevation of one of the arms by which motion is communicated to the cutter-stocks. Fig. 6 is a plan, showing the lines of the edges of the cutters, and the form of the nails as cut from the sheet. Fig. 7 is a plan, showing the relations of a series of single nails as they are simultaneously cut from the sheet. Fig. 8 is an elevation, showing one form of nippers used for clamping the sheet while the cutters are in action, another construction of the same part being shown in Fig. 2. Fig. 9 is an elevation of the cam and sash, which gives motion to the cutter-stocks in shifting from one set of cutters to another. Fig. 10 is an elevation of the eccentric and part of the rod which communicates motion from the driving-shaft to the feed mechanism. Fig. 11 is an elevation, showing the mechanism for adjusting and operating the cutters; and Fig. 12 is a perspective view of the cutters, showing the supporting-blocks against which the set-screws act in holding the cutters.

The same letters and numerals are employed in all the figures in the indication of identical parts.

The machine is mounted upon a stout frame, and derives motion from any suitable prime motor acting on the driving-shaft A, which carries two spur-pinions A^1 A^1, and two eccentrics, A^2 A^2, and fly-wheel A^3. The pinions engage two spur-wheels, B B, having double the number of cogs, so as to revolve once to each two revolutions of the driving-shaft. The wheels B are mounted upon the crank shaft B^1, having a crank at B^2, and carrying on the overhung ends cams B^3. These latter actuate the bifurcated rods H, which oscillate the cutter-stocks while the eccentrics A^2 actuate the feed mechanism, giving two movements to the latter to one of the former. It is evident that the same result could be accomplished by applying the power to the crank-shaft and modifying the operative cams and eccentrics so as to give two movements to one, as herein set forth.

The crank carries the connecting-rod C, which operates two levers, C^1 C^1, centrally pivoted in the case, as illustrated, but capable of being modified to give one motion to the cutter-stocks to each revolution of the crank, by shortening their outer arms. These levers actuate the upper and lower rods C^2 C^2, the upper of said rods actuating the toggle-levers C^3, which actuate the boxes of the upper cutter-stock, and the lower giving a corresponding reciprocation to the lower cutter-stock. The latter movement is effected by means of reciprocating blocks D, one on each side, having cut on their inner and opposed faces corresponding camways D^1, formed as shown in dotted lines in Fig. 2. Friction-rollers D^2,

attached to wrist-pins on the sliding boxes E, fit into the cam grooves or ways D^1, so that as the blocks are reciprocated horizontally the boxes E will be raised and lowered by the inclined parts of the ways, and held elevated and stationary while the elevated and horizontal portions of the cams are passing. The blocks D are supported upon friction-rollers D^3, resting on fixed beds D^4. By this mechanism the boxes E of the lower cutter-stock G are raised, held stationary, and brought down with each movement of the blocks D, so that with each revolution of the crank-shaft they will be raised, held stationary, and brought down; again raised, held stationary, and brought down. The same movement is given to the upper cutter-stock by the upper rod C^2 acting on the toggle-levers C^3, the lower ends of which bear, by the friction-wheels *c*, on the upper cutter-stock, which latter is supported by the stirrups C^4, attached to the lower sections of the toggles and passed under the enlarged portions of the journals of the upper cutter-stock F. The boxes E^1 of the upper cutter-stock, slide vertically in ways like those of the lower cutter-stock. The throw of the upper of the levers C^1 being sufficient to pass the toggles equal distances on each side of the vertical positions they have when the upper cutters are down, it follows that there will be two downward and as many upward movements to the upper cutter-stock F every time the crank revolves. The downward movement of the upper cutters, it will be observed, occurs when the lower cutters are elevated and stationary.

In each cutter-stock there are two sets of cutters reversed to cut the two edges of the nails, and to make a series of nails at each stroke it is necessary that the feed mechanism should set up the sheet a distance equal to the widest part of the nail at every alternate movement, and as each two movements of the cutters makes two series of nails, and there are two such movements, downward and upward, of the two cutter-stocks at each revolution of the crank-shaft, it follows that there must be two movements of the feed-mechanism to every revolution of the crank-shaft, which, as we have seen, is provided for in the relative sizes of the spur-wheels and pinions.

To bring the sets of cutters into alternate action the cutter-stocks are made to oscillate on their journals. This is done by means of the arms G^1 and F^1, respectively, attached to the cutter-stocks, and oscillated by the bifurcated rods H, operated by the cams B^3, on the crank-shaft. On the ends of the rods are sashes H^1, shaped as shown in Fig. 9, and inclosing the cams B^3, the points of which, striking alternately the shoulders at H^2 H^3, throw forward and retract the rods H, and cause the cutter-stocks to oscillate sufficiently to bring the two sets of cutters alternately into action.

To the arms F^1 and G^1 are adjustably attached plates or blocks carrying stud-pins G^2, which engage vertical slots in the ends of the bi-furcated rods H at H^4, the slots allowing the vertical motion to the cutter-stocks already described. Locking-bolts G^3 and F^3 are also attached by set-screws G^4 and F^4 to the walls of recesses in the arms G^1 and F^1, adjusting them to fit into recesses formed by means of the adjustable blocks I^2 attached to the plates I I^1, bolted to the main frame. The manner of adjusting these blocks to locate the recesses with absolute precision is shown in the enlarged view, Fig. 4. When accurately adjusted by the set-screws I^4 they are fixed in position by the bolts and nuts I^3. When the lower cutter-stock is raised, the lock-bolts G^3 enter their proper recesses, and during the time the rollers D^2 are traversing the horizontal portions of the ways the lock-bolts hold the cutter-stock immovably in its position, the lower cutter being thus accurately adjusted in its proper position. So, when the upper cutter-stock is brought down, the lock-bolts F^3 entering their equally exactly located recesses, the cutters are guided with absolute precision to make the proper cut.

The cutters are shown at K K, fitted into recesses of uniform depth in the cutter-stocks, arranged so as to make a shearing cut, and accurately adjustable by means of set-screws K^1 bearing on their sides, and other set-screws K^2 set into the bases of the cutters and bearing against the cutter-stock, to regulate the projection of the cutters and permit them to be set out as they are worn away. The width of the cutters determines the length, and its form the shape, of the nail to be cut. Another set of cutters, K^3 K^3, similarly adjustable, are formed to cut the other sides of the nails.

As the nails are cut the sheet is fed forward by the following mechanism: A rod, L, extends from each eccentric, A^2, on the driving-shaft, and is pivoted to the lever, L^1, which carries a pawl, L^3, which is held down by a spring, L^2, onto the arm L^4, or on the cogs of the ratchet-wheel M, on the shaft of the upper roll, M^1. The movement of lever L^1 and pawl L^3 would move the ratchet three notches, but the arm L^4 is so placed as to catch the feed-finger or pawl and hold it up so that on its return it will catch only one cog lower, and thus give motion to the rolls to feed forward the nail-plate the width of the widest part of the nail. The upper roll has adjustable boxes M^2, and adjusting-screws M^3, by means of which it may be adapted to the sheet to be cut. The nail-sheet, resting upon its bed, is confined by cleats, which hold it in place as it is moved forward. When subjected to the action of the cutters, the sheet is clamped by the hook-headed lever N, which is connected by the link N^1 with the lever N^2, which extends forward, so that as the upper cutter-stock comes down the stirrups C^4 shall bear on its fore end, and thus compress the clamp upon the sheet and hold it immovable while

the cutters are shearing a nail, and freeing it afterward to permit the sheet to be fed freely forward.

I have shown in Fig. 2 an alternative means of holding the sheet, which may be employed, if preferred, independently of, or in connection with, the last-named mechanism. X is a block of wood, having grooves to act as guides or ways for the sheet. It is formed as shown, being elastic, to permit the sheet to yield to the ascending cutters.

I have shown in Fig. 8 another form of clamp, which may be used instead of that shown in Fig. 2. Two arms, O O^1, are placed on each side of the sheet, supporting it, as shown at the point where the cutters shear the sheet. These arms or levers have their fore ends held by adjustable screws O^2, which hold them in such position as to hold the sheet so that it cannot yield to the shears, but will not so tightly hold it as to prevent the feed-rolls from feeding the sheet forward. The elasticity of the long arms should be such as to permit the points to yield to slight irregularities in the thickness of the sheet.

The operation of the machine is apparent from the foregoing description. All the working parts of the machine are susceptible of the nicest adjustment and readjustment from time to time, as necessary. The set-screws M^3 adapt the feed to the thickness of the sheet. The gibs F^6 and set-screws F^5 adjust the sliding box of the upper cutter-stock. The guides and lock-bolts, and all the parts necessary to the accurate adjustment of the cutters, have been fully explained. As the sheet comes forward, it is first cut by the cutters K K, then the cutter-heads are retracted, turned, and again projected, to bring into action the cutters K^3 K^3. The machine illustrated in the drawings is adapted to cut eight nails with every descent of the upper cutter-stock.

The machine may be varied in the construction of many of its parts without departing from the principle of its operation. Thus, as suggested, the machine, by simple changes in levers C^1 or rods C^2, may be organized to cut but one set of nails at one revolution of the crank-shaft, or the power may be applied direct to the crank-shaft, dispensing with shaft A; or, the lower cutter stock may be raised and lowered by cams so placed on a shaft having a crank actuated by rod C^2 as to raise the cutter-stock at proper intervals, and a segment-disk may be placed to shove the cutter-stock between its journals and transmit the weight to the cams through and by means of a connecting-rod attached by key-head devices to the cam and to the disk. I have also adopted other means for shifting the cutter-stocks by a circular rack attached to the lower arm of the toggle C^3, but such variations in construction I regard as the equivalents of the mechanism here shown.

What I claim as my invention, and desire to secure by Letters Patent in a nail-cutting machine, is—

1. The cutter-stocks F and G, each carrying two series of cutters, brought alternately into action from the same direction on the nail-plate in lines at right angles to the plane of the sheet, substantially as set forth.

2. The cutter-stock G, having an oscillating and also a reciprocating vertical movement, by which it is brought up and held stationary under the sheet while the descending cutters are making the cut, substantially as set forth.

3. The cutter-stock G, having two sets of cutters, and having a vertically-reciprocating movement for the purpose of bringing the cutters under the sheet, and also an oscillating movement for bringing the two sets of cutters alternately into action, substantially as set forth.

4. The cutter-stock F, having two sets of cutters, and having an oscillating and also a constant reciprocating movement for bringing the cutters successively into action, substantially as set forth.

5. The cutter-stock G and arms G^1, provided with lock-bolts G^3, received into recesses to hold the cutter-stocks immovable while the cut is being made, substantially as set forth.

6. The combination of the lock-bolts and plates I I^1, recessed, and carrying plates I^2, for fixing position of the cutter-stock, substantially as set forth.

7. In combination with the cutter-stock G, hung in sliding boxes, the reciprocating ways adapted to raise the cutter-stock, hold it stationary, and then bring it down alternately, substantially as set forth.

8. In combination, the cutter-stock G and sliding boxes E, reciprocating ways D D^2, arm C^2, lever C^1, and connecting-rod C, substantially as set forth.

9. In combination with the cutter-stock F and sliding-boxes E^1, the stirrups C^4, toggles C^3, rod C^2, lever C^1, and connecting-rod C, substantially as set forth.

10. In combination with the cutter-stocks and arms G^1 F^2, the reciprocating bifurcated rods H, connected by studs and slots to give oscillation to the cutter stocks, and at the same time allowing them a reciprocating vertical movement, substantially as set forth.

11. In combination with the intermittent feed mechanism, the cutter-stocks, having both oscillating and reciprocating movements, and duplicate sets of cutters, each set alternately making a cut before the sheet is fed forward, substantially as set forth.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

W. N. SEVERANCE.

Witnesses:
E. P. KING,
VICTOR KING.