(No Model.) 4 Sheets—Sheet 1.

C. E. HOUGHTON.

NAIL MACHINE.

No. 462,969. Patented Nov. 10, 1891.

FIG. 1.

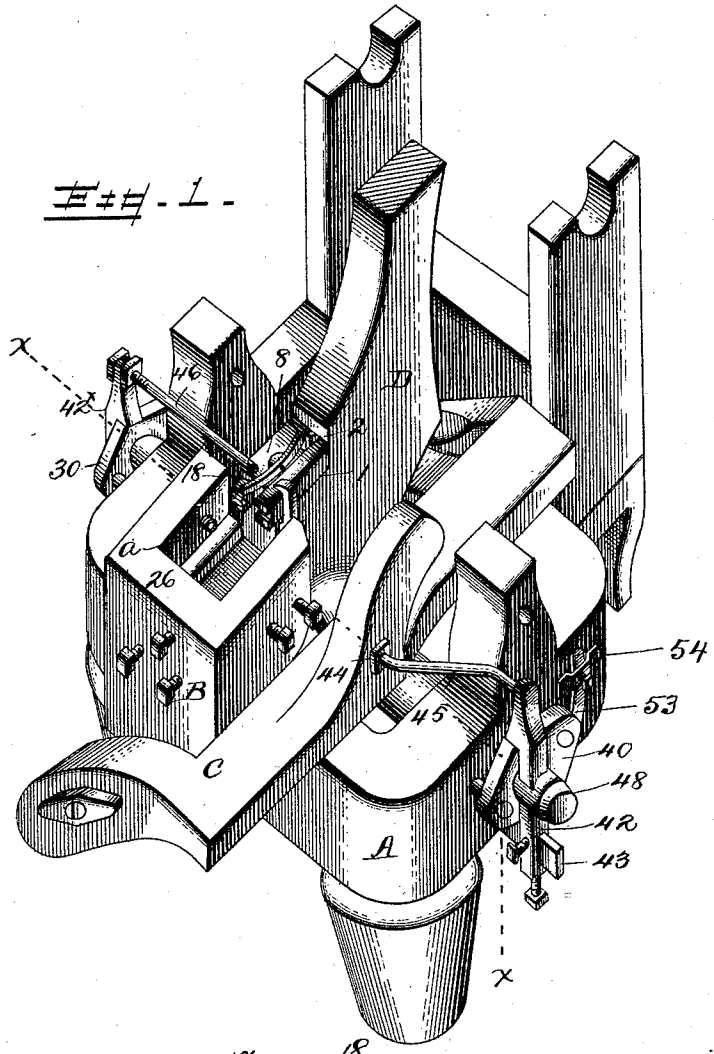
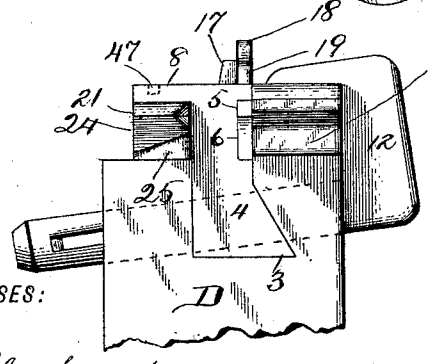


FIG. 4.



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F. D. McCleary.

INVENTOR

Chas. E. Houghton

BY

A. G. Hopkins

ATTORNEY.

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

(No Model.) 4 Sheets—Sheet 2.

C. E. HOUGHTON.

NAIL MACHINE.

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Fig. 2.

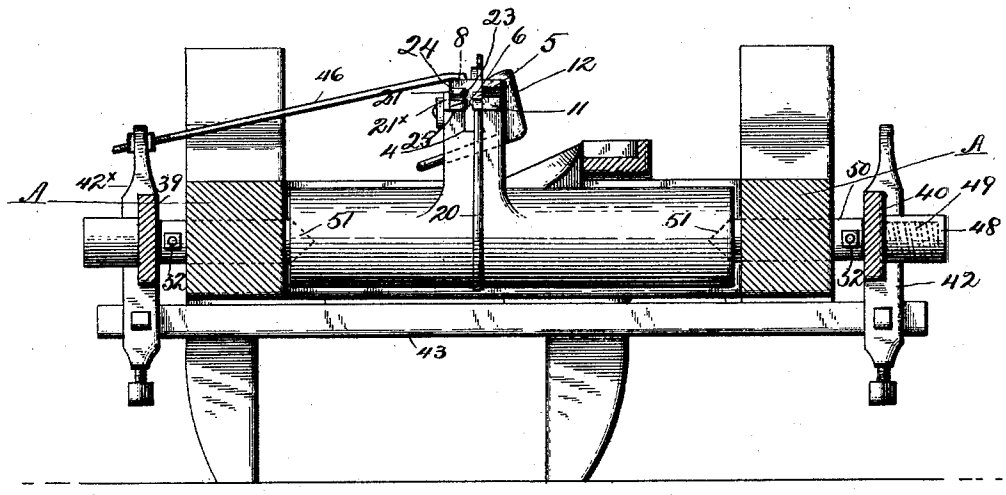
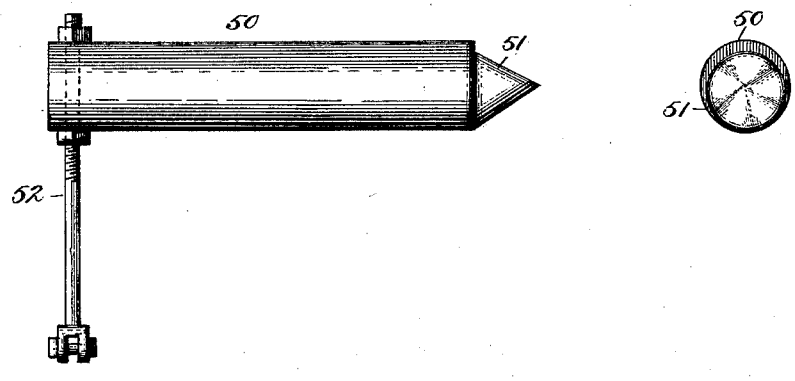


Fig. 14.



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(No Model.) 4 Sheets—Sheet 3.

C. E. HOUGHTON.

NAIL MACHINE.

No. 462,969. Patented Nov. 10, 1891.

Fig. 12.

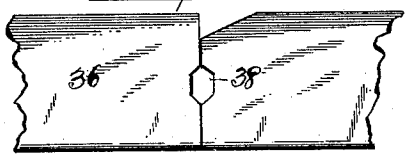


Fig. 3.

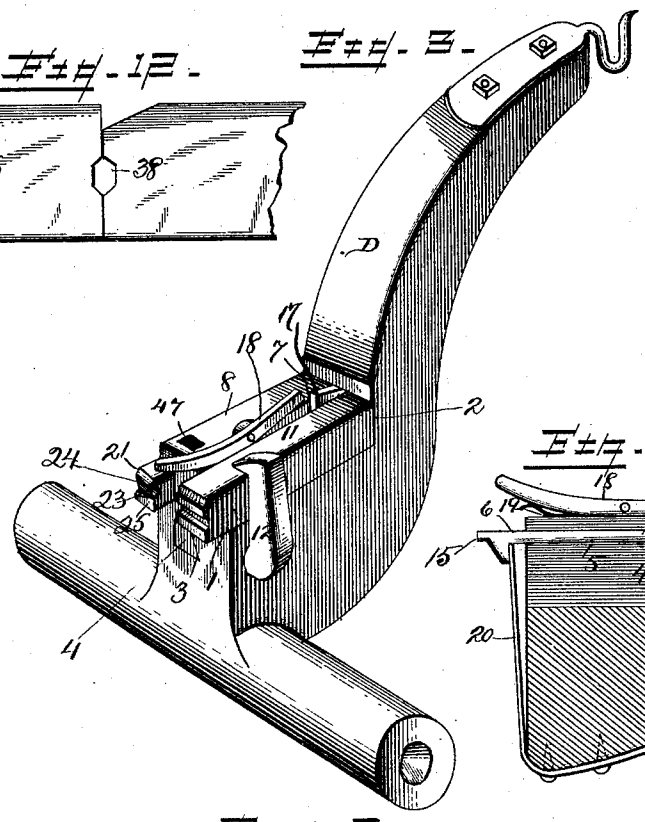


Fig. 5.

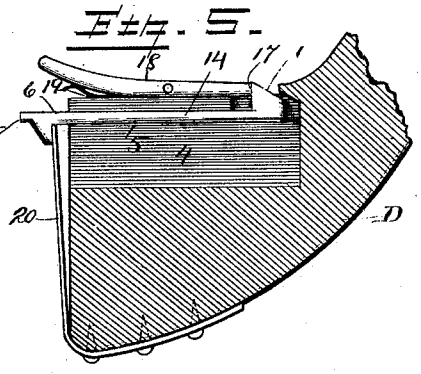


Fig. 6.

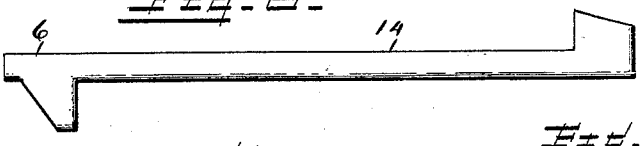


Fig. 10.

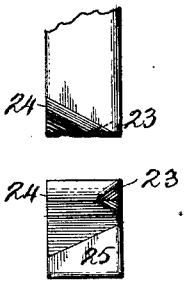


Fig. 7.

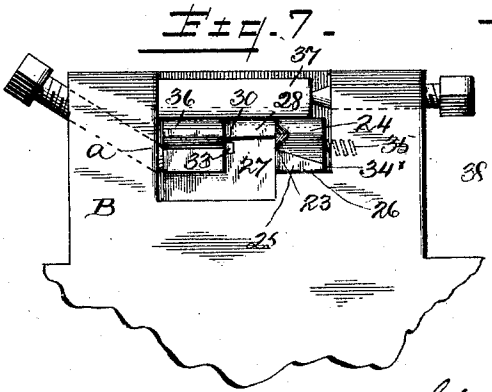
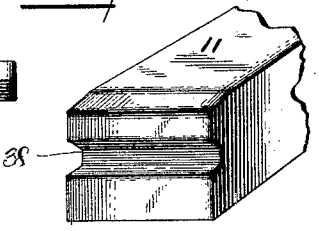


Fig. 11.



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C. E. HOUGHTON.

NAIL MACHINE.

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Fig. 8.

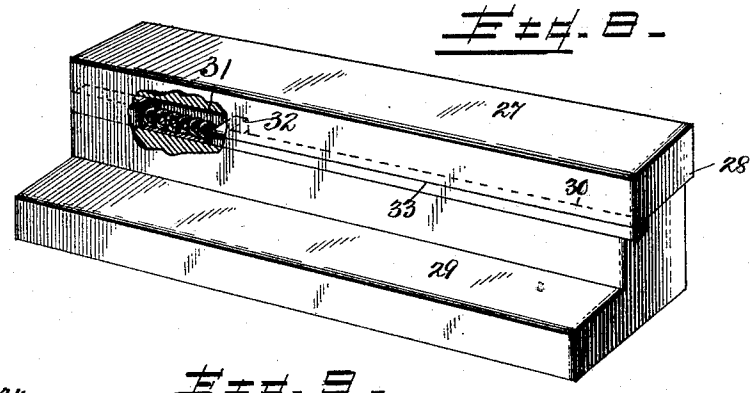


Fig. 9.

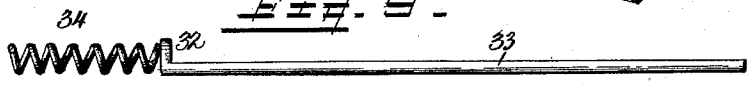


Fig. 13.

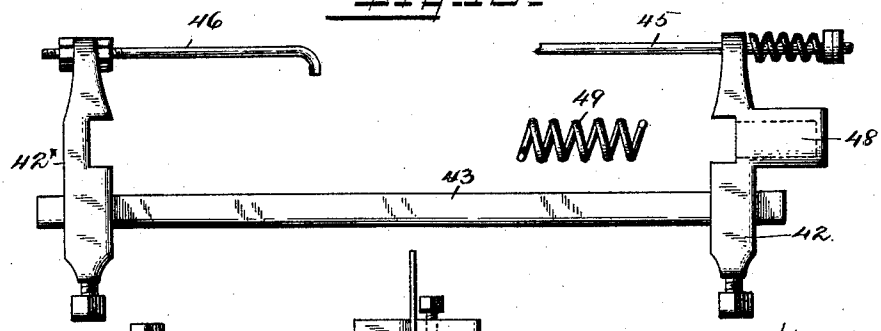


Fig. 16.

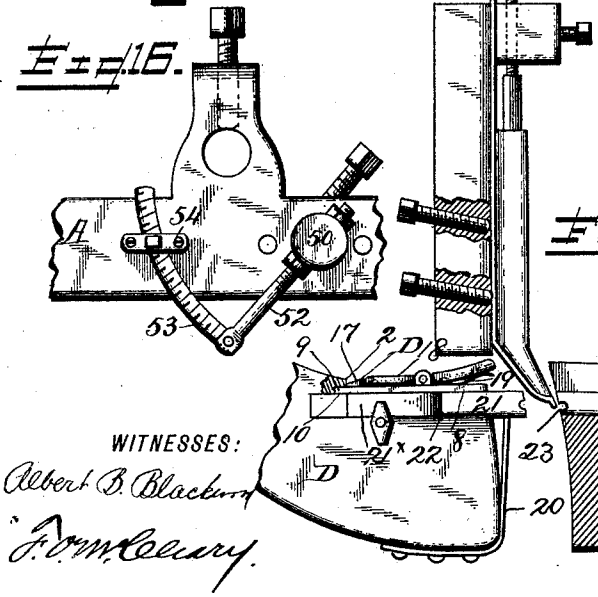


Fig. 17.

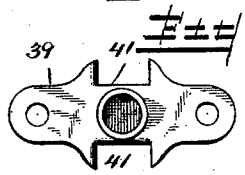
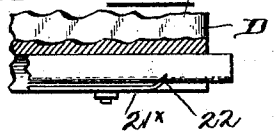


Fig. 15.

Fig. 18.



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INVENTOR

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

UNITED STATES PATENT OFFICE.

CHARLES E. HOUGHTON, OF NORTHUMBERLAND, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO HORACE RUFUS JOHNSON, OF SAME PLACE.

NAIL-MACHINE.

SPECIFICATION forming part of Letters Patent No. 462,969, dated November 10, 1891.

Application filed February 25, 1891. Serial No. 382,784. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. HOUGHTON, a citizen of the United States of America, residing at Northumberland, in the county of Northumberland and State of Pennsylvania, have invented a new and useful Nail-Machine, of which the following is a specification.

My invention relates to improvements in machines for cutting nails from a rolled plate; and the object is to provide improved and simplifying mechanism for operating point-cutting dies and the nipper of the machine. It also relates to means for adjusting the gripping-lever.

The invention is fully described hereinafter, and particularly pointed out in the claims.

I have fully and clearly illustrated my invention in the accompanying drawings, wherein—

Figure 1 is a perspective of a nail-machine, some of the parts being removed and my improvements applied. Fig. 2 is a transverse section on the line *x x* of Fig. 1. Fig. 3 is a detail view of the gripping-lever carrying my improvements. Fig. 4 is an end view of the same. Fig. 5 is a view of the nipper-seat in the gripping-lever, with the spring to operate the nipper. Fig. 6 is a view of the nipper. Fig. 7 is an end view of the bed-knife and die-seat with the dies and back piece arranged therein. Fig. 8 is a perspective of the back piece. Fig. 9 is a view of the nail ejector or clearer. Fig. 10 is a view of the point-cutting dies. Fig. 11 is a detail face view of one of the gripping-dies. Fig. 12 is a side view of the gripping-dies in gripping position. Fig. 13 is a detail view of the die-operating mechanism for moving the moving point-cutting die laterally. Fig. 14 is a view of one of the center bearings having an eccentric conical bearing-point. Fig. 15 is a view, partly in section, showing the relation of the nipper-latch and the cutting-jaw. Fig. 16 is a detail of the adjusting means for the conical bearings. Fig. 17 a detail view of one of the grooved brackets for the hangers. Fig. 18 is a detail plan view of the moving point-cutting die and its spring 21.

Referring to the drawings, A designates the bed-frame of the machine, which in general respects does not differ from the usual construction of "high-post" machines. I have omitted from the illustration the driving-shaft and cutting-jaw and lever, in order to better show the parts associated with my invention. The old and well-known nipper and nipper-bar are also omitted because they are not used in connection with my improvements.

B designates the part of the machine provided with a chamber *a* to take the back piece, bed-die, bed-knife, and a point-cutting die.

C designates the heading-lever, and D the moving or gripping lever. On the front upper face of the gripping-lever is formed a die bed or floor 1, terminating at the rear in a vertical wall 2. In the gripping-lever D is formed a dovetail groove 3, in which is fitted a steel partition-bar 4, having formed in the side adjacent the gripping-die a groove 5, in which the stem or bar of the nipper 6 is disposed and slides, the upper wall of the groove being cut away, as at 7, to provide room for the catch on the nipper to project therefrom and engage the end of the nipper-latch. On the opposite side of the partition-piece 4 at the top is a flange 8, under which the point-cutting die lies and is kept from upward displacement by the flange. The rear end of this flange may extend rearward, as at 9, and be disposed in a recess 10 in the gripping-lever to give strength to the part.

11 designates the gripping-die, adapted to rest on the die-bed with its inner face against the wall of the partition-piece and form one wall of the channel or groove in which the stem or bar of the nipper rests. This die is kept in place by the usual clamp 12.

6 is the nipper formed with a stem or bar 14 to fit the groove or seat in the side of the partition-piece and having an end 15 to engage the nail when severed from the plate and carried down by the moving-knife, as indicated in Fig. 5 of the drawings, and at the rear the bar is formed with a projection 17, constituting a catch which projects through the opening 7 in the side of the partition-piece and engages with the end of a latch 18, fulcrumed on the partition-piece and arranged to be moved into engagement with the catch on the nipper by a spring 19. The forward

end of the latch is directed upward and arranged to be engaged and depressed by the cutting-jaw of the machine in its downward movement. The nipper is thrown forward to contact and hold the nail when the latch is released by a spring 20, fastened in front of the gripping-lever and bearing with its free end against the shoulder of the nipper, substantially as shown in the drawings.

21 designates the moving point-cutting die arranged in the seat formed by the die-bed, the partition-piece, and its extending flange, and is designed to have a limited lateral movement in performing its function of cutting the point. To insure this lateral and consequently shearing movement I have provided the mechanism hereinafter described. After the point-cutting die has made the point or effected its portion of that work it is returned to its inner limit by the force of a spring $21^{\times}$, bearing with one end against the side of the die. The other end of the spring may be lodged in a notch 22, which also holds the die against longitudinal displacement in a forward direction. (See Fig. 15.) The cutting-faces of the point-cutting dies are duplicates or counterparts, and consist of a point-cutting groove 23, terminating at the apex of a double incline 24, and a broad abutting face 25, extending clear across the under part of the die and affording ample surface to meet the jars and jams it has to sustain.

In the bottom of the chamber *a* of the bed part B is a step or shoulder 26, on which the point-cutting bed-die is placed. This step is made wider than the point-cutting die to give the die a limited lateral movement in operation.

27 designates the back piece, consisting of a substantial piece of steel having the usual lip or shoulder 28 on its end face and formed with a wide side flange 29 at the bottom, serving as a bed for the bed-die. In the side of the back piece is a groove 30, having its rear end deepened for a distance, as at 31, to take the lug 32 of the nail-ejector 33 disposed in the groove. This nail-ejector in its normal position rests with its outer end projecting out even with the outer edge of the lip on the back piece, and is held in that position by a spring 34, arranged behind the inner end, substantially as shown.

$34^{\times}$ designates the point-cutting bed-die, the duplicate in construction and face end formation to the point-cutting moving die. This die is lodged or disposed on the step or bed in the bed part of the chamber, and is allowed a limited lateral play in its seat, the lateral shearing movement being given to it by the contact with the nail-point, because the tendency of movement is in the direction of the point of the nail, and it is returned to its normal position by the agency of a spring 35 between the die and the wall of its seat.

36 designates the bed-die of the common and usual construction, except in the shape of the groove, arranged on the side flange 29 of the back piece 27 and held there by a set-screw, as shown. The bed-knife 37 is mounted on these parts, as usual. The gripping grooves or scores 38 of the gripping-dies are polygonal in shape, as seen in Figs. 11 and 12 of the drawings, so that when the dies are brought into contact the nail may be compressed and held, so that a round head may be formed, and also that the nail may be readily ejected from the dies. The shape of the united scores is a hexagon, as seen, this being preferred, as a square nail may be held without material alteration of the shape of the blank.

To insure the requisite lateral shearing movement to the point-cutting moving die, I have provided the following mechanism: On both sides of the frame of the machine are mounted brackets 39 40, having notches or grooves 41 formed across them in their upper and lower edges, and on these notches of the brackets are supported hangers 42 $42^{\times}$, having a limited reciprocating movement in the grooves, and the lower ends of the hangers are connected by a rod or bar 43, adjustably let through them and kept in a set position by set-screws. On the heading-lever is fixed a bearing-piece 44, in which is jointed a pull-rod 45, its outer end having a yielding or elastic connection to the top of the hanger, substantially as shown. In the upper end of the opposite hanger $42^{\times}$ is secured one end of a pull-rod 46, having its other end formed to take in a slot 47 in the flange 8 of the partition-piece 4 and engage behind the point-cutting moving die and pull it outward at the proper time when it is engaging the point of the nail-blank. By means of the rod connections 45 and 46 to the heading-lever and to the point-cutting moving die the outward reciprocations of that die are accomplished. To return the hangers with their associated elements to a position which places the point-cutting moving die to its inner and normal position, the hanger adjacent to the heading-lever is formed with a socket 48, in which a spring 49 is arranged with its free end bearing against the face of the bracket, and serves to push the frame and hangers opposite to the direction it has been drawn by the upward and inward movement of the heading-lever. This mechanism, as stated, is designed to insure the positive outward lateral movement of the point-cutting moving die; but these outward movements of both point-cutting dies are accomplished by the shearing engagement of the two or pair, the direct effect of which is to carry the dies outward by the force of the compression; but because they might stick in their engagement I attach this moving mechanism.

In grinding the gripping-dies of a nail-machine, whether they consist of the common form or of my improved shouldered dies, it happens, especially with the older form of dies, that the gripping-scores of the dies do

not register accurately. One may be higher than the other, and the defective results are hard to remedy. The dies will have to be removed from the machine and the scores reground. To remedy these defective results I mount the gripping-lever on conical bearings arranged eccentric to their stems.

I have shown the bearings in detail in Fig. 14 of the drawings, wherein 50 represents the stem of the bearing, consisting of a true cylinder, and 51 is the conical bearing-point cut eccentric to the axis of the stem. By turning the stems the gripping-lever is raised or lowered and the die carried by it moved accordingly, and by having means to turn and adjust the bearings they may be set at proper position with little trouble and in much less time than it takes to remove the die and grind it into registration with the other. I have devised for the purpose of turning and setting the bearings the following means: In the stem of the bearing is made a hole and in this is fixed a lever-bar 52, having its free end connected to an arm 53, held and sliding in a keeper 54, substantially as shown in Fig. 16 of the drawings. The arm 53 may be marked by measurements and kept in a fixed position by a set-screw through the keeper.

I have shown and described my invention as applied to a machine for making small nails, and consequently having a rather narrow gripping-lever, necessitating a steel partition-bar; but in larger machines the metal is wider, and the chambers and seats may be cast or formed as parts of the gripping-lever, and the inserted steel partition thus be substituted by an integral partition.

It is the purpose of my invention to provide a point-cutting mechanism which will accomplish the object with a limited lateral shearing cut or pinch, this being the only certain mode of effecting it without speedy destruction of the cutting-edges and faces of the dies, besides making, by my improvements, a better, cleaner, and more accurate point to the nail. The operation of cutting the points by the dies having a lateral yielding movement is also an essentiality to prevent the nail from buckling or bending when the header strikes the end of the blank sticking from the gripping-dies while the point end is held between the point-cutting dies. The nail is pushed in more or less by the header, and unless the point is held by laterally moving dies the nail will often buckle and bend, and is thus spoiled.

The operation has been stated in the description of the various elements specifically, but may be generally rehearsed in conclusion as follows: The moving knife, having severed the nail from the plate, carries or pushes the cut blank downward to be engaged by the nose of the nipper, which is released by the moving jaw striking the free end of the latch, and thus releases the nipper in time to advance and engage the nail and push it against the back piece and bed-die. The moving die coming up in turn and gripping the nail, the point-cutting dies also engage the point at this moment, and the shifting mechanism being brought into requisition at the same time the nail is gripped and while the header is moving upward, the point-cutting moving die is drawn laterally, and the point-cutting bed-die being moved in the same direction by the tendency of its shape the point is cut by a laterally-shearing movement. The nail-point being formed, the moving gripping-die and the moving point-cutting die recede and the ejector throws the nail from contact with the bed-dies and the back piece. In the forward movement and engagement of the nipper it is pushed back against the force of the spring until the latch engages the catch and is there held until the next movement of the cutting-jaw releases the latch.

The present invention is designed to apply my improved laterally-moving point-cutting dies to a common set of gripping-dies in a machine for cutting a common nail, and this is accomplished by the means and appliances shown and described.

Having thus described my invention and explained its principle and operation, as required by the statute, I now proceed to particularly point out and distinctly claim the parts, improvements, and combinations.

I claim as my invention as follows:

1. In a nail-machine, a gripping-lever formed with die-beds separated by a vertical partition formed with a side flange on the top edge of one of its walls, whereby a die-seat is formed by the floor of the bed, the wall of the partition, and the flange, substantially as described.

2. In a nail-machine, a gripping-lever formed with a die-bed having a central longitudinal groove and provided with a detachable partition-piece having its lower part fitted in the groove of the die-bed and formed with a side flange constituting the top piece or wall of the die-seat, substantially as described.

3. In a nail-machine, a gripping-lever formed with die-beds in opposite sides of a vertical partition, said partition being formed with a top side flange on one side and a nipper-seat in the opposite side, substantially as described.

4. In a nail-machine, the combination of a gripping-lever formed with a vertical partition longitudinally arranged on the die-bed and a nipper-seat in the partition, a spring-actuated nipper in the seat formed with a catch, a gripping-die on the bed adjoining the nipper, and a latch to engage the catch on the nipper and hold it back against the force of the spring, substantially as described.

5. In a nail-machine, the combination, with the gripping-lever having a central longitudinal and vertical partition extending from the die-bed and formed with a nipper-seat in the side, a spring-actuated nipper in the seat formed with a catch projecting above the face

of the partition, and a latch fulcrumed on the partition to engage the catch of the nipper and be released by the downward movement of the cutting-jaw, substantially as described.

6. In a nail-machine, the combination of a gripping-lever having a vertical longitudinal partition on the die-bed thereof, formed with a nipper-seat in the side adjoining the gripping-die and a top side flange on the side opposite to the nipper, a gripping-die on the die-bed, a spring-actuated nipper in the nipper-seat, a latch to hold the nipper against the force of the spring, a point-cutting die in the die-seat having a limited lateral play, and mechanism, substantially as described, to positively move the point-cutting die in lateral direction, as specified.

7. In a nail-machine, the combination, with the gripping-lever formed with a point-cutting die-seat, of a point-cutting die arranged in the die-seat to have a limited lateral movement, mechanism to move the die outward, and a spring to return it in the opposite direction, substantially as described.

8. In a nail-machine, the combination, with a moving point-cutting die arranged on the gripping-lever to have a limited lateral play, of a frame adapted to be reciprocated and arranged across and under the machine-frame, a pull-rod to connect the die and the frame, and a pull-rod to connect the opposite end of the frame to the heading-lever of the machine, substantially as and for the purpose specified.

9. In a nail-machine, the combination, with the heading-lever, the gripping-lever, and a point-cutting die on the gripping-lever, of the brackets 39 40 on opposite sides of the machine, hangers 42 $42^{\times}$ on the brackets, a connecting-rod 43, adjustably secured in the lower ends of the hangers, a pull-rod 45, connecting the heading-lever and the adjacent hanger, and a pull-rod 46, connecting the opposite hanger and the point-cutting die, substantially as and for the purpose specified.

10. In a nail-machine, the combination, with the bed part B of the machine, formed with a step or shoulder 26, of a point-cutting die on the step, having a limited lateral play thereon, a back piece 27, formed with a wide side flange projected from its lower portion, and a bed-die on the side flange of the back piece, substantially as described.

11. In a nail-machine, the combination, with the gripping-lever of the machine, of bearings consisting of a true cylinder formed with a conical bearing-point arranged eccentric to the axis of the cylinder or stem of the bearing, substantially as and for the purpose specified.

In witness whereof I have hereto set my hand in the presence of two attesting witnesses.

CHARLES E. HOUGHTON.

Attest:
A. G. HEYLMUN,
J. S. BARKER.