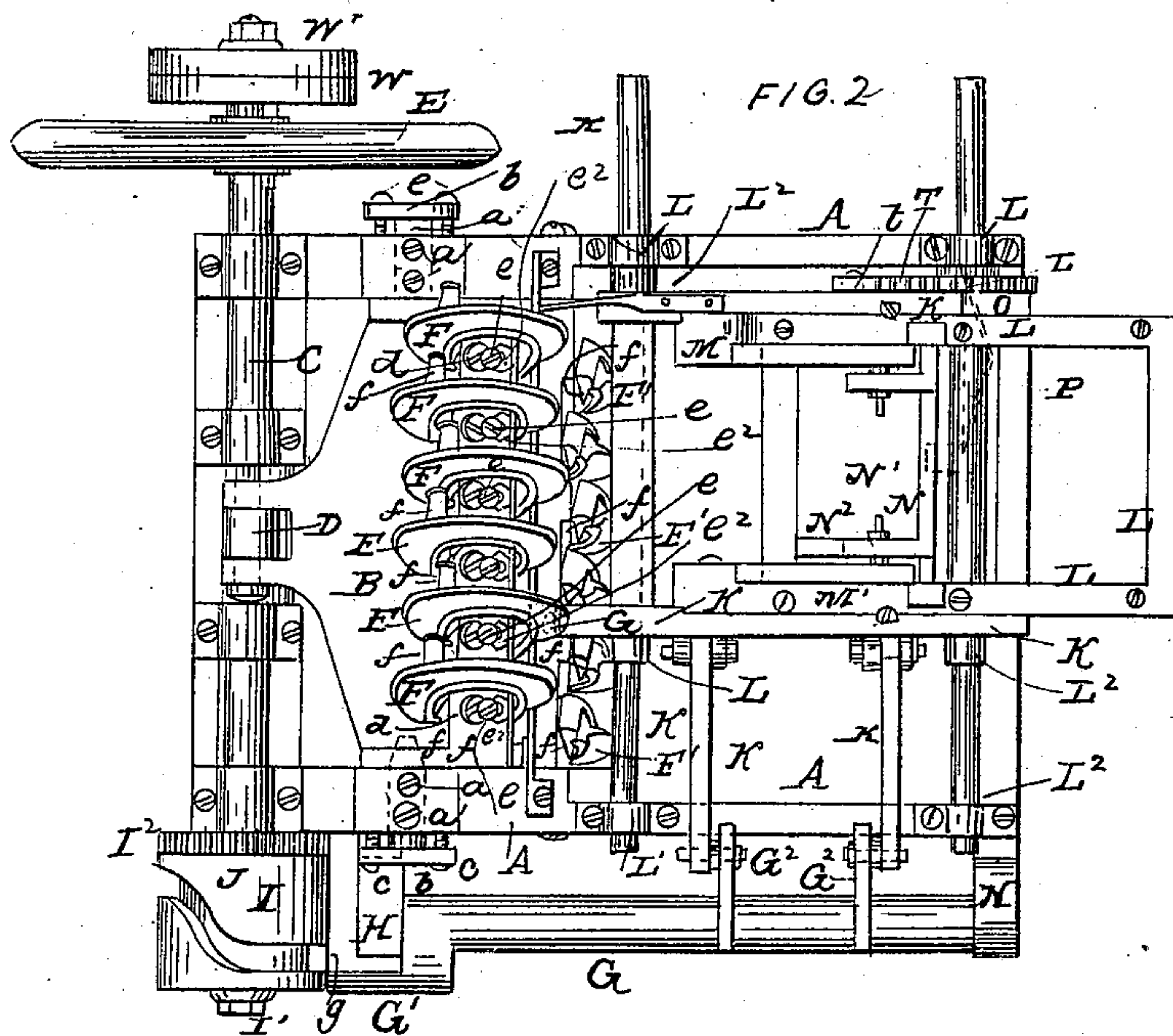
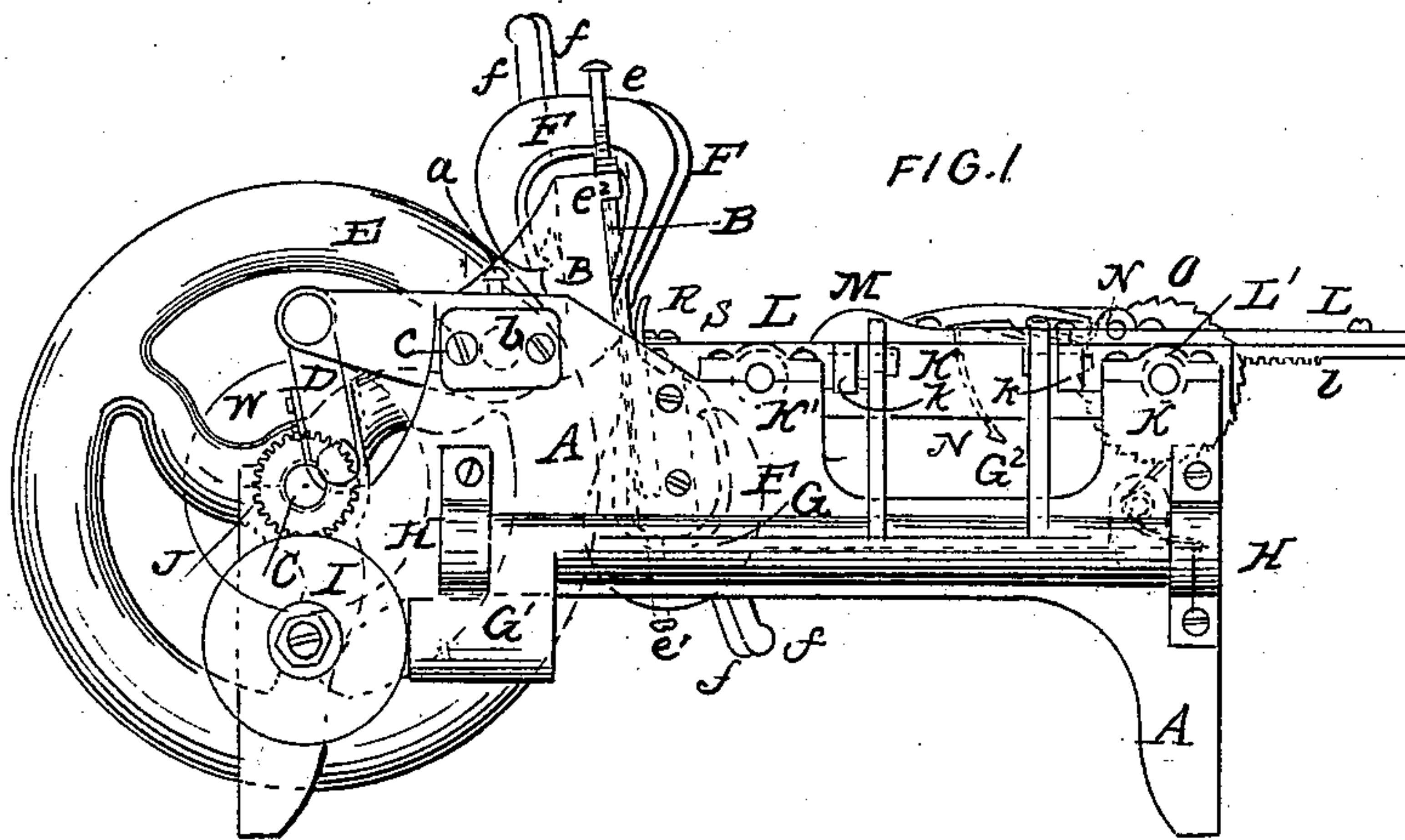


W. WICKERSHAM.

Nail Machine.

No. 52,479.

Patented Feb. 6, 1866.



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FIG. 3

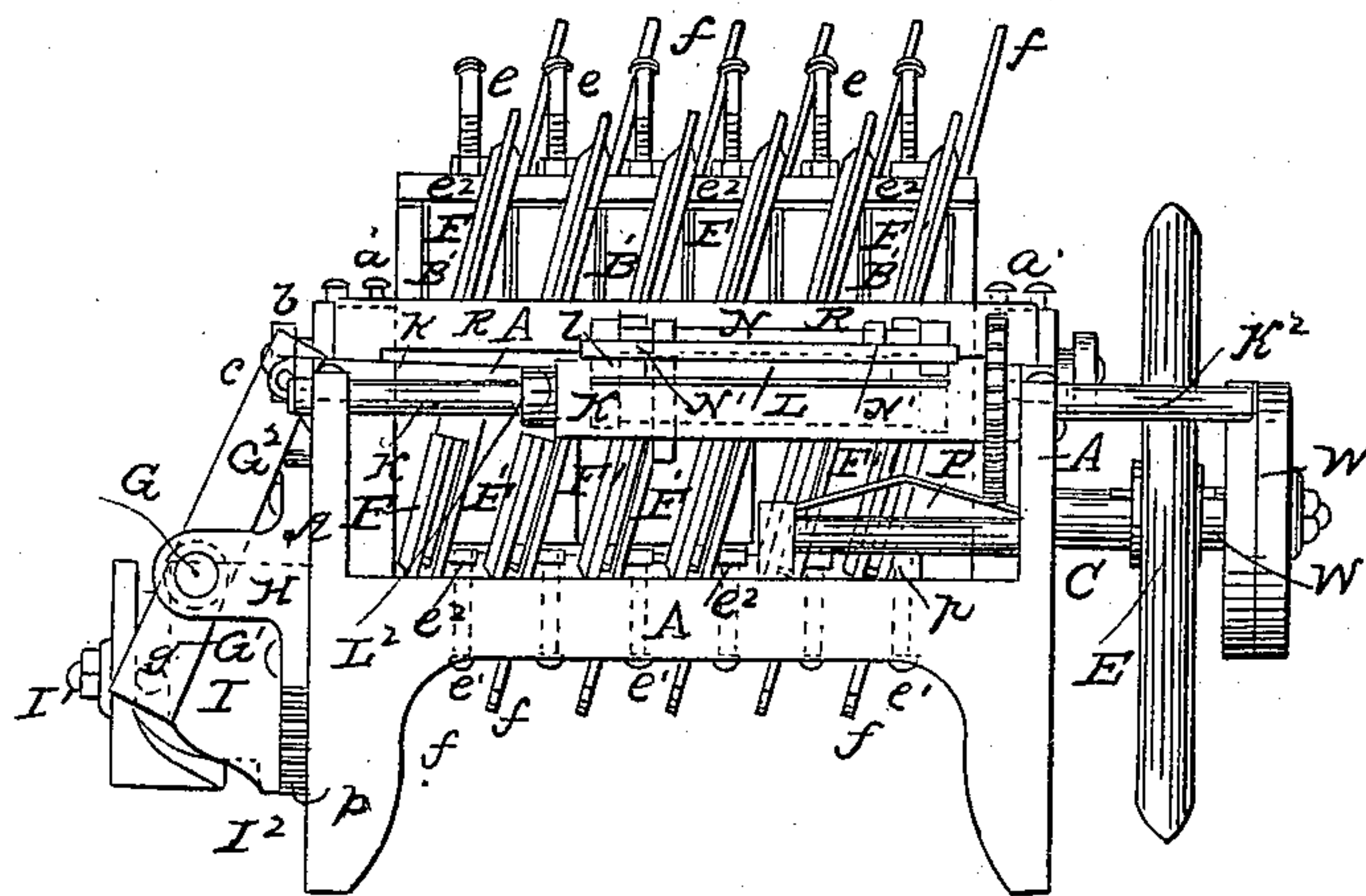
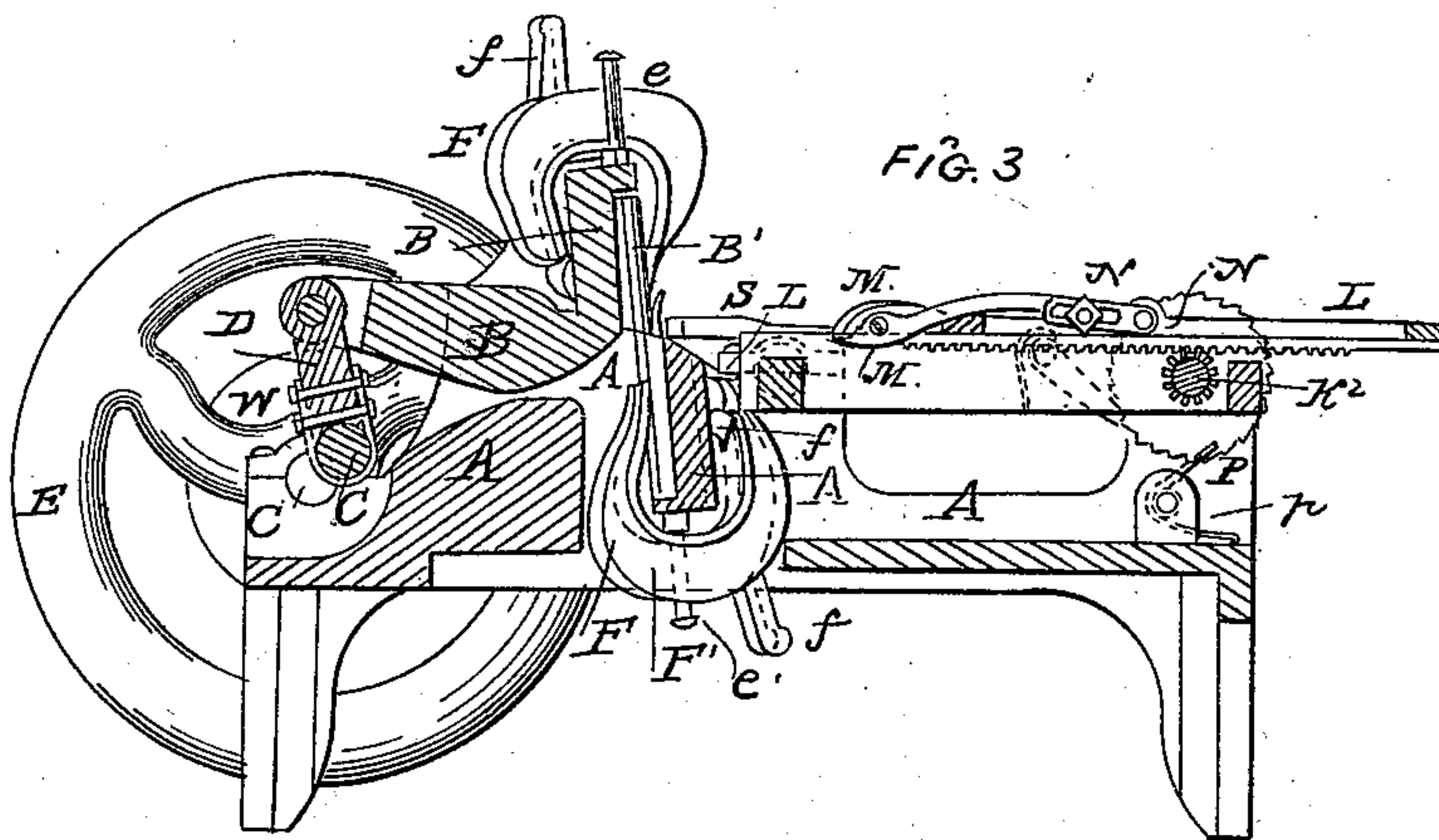


FIG. 3



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FIG. 5

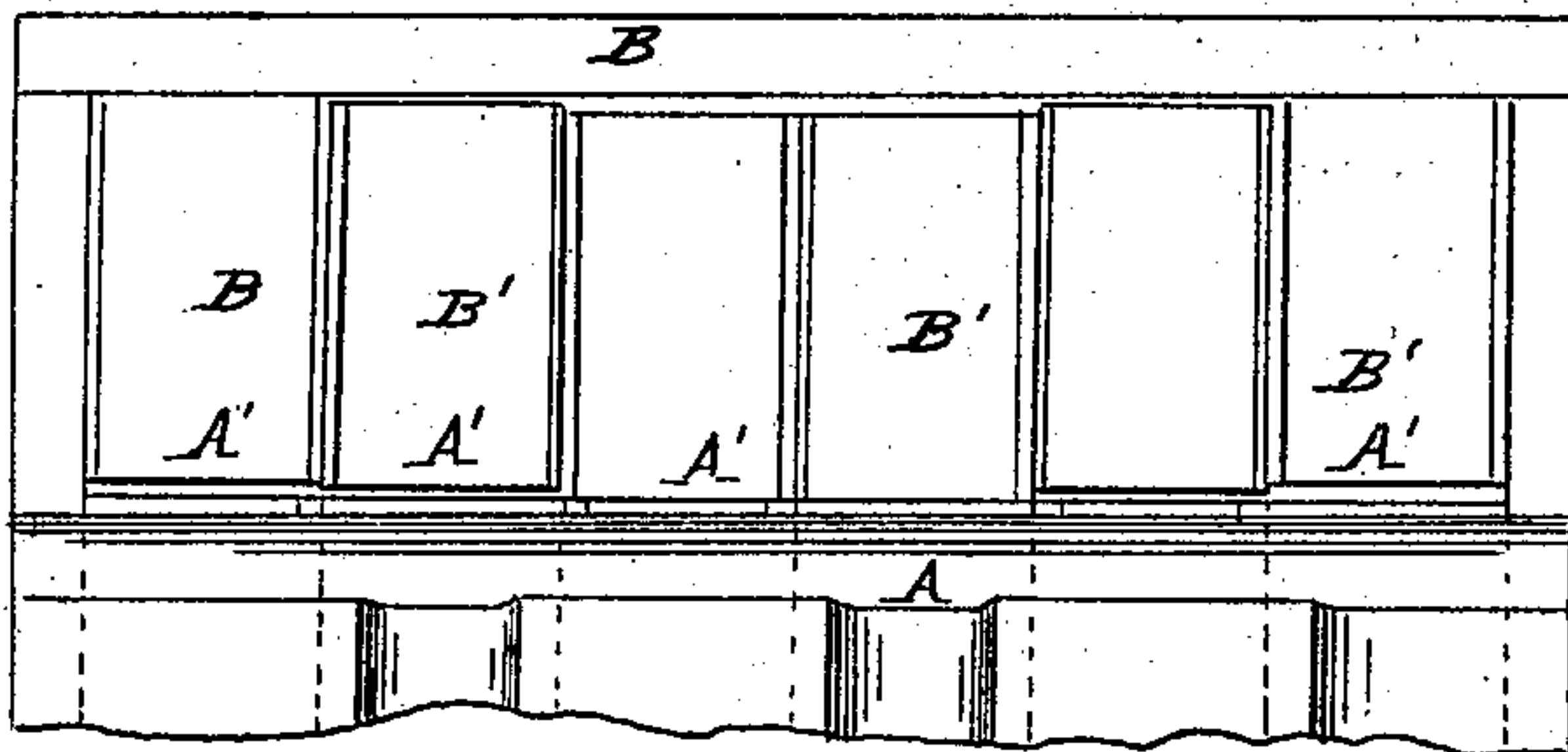


FIG. 6

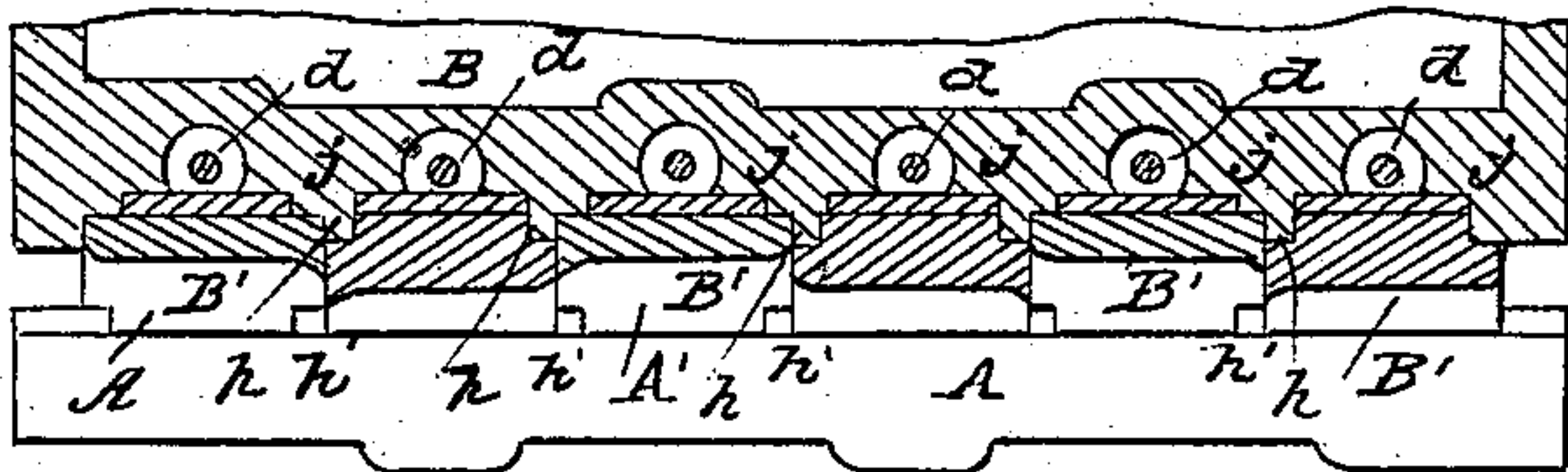


FIG. 8

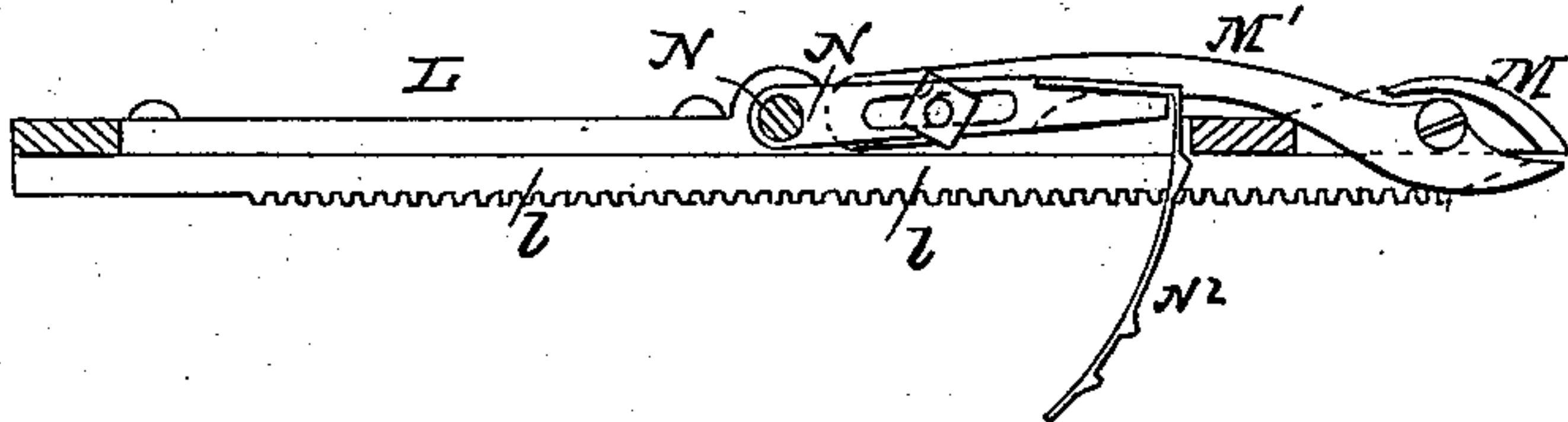


FIG. 9



FIG. 10

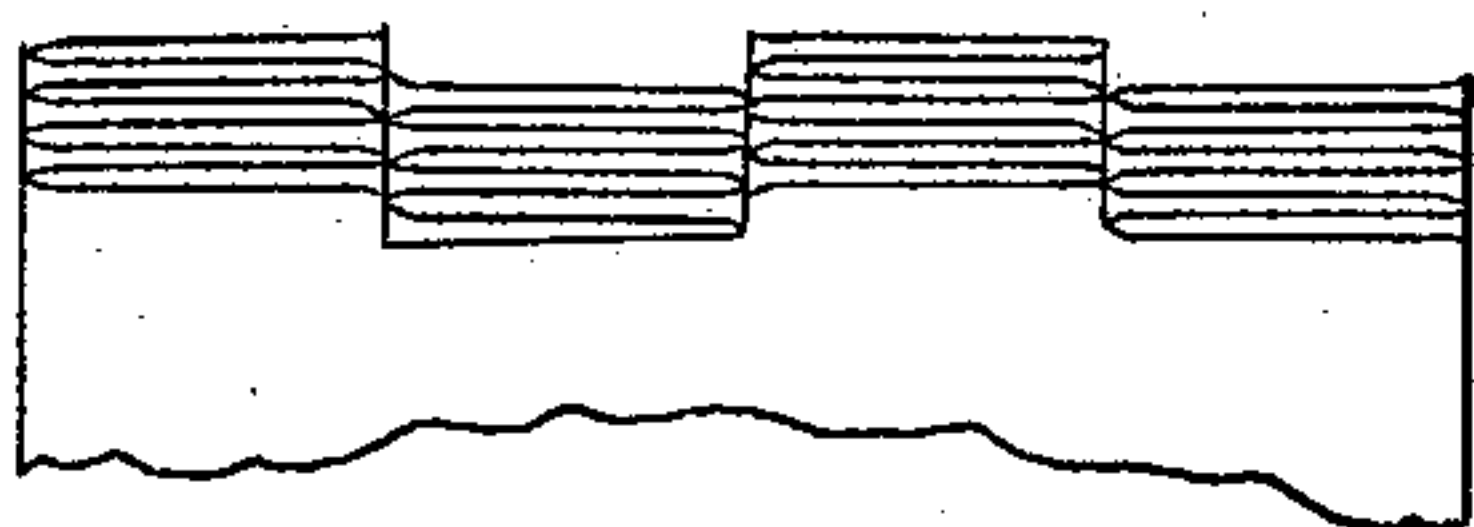


FIG. 11

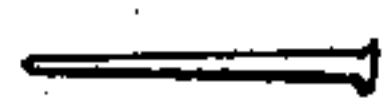
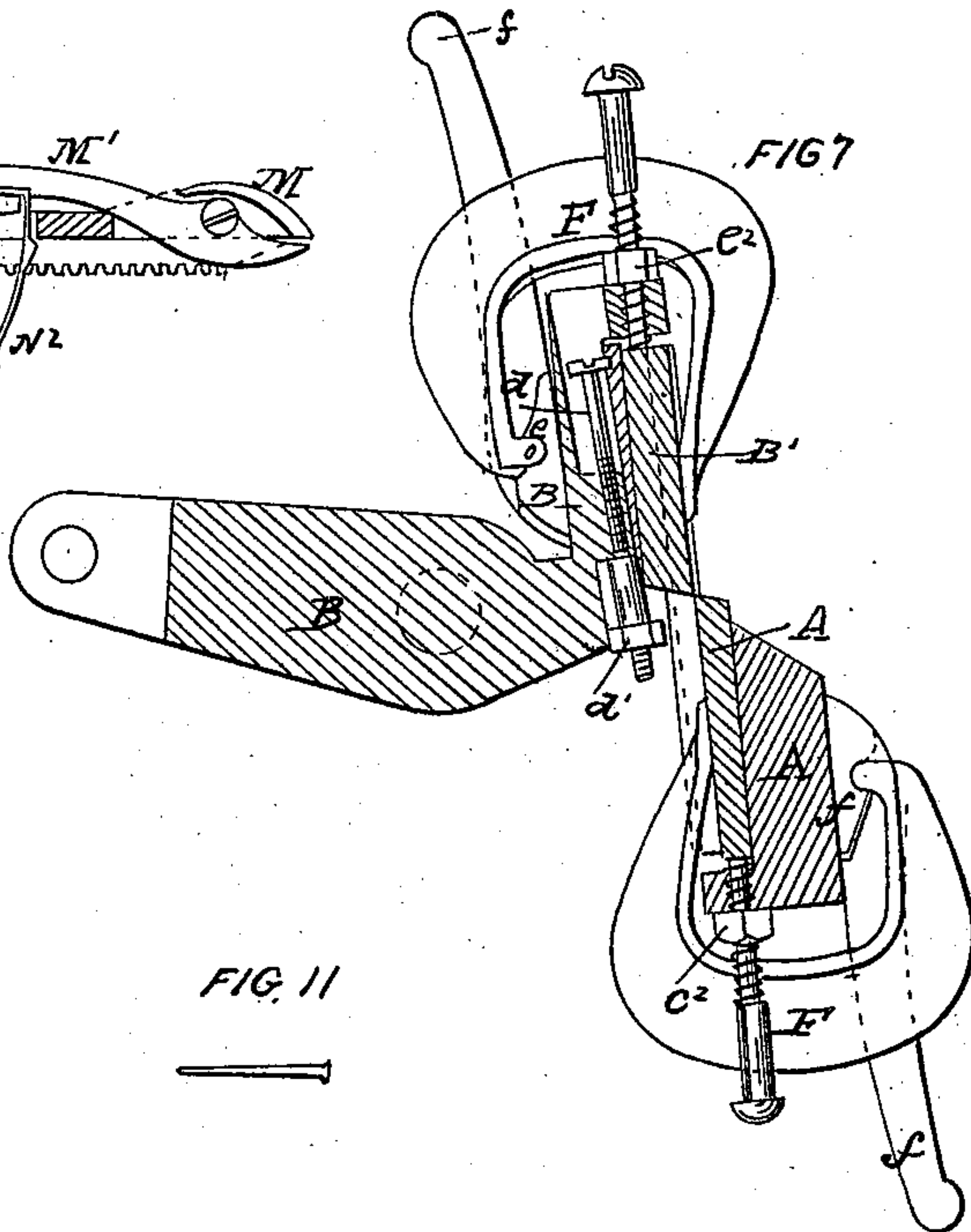


FIG. 7



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# UNITED STATES PATENT OFFICE.

WM. WICKERSHAM, OF BOSTON, MASSACHUSETTS.

## IMPROVEMENT IN NAIL-MACHINES.

Specification forming part of Letters Patent No. 52,479, dated February 6, 1866.

*To all whom it may concern:*

Be it known that I, WILLIAM WICKERSHAM, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Nail-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, taken in connection with the accompanying drawings, making a part of this specification, in which—

Figure 1 is a side elevation of the machine. Fig. 2 is a plan of the same. Fig. 3 is an end elevation of the same. Fig. 4 is a vertical longitudinal section of the same. Fig. 5 is an elevation of a part of the movable cutter-stock with the cutters in place, and also a part of the stationary cutters. Fig. 6 is a horizontal section through the movable cutter-stock, showing the construction behind the cutters with the stationary cutters in place. Fig. 7 is a vertical transverse section through the same parts. Fig. 8 is a sectional elevation of the carriage with one of the pinchers that hold the sheet of metal. Fig. 9 is a top view of one of the clamps that hold the cutters in place. Fig. 10 is a diagram showing the order and position in which the nails are cut from the sheet of metal; and Fig. 11 is a separate view of the nail.

My improved machine is for the purpose of cutting nails from a sheet of metal having a breadth equal to the length of several nails.

The first feature of my invention relates to the manner of arranging the cutters in the movable cutter-stock to distribute the power and so that the machine shall be relieved of the great strain which would be produced by cutting across the entire breadth of the sheet of metal at the same instant; and it consists in placing the several movable cutters at a different distance vertically from the bed-cutters, the edges of which are substantially at the same height, so that some of the nails will be cut a little before the others, and thus distribute the power and divide and reduce the strain upon the machine.

The second feature of my invention also relates to the manner of arranging the cutters in their stocks, so that they will all retain their proper places in relation to each other in the machine. In cutting nails from a broad sheet of metal by the mode of operation herein described, in which each pair of cutters co-

operates with the next pair but one at either side of it to form the opposite sides of the nail, it is necessary that the distances apart of the cutters across the machines should be accurately adjusted and maintained in relation to each other, and to the extent of the lateral movement given to the sheet of metal to transfer any section of it from one pair of cutters to another, and in the practical working of the machine it is very desirable that the cutters should be so held that the removal of any one of them for any purpose should not displace the others. This part of my invention therefore consists in forming in the cutter-stocks a separate recess, or its equivalent, to receive the back of each cutter, while their front edges come into close proximity, so as to produce a continuous cut across the sheet.

The third feature of my invention relates to the method of confining the cutters in the stock to avoid making holes or slots in the same to receive bolts, so that nearly the whole length of the cutters may be used, which the making of slots in the same would prevent, and also to avoid producing a lateral strain upon the cutter-stock which would be produced by confining a large number of cutters in the ordinary way, and would be liable to spring the cutter-stock so as to interfere with the adjustment of the movable and stationary cutters to each other. This part of my invention, therefore, consists in the employment of detached clamps to hold the cutters in place, which embrace the cutter-stock, and one jaw of which bears upon the face of the cutters and the other jaw upon the back of the stock opposite to it, so that the pressure upon the cutter to hold it in place does not tend to spring the cutter-stock.

The fourth feature of my invention relates to the manner of constructing the clamps that hold the cutters in place; and it consists in combining with one jaw of the clamp a lever for applying the pressure and a suitable catch for holding the lever under strain, the construction of which will be hereinafter explained.

The fifth feature of my invention relates to the means employed to insure an accurate lateral movement to the sheet in relation to the cutters, so that the two edges of the nail shall be symmetrical; and it consists in the employment, in combination with the sliding frame, of fixed stops, which arrest the lateral



motion of the frame at a determined point at each limit of its movement, and thus insures the accurate position of the sheet upon the cutters; and it also consists in the employment, in combination with said sliding frame, of a fixed and a yielding guide, which press against the edges of the sheet and between which it is guided as it is moved forward to the cutters.

In the drawings the letters indicate the same parts in all the figures.

A is the frame or bed of the machine upon which the mechanism is arranged, as shown, and to which the stationary cutters A' are secured.

B is the moving cutter-stock to which the moving cutters B' are secured. It is mounted upon pivots *a a*, which are secured in the bed by the set-screws *a'*, and the cap *b*, and screws *c c*. The stock B receives a reciprocating motion through the connecting-rod D from the crank-shaft C in an obvious manner. E is a fly-wheel upon the crank-shaft to give steadiness to its movement.

F F, &c., are detached clamps, which hold the cutters B' in the stock B, and F' F', &c., are similar clamps, which hold the stationary cutters A' in the bed. The clamps are made of the form shown more distinctly in Figs. 7 and 9, so as to embrace the cutter and stock and to bear upon the face of the cutter and back of the stock at points nearly opposite to each other. One jaw of the clamp is provided with a lever, *f*, which has its fulcrum at *f'*, the short arm of which bears upon the back of the stock, and the long arm of which reaches back beyond the body of the clamp, as shown, to give sufficient leverage to apply the requisite pressure to the cutter, and is held by a ratchet, *f*<sup>2</sup>, formed upon the body of the clamp, into which a catch upon the side of the lever takes, in an obvious manner; but instead of this lever a set-screw may be used to apply the pressure working through the jaw of the clamp.

The cutters A' and B' are each made of the same cross-section throughout their entire length—that is to say, the transverse form or contour of the face is that designed to be given to the edge of the nail cut by it, and the back is made longitudinally parallel to it. The cutting-edge is formed on the end of the cutter by grinding it to a slightly acute angle, as is shown in Fig. 7, and it is sharpened by grinding it upon the end only, so that the form and position of the cutting-edge may be retained unaltered in its relation to the cutter with which it works by merely setting it forward lengthwise by the set-screws *e e'* as fast as it is worn until it is worn out. The stationary cutters are all placed in the bed at nearly the same height, but in the movable stock they are placed at different heights, as seen in Fig. 5, so that the middle nails are cut a little in advance of the others, which follow in close succession, thus dividing the power and distributing the strain upon the machine.

Every other one of the cutters in each series is made thicker than the others to place their cutting-edges in advance of the others in the plane of the sheet, so as to cut the several columns of nails from the sheet separately.

The cutters are placed side by side, so as to make a continuous cut across the sheet, and the backs of the cutters fit into recesses in the cutter-stocks formed by the ribs *h h'*, as seen in Fig. 6, by which means the relative positions of the cutters to each other are exactly preserved, and the removal of any one of them does not derange the others. The back sides of the cutter-stocks are made with elevations and depressions opposite the several cutters, as shown, so that the distance through the stock and each cutter is the same, and so that all the clamps F F' may be made alike and fit any of the places. The set-screws *e e'* keep the cutters from moving back in their seats, and the screws are held from turning by the binding-nuts *e*<sup>2</sup>.

Behind each cutter in the movable stock B is inserted a broad flat wedge, *j*, nicely fitted, against which the back of the cutter rests. This wedge is held in position by the set-screw *d*, the head of which takes into a notch in the wedge, as is shown in Fig. 7, by the turning of which the wedge may be moved in or out to adjust the edge of the cutter with accuracy to the stationary cutter that works with it. The screws *d* are held from turning by the binding-nuts *d'*.

G is a rocking-shaft, which is mounted in boxes H attached to the frame A, as shown, and is provided with an offset-arm, G', which has a pin and roller *g*, which works in the groove in the cam I, from which it receives its motion. It has also two arms, G<sup>2</sup> G<sup>2</sup>, which are connected with the shifting-frame K by the connecting-rods *k*, and thus impart a reciprocating lateral motion to it.

The cam I is mounted upon the stud I', secured to the frame A, and receives its motion by means of the gear I<sup>2</sup>, which is attached to it, which engages with the pinion J on the crank-shaft C. The sizes of the gears are such that the crank-shaft will make just two revolutions to one of the cam. The groove in the cam is of such a form that its obliquity will give to the frame K a lateral movement exactly equal to the breadth of two cutters, and for about one-fourth of a revolution at the time when the nails are being cut it will hold the frame still. The shifting or sliding frame K is made with two rails, upon which the carriage L is guided and moves toward and from the cutters. These rails are mounted upon cross-bars K' K<sup>2</sup>, the first of which is fixed in the rails, but the last of which turns loosely in them, and also serves as a pinion-shaft and carries two pinions, *n n*, which work in the racks *l l* upon the carriage, and it also carries a ratchet-wheel, O, in the teeth of which the pawl P works and imparts to it an intermittent motion to feed the carriage forward at each reciprocation of the frame. Those parts of the bars K' K<sup>2</sup> out-



side of the rails are made cylindrical and slide in bearings  $L'$  on the bed  $A$ , and support and guide the frame  $K$  in its lateral movement.

$L^2$   $L^2$ , &c., are collars or stops on the cross-bars  $K'$   $K^2$ , which bring up against the bearings  $L'$  at each limit of motion of the frame  $K$  and serve to stop it in either direction at a definite point in relation to the cutters.

$M$   $M$  are stationary jaws of clamps or pinchers attached to the end of the carriage  $L$ , and  $M'$   $M'$  are movable jaws that work with them, by which the sheet of metal is held by the edge and presented to the cutters and fed forward at each cut.

The movable jaws of the pinchers are worked by the rocking-shaft  $N$  by means of the arms  $N'$ , which carry pins that work in slots in the movable jaws, as is seen in Figs. 4 and 8, and thus open and shut them simultaneously. They are held either open or closed by means of the spring-catch  $N^2$ , which engages with the cross-bar of the carriage.

On the ends of the rails of the shifting-frame  $K$ , next to the cutters, are fixed two guides,  $S$  and  $S'$ , between which the sheet of metal is held edgewise close to the cutters. The guide  $S$  is rigid, and its inner surface is in line with the inside of the rail to which it is attached, but the guide  $S'$  is attached to the rail by a spring which permits it to yield to the inequalities in the width of the sheet and at the same time to hold it firmly, and in connection with the stops  $L^2$  to insure the accurate lateral movement of the sheet of metal, so that the cuts that form the two edges of the nail shall be exactly opposite to each other, and the cuts lengthwise of the sheet between the several sections shall accurately follow each other, as seen in Fig. 10.

$R$  is a cross-bar secured to the frame  $A$  at each end just above the stationary cutters, beneath which the sheet of metal passes to the cutters, and which serves to hold the sheet down when the movable cutters rise.

The pawl  $P$  is a plate of metal of a breadth at least equal to the lateral movement of the frame  $K$  and the thickness of the ratchet  $O$ , and is mounted upon bearings and held up to the ratchet by the spring  $p$ , as is shown in Fig. 4. The edge of the pawl that works in the teeth of the ratchet is made broader in the middle than at the ends by an amount at least equal to the distance apart of the teeth of the ratchet and inclined from the middle each way, so that as the frame  $K$  is moved either way the ratchet-wheel, sliding over the pawl, is turned one tooth, which is so proportioned to the pinions  $n$ , which work in the racks  $l$  of the carriage  $L$  as to advance it the distance necessary to give the proper breadth to the nail.

$T$  is a stationary pawl which works in the ratchet  $O$  to prevent it from turning back, and is held in place by the spring  $t$ .

$W$   $W'$  are a tight and loose pulley on the crank-shaft  $C$ , by which power is applied to operate the machine.

In operating this machine the carriage  $L$  is

drawn back and the pinchers  $M'$   $M'$  are opened by unhooking the catch  $N^2$  and raising the arm  $N'$  of the rocker  $N$  till the lower catch of  $N^2$  engages with the cross-bar of the carriage and holds the jaws of the pinchers open. The sheet of metal of the exact width necessary to make the required number of nails is then placed between the rails of the frame  $K$ , with one edge against the guide  $S$  and the back edge in the jaws of the pinchers. The pinchers are then closed upon it by pushing down the arm  $N'$  of the rocker until the upper catch on  $N^2$  engages with the cross-bar, as shown in Fig. 8, the springing of the arms  $M'$  compensating for any small inequality in the thickness of the sheet. The sheet, with the carriage, is then moved forward, passing between the guides  $S$  and  $S'$  until the forward edge is near the cutters. The machine is then put in operation, and as the sheet is moved laterally by the shifting-frame  $K$  and fed forward by the carriage  $L$  by the mechanism described, between the operations of the cutters, the nails are cut from its forward edge by the cutters in the manner shown by Fig. 10, each nail being formed by the operation of two pairs of cutters, one pair forming one edge of the nail and the next pair but one from it on either side forming the other edge of it, a series of nails being cut at each alternation of the sheet. The lateral movement of the frame  $K$  and sheet of metal is, by means of the stops  $L^2$ , cam  $I$ , and intervening mechanism already described, arranged so as to be exactly equal to the width of two cutters which brings the cuts to form the two edges of the nail exactly opposite.

It is obvious that the several parts of my machine may be much modified in form and still retain essentially the same mode of operation, and a part only of my invention may be usefully employed without taking the whole of it, some of which modifications I will suggest—as, for instance, it is not material that the form given to the face of the cutter should extend the entire length, but only for so much of it as is designed to be used for cutting-edge, as the form of the other part of the face is immaterial; and instead of making the cutters of different thicknesses, as shown, they might all be made of the same thickness, and the seats of the cutters made alternately deeper, to give the alternate projection of the cutters, and the cutters might also be made with a cutting-edge upon each end, in which case all the cutters might be made exactly alike and worked right or left as their position in the series required; and in relation to the setting of the movable cutters so that they shall not all cut at once, the order shown in the drawing is not material, but may be varied at pleasure. In relation to the manner of forming the recesses in the cutter-stocks to receive the cutters, also, any other convenient form that will guide them longitudinally and determine their position in the stock may be used instead of the form shown, and the arrangement of wedges



for adjusting the movable cutters may also be used, if desired, with the stationary cutters as well as the others. The clamps for holding the cutters may also be dispensed with and the cutters held by bolts or other suitable means, if preferred, and the rocker-shaft N for working the pinchers may be omitted and the pinchers made to work separately and secured in any other suitable manner; and other modifications of a similar character may be made without changing the general mode of operation of the machine; and although I have described and represented my improvements as applied to a machine with reciprocating movable cutters, which, for certain reasons, I now deem to be the best form in practice, still many of the features of improvement are equally applicable to a machine working with revolving cutters, and I therefore do not limit their use to the form of machine hereinbefore represented.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. Placing some of the cutters a little in advance of the others in the direction of their cutting movement, so that some of the nails shall be cut a little before the others, for the purpose of relieving the strain upon the machine, substantially as described.

2. The series of recesses in the cutter-stock, formed, substantially as shown, to determine the position of the cutters in the stock or the employment of equivalent means to accomplish the same purpose, substantially as described.

3. The method herein described of confining the cutters in the stock.

4. The employment, in combination with the shifting frame and carriage, of pinchers or clamps, for the purpose of holding the sheet and presenting it to the cutters, substantially as described.

5. The employment, in combination with the sliding frame K, of the stops  $L^2$   $L^2$  or other equivalent device, for arresting the movement of the frame at the same fixed point in either direction, substantially as described.

6. The employment, in combination with the frame K and carriage L, or their equivalents, of the fixed and yielding guides S and S', or their equivalents, to guide the sheet of metal laterally as it is moved forward, substantially as described.

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Witnesses:

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