

J. P. SHERWOOD.

2 Sheets—Sheet 1.

Making Nails.

No. 8,326.

Patented Aug. 26, 1851.

Fig. 1.

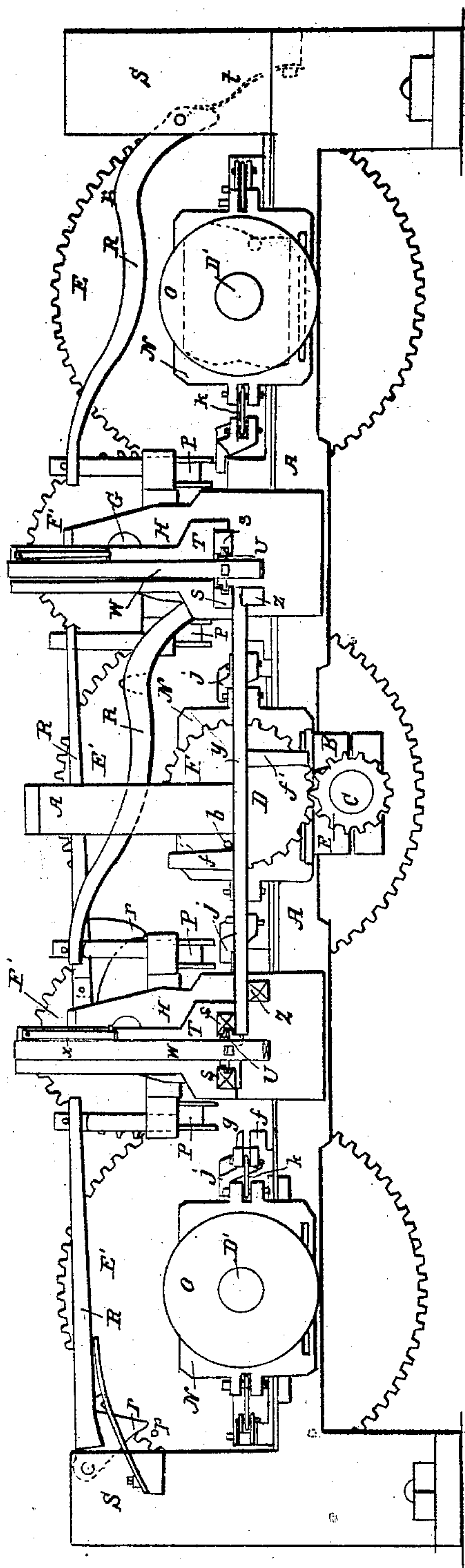
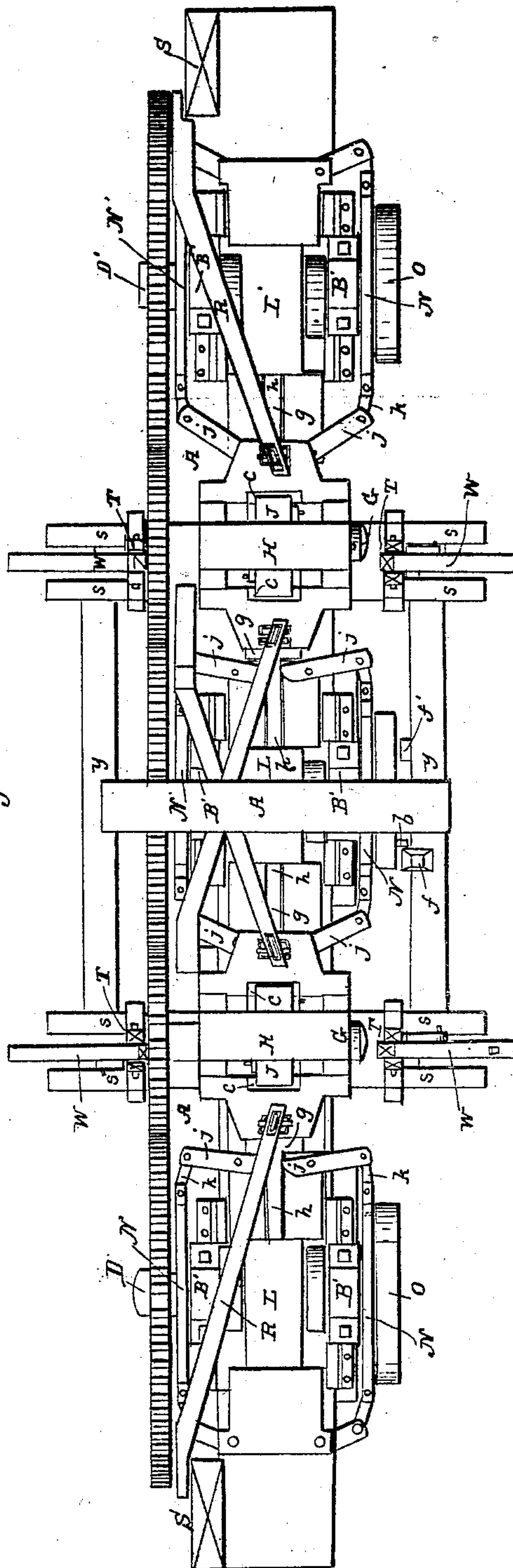


Fig. 2.



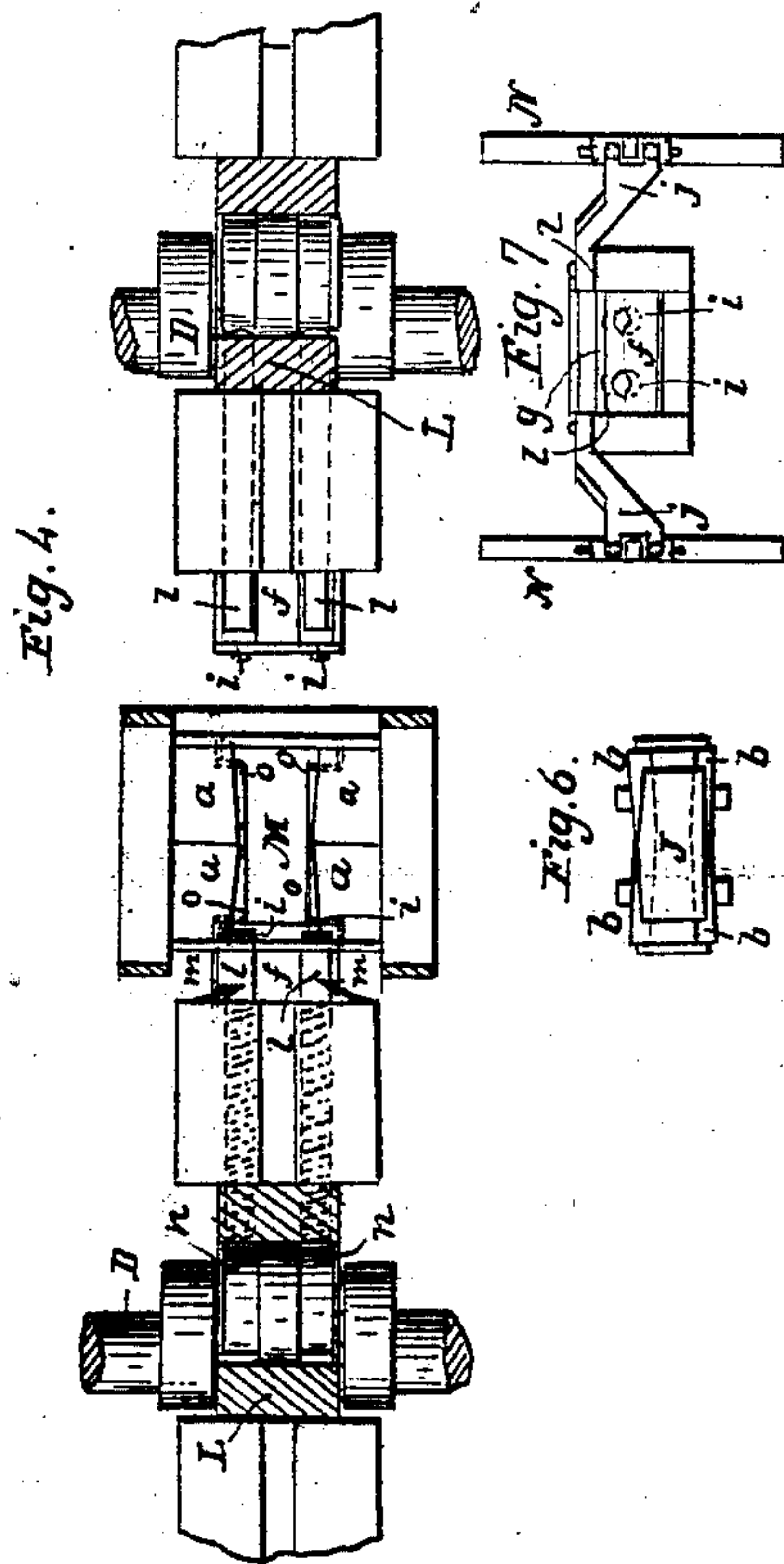
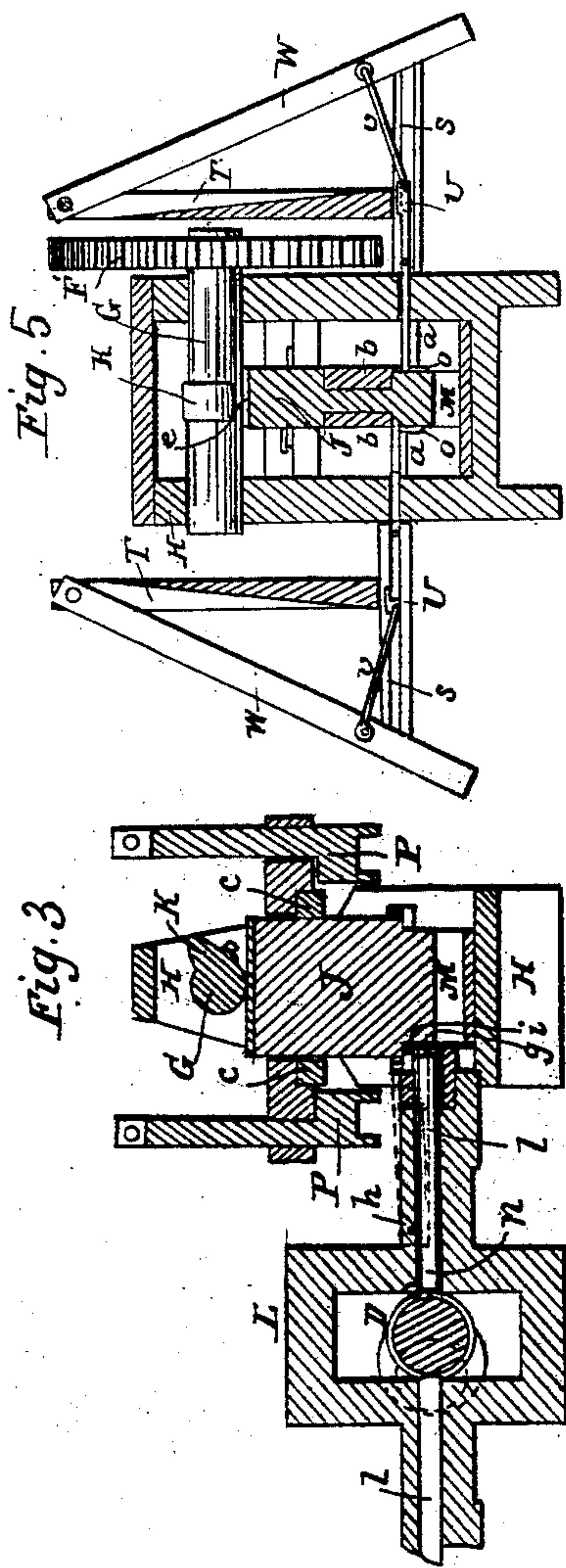
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# UNITED STATES PATENT OFFICE.

JOHN P. SHERWOOD, OF FORT EDWARD, NEW YORK.

## CUT-NAIL MACHINE.

Specification of Letters Patent No. 8,326, dated August 26, 1851.

*To all whom it may concern:*

Be it known that I, JOHN P. SHERWOOD, of Fort Edward, in the county of Washington and State of New York, have invented certain new and useful Improvements in Machines for Cutting Nails, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form part of this specification, and in which—

Figure 1 represents a side elevation of my cut nail machine. Fig. 2 is a plan of the same. Fig. 3 is a vertical longitudinal section, and Fig. 4 is a plan of a fragmentary portion of the machine. Fig. 5 is a vertical transverse section through one of the knife stocks. Fig. 6 is a face view of one of the knife stocks, and Fig. 7 is an end view of one of the gripping tongs and the parts connected therewith.

My cut nail machine is constructed to cut, grip, head, and deliver nails automatically.

The object of the first part of my invention is to dispense with the necessity of turning the cut nail blank one quarter of a revolution before submitting it to the gripping dies and it consists of reciprocating gripping tongs which open and close in a direction perpendicular to the face of the nail plate and which advance upon the nail blank, grips it and draw it endwise from the position in which it is placed by the action of the knives.

The object of the second part of my invention is to equalize the strain upon a machine in which several nail blanks are cut by one stroke of the same knife stock, and it consists in arranging the knives and operating the knife stock in such manner that the nail blanks are cut in succession as the moving knives approach the stationary ones.

The third part of my invention relates to the relative movements and positions of the gripping dies and heading tool, and it consists in arranging the latter to move within a pair of jaws which constitute the gripping dies the whole being so arranged that the nail blank is headed irrespective of the movement of the gripping dies, and the last part of my invention consists of a double acting reciprocating gripping and heading carriage, furnished at each of its extremities with sets of gripping and heading apparatus which act alternately and in connection with

two sets of severing knives, whereby much time is saved as a nail is formed at each single stroke of the gripping and heading carriage.

The several acting members of my machine as represented in the accompanying drawings are all secured to a strong bed frame A, to the lower side of which two pillow blocks B are secured to support the driving shaft C, to which power is imparted either through the intervention of a belt and belt pulleys or by means of some other convenient and suitable mechanical device. Pairs of pillow block standards B', B', B', are erected upon the opposite sides of the bed plate to support the journals of three transverse crank shafts D, D', D', one of which is immediately above the driving shaft C, and the other two are situated at equal distances on each side thereof. The central crank shaft D is put in motion by the driving shaft through the intervention of a toothed pinion E and wheel F secured to the respective shafts, the lateral crank shafts D', D', are caused to revolve, simultaneously with the central one D and in the same direction, by means of three equal cog wheels E', E', E', secured to the respective shafts D, D', D', and of two intermediate wheels F', F', which are of half the diameter of those on the crank shafts and are secured to two intermediate shafts G, G, whose journals are supported in suitable boxes secured to two frames H H. These frames are firmly secured to the bed frame at points intermediate between the crank shafts; they support the cutting apparatus by means of which the nail blanks are severed from the nail plates, while the crank shafts give motion to the carriages which carry the gripping and heading apparatus.

The cutting apparatus, connected with each cutter frame H, is composed of four stationary and four moving knives. The former, *a*, *a*, are arranged in pairs upon opposite sides of a socket M which guides the lower extremity of a reciprocating knife stock J, to which the four moving knives *b*, *b*, are secured. The upper extremity of the knife stock is guided by the blocks *c*, *c*, which are secured to the standards of the frame, and it is fitted with springs which tend to hold it to its highest position. This knife stock is depressed at the proper mo-



ment, to cut the nail-blanks by means of a double graded cam K which is secured to the shaft, and acts upon a shoe *e* secured to the upper extremity of the knife stock. It is raised whenever the cam in its rotation passes the shoe *e*, by means of two springs which are projected in opposite directions from the crossbars of the cutter frame (H). The stationary knives of each pair are beveled in opposite directions as shown at Fig. 4, and the corresponding pair of movable knives are also beveled as shown at Fig. 6. The pair of stationary knives upon one side of the machine are placed a little below the opposite pair so that the movable knives corresponding with the former shall not act until the movable knives corresponding with the latter have finished their work. The lower extremity of the knife stock, or that portion of it which extends below the movable knives and works in the socket of the bed frame, is beveled in a direction the reverse of that of the stationary knives, and is situated at such a distance from their edges that the space included between each of the latter and the adjacent face of the knife stock, when the latter is at its highest position, has the same breadth and taper as that of the nail blank to be cut.

The upper edges of the socket in which the lower extremity of the knife stock works, form rests *o, o*, upon which the nail blanks severed by the knives are delivered by the downward movement of the knife stock, and from which they are drawn endwise by the action of the reciprocating gripping and heading apparatus. Each cutter frame has two double sets of gripping and heading apparatus appertaining to it, one of which is moved to and fro at each of its sides. In the present machine there are two cutter frames and four sets of gripping and heading apparatus; the two sets which are situated between the adjacent sides of the cutter frames are attached to the same carriage L, which is arranged to slide upon ways secured to the bed frame of the machine, and is moved to and fro between the two cutter frames by the crank wrist of the central crank shaft, D, which passes through and works in a rectangular socket formed in the middle of the carriage. The sets of gripping and heading apparatus which are situated at the outer sides of the cutter frames are attached to separate carriages L', L', which are also arranged to slide upon ways like those of the central one, and are moved toward and from the sides of their respective cutter frames by the crank wrists of the outer two crank shafts D' and D', which work in rectangular sockets formed at the middles of their respective carriages.

Each double set of gripping and heading apparatus consists of a pair of gripping

jaws and two heading punches; the gripping jaws or tongs consist of two jaws *f* and *g*, the lower, *f*, of which is fixed to the carriage while the upper terminates in a shank *h*, which is pivoted to the carriage and is situated in a socket formed therein by means of which it is guided in opening and closing. The pivot of the upper jaw is horizontal so that this jaw rises from the lower in opening and is depressed toward it in closing; the upper jaw is pressed away from the lower by a spring which acts upon the under side of its shank and tends to keep it raised. The upper jaw is depressed upon the lower by means of a pair of bevel-ended levers *j, j*, which are pivoted to the carriage, and whose hinder extremities are connected by link bars *k, k*, with sliding frames, N and N', situated at opposite sides of their respective carriages. Each of these frames is slotted near its lower edge to traverse upon guide-pins secured to the bed frame, and each is carried along with the carriage in its movement until the proper moment arrives for gripping the nail blanks, at which time the frames are moved independently of their respective carriages by pins, which at one side of the machine, are secured to and revolve with the adjacent faces of the crank shaft cogwheels, and at the other side of the machine are secured to the inner faces of the wheel F upon the central crank shaft, and circular disks O, O, upon the outer ones. The pins appertaining to the opposite sliding frames are exactly opposite each other so that the opposite frames are moved simultaneously, and the interior peripheries of the frames are of such form that the pins act to move them, when the carriage has arrived at the end of its stroke in either direction. The movement of the frames moves the levers *j, j*; the pair at one extremity of the carriage being moved to depress their respective gripping jaw while those at the other are simultaneously moved to allow theirs to open under the action of its spring. The pin is in such a position with respect to the respective crank shaft that the movable gripping jaw at that extremity of the carriage which is nearest its respective cutter frame is depressed while the other is allowed to rise.

The adjacent faces of each pair of gripping jaws have two curved grooves *i, i*, formed in them, which correspond with each other, and are placed in such positions with respect to the rests *o, o*, upon which the nail blanks are delivered that a straight line drawn through the center of the latter passes through the center of the grooves. These grooves are of such depth that when the upper gripping jaw is closed upon the lower, the elliptical or oval space included between the two grooves is equal in depth with the thickness to which it is necessary to reduce



a nail blank by gripping in order to hold it firmly during the action of the heading tool. The extremity of each pair of gripping tongs is at such a distance from the crank shaft of its carriage that when the latter is moved toward the cutting knives the jaws of the tongs will enter the cutter frame a sufficient distance, as shown in Fig. 3, to grip the nail blank lying on the rest *o* at the proper distance from its head; and in order to permit the entrance of the gripping tongs the outer extremities of the rests and the corresponding portions of the lower extremity of the knife stock are cut away.

The heading tools are arranged to work within the gripping tongs, there is one for each pair of knives, each consists of a sliding bolt *l*, which slides longitudinally in a socket formed in the carriage; they are forced outward by means of cams *n* secured to the crank wrists, and are returned inward, when these cams by the revolution of the crank pass their inner extremities, by means of springs *m* secured to the carriage.

The discharging apparatus consists of wedge formed plungers or pistons *P*, one of which is constructed to slide vertically in guides on each side of each cutter frame. These pistons are placed in such positions with respect to the gripping tongs beneath them, that when the latter are at their farthest distances from the cutter frames the pistons in descending will clear the extremities of the gripping tongs. The breadths of the lower extremity of a discharging piston is a little less than the distance between the two sets of curved recesses in which the nail blanks are gripped, so that it can enter between them as it is depressed, and can shove them laterally from the jaws of the gripping tongs. Each discharger is operated by a separate lever *R*, which is pivoted at its heel to the standard of the opposite cutter frame, or to a supplementary standard *S* erected upon the bed frame. Each is depressed at the proper moment to discharge the nails by means of a pin *r*, which is secured to the adjacent face of the crank shaft cog-wheel, and which acts upon a snug *r* projected from the lever near its heel. Each lever is raised to lift its discharger after the pin has ceased to act by means of a spring *t*, which maintains the discharger in a raised position until the pin again begins to act.

As the cog wheels to which the pins are secured all revolve in the same direction, while the levers project in different directions, some of the snugs on which the pins act are projected above the pivots of their levers while others are projected below as shown in the drawings. As one of these levers also crosses another it is necessary to bend one or both to prevent them from coming in contact with each other. The snugs of the two central levers must also be grooved or other-

wise constructed to permit the pin which works each lever to revolve without affecting the snug of the other lever.

In order to feed nail plates to this machine a traveling feeding carriage is applied to it. This carriage consists mainly of four spring feeders, one for each extremity of each cutter frame, which are connected by suitable frame work. Each feeder is composed of a pair of grooved guides *s, s*, in which the nail plate is inserted and which are firmly secured to a standard *T*, together with a driver *U* by means of which the nail plate in the guide grooves is forced endwise through an aperture in the adjacent standard of the cutter frame and thence over the stationary knives to the proper position for cutting. The driver is fitted to slide in the grooves of the guides and is connected by a link rod *v* with a bar *W* which is pivoted at its upper extremity to the upper end of the standard *T* and is drawn toward the latter by a spring *x*; the latter acting through the bar and link rod forces the driver inward and toward the knives. The two feeders at each side of the machine are connected by side pieces *y y* which are supported by rests *z*, upon which they are constructed to slide longitudinally so as to place each feeder in proper positions to feed the nail plate alternately to each adjacent pair of knives. The side pieces of the feed carriage are connected by an upright frame *A* which passes over the intermediate portions of the machine; and the carriage is moved to and fro at proper intervals by means of a pin *b*, which is secured to the face of the cog wheel *F*, and in its revolution acts in alternate succession upon two standards, *f* and *f'*, one of which is projected above and the other below the horizontal line passing through the axis of the central crank shaft to which the cog-wheel *F* is secured.

When the machine is in operation the nail plates to be cut are applied endwise to the four feeders by an attendant who draws the driver outward by hand, inserts the plate, and then allows the driver to bear against the outer end. As the nail plate is forced inward by the driver, it is projected over the stationary knife, with which the feeder is acting at the time, and against the face of the moving knife on the knife stock; as the edge of the moving knife rises by the upward movement of the knife stock the extremity of the nail plate is driven beneath it, and strikes the face of the lower portion of the knife stock which thus acts as a gage to limit the breadth of the nail blank. The plate remains in this position until the knife stock is depressed by the action of the cam above; by this depression the moving knife is forced down upon the nail plate, and severs that portion of it which projects over the edge of the stationary knife from the



remainder. As the knife stock continues to descend it forces the nail blanks, thus severed by the knives upon its opposite sides, downward, and delivers them upon the rests  
 5 beneath. The knife stock is then raised by its springs which act as soon as the cam has passed the shoe at the upper extremity of the knife stock. As the knife stock rises the gripping tongs advance with their jaws  
 10 open, and embrace the extremities of the nail blanks lying upon the rests. As soon as the jaws have passed, the one above and the other beneath the nail blanks, the upper jaw is closed upon the lower by the movement of the levers  $j, j$ , which are operated  
 15 by the pins working in the frames  $N, N'$ . By this operation the nail blanks are firmly gripped within the grooves of the jaws, and as the crank wrist continues to turn, the  
 20 cams secured to it acting upon the heading tools force them endwise against the extremities of the nail blanks, which project within the inner edges of the gripping jaws, and thus form the heads of the nails. As  
 25 soon as the cams pass the ends of the heading tools the latter are moved inward by the action of their respective springs and the carriage, with the finished nails in its gripping tongs, is moved away from the  
 30 cutter frame by the action of the crank wrist upon the rectangular aperture in which it moves. As the carriage finishes its backward stroke the frames  $N, N'$ , are moved by their pins to turn the levers  $j, j$ , and thus  
 35 permit the upper gripping jaw to rise under the action of the spring beneath it; as it rises from the lower jaw the discharging piston is depressed by the action of its appropriate driving pin upon the snug of its  
 40 lever, as it is depressed its point enters between the two sets of gripping grooves, and its wedge formed sides bearing against the inner edges of the nails project them laterally from the gripping tongs, thus completing  
 45 the operation.

Each set of knives acts in connection with one set of gripping grooves and one heading tool; and one pair of gripping tongs is advanced by its carriage toward one side of  
 50 each cutter frame as the other is drawn away from the other side; the adjacent sets of knives therefore act alternately, and the knife stock is depressed to cut a nail blank just before each pair of gripping tongs advances. In order to feed the nail plate  
 55 alternately to each adjacent set of knives, the feeder appertaining to the two adjacent sets of knives on each side of the knife stock frame is made to vibrate from one to the  
 60 other by the movement of the feeding carriage. The feeders, it will be perceived, present the nail plates to the knives in directions always perpendicular to the direction in which the carriage moves, and the  
 65 knives are equally sloped or beveled in oppo-

site directions to that perpendicular line in order that they may cut the nail blank with the proper taper.

It will be perceived that the central carriage has a gripping and heading apparatus  
 70 at each of its extremities, which act alternately as it is moved alternately toward each cutter frame. By this arrangement much space is saved as one carriage is thereby enabled to do the work of two; much machinery is also saved as the frames  $N, N'$ ,  
 75 and their driving pins, together with the levers  $j, j$ , are constructed in such manner that the one set of gripping jaws is opening when the other is being closed. This  
 80 arrangement also, by rendering the machine more compact, enables the attendant to supply nail plates to the feeders with greater ease.

It will be perceived that the gripping  
 85 jaws open in a direction perpendicular to the face of the nail plate, and consequently it is necessary to give them a longitudinal movement to draw them out of the range  
 90 of the descending knife. But this arrangement of the jaws enables me to grip the nail-blank sidewise without the necessity of turning it upon its edge, which operation is  
 95 necessary in preceding machines where the gripping dies open in directions parallel with the face of the nail plate. It is well known that the mechanism for turning a  
 100 nail blank upon edge before gripping it, requires an exceeding nice adjustment, and the difficulty of keeping it in order is one of the principal causes of the misshapen  
 105 nails which are so frequently made; the adjustment of this mechanism also requires great practical knowledge and experience on the part of the workman, which is unnecessary in machines constructed upon the plan  
 I have described in which this turning mechanism is dispensed with.

It will be perceived that each knife stock in descending cuts two nail blanks, one at  
 110 each of its sides; by arranging the stationary knives at one side of the knife stock a little lower than those at the other, and by forming the cam with two grades or  
 115 steps, the nail at one side of the knife stock is cut a little after that at the other, by which means the strain upon the machinery is but half of what it would be if both nails were cut at the same moment, and hence  
 120 there is much less danger of breaking the machine, and a much less strain upon the driving belt or other mechanism which imparts motion to the machine from the prime mover. It is obvious that this same result  
 125 will be obtained by arranging the opposite stationary knives at the same height, and by setting the moving knives at different heights upon the knife stock, so that the edge of one of them shall pass its corresponding stationary knife before the other  
 130



upon the opposite side of the knife stock begins to act; this arrangement being the converse of the one described.

What I claim as my invention and desire to secure by Letters Patent is—

1. In combination with knives or the equivalent thereof for cutting blanks side-wise from nail plate I claim a traveling gripping and heading tongs or jaws opening and closing in a direction perpendicular to the face of the nail plate and constructed and actuated substantially as herein set forth to grip the blank on its flat sides, without the necessity of turning it upon edge as is customary with nail machines heretofore constructed, to draw it from beneath the knives, and to hold it while being headed.

2. I claim the direct acting knife stock with knives secured to its opposite sides in such positions with respect to the stationary knives or to each other that the knife upon one side cuts after the knife upon the opposite side, in combination with a

double graded cam or other equivalent actuating mechanism which shall cause the cutter bar to descend with two impulses at each of which one knife acts to cut a nail blank.

3. I claim the relative arrangement of the traveling gripping jaws and heading tool, the latter being actuated within the former and traveling with it.

4. In combination with two sets of knives acting alternately to sever nail plates I claim a reciprocating gripping and heading carriage which traveling to and fro between the two sets of knives grips, heads, and delivers a nail at each single stroke in alternate succession at its opposite extremities, whereby much time and labor are saved and the machinery to cut a given number of nails is condensed into a less space.

JOHN P. SHERWOOD.

Witnesses:

I. L. SMITH,  
E. S. RENWICK,