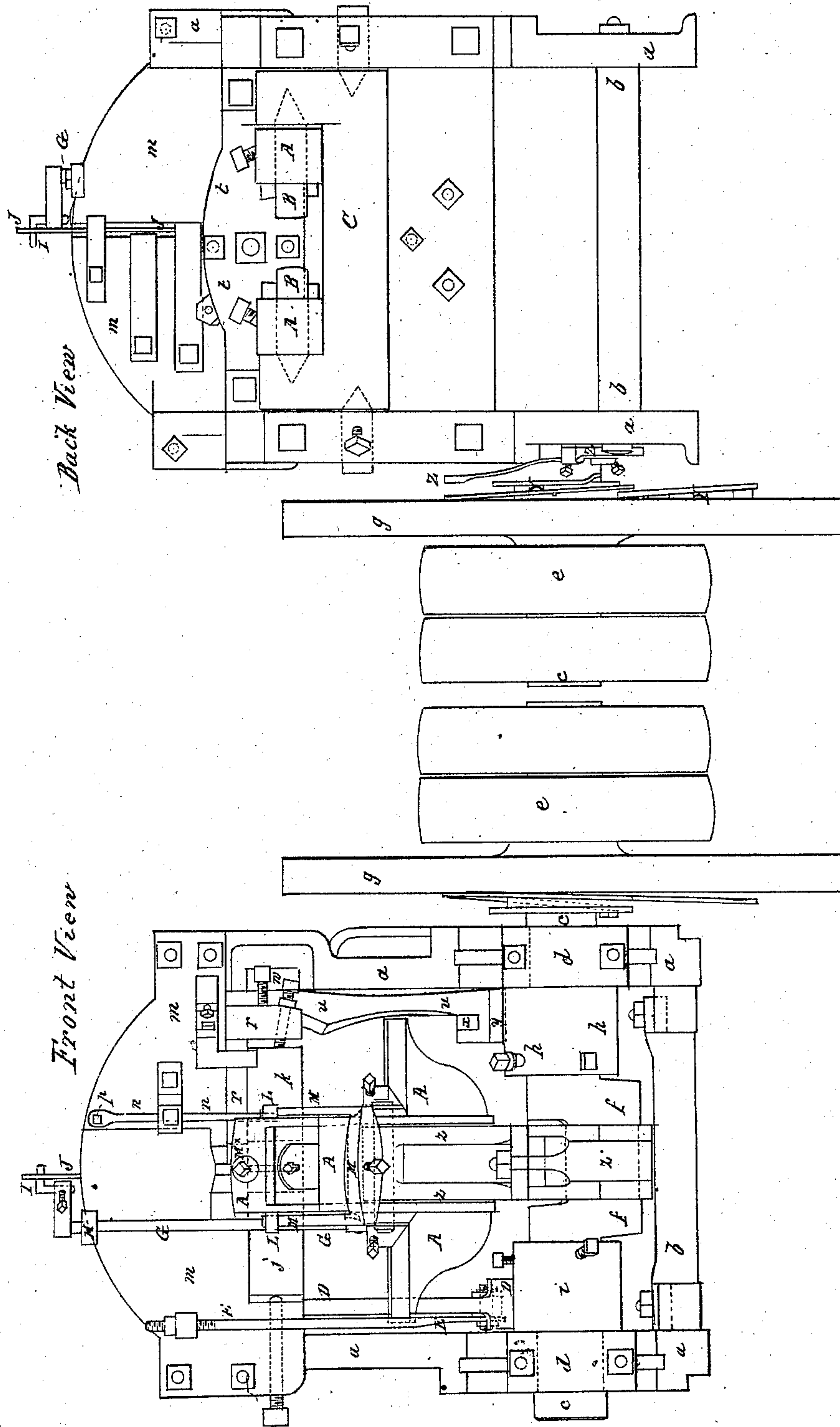


S. G. REYNOLD.  
NAIL MACHINE.

No. 3,681.

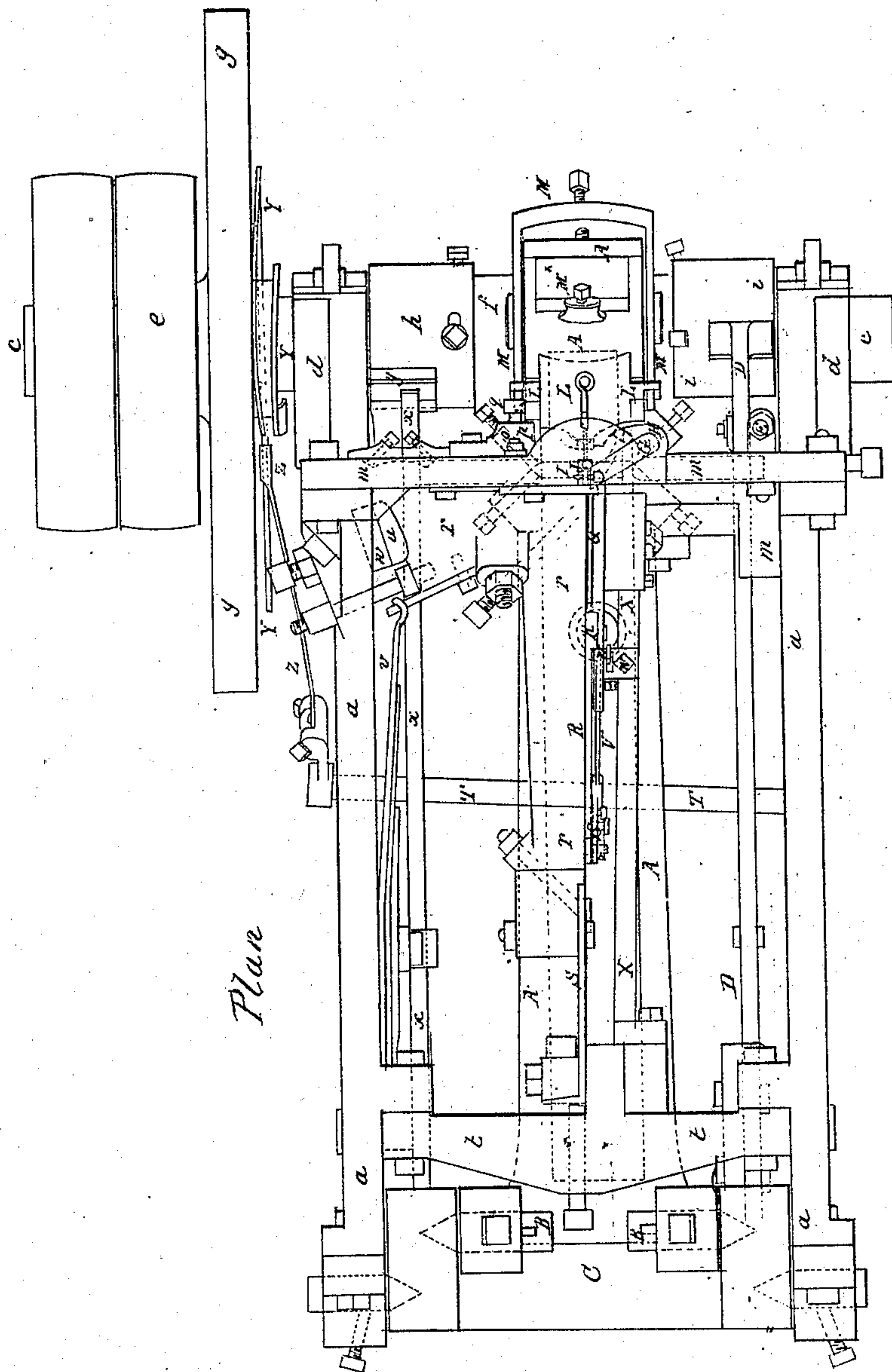
Patented July 26, 1844.



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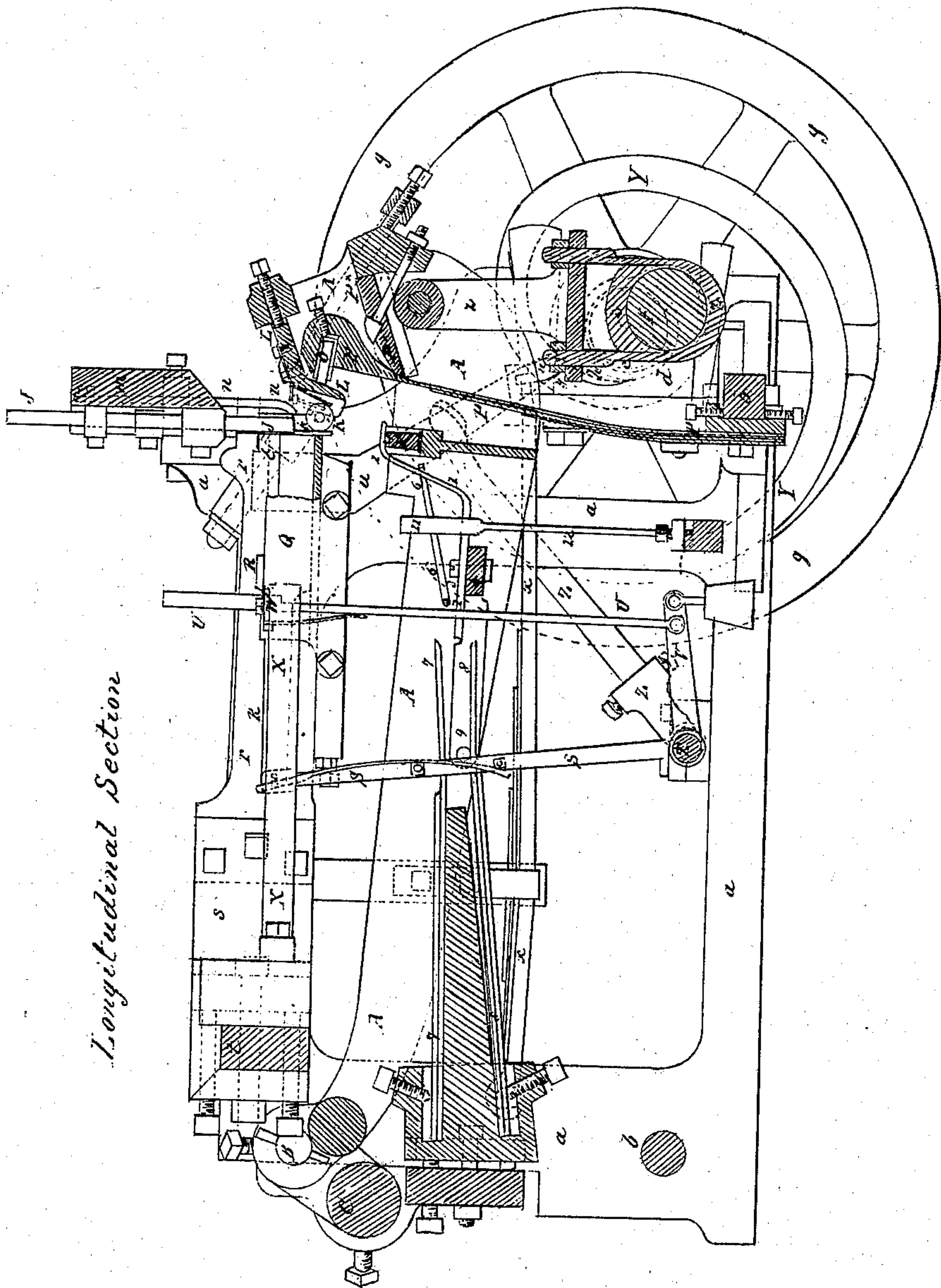
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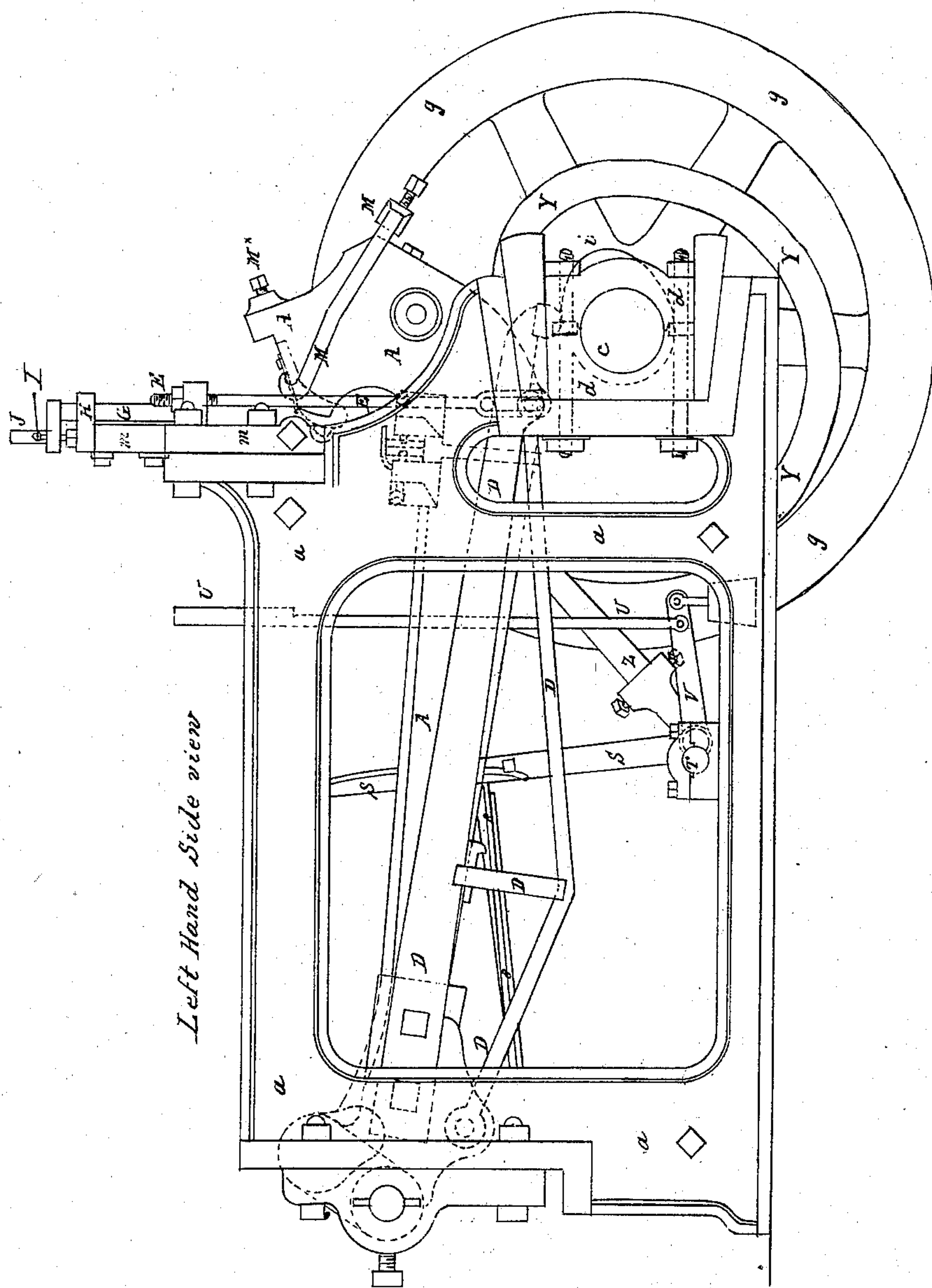




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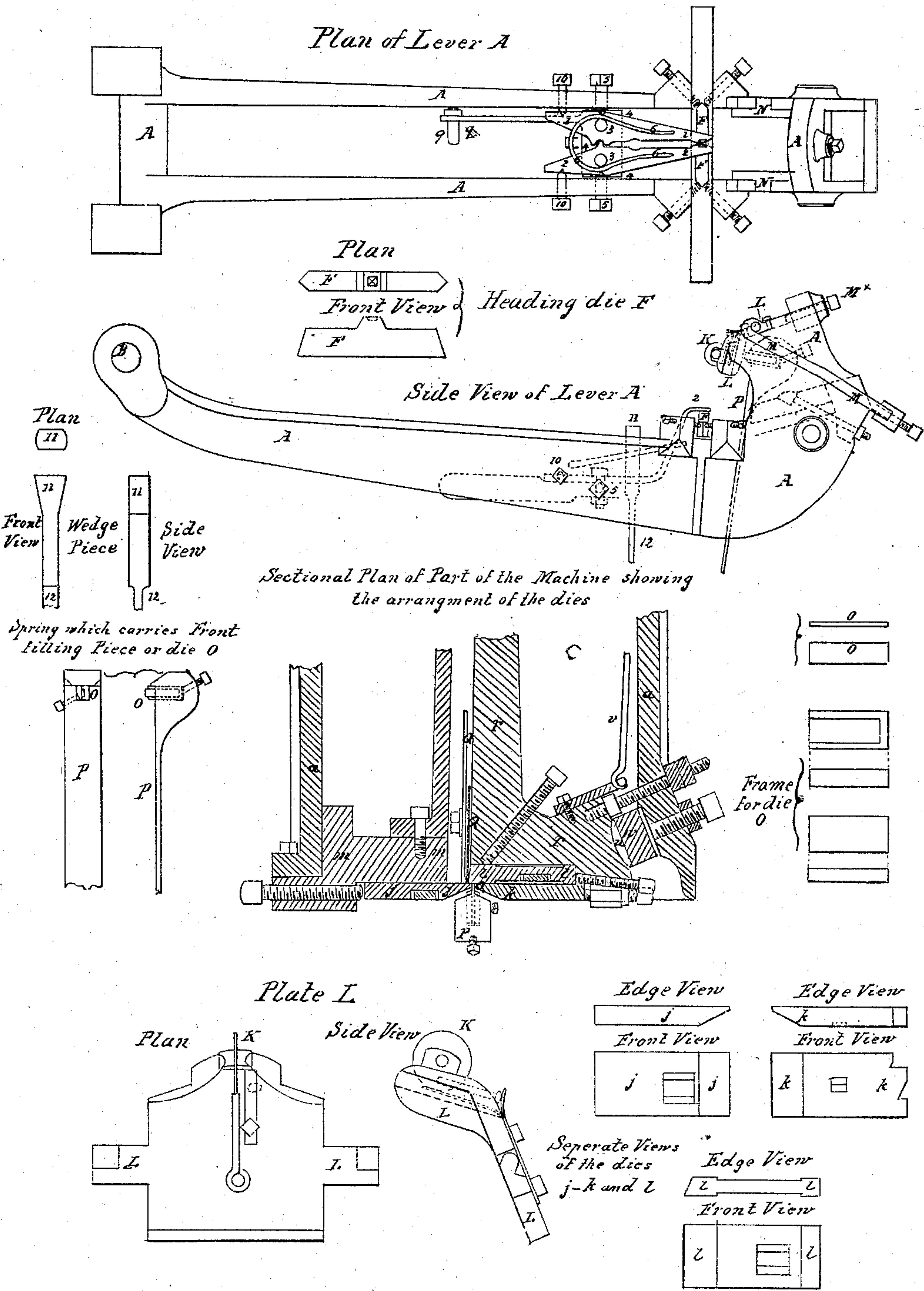
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# UNITED STATES PATENT OFFICE.

S. G. REYNOLDS, OF BRISTOL, RHODE ISLAND.

## SPIKE-MACHINE.

Specification of Letters Patent No. 3,681, dated July 26, 1844.

*To all whom it may concern:*

Be it known that I, SAMUEL GODFREY REYNOLDS, of Bristol, Rhode Island, United States, a citizen of the said United States, and now residing in Cecil street, Strand, in the city of Westminster, England, have invented or discovered new and useful Improvements in Forging Bolts, Spikes, and Nails; and I, the said SAMUEL GODFREY REYNOLDS, do hereby declare that the nature of my invention and the manner in which the same is to be performed are fully described and ascertained in and by the following statement thereof, reference being had to the drawings hereunto annexed and to the figures and letters marked thereon—that is to say:

The nature of each of the figures of the drawings being written thereon it will not be necessary to repeat them here and it will be found that in all the figures where the same letters or figures of reference are employed they refer to similar parts in the machinery.

*a, a*, are the two side framings of the machine the nature of which is clearly shown in the drawing and these frames are combined together by means of the bolts *b, b*, with suitable screws and nuts.

*c*, is the main or driving axle which turns in suitable bearings *d, d*, affixed to the front ends of the side framing *a, a*. Motion is communicated to the main or driving axle from a steam engine or other power by means of a strap acting on a fixed drum or pulley *e*, affixed on the axle *c*, and on the axle *c*, is formed the crank *f*, the object of which will be hereafter described. *g*, is a fly wheel affixed on the axle *c*. On the axle *c*, are formed or affixed eccentrics *h*, and *i*, by which proper motions will be communicated to parts of the machinery as hereafter explained.

This machine is so arranged that portions of a plate of iron are successively cut off and held between two side surfaces or dies there being a third surface or plate at the back of such two side plates or dies and the portion of heated iron being held between such three surfaces pressure is applied to the fourth surface of the piece of heated metal in order to forge the point and while the spike bolt or nail is still held in the surfaces before mentioned the head is formed at one end of the piece of metal and thus is the nail spike or bolt forged with a head without being

moved out of the three holding surfaces between which the point has been made or formed. The two side dies *j*, and *k*, hold the pieces of metal at two sides thereof as they are successively cut off and during the time that a point is being formed thereon and a head formed thereon, *l*, being the back surface or die which acts with the two surfaces or dies *j*, and *k*, in holding a piece of metal when having a point formed thereon and a head formed thereon the surface *l*, being so formed that when the piece of metal is being pressed on the opposite surface it will aid in producing the point to the nail spike or bolt according to which article the machinery is constructed to make such articles differing in name consequent on size and therefore require machinery of power and size suitable for the particular article in other respects the machine will be the same whether for making nails spikes or bolts. In the front of the machine is fixed a cross framing *m* affixed at the ends of the two side framings *a*. In this front framing *m*, are formed suitable recesses for receiving the side dies *j* and *k*; the side die *j*, is a fixed die yet capable of adjustment by set screws; the die *k*, is movable to such an extent as to allow of pieces of metal being fed between it and the die *j*, and to admit of the nails spikes or bolts being removed as they are finished such die *k*, being supported in its place in the frame *m*, by means of a recess cut in the front thereof into which the turned end of a small bar *n*, enters and this bar passes through a socket *o* fixed to the front framing by means of the screw *p*, and the lower end of the bar *n*, can be caused to press more strongly against the die *k*, by the screw *q*, (which passes through the socket *o*,) more or less as will readily be understood on examining the drawings. The back surface *l*, forming the third surface between which each piece of metal is held when being forged also acts as a cutter so that the pieces of metal are cut off a plate by the sliding of such back surface *l*, against the back edge of the surface or die *j*. It will therefore be seen that the piece of metal on being fed in between the dies *j*, and *k*, will by the movement of the plate or die *l*, be cut off and remain held between the three surfaces *j*, *k*, and *l*, when the point and head will be formed. The die or surface *l*, is supported in its place at the back of the die plate or surface *k*, and in contact therewith



by which means when the surface or die *l*, is moved back it will by its friction carry back the die *k*, and thus open it away from the die *j*, and allow of the finished nail spike or bolt being removed and a fresh piece of metal fed in. The die or surface *l*, is affixed to the bar *r*, in such manner as to be adjusted by means of screws as is shown in the drawing, the bar *r*, being carried at its back end by being affixed to a plate of steel *s*, affixed to the back cross framing *t*, affixed to the side framings or near the back ends thereof or is shown in the drawings, the steel plate holding the bar *r*, in its place so that when not acted on the die *l*, will be open the steel plate allowing the bar *r*, to be moved so as to close the die or plate *l*, over the opening between the dies or surfaces *j*, *k*, and in so doing the piece of metal between the dies *j*, and *k*, will be cut off by the edge of the plate *l*, which is slightly inclined together with the back edge of the die *j*, acting as a pair of shears.

It will therefore be seen that in the arrangement shown the die or plate *l*, in addition to forming one of the surfaces between which each nail bolt or spike is held when having a point formed thereon and a head formed thereto constitutes the moving cutting edge and the die *j*, in addition to being one of the holding dies forms the fixed cutting edge by which arrangement the pieces of metal so cut are at once held and retained during the further process of pointing and heading; at the same time I would remark that although I prefer that the arrangement of cutting and holding of the piece of metal should take place in nearly the same part of the dies *j*, *k*, *l*, so that the piece of metal shall not require to be moved after it is cut more than the length of the metal which is necessary to form the head yet it will be evident that the dies *j*, and *l*, may be of such length as to cut off a piece of metal when they are closed together, the piece of metal being moved from that part of the dies where it was cut off to the lower part of the dies where it would have the point formed thereto and head formed thereon in which latter arrangement I should prefer that the cutting edges of the dies *l*, and *j*, should be capable of being changed without changing the parts of the dies *l*, and *j*, which form the points of the nail spike or bolt by making each of these dies in two parts connected together in such manner as to enable the operative to remove the cutting parts without changing the other parts, the manner of doing this being very well known to every mechanist. The dies *k*, and *l*, are caused to close in the following manner. In addition to the spring or plate of steel to which the bar *r*, is affixed there is a spring *v*, which is connected to the bar *r*, and affixed to the right hand frame *a*, by

which the bar *r*, will be brought back when permitted so to move back by the wedge *u*, which slides up and down between the end of the bar, and adjusting surface *w*, affixed to the side framing *a*, and the lower end of the stem of the wedge *u*, is borne down by the spring *x*, which has a forked end which embraces the upper part of the projection of the stem of the wedge *u*, the other end of the spring *x*, being affixed to the side framing *a*, as is shown. The lower end of the stems of the wedge *u*, curve so as to enter the hollow of the sliding piece *y* which at all times rests on the eccentric *h*, by which means as the wedge *u*, is caused to rise it will move the bar *r*, and with it the dies *l*, and *k*, the die *k*, being pressed forward by the projecting end of the bar *r*, coming behind it having adjusting screws which press against the die *k*, the die *k*, being as before stated carried back by its pressing against the surface of the die *l*. The crank on the main axle gives motion to the connecting rod or link *z*, the nature of which is clearly shown in the drawing and the connecting rod is attached at its upper end by means of a pin joint to the lever *A*. This lever at its front end receives an up and down motion by revolution of the crank on the main axis. The lever *A* which consists of two parts *A*, *A*, is carried by the axes *B B* which move in the arms cast or formed on the axis *C* which turns on suitable axes at the back ends of the framings *a*, *a*, as will be readily understood on examining the drawings; by this arrangement the lever *A* in order to its being moved up and down at its front end by the crank on the main axle is capable of movement back and forth by the axles *B B* which have a movement by means of their being affixed to arms on the axis *C* which are caused to vibrate by the eccentric *i*, on the main axle acting on a trussed arm *D* affixed on the axis *C*, the extent of this vibration being governed by bringing the arm *D* earlier or later into action with its eccentric according as it is more or less by the rod *E* suspended from the front cross framing and capable of adjustment, this rod having a link formed at its lower end which embraces a pin which passes through the arm *D* as is shown.

*F* is what I call the header or heading punch; it is affixed on the upper surface of the lever *A* and adjusted correctly by set screws and this heading die will be formed according to the figure it is desired to give the heads of the nails spikes or bolts.

*G* is a rod affixed to the lever *A*. It passes through a guide *H* affixed to the upper part of the front cross framing; to this rod is attached a crank pin *I* from which is suspended the thin bar *J* which coming between the dies *j*, and *k*, forces the piece of metal to form a nail spike or bolt between



them down low enough to protrude below the dies to an extent to offer sufficient metal to form a head.

The nature of the front parts of the lever A will readily be traced by examining the drawing, and it will be seen that the lever A carries the roller K the axis of which turns in bearings carried by the plate L affixed on the lever A by the cramping fork M each prong of which has a hook formed at its end which enter into recesses formed in the upper surface of the plate L, and by means of the screw M<sup>x</sup> the plate L is securely held in its proper position on the lever, there being recesses N, N, formed in the upper surfaces of the lever A into which the projections on either side of the plate L enter. The roller is of such a thickness as to enter between the dies j, and k, and by rolling between them and pressing the hot metal between its periphery and the back die or surface l, the point will be formed. As the lever A rises and the roller K begins to form the point of the nail spike, &c., the eccentric i, acts on the trussed lever D which causes the axle C to which it is attached to vibrate, and as the lever A is connected with the axis C by the axles B B on arms projecting from the axle C the roller K is thus made to approach the die L to form the point of the nail spike or bolt. And in order that all the sides of the piece of metal may be supported when forming a head thereto there is a short filling piece or die O carried by a spring P which has at all times a tendency to keep the die or filling piece O from between the dies j, and k, but just before the heading die is raised a plate P<sup>x</sup> attached to the lever A is so formed as to press the filling piece or die O between the dies j, and k, and thus support the heated metal on the front surface thereof; while the head is being formed the filling piece or die being short only supports the metal for a short part of its length, that being sufficient. The metal to be cut up is first formed into plates of a width equal to the length of the piece which will be suitable for forming the acquired length of nail spike or bolt; these plates are to be heated to render the pieces cut off of a proper heat to be forged; such plates of metal are to be successively put into the trough Q formed on the surface of the bar r, as is shown. R is a sliding bar which moves within the trough Q and progressively forced up the plate of metal therein so as to cause the plate to enter in between the dies j, and l, to a sufficient extent to have the required piece cut off by the die l. The plate of metal is forced up toward the dies by means of the sliding bar R such bar being connected by a pin joint to the arm S affixed to the axis T the sliding bar being moved forward when permitted by means of a weight attached to the

arm V affixed to the axis T and to this arm is attached the rod U by a pin joint, such rod passing through the staple W affixed to the fixed bar X, and there is a notch formed in the rod U which when resting on the top of the staple prevents the weight moving the sliding bar and the workman when he has supplied a plate of metal into the trough moves the notch of the bar U off the staple which liberates the arm V so that the axle T with the arm S can actuate the sliding bar, moving the plate of metal up toward the dies, and when the sliding bar has forced up the plate so that the same has been used up the curved snail inclined plane Y affixed to the fly wheel causes the axis T to be reversed in its action or moved around to such an extent that the bar U will have its notch raised above the staple and thus cause it to be supported till a fresh plate of metal has been put into the trough, the connection between the snail inclined plane Y and the axis T being by an arm Z so notched on the under side as to embrace the snail by which it is elevated and the axis T, caused to vibrate. When the arm has reached the highest point of the snail it is necessary that it should be free to descend to assume a position to receive the lowest part of the snail to recommence the ascent which is effected by giving it a spring in the direction of the arrow so that when brought down by the action of the weight on the arm Y of the axle T it will be in the required position. In order to insure the nail spike or bolt being removed from the dies after it is made there are two levers (1) (2) which are toothed together so as to move (in respect to opening and shutting) together; these levers (1) and (2) each moves on its axis (3) which axis (3) (3) are affixed to the plate (4) which is carried by the lever A by means of the points (5) (5); hence the plate (4) is capable of movement on these points (5), (5). The levers (1) and (2) are constantly pressed toward each other by the bent spring (6). The levers (1) and (2) are cranked as is shown so as to come in a position to take hold of the nail above the header and below the dies j, k, and the edges of the levers (1) and (2) where they take hold of the nail spike or bolt are sharpened or wedge formed so as in closing against the nail spike or bolt the sharp or wedge formed parts of the levers press between the undersides of the dies j, and k, and the head which they are enabled to do owing to the nail spike or bolt being released by the dies at the time the levers come into action.

(7) and (8) are two springs affixed at the back of the machine one coming under and the other coming over and have between them the shed (9) which is affixed on the arm formed or affixed on the plate (4); hence as the levers (1) and (2) are



raised up and down by the rising and fall-  
 ing of the lever A the springs will come  
 into action and in such manner as to draw  
 down the levers suddenly when permitted  
 5 and thus draw the finished nail spike or  
 bolt from the dies and also in order that  
 the levers (1) and (2) may open when  
 they have descended; the tails of the levers  
 by the action of the springs are caused to  
 10 move against the inclined ends of the screws  
 (10) (10) which causes those tail ends of  
 the levers (1) and (2) to move toward each  
 other and thus open the holding ends of  
 those levers from each other and thus release  
 15 the nail should it have been retained, and  
 in order to open the holding ends of the  
 levers (1) and (2) as they go up to take  
 hold there is applied a wedge formed piece  
 (11) affixed on the fixed standard (12);  
 20 this wedge formed piece comes between  
 the levers (1) and (2) as they rise up  
 against the sides thereof and thus will the  
 holding ends of those levers be separated till  
 they come against the head of the nail spike  
 25 or bolt and as their axis descend with the  
 lever A owing to one of the two springs  
 the holding ends of the levers (1) and (2)  
 will not descend but will remain under the  
 dies *j*, and *k*, and will close on the nail spike  
 30 or bolt as the parts of the levers (1) and (2)  
 which are against the wedge formed piece  
 descend and the stud (9) then coming  
 against the lower spring (8) will cause the  
 levers (1) and (2) to move quickly and  
 35 thus release the nail spike or bolt from the  
 dies *j*, and *k*.

I am aware that in machines for making  
 nails spikes or bolts, &c., the piece of metal  
 has been cut off and gripped for the forma-  
 40 tion of the point and head by means of

three dies, and therefore I wish it to be  
 distinctly understood that I do not claim  
 simply the employment of three dies for  
 cutting off and gripping the piece. The dies  
 in the machines heretofore known were for 45  
 making nails spikes, &c., from a rod instead  
 of a flat bar and hence the arrangement of  
 the dies and some of the functions per-  
 formed by them differ in the above de-  
 scribed machine from those heretofore 50  
 known and therefore

What I claim as my invention is—

1. The employment in combination with  
 the gripping dies *j*, and *k*, of the die *l*,  
 which performs the operation of cutting off 55  
 the piece from the flat plate or bar and  
 constitutes the bed against which the roller  
 K acts to reduce the nail, &c., to the re-  
 quired form in manner substantially as here-  
 inbefore described. 60

2. I also claim in combination with the  
 dies *j*, *k*, and *l*, (possessing the character-  
 istics above given) the die for forming the  
 head of the nail, spike, &c., as described.

3. I also claim in combination with the 65  
 dies *j*, *k*, and *l*, (possessing the character-  
 istics above indicated) the method of point-  
 ing the nail spike, &c., in manner substan-  
 tially as described.

4. And finally I claim in combination 70  
 with the dies *j*, *k*, and *l*, the piece or die O  
 which holds the piece of metal to be acted  
 on against the die *l*, while it receives the  
 action of the heading dies as herein de-  
 scribed.

S. G. REYNOLDS.

Witnesses:

HARRY MAIL,  
 W. H. RITCHIE.