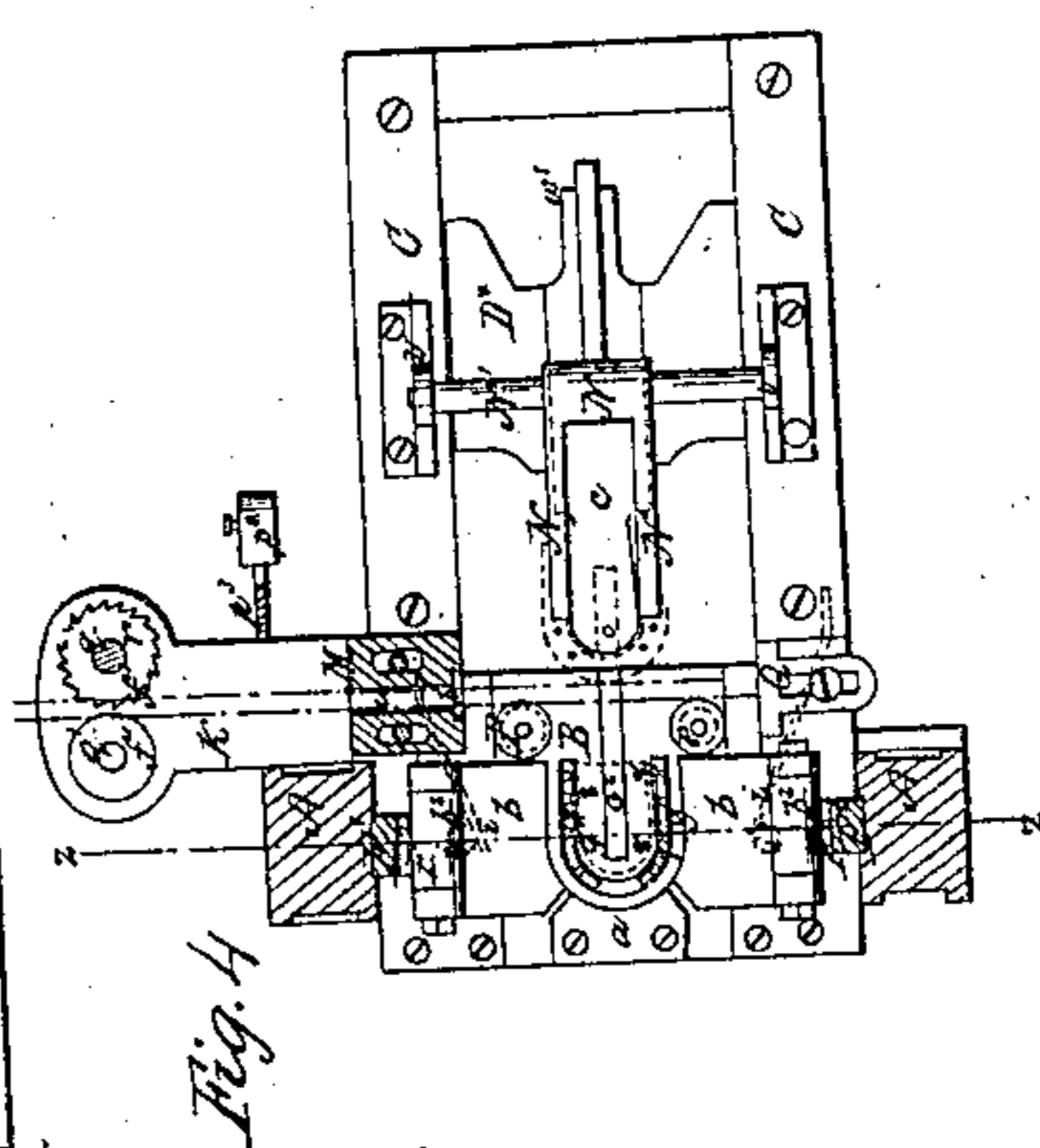
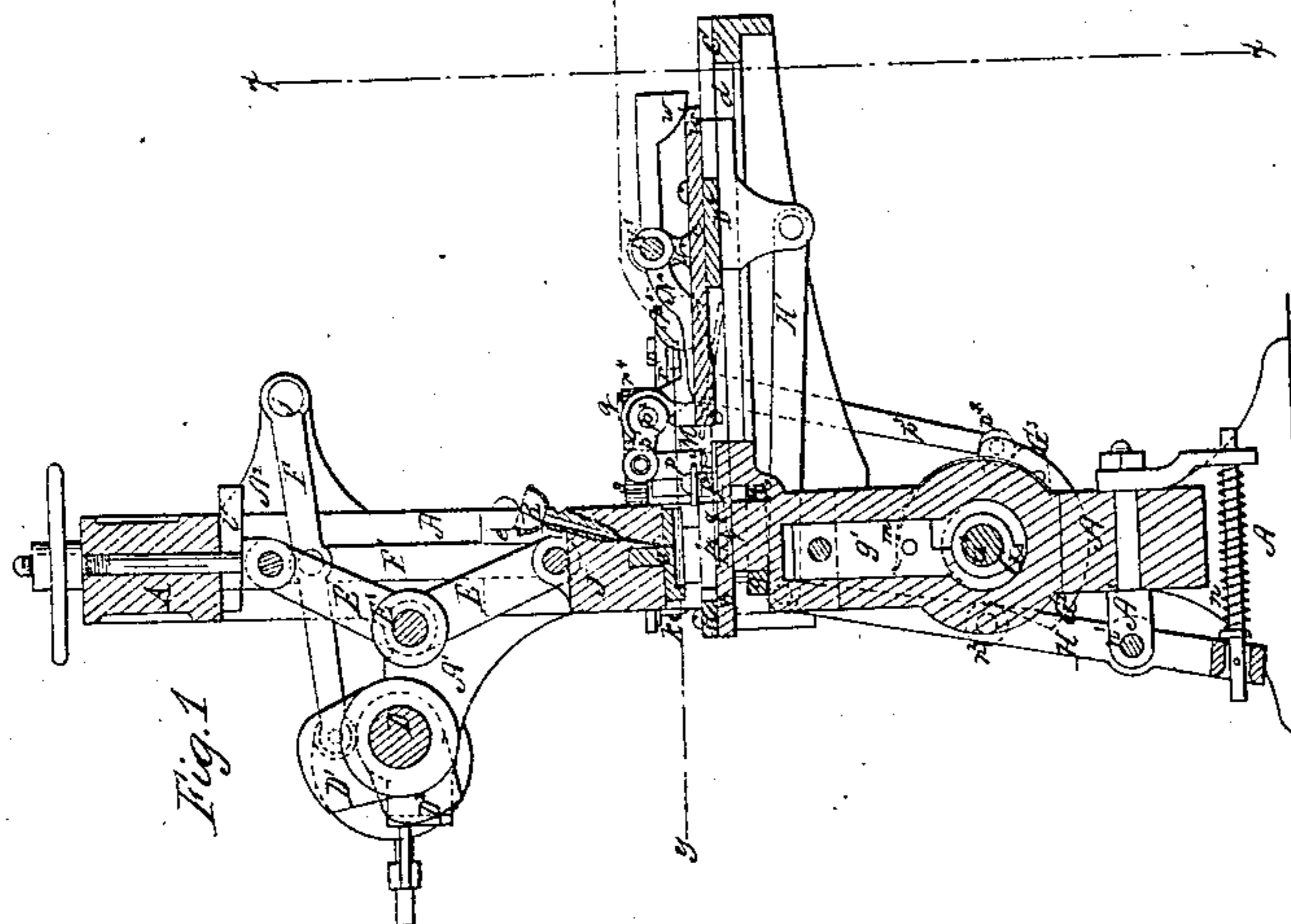
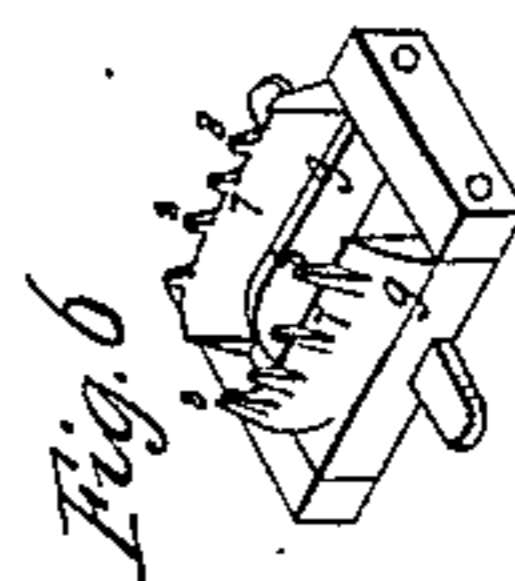
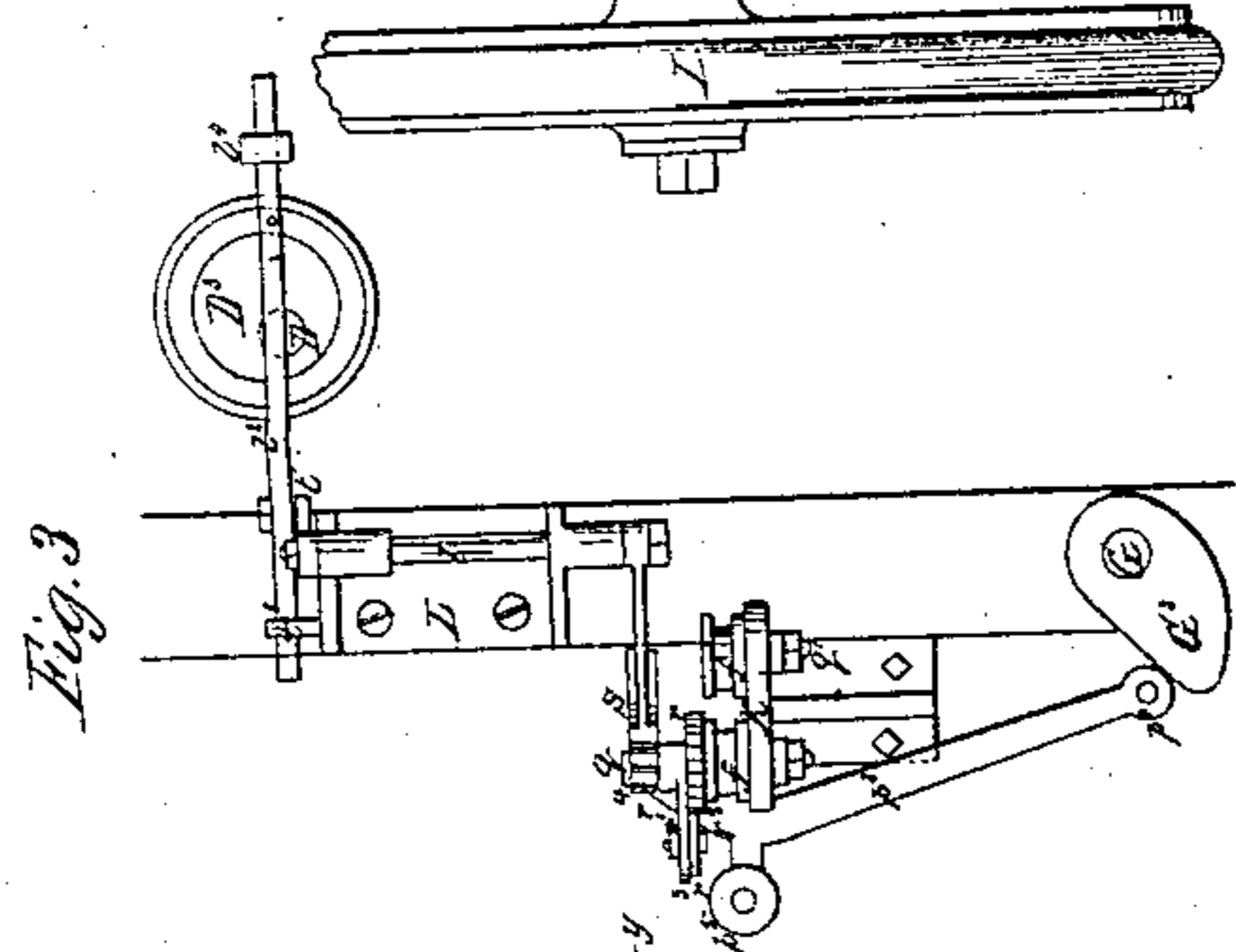
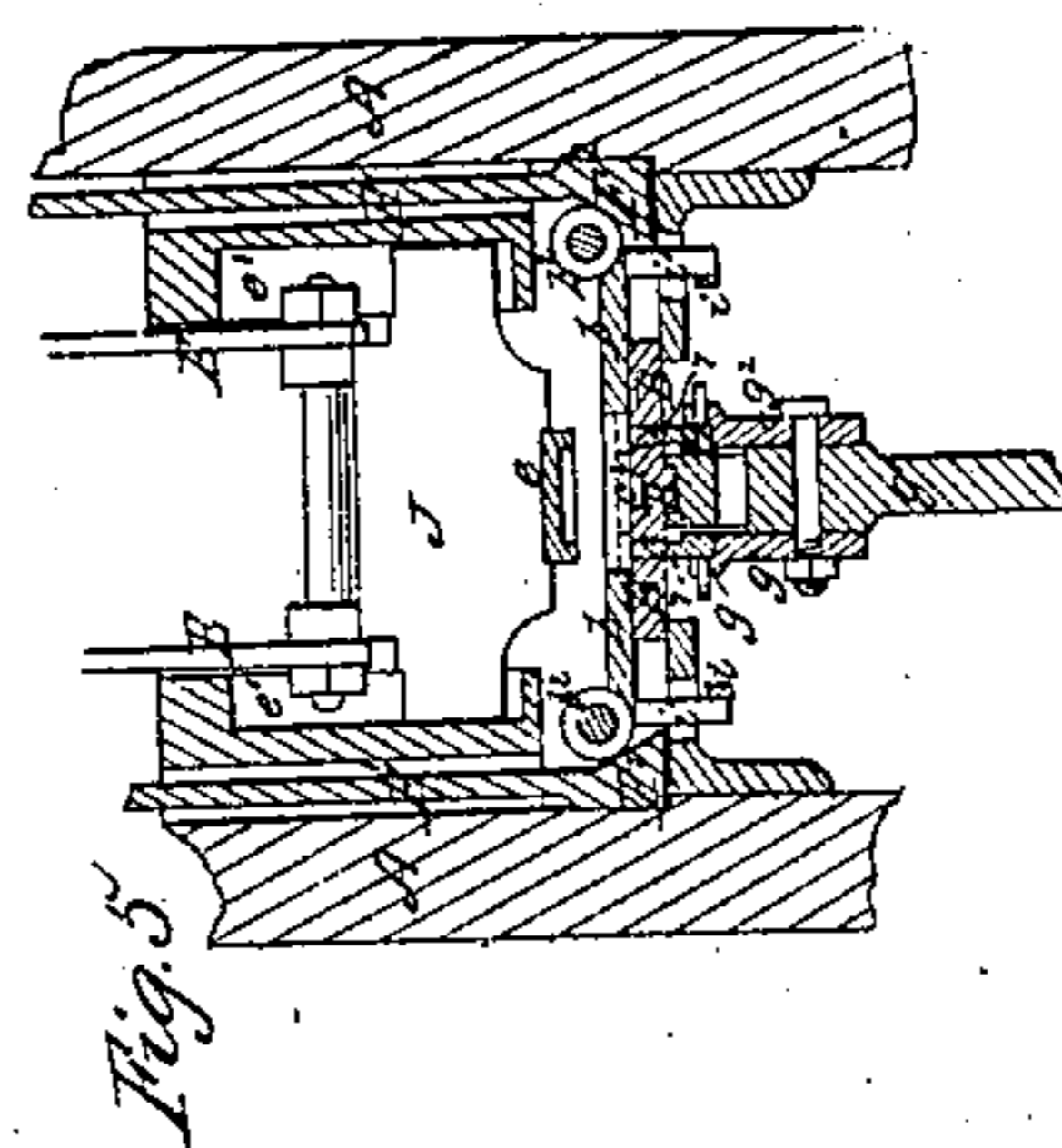
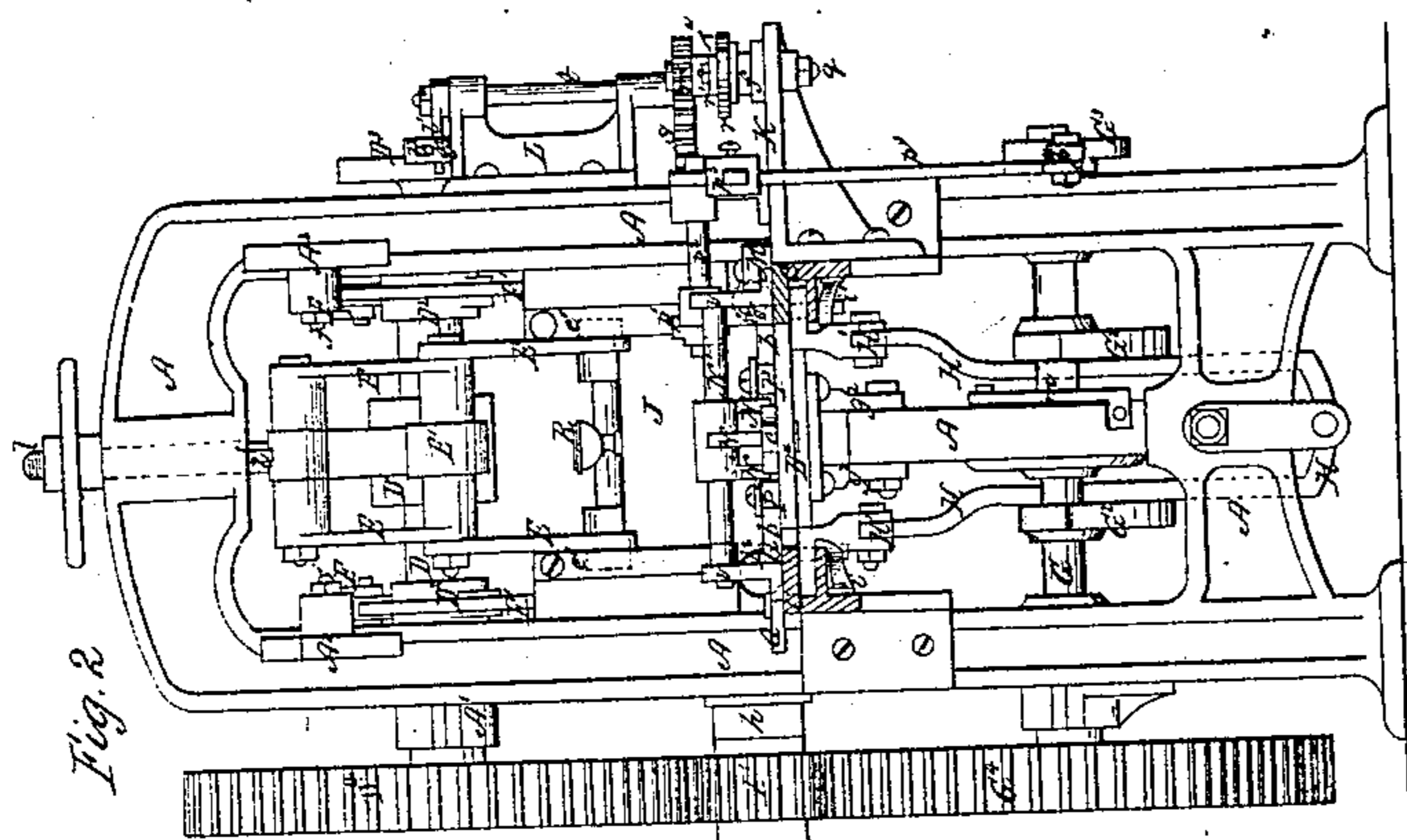


*W. W. Lewis,*  
*Horseshoe Machine,*  
*No. 20,646.*      *Patented June 22, 1858.*



# UNITED STATES PATENT OFFICE

W. W. LEWIS, OF CINCINNATI, OHIO.

## HORSESHOE-MACHINE.

Specification of Letters Patent No. 20,646, dated June 22, 1858.

*To all whom it may concern:*

Be it known that I, WILLIAM W. LEWIS, of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Machine for Forging Horseshoes; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a vertical central section of the machine in a plane at right angles to Fig. 2. Fig. 2 is a front elevation of the machine, with a portion of the framing cut away, in the line  $x, x$ , of Fig. 1. Fig. 3 is a side view of a portion of the machine seen at the right hand of Fig. 2. Fig. 4 is a horizontal section in the line  $y, y$ , of Fig. 3. Fig. 5 is a vertical section of a portion of the machine in a plane parallel with Fig. 2, indicated by the line  $z, z$ , of Fig. 4. Fig. 6 is a perspective view of the die which forms the crease in the shoes.

Similar letters of reference indicate corresponding parts in the several figures.

A, is the main framing of the machine, between the upright portions of which is secured a stationary horizontal table B, upon which are arranged the dies  $a, b, b, c$ , by which the curved form is given to the shoes. In front of this table there is secured to the framing A, a horizontal frame C, containing parallel horizontal ways  $d, d$ , in which slides a carriage  $D^*$ , to which is attached a flat mandrel  $e$ , which forms the interior of the shoe; said mandrel sliding on the table B.

At the upper part of the back of the main framing A, there are cast or secured by bolts, two brackets  $A', A'$ , which contain the bearings for a horizontal shaft D, which carries a cam  $D'$ , for operating through a toggle E, E, on the die  $e$ , which forms the top of the shoe; also two cams  $D^2, D^2$ , operating through levers F, F, rods  $F', F'$ , and wedges  $F^2, F^2$ , on the two dies  $b, b$ , which form the sides of the shoe; and a cam  $D^3$ , which operates through mechanism that will be presently described on the feed rolls  $f, f$ , which feed the bars of iron from which the shoes are made into the machine.

In the lower parts of the upright sides of the main framing A, there are bearings for a horizontal shaft G, which carries a cam  $G'$ , for operating through an upright slide  $g'$  on the die  $g$ , by which the crease is

formed in the face of the shoe and the punching of the holes is effected; also two cams  $G^2, G^2$ , for operating through a double or forked lever H, and two rods  $H', H'$ , on the horizontal sliding carriage  $D^*$ , which carries the mandrel  $e$ , before-mentioned; and a cam  $G^3$ , which operates through mechanism hereinafter described on the cutter  $p$ , by which the bars of iron are cut into pieces of proper length to make the shoes.

I, is the driving wheel of the machine fitted to turn on a fixed stud  $h$ , secured to one side of the framing A, or applied in any other suitable manner and carrying a pinion  $I'$ , which gears with two gears  $D^4$  and  $G^4$ , of equal size, on the two shafts D and G, and drives the said shafts at a uniform velocity.

The dies  $a, b, b$ , already mentioned as being arranged upon the table B, combine to give the form to the exterior of the front and sides of the shoes. The die  $a$ , which gives form to the front of the shoe is secured firmly to the table; but the dies  $b, b$ , which give the form to the sides of the shoe are fitted to slide toward and from each other on the table B, being held in contact with the wedges  $F^2, F^2$ , on the rods  $F', F'$ , which work in vertical guides in the framing A, A, by springs  $i, i$ , secured to the horizontal frame C, and being forced toward each other by the upward movement of the said wedges produced by the action of the cams  $D^2, D^2$ , on the levers F, F, and forced apart again by the springs  $i, i$ , when the cams permit said levers and rods  $F', F'$  to descend. The springs  $i, i$ , bear upon studs  $i', i'$ , which are secured to the bottoms of the dies and which pass through slots in the table B. The said dies  $b, b$ , are fitted with antifriction rollers  $b^2, b^2$ , at the parts where the wedges  $F^2, F^2$  act upon them. The levers F, F, work upon fulcrum  $j, j$ , in brackets  $A^2, A^2$ , cast on front of the framing A, and they are furnished with antifriction rollers to bear upon the cams  $j', j'$ . The top die  $e$ , is attached to a block J, of cast iron, that is fitted to slide in guides  $e', e'$ , in the sides of the framing A, the said block being connected by the toggle E, E, with the top of the framing, and being depressed by the action of the cam  $D'$ , on the roller  $E'$ , which is applied at the joint of the toggle, and raised again by a spring  $k$ , applied at its back. The connection of the toggle E, E,

with the head of the frame A, is made by a screw  $l$ , and wedge  $l'$ , which permits of its adjustment to regulate the descent of the die  $e$ , and thereby regulate the thickness  
5 of the shoes.

The die  $g$ , by which the crease is formed in the shoe, of which a perspective view is given in Fig. 6, is formed with a number of punches 8, 8, to punch the holes in the shoe to receive the nails. The table B has  
10 suitable openings for the projecting portions 7, 7, of the said die  $g$ , which form the creases in the shoes, and to which the punches 8, 8, are attached, to work through.  
15 The said die  $g$ , is supported in two cheek plates  $g^2$ ,  $g^2$ , secured to the vertical slide  $g'$ , which is fitted to a suitable guide or guides in the framing A, and is forced upward by the action of the cam  $G'$ , upon its  
20 lower end, and caused to descend as the offset of the said cam retires from it, by means of a spring  $m$ , which is attached to the stand A, and arranged to press downward on a pin projecting from one side of  
25 the said slide.

The mandrel  $c$ , which forms the interior of the shoe consists of a plate of steel or iron of a thickness equal to that of the shoes to be formed having its rear end of the desired shape of the interior of the shoe. It is made with a tongue  $c'$ , on its under side to fit a groove  $c^2$ , in the table B, which guides it steadily in its operation. The carriage D, to which the die is attached, is  
30 driven forward between the dies  $b$ ,  $b$ , by the action of the cams  $G^2$ ,  $G^2$ , before described on the forked lever H, which is operated to draw back said carriage by means of a spiral spring  $n$ , applied to the bottom of the said lever. The fulcrum  $n'$ , of the  
35 said lever is secured in a bracket  $A^3$ , bolted to the front of the framing A. The said lever is furnished with anti-friction rollers  $n^2$ ,  $n^2$ , for the cams  $G^2$ ,  $G^2$ , to work against.

The feed rollers  $f$ ,  $f'$ , are fitted to rotate on two vertical studs  $q$ ,  $q'$ , secured in a bracket K, secured to one side of a frame C, a short distance in front of the dies  $b$ ,  $b$ . The roller  
40  $f$ , which is the driver, has attached to it a ratchet wheel  $r$ , and above this wheel there is fitted to its stud  $q$ , a lever  $r'$ , which carries a pawl  $r^2$ , which is kept in gear with the ratchet wheel  $r$ , by a spring  $r^3$ . To the  
45 hub of the lever  $r'$ , there is attached a pinion  $r^4$ , which gears with a toothed sector  $s$ , on the lower end of an upright rockshaft  $t$ , which works in bearings in a two-armed bracket L, that is bolted to one side of the  
50 frame A. At the upper end of the rockshaft  $t$ , there is an arm  $t'$ , which connects with a rod  $t^2$ , which is fitted to slide through a fixed guide  $t^3$ , on the bracket L, and another  $t^4$ , on one of the brackets  $A'$ ,  $A'$ , and  
55 which derives motion from the cam  $D^3$ .

The said rod  $t^2$ , gives motion to the rockshaft  $t$ , and its toothed sector  $s$ , and the latter operating on the pinion  $r^4$ , gives the pawl  $r^2$ , once during every revolution of the shaft D, a movement back and forth over  
60 the ratchet wheel, and thus gives a movement to the roller  $f$ , to feed the bar.

Between the feed rollers and the die-table B, there is situated upon the frame C, a block of cast iron M, having an opening  $u$ ,  
65 (Fig. 4) made horizontally through it, of such size and form as just to allow the bar of iron from which the shoes are to be made to pass freely through. The cutter  $p$ , is fitted to work vertically in a guide in  
70 this block so that its edge passes the mouth of the opening  $u$ . The said cutter is attached to an arm  $p'$ , of a rockshaft  $p^2$ , which works in a bearing on the top of the cutter-block M, and another on the bracket L, and  
75 the said rockshaft carries a longer arm  $p^3$ , at the extremity of which is a roller  $p^4$ , upon which the cam  $G^3$  acts. The said arm  $p^3$ , has a weight  $p^5$ , attached to raise the cutter after its operation.  
80

P, P, are two rollers arranged on vertical axles secured in the table B, one in front of each die  $b$ , to operate in combination with the mandrel  $c$ , to bend the bar to a condition for the dies  $b$ ,  $b$ , to operate upon it;  
85 the said rollers being caused to roll by the friction of the bar against them.

Q, is an adjustable stop attached to the frame C, C, opposite to the cutter block M, to stop the bar when it is fed to the machine. By adjusting this stop and by a  
90 corresponding adjustment of the cutter block M, the length of the pieces cut off to form the shoes may be varied to make shoes of different sizes.  
95

N, is a forked lever for the purpose of throwing the finished shoes out of the machine. Every shoe after it is formed is left on the mandrel  $c$ , and this lever N, is applied  
100 to the frame C, C, to knock off the shoes when the mandrel moves forward off the table B, after it has completed its operation. N', is a shaft forming the fulcrum of the said lever, working in bearings  $v$ ,  $v$ , on the frame C, C. The forked rear portion of said  
105 lever is made of such a width that one prong will pass on either side of the mandrel; the front portion is wedge-shaped on its under side, as shown at  $w$ , in Fig. 1, and by the action on this wedge shaped portion, of a  
110 projection  $w'$ , on the front of the mandrel  $c$ , the fork of the lever is thrown down to knock off the shoe from the die.

R, is a funnel attached to the block J, and communicating with an orifice made through the said block and through the die  $e$ , for the purpose of admitting water to cool the dies after each shoe is finished. The water may be supplied by a cock which is opened by  
115 the movements of the machine at the proper  
120  
125  
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time and closed again by the same means before a new piece of iron enters the dies.

Having now described the several parts of the machine and their individual operations, I will proceed to describe their operations relatively to or in combination with each other in forging a shoe. A bar from which shoes are to be made, having been heated, is introduced between the feed rollers  $f, f'$ , which, while the dies are all stationary in an open condition or at their greatest distance apart, receive their movement from the cam  $D^3$ , through the agency of the mechanism before described, and carry the bar through the cutter block  $M$ ; after which the cam  $G^3$  comes into operation on the arm  $p^3$ , of the cutter-rockshaft  $p^2$ , and brings down the cutter. The first operation of the cutter merely cuts off the fag end of the bar, but another revolution of the shafts  $D$  and  $G$ , causes another operation of the feed and of the cutter and causes the bar to be laid across the table  $B$ , in front of the rollers and cut to the proper length to make a shoe. As soon as the cutter has operated the mandrel  $c$ , advances against the bar, and bends it between the rollers  $P, P$ , and drives it back into contact with the die  $a$ , and holds it there while the dies  $b, b$ , move toward each other to form the sides of the shoe between them and the sides of the mandrel  $c$ , whose nose combines with the die  $a$ , to form the front of the shoe. After the dies  $b, b$ , have advanced toward each other the necessary distance, the top die  $e$ , descends and compresses the shoe and forms the top thereof, and confines it within the box formed by the table  $B$ , and dies  $a, b, b$ , while the punch

$g$ , comes into operation and forms the crease, and punches the holes. After the latter operation has been performed, the dies  $b, b, e$ , and  $g$ , all separate from each other, or open, and the mandrel  $c$ , retreats and the latter by reason of its shape retains the shoe upon it as is shown in Fig. 4, where the shoe is represented in red outline. The opening of the dies and retreat of the mandrel, owing to the shapes of their operating cams, is very sudden, and the front projection  $w'$ , of the mandrel, striking the wedge-like projection on the front end of lever  $N$ , causes the fork of said lever to descend and knock the shoe off the mandrel. As soon as the mandrel has completed its retreat, the feed rolls operate again to feed the bar, and their operation is followed in proper order of succession by the operation of the other parts of the machine in the manner above specified.

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

1. The combination with the stationary table  $B$ , of the mandrel  $c$ , the rollers  $P, P$ , the stationary front die  $a$ , sliding side dies  $b, b$ , and top die  $e$ , all applied to operate together substantially as described.

2. Operating the dies  $b, b$ , which form the sides of the shoe by means of the upright sliding rods  $F', F'$ , with their wedge-shaped ends, the levers  $F, F$ , and the cams  $D', D'$ , on the shaft  $D$ , the whole combined and applied as described.

W. W. LEWIS.

Witnesses:

J. H. GETZEENDANNEN,  
W. H. ADAMS.