

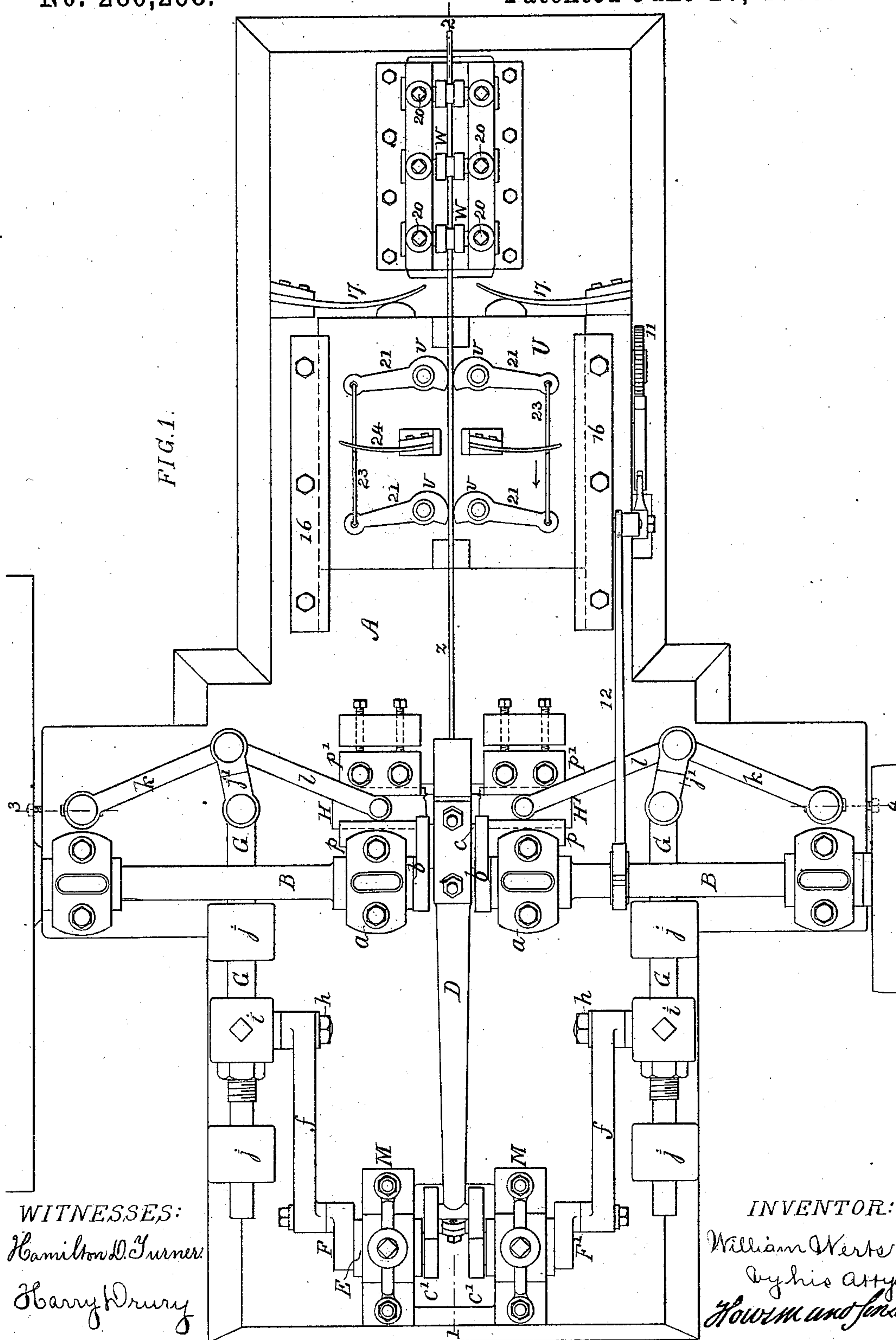
(No Model.)

5 Sheets—Sheet 1.

W. WERTS.
HORSESHOE NAIL MACHINE.

No. 280,268.

Patented June 26, 1883.



WITNESSES:
Hamilton D. Turner
Harry Drury

INVENTOR:
William Werts
By his atty
Howe and sons

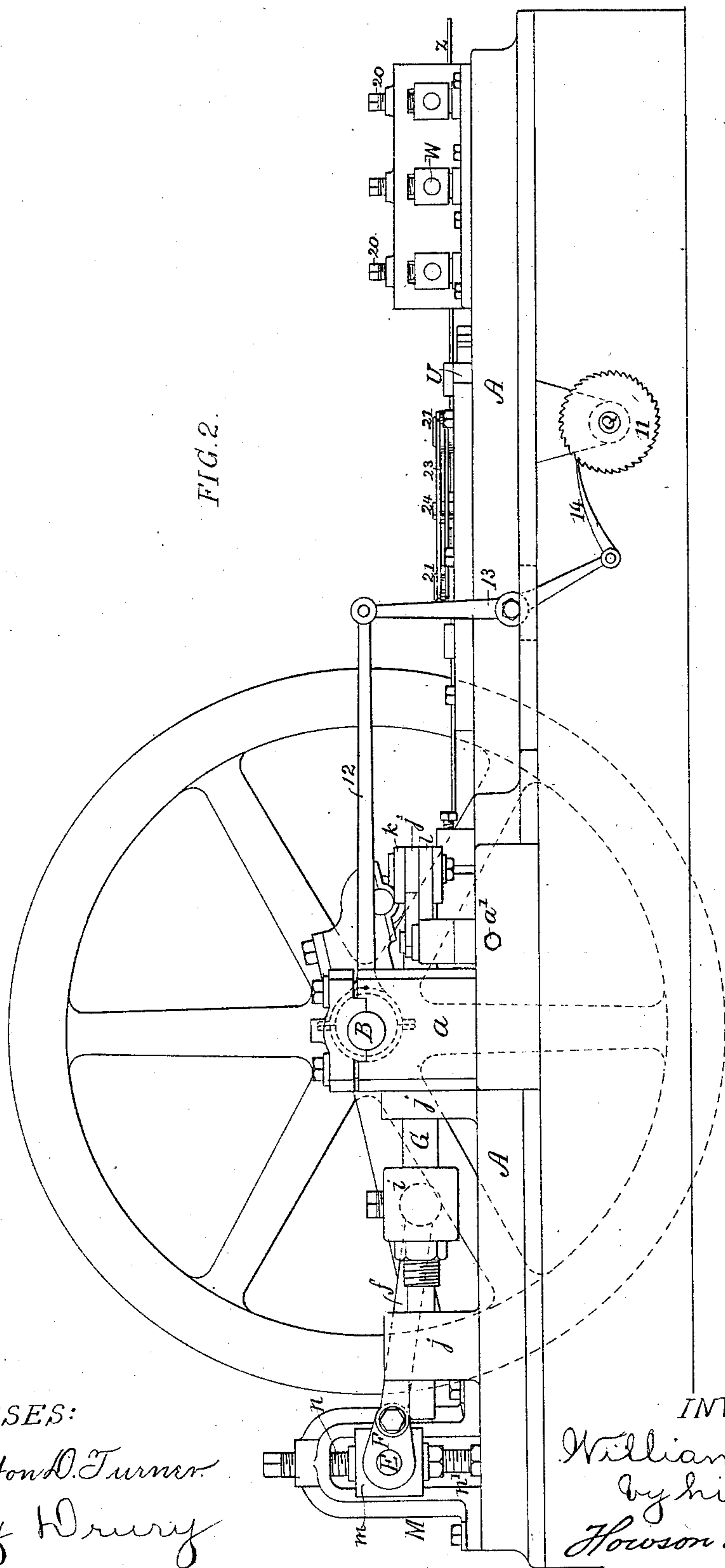
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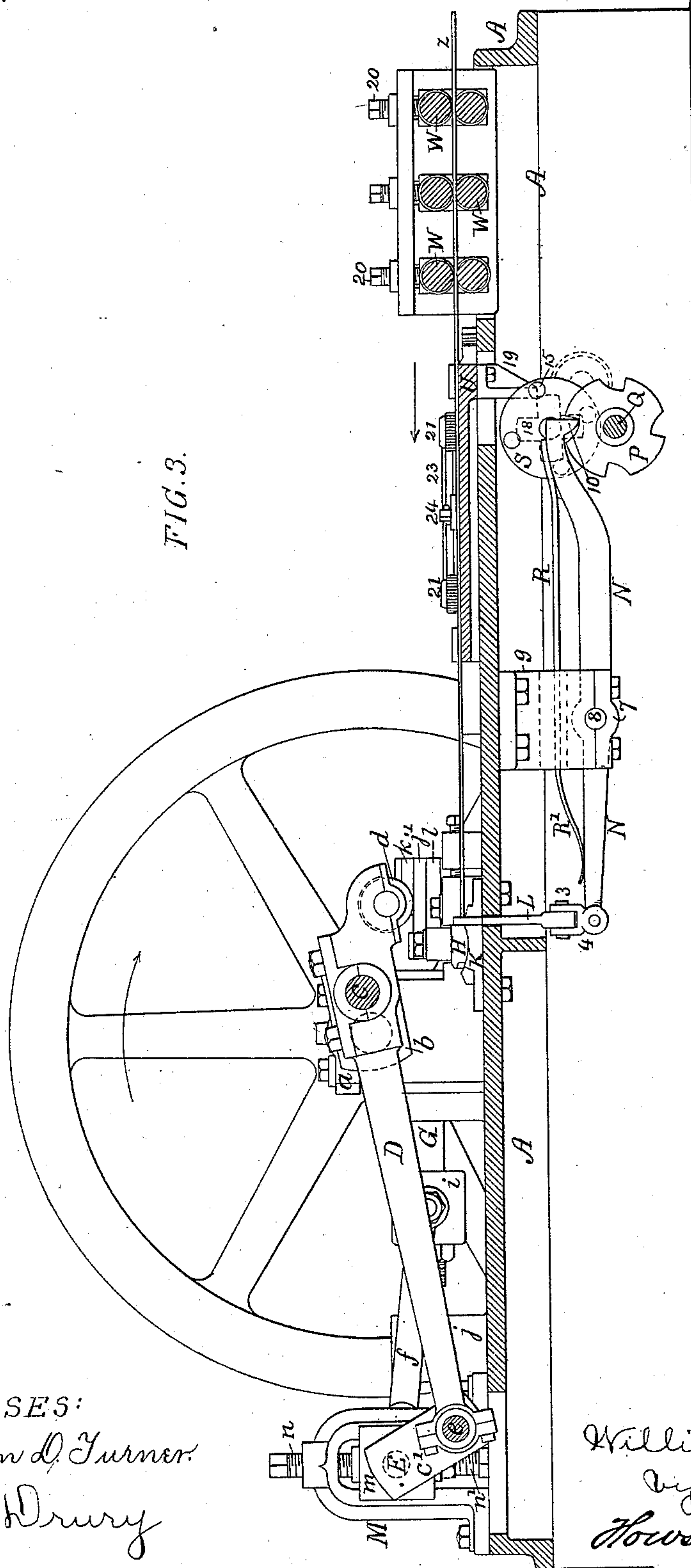
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FIG. 3.



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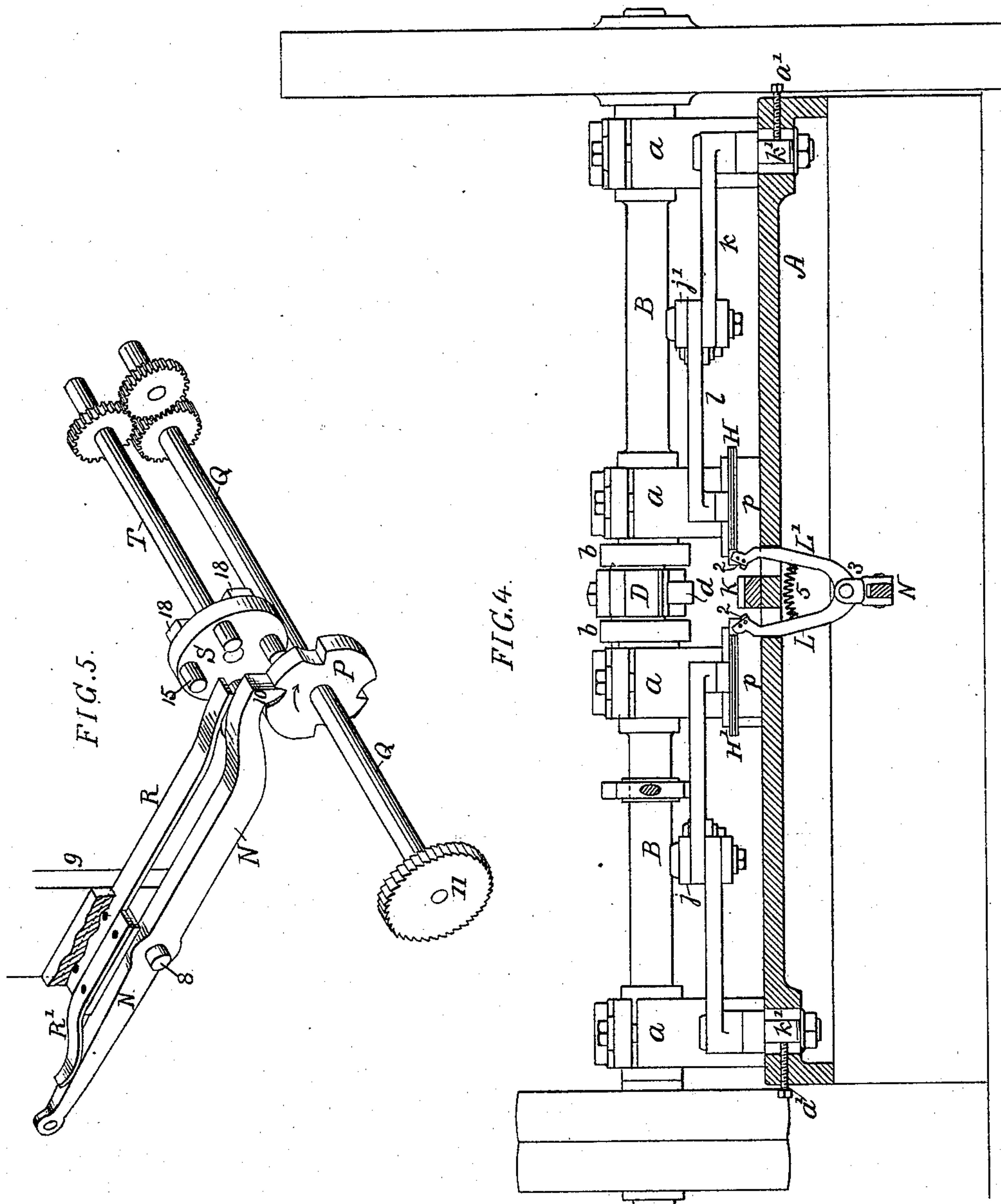
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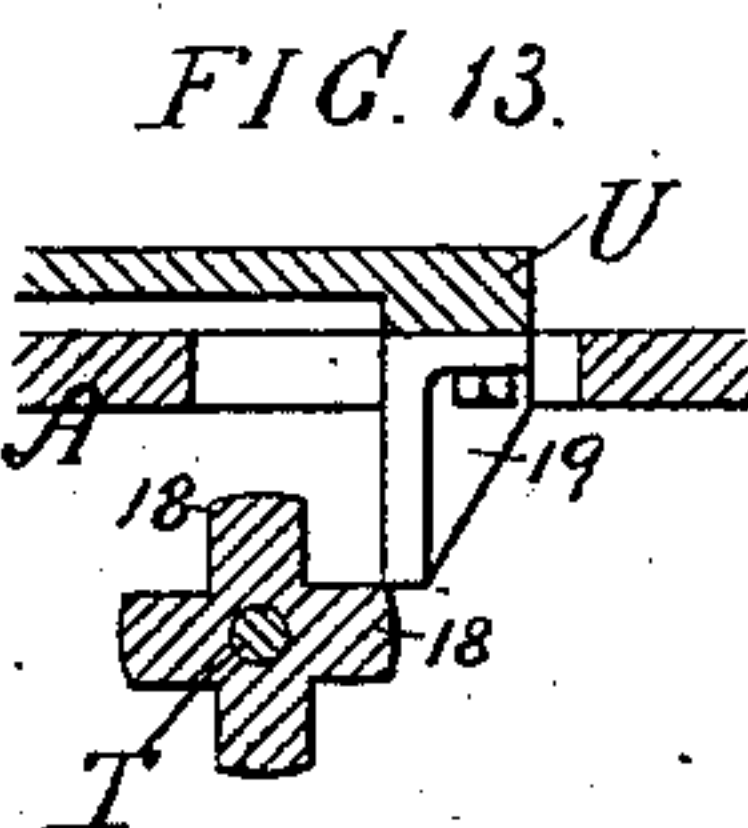
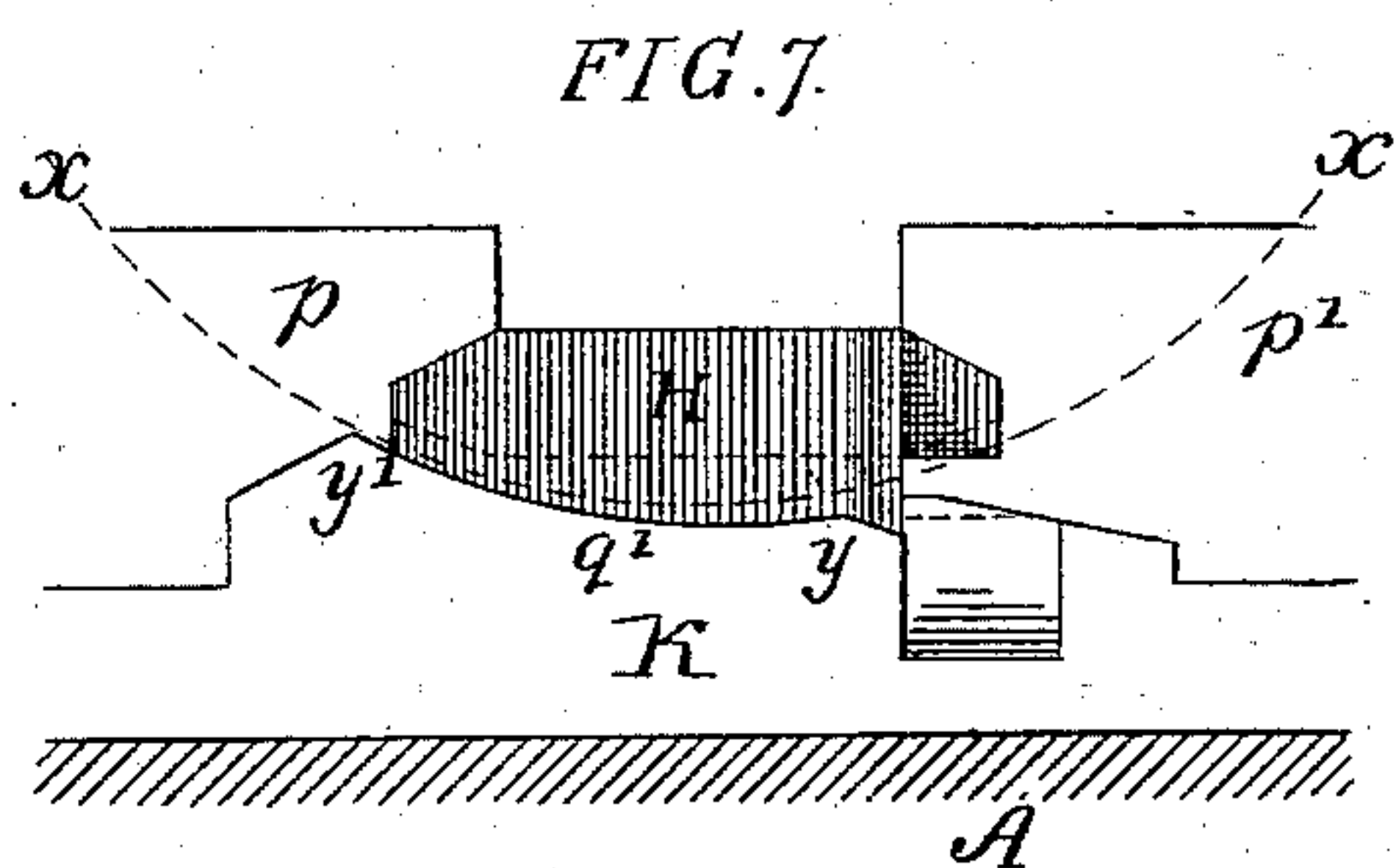
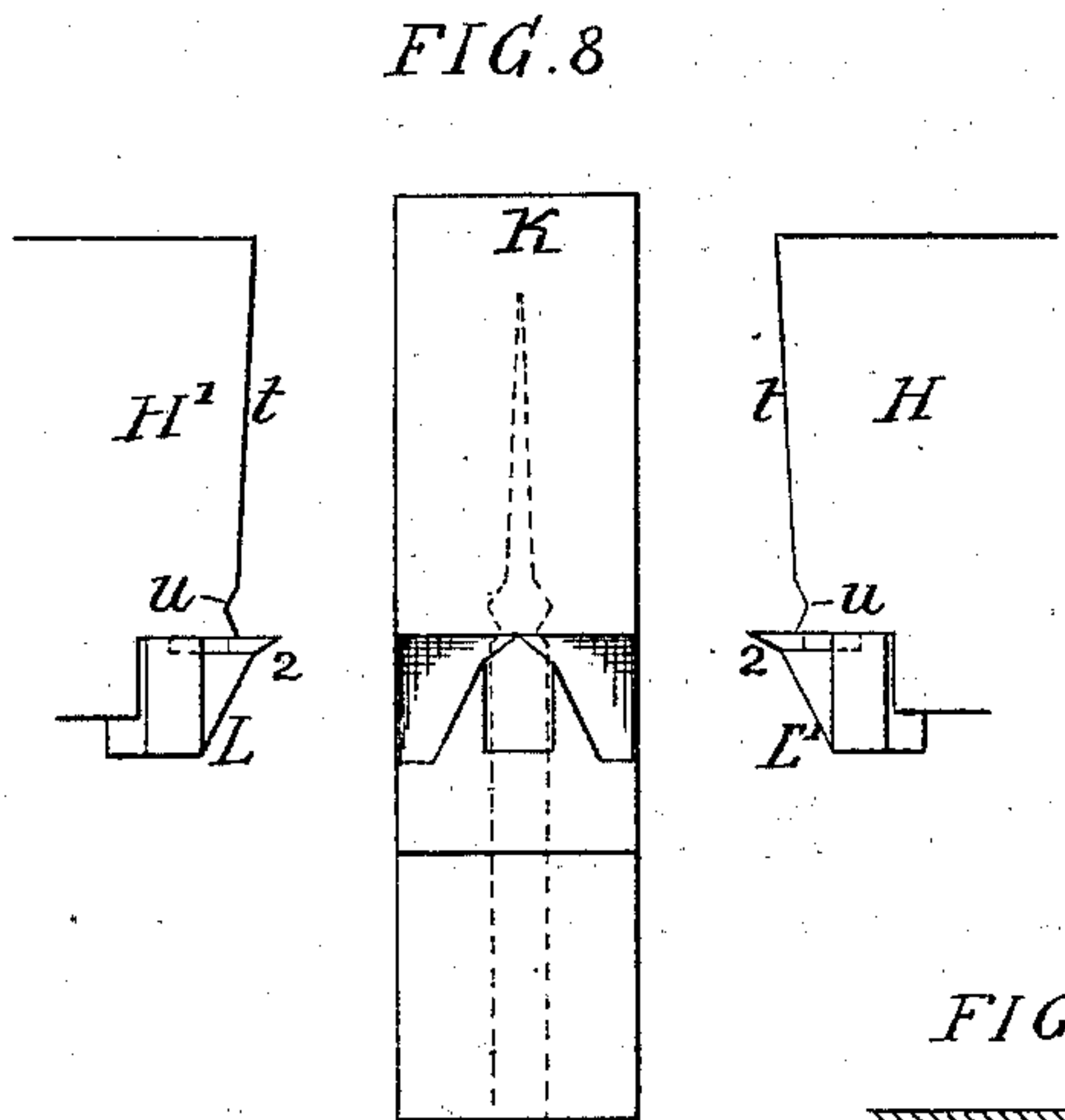
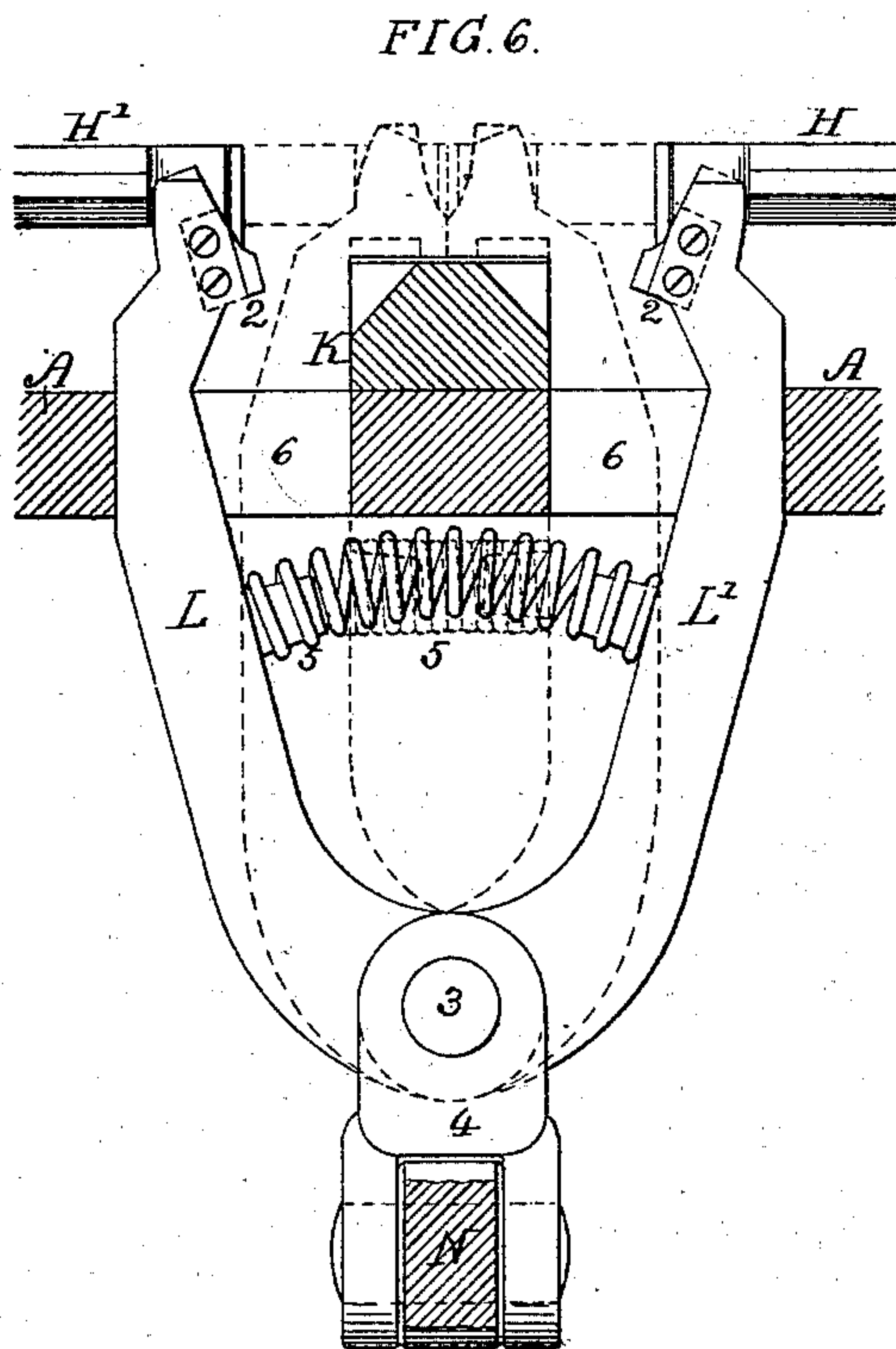
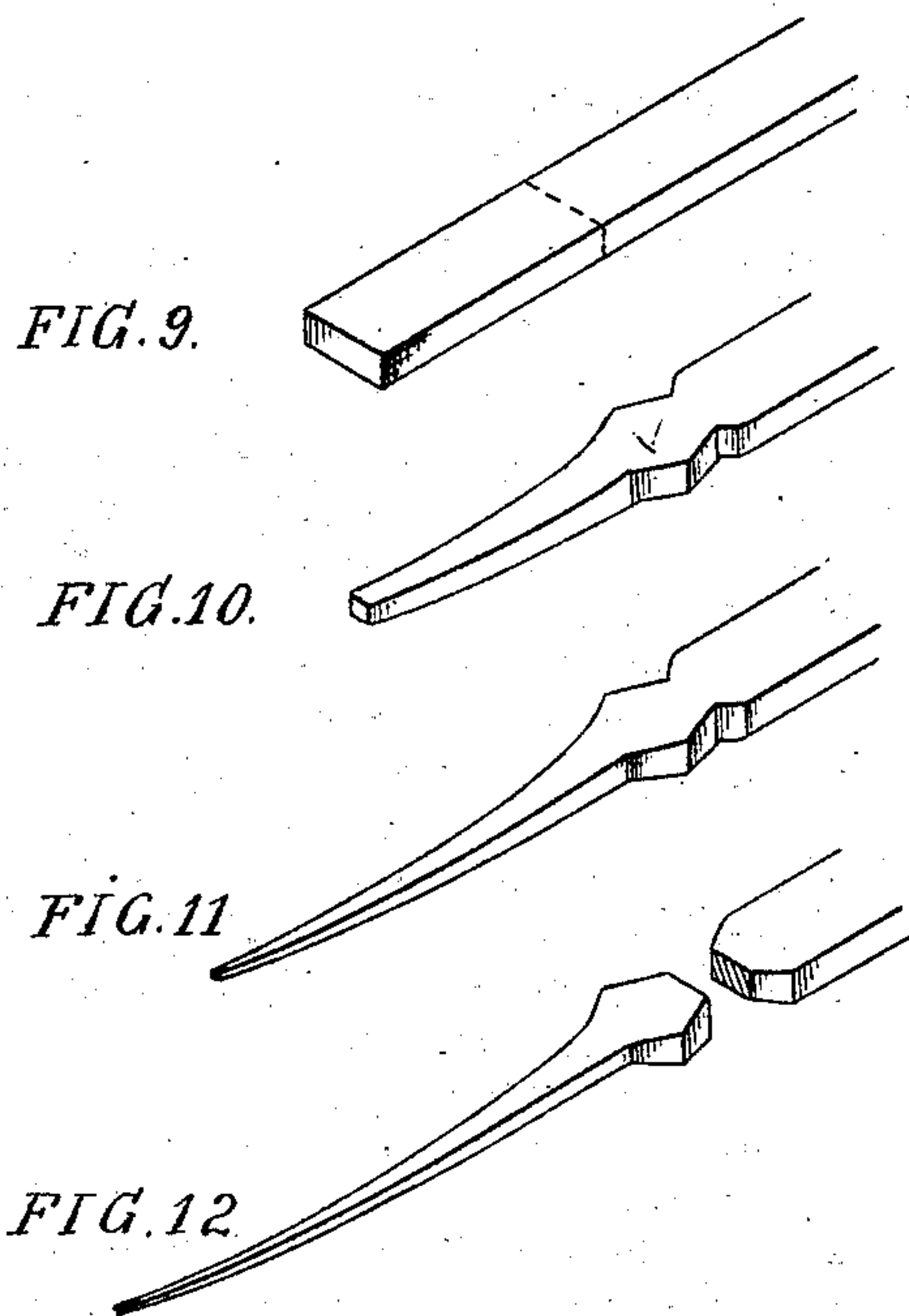
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UNITED STATES PATENT OFFICE.

WILLIAM WERTS, OF CAMDEN, NEW JERSEY, ASSIGNOR OF ONE-HALF TO
WILLIAM H. MATTSON, OF PHILADELPHIA, PENNSYLVANIA.

HORSESHOE-NAIL MACHINE.

SPECIFICATION forming part of Letters Patent No. 280,268, dated June 26, 1883.

Application filed October 23, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WERTS, a citizen of the United States, and a resident of Camden, New Jersey, have invented certain Improvements in Nail-Machines, of which the following is a specification.

My invention consists of the hereinafter-described improvements in and attachments to that class of horseshoe-nail machines in which an anvil having a concave face is combined with laterally-operating dies for forging the edges of the nail-blanks, and with a forging-roller carried round by a crank, and acting, in conjunction with the anvil, to flatten and taper the shank, one object of my invention being to control the forging-roller and to readily change its course in respect to the anvil, and further objects of my invention being to operate the lateral dies by simple mechanism, to regulate their movement, to provide appliances for cutting the forged nail from the nail-rod, and to feed the latter intermittently to the machine.

In the accompanying drawings, Figure 1, Sheet 1, is a plan view of my improved horseshoe-nail machine; Fig. 2, Sheet 2, a side view; Fig. 3, Sheet 3, a vertical section on the line 1 2; Fig. 4, Sheet 4, a transverse vertical section on the line 3 4, Fig. 1; Fig. 5, a perspective view of part of the feeding mechanism; Fig. 6, Sheet 5, an enlarged sectional view of the cutting mechanism; Fig. 7, a side view of the anvil and forging-dies drawn to an enlarged scale; Fig. 8, a plan view of the anvil and parts of the forging-dies; Figs. 9, 10, 11, and 12, perspective views, showing how the nail-rod is converted into a horseshoe-nail by the machine; and Fig. 13, a diagram illustrating part of the feed mechanism.

It may be well, in the first instance, to refer to Figs. 9 to 12, Fig. 9 representing the crude nail-rod, Fig. 10 an incipient nail formed on the rod by the machine, Fig. 11 the nail nearly completed, but still attached to the rod, and Fig. 12 the completed nail severed from the rod.

Referring to the machine illustrated in the several sheets of drawings, A is the base-plate, to suitable bearings, a, on which is adapted the cranked driving-shaft B, which may be either forged in one piece with the crank, or the shaft

may be in two parts, each provided with a crank, and the two cranks being connected together by the crank-pin c, as shown in the drawings.

An arm, D, carries at one end the forging-roller d, the journals of which are at liberty to revolve freely, and at a short distance from the roller the arm embraces and is carried by the crank-pin c, the rear end of the arm being connected to a pin, e, on arms C' C' on the rock-shaft E, which is preferably forged in one piece with the arms and pin. The shaft E vibrates in two bearing-blocks, m, one adapted to each of the vertical guides M M, secured to the base of the machine, the blocks being made adjustable in the said guides, in the present instance by set-screws n n', one above and the other below each block, as best observed in Fig. 3, the raising of the block being accompanied by the lowering of the forging-roller, and the latter being raised by the lowering of the blocks.

The rock-shaft E has at one end an arm, F, the pin of which is connected by a link, f, to a pin, h, projecting from a block, i, adjustably secured to the sliding rod G, which is adapted to guides j j on the base of the machine. The sliding rod is connected by the link j' and knee-joint rods k l to the horizontal forging-die H. In like manner, and through the medium of another arm, F', on the rock-shaft E is caused to operate another horizontal die, H'. These dies H H', which during the operation of the machine approach each other simultaneously, and are retracted simultaneously while the forging-roller is elevated, are adapted to guides p p and p' p', the former of which are secured to the bed of the machine, the latter being adjustable thereon, so that they can be set up as the dies wear, in a manner more fully explained hereinafter.

In order that the movement of the dies toward each other may be readily adjusted, I connect the outer end of each knee-joint rod k to a stud, k', Fig. 4, which passes through a slot in the base-plate, and is confined thereto by a nut, after loosening which the stud may be delicately adjusted by a small set-screw, a'.

The anvil K is shown in Figs. 3 and 4; but its arrangement and relation to the forging-dies H H' can be best explained by reference to the

enlarged views, Figs. 6, 7, and 8, Sheet 5, of the drawings.

As shown in Fig. 7, the face *q* of the anvil is concave, and may be made in the arc of a circle or on a curve approximating thereto. The edge of the forging-roller also traverses, during the lower part of its course, in the arc of a circle, or in an approximate curve, as indicated by the dotted line *xx*, Fig. 7. These two curves bear such relation to each other that at *y* the roller is at a distance from the anvil, and gradually approaches the latter, so as to be at a shorter distance from the face of the said anvil when the forging-roller reaches the point *y*. It is this relation of the course pursued by the edge of the forging-roller to the face of the anvil which insures the imparting of the proper taper to the nail, and the thickness of this tapering portion of the nail will depend upon the adjustment of the above-mentioned blocks *m m*, by which adjustment the forging-roller can be made to traverse in a course nearer to or farther from the anvil.

It will be seen on reference to Fig. 7 that the under sides of the horizontal dies conform to the shape of the concave face of the anvil and slide on the same, the guides *p p'* overlapping the dies and keeping them down to their places, the said dies being preferably inclined where the inclined portions of the guides bear upon them.

On referring to the enlarged plan view, Fig. 8, it will be observed that the edges *t t'* of the two dies are inclined so as to impart the desired lateral taper to the shank of the nail, these edges being indented at *u u*, so as to form the lateral enlargement *v*, Fig. 10, which is to constitute the head of the nail.

In operating on the heated rod, introduced above the anvil by mechanism described hereinafter, the dies and forging-roller act on the rod alternately, the roller flattening out the rod and imparting to it a varying thickness, and the dies contracting the rod and imparting the desired lateral taper to it.

It has been found in practice that about ten actions of the forging-rollers and dies, in alternately flattening and contracting the nail-rod, are necessary to completely form the nail before it is cut off from the said rod. This severing of the nail from the rod is effected by two knives, 2 2, one attached to each of the arms *L L'*, which are pivoted to a pin, 3, passing through a link, 4, which is hinged to one arm of a lever, *N*, which is pivoted to the base of the machine, and through the medium of which the arms are raised and lowered. The arms *L L'* pass through slots 6 6 in the base-plate, and are forced apart and against the ends of the slots by a spring, 5, interposed between the arms, and shown by dotted lines in Fig. 6 and plain lines in Fig. 4. During the forging of the nail these arms, with the cutters, are depressed and out of action; but just before the tenth action of the dies they are elevated, and being brought within range of the

said dies, the latter force the arms and knives toward each other, and the finished nail is thus severed from the rod, as indicated in Fig 12, after which the arms and cutters are at once depressed, brought out of action, and remain out of action until another nail has to be severed from the nail-rod.

The mechanism which I prefer for effecting the desired movement of the lever *N* and the raising and lowering of the arms *L L'* and their knives can be best explained by reference to Figs. 3 and 5.

The fulcrum-pin 8 of the lever *N* is adapted to a bearing, 7, in a hanger, 9, secured to the under side of the bed-plate, and the long arm of the lever terminates in a projection, 10, adapted to notches in the periphery of the disk *P* on a shaft, *Q*, which has its bearings in attachments to the base-plate of the machine.

A ratchet-wheel, 11, is secured to one end of the shaft *Q*, and is operated, in the present instance by an eccentric on the driving-shaft, through the medium of the eccentric-rod 12, bell-crank lever 13, pivoted to the bed-plate, and a pawl, 14. (See Fig. 2.)

A strong spring, *R*, bears on a projection on the long arm of the lever *N*, as best observed in Fig. 5, and a lighter spring, *R'*, on the short arm, the strong spring resisting the effect of the weaker spring and tending to force the projection 10 of the long arm of the lever into a notch of the disk *P*, excepting at intervals, when one of the pins, 15, on the disk *S*, secured to a shaft, *T*, raises the said spring, and when this takes place the weaker spring will be at liberty to depress the short arm of the lever; and with it the arms *L L'* and knives above referred to, and they will remain thus depressed until another notch in the disk *P* presents itself to the projection 10 of the long arm of the lever, at which time that pin of the disk *S* which had maintained the strong spring out of action recedes therefrom and permits the spring to depress the projection into the notch of the disk *P*, and this will result in the instant rising of the short arm of the lever *N*, the raising of the arms *L L'*, and the severing of the completed nail from the nail-rod in the manner described above.

In place of the light spring *R'*, a weight may be suspended from the lever; but a spring is preferred.

The shaft *T* has its bearings in attachments to the base-plate, and is driven from the shaft *Q* through the medium of wheels shown in Fig. 5, or any other suitable system of gearing.

In the present instance the ratchet-wheel 11 has such a number of teeth and the extent of the movement of the pawl is such that the above-described movement of the lever *N*, and consequent raising of the knives within range of the dies, shall take place immediately before the tenth action of the dies; but if a greater or less number of actions is required before the nail is severed from the rod the mechanism described must be altered accordingly.

It will be understood that the finished and severed nail is pushed from the anvil by the nail-rod in feeding the same forward.

The device for feeding the nail-rod to the machine is shown in Figs. 1, 2, and 3.

The opposite edges of a plate, U, are adapted to guides 16 on the bed-plate, and an intermittent reciprocating motion is imparted to this plate, the latter being moved forward by springs 17 and backward by projections 18, which in the present instance are at the back of the above-mentioned disk S on the shaft T, a lug, 19, on the under side of the base-plate being within range of these projections, as will be best understood by reference to the diagram, Fig. 13, Sheet 5. There are four projections 18, of quadrangular form and at equal distances apart, and when the projections are in the position shown in Fig. 13 the sliding plate is at liberty to be moved forward by the springs, the backward movement being effected by one of the projections as the disk S is intermittently rotated.

In front of the machine are a series of upper and lower grooved rollers, W, the journals of the lower rollers being in fixed bearings and those of the upper rollers in bearings adapted to slide in guides on the base-plate, and acted on by set-screws 20, which can be screwed down to impart more or less friction to the journals, for it should be understood that while the nail-rod Z can be drawn forward with the plate U by the springs 17, it cannot be moved without an effort during the interval when the said plate U is being moved back by the devices described above.

Other guiding and frictional devices which will readily suggest themselves to expert mechanics may be substituted for the grooved rollers.

On the plate U are two pairs of cam-levers, 21, the levers on one side of the nail-rod Z being connected by rods 23, and those on the other side by similar rods, and on each of these rods a spring, 24, so acts as to cause the cam-shaped portions *v* of the levers to grip the nail-rod. This is during the forward movement of the plate U and while the heated end of the nail-rod is being acted upon by the forging-roller and jaws. As the plate U is retracted, however, the hold of the cam-levers on the nail-rod ceases, for, as before remarked, the said rod is so held by the rollers that it cannot be carried back with the said plate U.

One pair of cam-levers might suffice for gripping the nail-rod; but I prefer the use of two pairs of levers.

I claim as my invention—

1. The combination, in a horseshoe-nail machine, of the following instrumentalities, namely: first, a concave anvil; second, a cranked shaft; third, an arm carried by the crank-pin of the shaft, and provided near one

end with a forging-roller; and, fourth, a cranked rock-shaft free to oscillate, and having a crank-pin carrying the opposite end of the said arm, all substantially as set forth.

2. The combination of the anvil, the cranked shaft B, the arm D, carrying the forging-roller, the cranked rock-shaft E, connected to the said arm, and the vertically-adjustable bearings adapted to the said shaft E, substantially as specified.

3. The combination of the anvil, the cranked shaft B, the arm D, the crank-shaft E, dies H H', and intervening mechanism whereby the dies are operated from the said shaft E, substantially as described.

4. The combination of the anvil K, having a concave face, *y*, the arm D and its forging-roller, and the reciprocating dies H H', having under sides conforming with the face of the anvil, with the guides *p* and adjustable guides *p'*, substantially as described.

5. The combination of the anvil, the reciprocated dies H H', the pivoted arms L L', each carrying a knife, 2, with automatic mechanism whereby the said arms are at intervals elevated within range of the dies, so as to be operated thereby, substantially as specified.

6. The combination of the anvil and reciprocated dies H H' and the knife-carrying arms L L' with the lever N, the intermittently-rotated disk P, the springs R R', and mechanism whereby the lever N is relieved at intervals from the pressure of the said spring R, all substantially as set forth.

7. The combination of the lever N, carrying the knife-arms L L', the springs R R', the intermittently-rotated shaft Q and its notched disk P, the shaft T, geared to the said shaft Q, and having a disk, S, with pins 14, substantially as described.

8. The combination, in a nail-machine, of the following elements, namely: first, the anvil, reciprocated dies H H', and arm D, carrying the forging-roller; second, a guided plate, U, and mechanism for reciprocating the same; third, one or more pairs of cam-levers for gripping the nail-rod and releasing the same; and, fourth, a device for permitting the same to be fed under friction, all substantially as set forth.

9. The combination of the guided plate U, its cam-levers, and lug 19, with an intermittently-rotated shaft carrying a disk or plate having projections 18, and with springs 17, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM WERTS.

Witnesses:

HARRY DRURY,
HARRY SMITH.