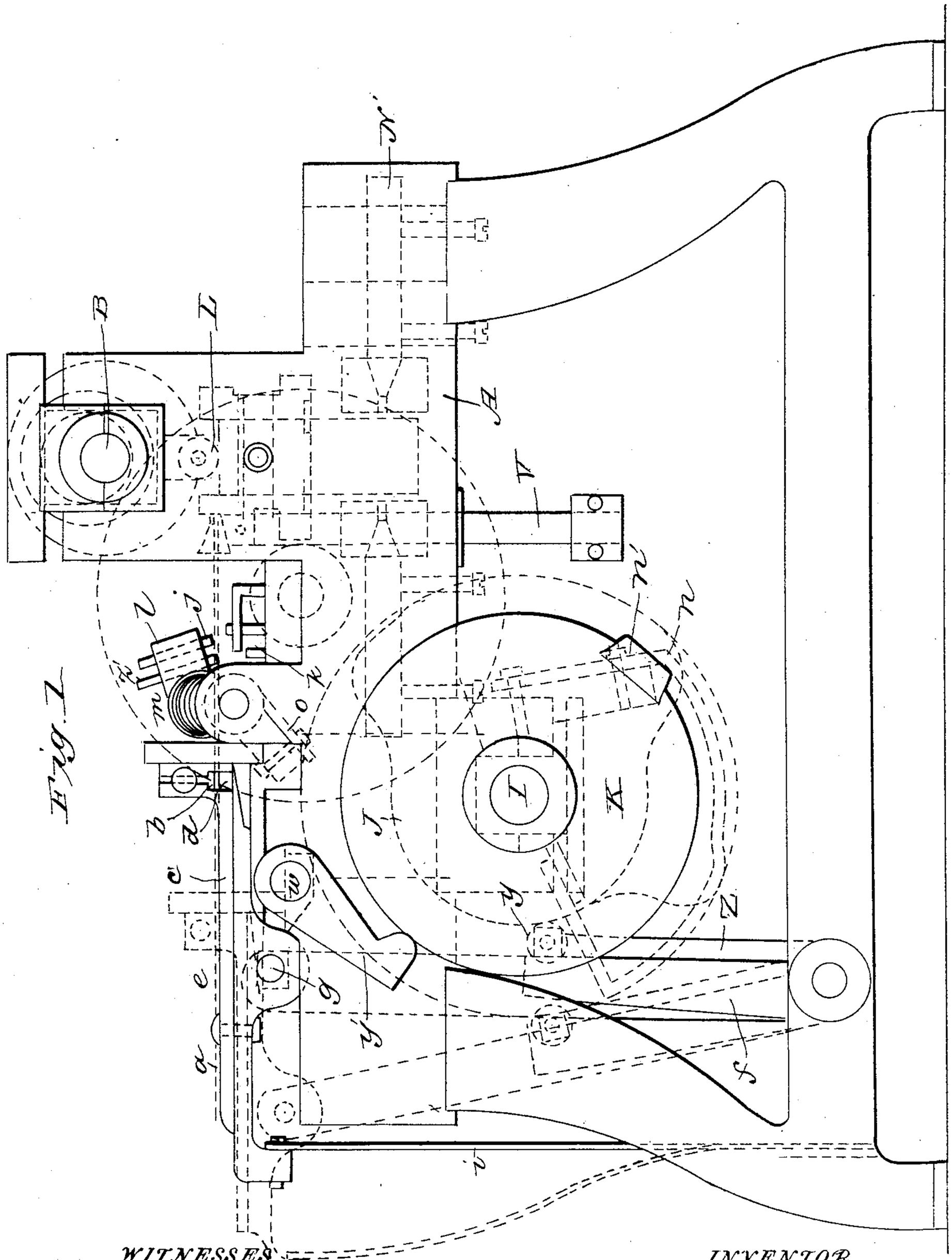
(No Model.) 4 Sheets—Sheet 1.

R. ROSS.

ELECTRIC FORGING MACHINE.

No. 423,956. Patented Mar. 25, 1890.



WITNESSES

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Attorney

(No Model.) 4 Sheets—Sheet 2.

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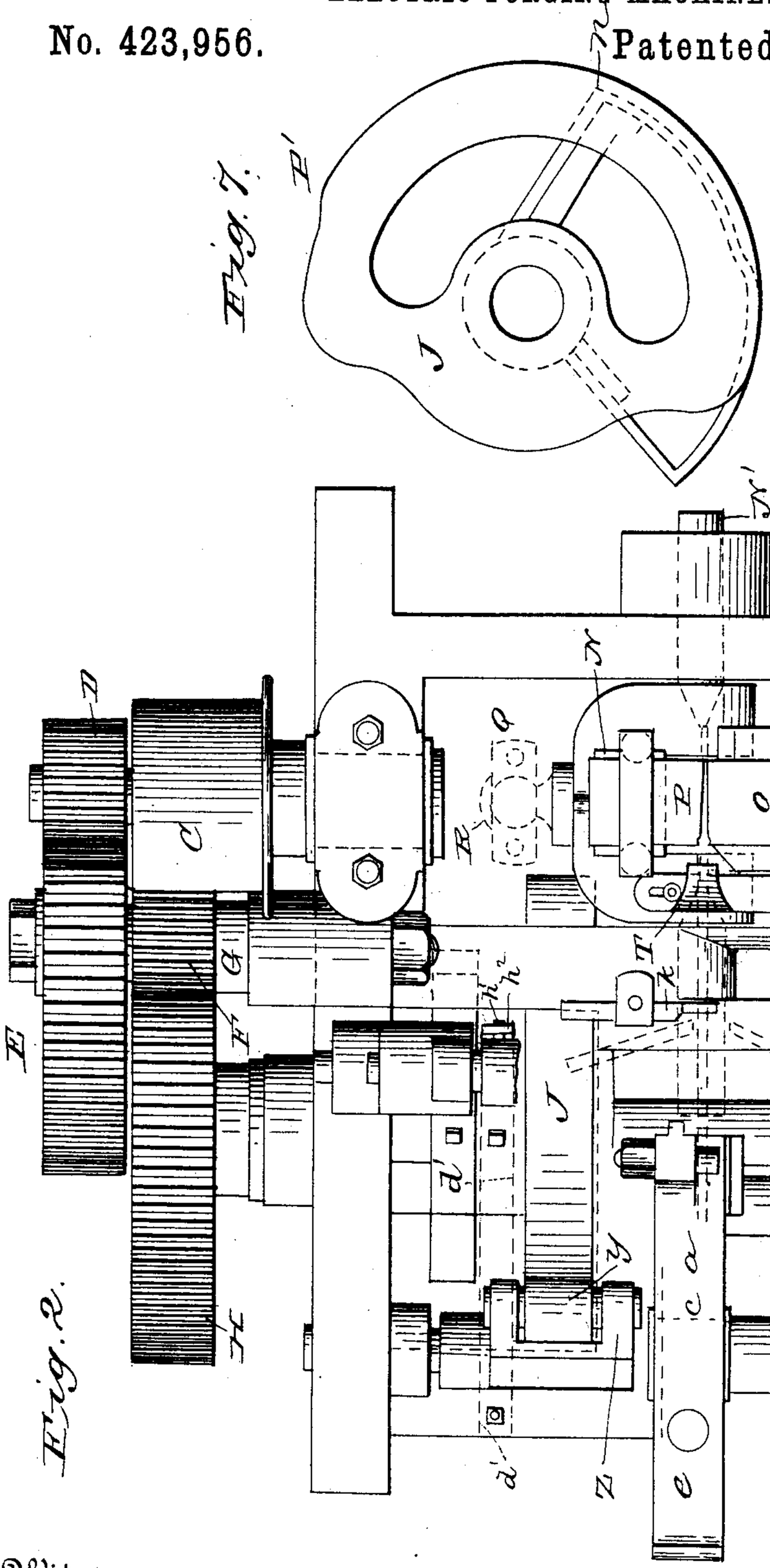

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(No Model.) 4 Sheets—Sheet 3.

R. ROSS.

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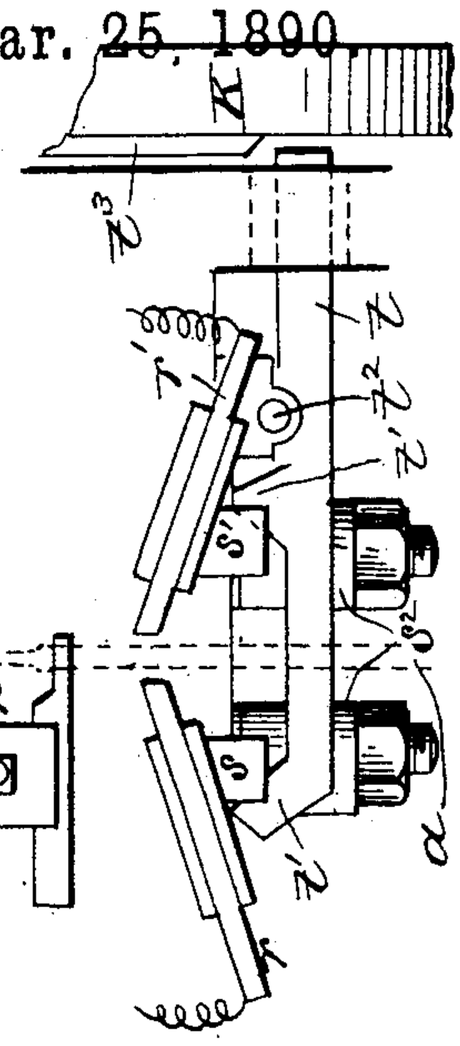

Fig. 3.

Fig. 6.

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(No Model.) 4 Sheets—Sheet 4.

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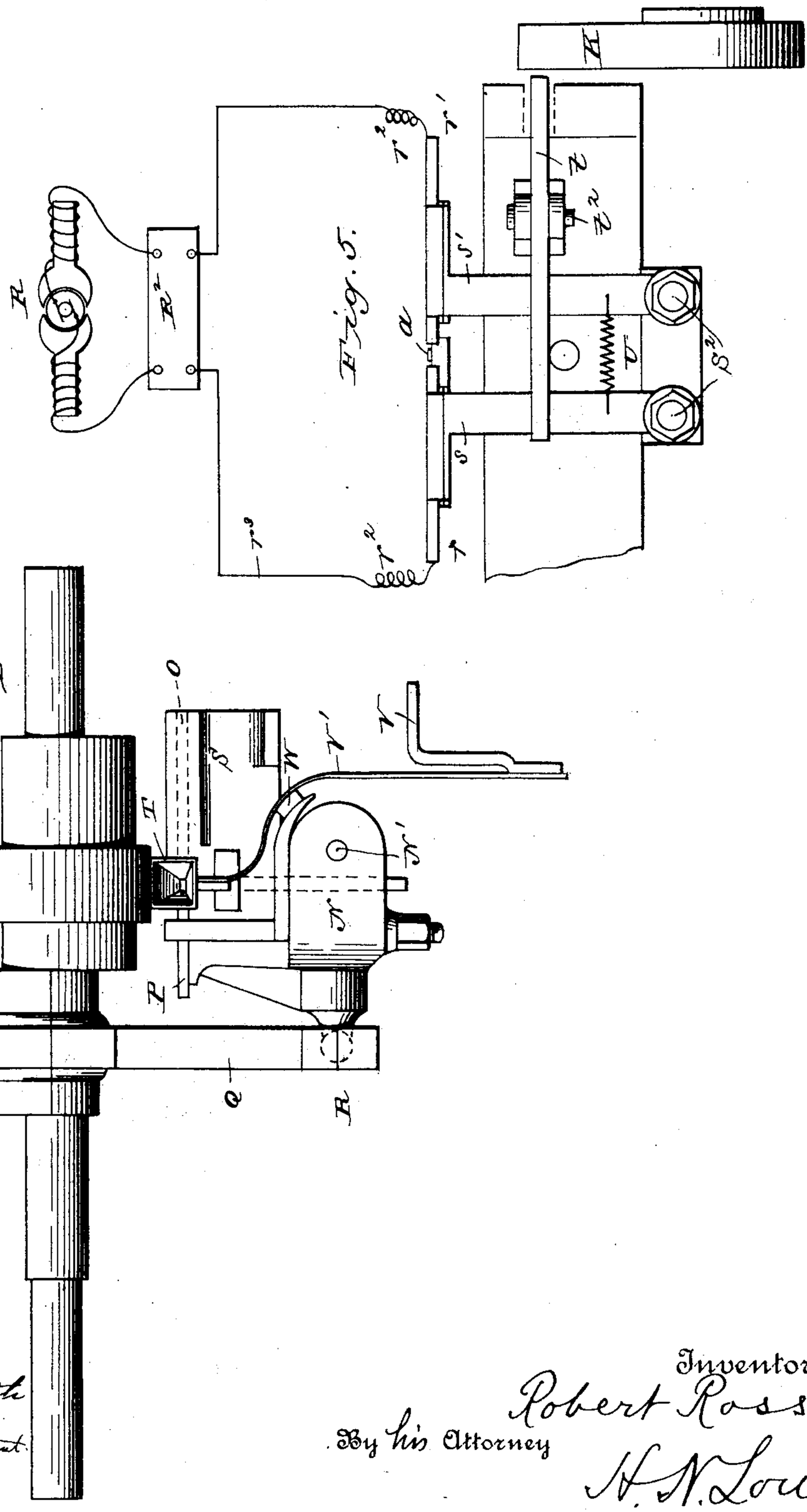

Fig. 5.

Fig. 4.

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UNITED STATES PATENT OFFICE.

ROBERT ROSS, OF VERGENNES, VERMONT, ASSIGNOR OF FIVE-EIGHTHS TO JOHN I. GILBERT, OF MALONE, NEW YORK; ELIZA J. ROSS ADMINISTRATRIX OF SAID ROBERT ROSS, DECEASED.

ELECTRIC FORGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 423,956, dated March 25, 1890.

Application filed June 14, 1889. Serial No. 314,265. (No model.)

To all whom it may concern:

Be it known that I, ROBERT ROSS, a citizen of the United States, residing at Vergennes, in the county of Addison and State of Vermont, have invented certain new and useful Improvements in Electric Forging-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to that class of machines for forging and shaping articles of metal in which the metallic blank from which the articles are formed is heated, softened, and prepared for the action of the shaping devices by the application of an electric current.

It is the object of my invention to provide a more efficient and rapidly-operating means for applying the electric current at the desired time and place, thus saving a large amount of time and labor and greatly increasing the capacity of the machine to which my improvements are applied.

To this end my invention consists in the essential elements and combinations thereof comprised in the structure hereinafter particularly set forth as one means for carrying my invention into practical effect.

I shall explain my invention as adapted to the manufacture of horseshoe-nails, though it will be understood that it may be advantageously employed for the manufacture of other articles.

In its leading features the machine hereinafter described is of the well-known Dodge type; but my invention may be employed in connection with other machines.

In order to make my invention more clearly understood, I have shown in the accompanying drawings an adaptation of the same to practical purposes.

In said drawings, Figure 1 is an end view of a horseshoe-nail-forging machine embodying my invention. Fig. 2 is a plan view of the same with some parts omitted for the sake of more clearly showing other parts. Fig. 3 is a transverse vertical section. Fig. 4 is a front view of the forging mechanism. Fig. 5 is a front view of the electric heating appliances. Fig. 6 is a plan view of the same. Fig. 7 is an elevation of one of the actuating-cams.

Referring to the drawings, A indicates the main frame of the machine provided with suitable bearings for supporting the parts of the operating mechanism hereinafter referred to.

B is the main driving-shaft or spindle, to which power is applied by the pulley C or other means.

L is the roller-hammer mounted on said spindle, rotated thereby in the direction indicated by arrow 1 in Fig. 3 and adapted, in connection with the opposing stationary anvil M, situated at the proper distance, to reduce the rod or blank (when heated as hereinafter described) to the required thickness and form the upper and lower sides of the nail.

At N is shown the side hammer carrying the movable die P and mounted upon a pivot or pivots N′ on which it is at the proper times rocked toward and from the opposing stationary side die O, secured to the bed-piece S by means of an eccentric on the spindle B, the eccentric-rod Q of which is connected by a universal joint R with a rigid arm projecting laterally from the side hammer. The opposing faces of the side dies P and O are shaped to form the edges and head of the nail. (See Fig. 2.)

To the above-described shaping-dies the rod or blank *a* (shown in dotted lines) is guided by the nose-piece T, Figs. 3 and 4, through which the rod passes, and which is mounted on a bracket V, bolted to the frame A. The support V′ of the guide T is flexible, and the latter is adapted to be slightly moved horizontally by a cam projection W on the movable hammer N, which engages a beveled or inclined portion of said support.

The blank is fed forward through the nose-piece T by means of the feeder *e*, which is provided with the stationary clamping-block *d* and with the movable clamping-block *b*, carried by spring *c*, the force of which latter causes the blocks to tightly hold the nail-rod. Spring *i* presses the feeder toward the forging-dies and causes the feeding movement,

while the return of the feeder (to the left of Fig. 3) is effected by rock-shaft X, carrying an arm *f*, the upper end of which is pivoted to the feeder *e*, between ears formed thereon, by a pin *g*, which passes through said ears and through a bearing-box *h*, seated in a recess in said arm. The rock-shaft X is mounted in suitable bearings on the frame A and is actuated to withdraw the feeder by a cam J, mounted on the cam-shaft I, which latter is connected by suitable gearing—as, for instance, by wheels H, F, E, and D—with the main driving-spindle B, the wheels H and D being mounted, respectively, on said cam-shaft and spindle, and the wheels E and F being mounted upon an intermediate stud-shaft G. The said cam J actuates the rock-shaft X through the medium of a roller *y*, carried by the upper end of an arm Z, secured rigidly to the rock-shaft or to the arm F. After the blank has received the requisite number of blows from the shaping devices already described the swell of the cam J forces back the arm Z and the feeder *e*, thus withdrawing the blank and the nail which has been formed upon its end to the proper position for the severing of the nail from the blank, as shown in Fig. 6. The cutting devices for this purpose consist of the bottom cutter *k*, rigidly secured to the frame of the machine, and the top cutter *j*, carried by an arm *l*, mounted upon and actuated by a rock-shaft *m*. When the blank is in proper position, as shown in the last-mentioned figure, the tappet *n* on the side of the cam J comes in contact with the projecting arm *o*, which extends downwardly from the shaft *m* and lifts arm *o* and depresses the cutter-holding arm *l*. The cutters *j* and *k* being situated one below and the other above the blank, (see Fig. 1,) the latter is seized and severed by them upon the line of juncture between the finished nail and the remainder of the blank. At this instant the swell P′ on cam J engages the roller *y* and moves the blank back an additional distance, withdrawing it from the cutting devices.

At K is shown a second cam-wheel carried by the cam-shaft I at the side of the machine. This cam is provided with a tappet or swell *n′*, in the path of which is situated an arm *y′*, mounted upon a rock-shaft *w*. The latter carries (see Fig. 3) a second arm situated beneath and adapted to engage and lift the spring *c* of the feeder. After the withdrawal of the blank, as above mentioned, the tappet *n′* reaches the depending end of said arm *y′*, actuates the rock-shaft *w*, and separates the clamping devices *b d* of the feeder, thus permitting the blank to be thrust forward by the operator against a stop-gage *z′*, carried by arm *l*, and which has been brought down by the movement of the rock-shaft *m* into the path of the blank. The shaft *m* is spring-controlled, so as to maintain the arm *o* in contact with the surface of cam J—as, for instance, by a horizontal spring *d′*, attached to the front portion of the frame A and engaging a link h^2, which is attached to and depends from a short arm or pin *h′*, extending horizontally from the rock-shaft. The further revolution of cam J permits the feeder *e* to be thrust forward, thus passing the end of the blank through the nose piece or guide T and into proper position between the shaping-dies, by which the forming operation already described is repeated.

I will now proceed to describe the electric-heating devices by which the metal blank is softened at the part which is to be operated upon by the mechanical devices above set forth. At opposite sides of the path of the blank *a* are situated positive and negative electrodes *r r′*, one or both of which may be movable and adapted to be placed in contact with or withdrawn from the blank. These electrodes are best seen in Figs. 5 and 6 and are situated between the feeder and cutters and beneath the rock-shaft *m*, which latter is slightly cranked or bent upward at its middle, in order to afford the necessary space for the heating devices. The said electrodes are mounted upon and properly insulated from arms *s s′*, which are pivotally connected at s^2 with the frame of the machine. Said arms are normally pressed apart by an interposed spring U, or equivalent device, and are controlled in this movement away from each other by inclines *t′*, formed on a bar *t*, which is pivoted at t^2 to a portion of the main frame. The laterally-projecting end of bar *t* is situated in the path of a tappet or cam projection t^3, formed upon the side of the cam K. (See Fig. 6.) The withdrawal of the blank by the projection P′, already described, brings that portion of it which is to be heated into proper position between the electrodes *r r′*. At this time and before the action of tappet *n′* to release the blank the cam projection t^3 engages the end of bar *t*, presses the inclines *t′* toward the pivoted arms *s s′*, and forces the latter toward each other, carrying with them the electrodes *r r′*, which are thus brought into contact with the opposite sides of the blank, immediately heating the latter to the desired degree by the passage of the strong electric current, in the circuit of which the electrodes are situated. Having been thus heated, the blank is ready to be fed to the shaping and cutting devices, as already described.

In the construction illustrated I have shown both the electrodes movable, and I prefer this arrangement; but it will be understood that, if desired, one electrode may be stationary, or both electrodes may be stationary, and adapted to bear constantly upon the blank; but the latter arrangement is not so convenient or economical, as it interferes with a free movement of the blank and keeps too large a portion of it heated. Suitable brushes or flexible conductors r^2 bear upon or are attached to the electrodes and form a portion of an electric circuit r^3, which is supplied with a current of the desired intensity by means of

a dynamo R, or other suitable generator. At the times when the electric current is not being passed through the blank *a*, I have provided for accumulating the same, thus saving a considerable amount of electric force. This I effect by interposing between the generator and the electric-heating devices the storage battery or accumulator R^2. The constant production of electric force by the dynamo is therefore not a waste, but the energy is all ultimately utilized in the actual heating of the blank at the necessary times.

The mode of operation of my invention has been sufficiently set forth in the foregoing description of its construction.

Having thus described my invention, what I claim is—

1. In an electric metal-working machine, the combination, with the mechanism which operates upon the softened metal, of an electrode and a second electrode connected with said mechanism and operated thereby automatically to make and break the circuit, substantially as set forth.

2. In an electric metal-working machine, the combination, with the mechanism which operates upon the softened metal and electric-heating devices adapted to pass an electric current intermittently through the metal, of a circuit and a generator for said current and an accumulator or storage-battery in said circuit, substantially as set forth.

3. In an electric metal-working machine, the combination, with the mechanism which operates upon the softened metal, of two movable electrodes situated in proximity to the path of the blank or rod to be heated, holding and feeding devices for the blank connected with the metal-working mechanism and independent of the movable part or electrode which makes or breaks the circuit, and means connected with said electrodes for causing them intermittently to make contact with said blank, substantially as set forth.

4. The combination, with the metal-shaping devices or dies and the cutter, of two electrodes situated in proximity to the path of the rod or blank and a feeder connected with and operated at proper times by the mechanism which actuates said dies and cutter, which engages said blank and feeds the heated portion of the same from said electrodes to the dies and then to the cutter, substantially as set forth.

5. In a horseshoe-nail-forging machine, the combination, with the shaping hammers or dies and the cutter, of electrodes situated in proximity to the path of the blank or rod and a feeder which moves the heated portion of said blank from the electrodes and to the shaping devices, substantially as set forth.

6. In a horseshoe-nail-forging machine, the combination, with the shaping hammers or dies and the cutter, of electrodes situated in proximity to the path of the blank or rod, a guide for directing the blank to the electrodes, a gage which determines the amount of advance of the blank and the part to be heated, and a feeder which moves the heated portion of said blank from the electrodes and to the shaping devices, substantially as set forth.

7. In an electric metal-working machine, the combination, with a mechanism which operates upon the softened metal, of electrodes situated in advance of said metal-working mechanism at the side of the path of the rod or blank to be heated, and movable toward or from said path, and holding and feeding devices which move the blank from said electrodes toward the said metal-working mechanism, substantially as set forth.

In testimony whereof I affix my signature in the presence of two witnesses.

ROBERT ROSS.

Witnesses:
WILLIAM S. HOPKINS,
EMILY C. SMITH.