4 Sheets--Sheet 1.

J. RUSSELL.

Machines for Making Horseshoes.

No. 152,252. Patented June 23, 1874.

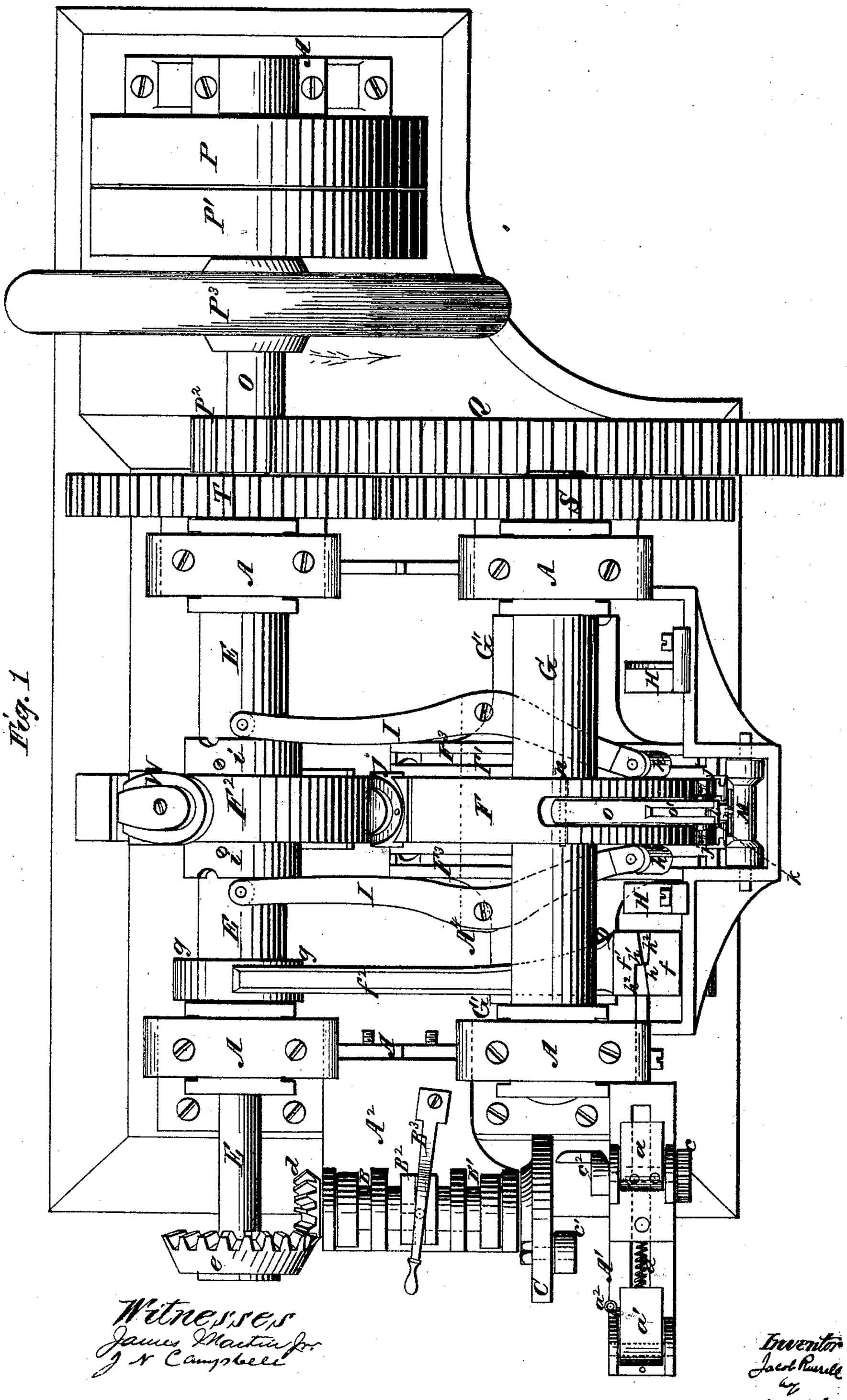

Fig. 1

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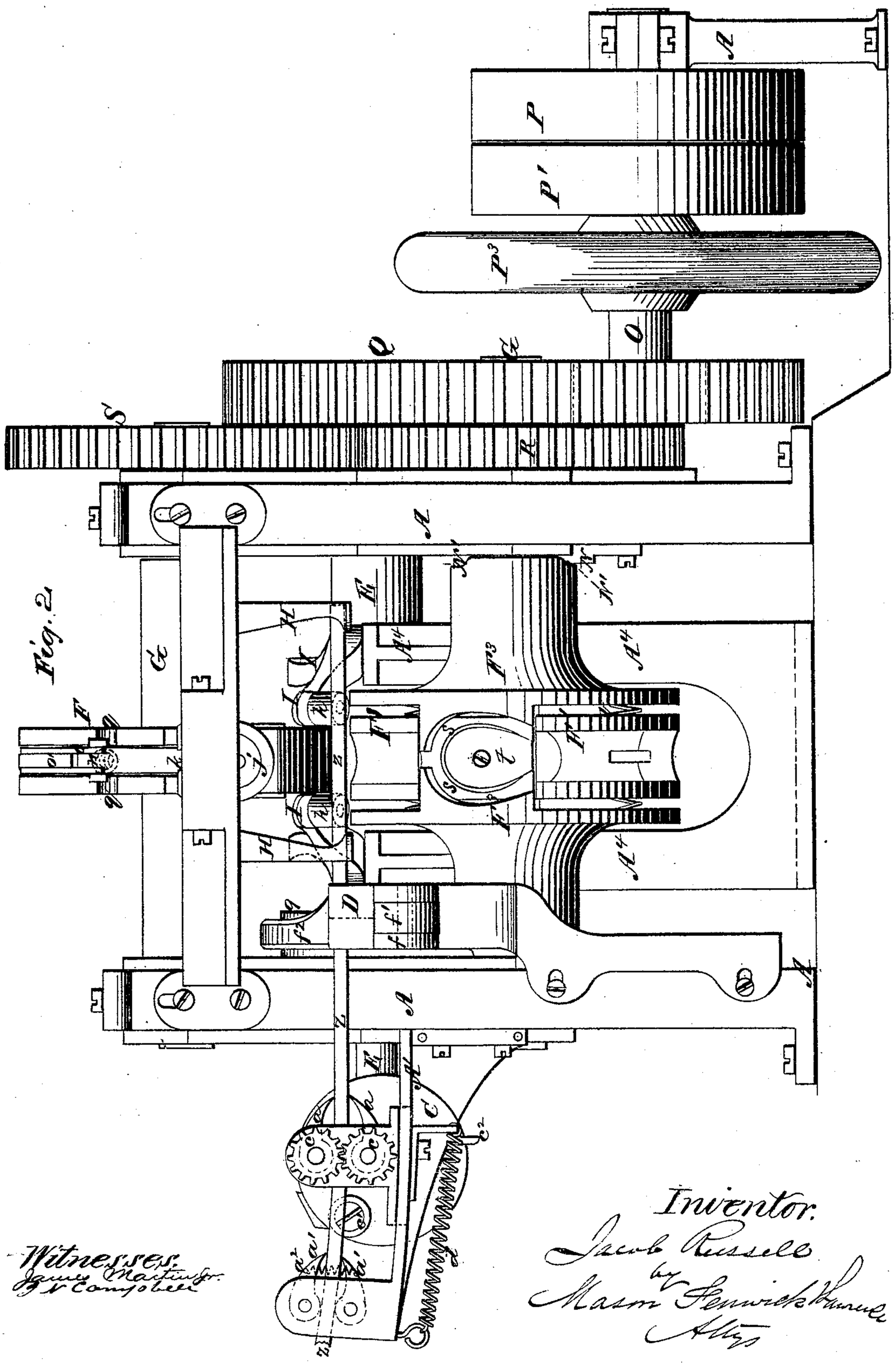

Fig. 2.

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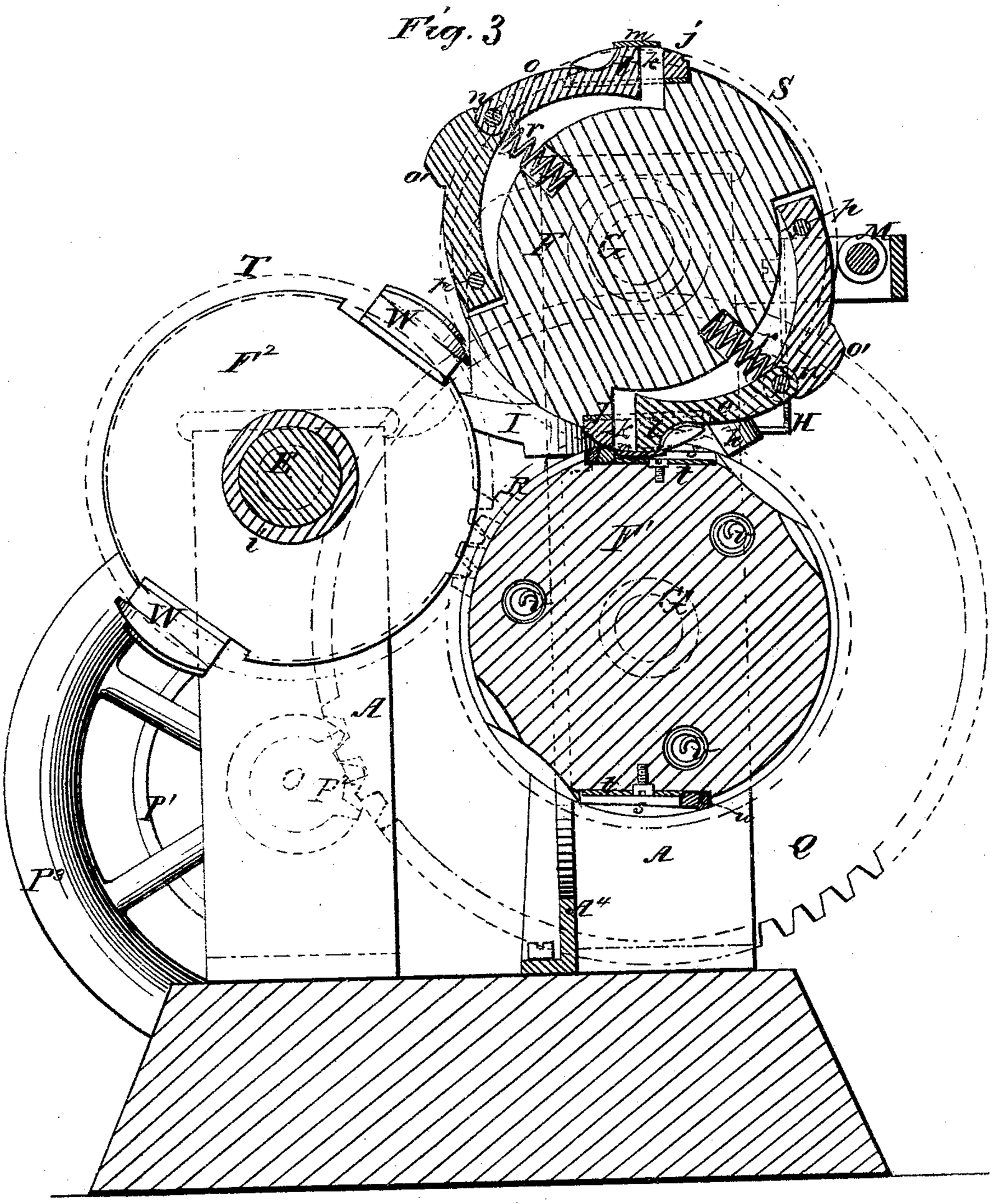
Fig. 3



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Machines for Making Horseshoes.

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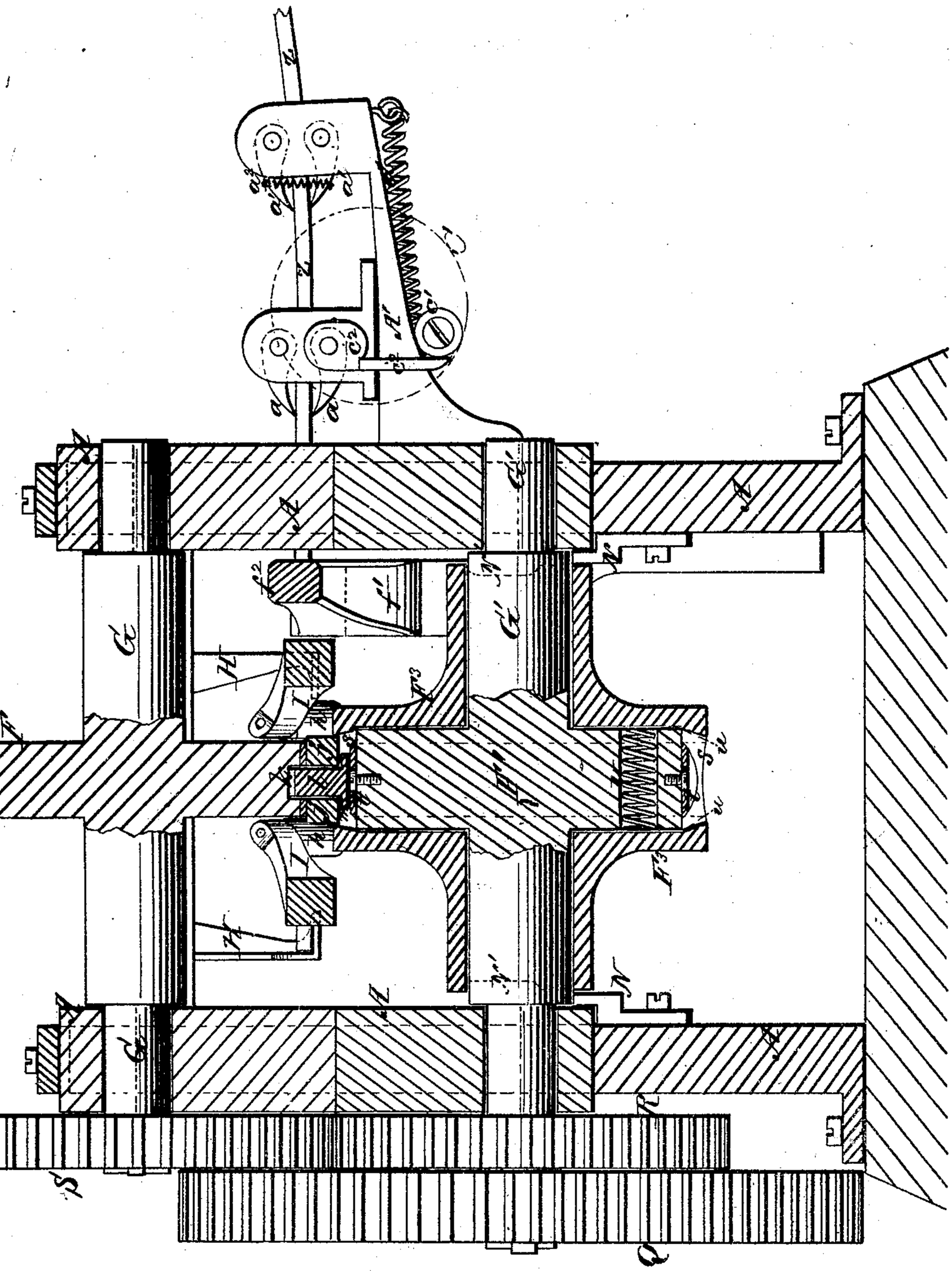

Fig. 4.

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UNITED STATES PATENT OFFICE.

JACOB RUSSELL, OF NEW YORK, N. Y.

IMPROVEMENT IN MACHINES FOR MAKING HORSESHOES.

Specification forming part of Letters Patent No. **152,252**, dated June 23, 1874; application filed May 21, 1874.

To all whom it may concern:

Be it known that I, JACOB RUSSELL, of the city, county, and State of New York, have invented a new and useful Improvement in Machines for Bending and Pressing Horseshoes; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings making part of this specification, in which—

Figure 1 is a top view. Fig. 2 is a front view. Fig. 3 is a longitudinal section. Fig. 4 is a transverse section of my improved horseshoe-machine.

The blanks for the bending and pressing machine which I have invented are produced in a separate rolling-machine, which produces continuous bars having the requisite creases, and also marks to indicate the proper length for each shoe upon them, the creasing and marking being done at the last pass that the bar of iron makes through the rolls. I mention this simply to have it understood that my machine does not do this work. One object of my improvement is to effect the thinning of the inner edge of the shoe at a stage of the operation when only the outer edge or side of the shoe is sustained by the upright walls, and thus render it practicable to press down the inner edge of the shoe to almost a knife-edge, if such degree of thinness is required. And another object is to effect the pressing of the shoes in a female die which has a gradual taper upward, and at the same time be able to discharge the shoe automatically from such a die, this manner of pressing the shoes enabling me to make them with an inward draft, or narrower at their base than at their top, and thus produce shoes which will not cause the feet of horses to interfere. And another object of my invention is to effect the proper feeding and cutting off and supporting of the iron while the machine is in continuous operation. Another object is to effect a compression or "upset" of the ends of the pieces of iron of which the shoes are formed by the shears which cut off the iron, and thus increase the density of the heel ends of the shoes. The nature of my invention consists in the means, as hereinafter described and pointed out in the claims, for accomplishing the object above set forth.

To enable others skilled in the art to make and use my invention, I will proceed to describe it.

A represents the frame of the machine. To one side of this frame a bracket, A^1, is bolted. This bracket is slotted vertically, and in the slot of the bracket a sliding frame, carrying two pawls, *a a*, is fitted to slide back and forth. These pawls are on vibrating shafts, which are geared together by small pinions *c c*. The guide of the frame is connected to a spiral spring, *d*, which is fastened to the bracket A^1. Another set of pawls, a^1 a^1, is applied on the bracket; but they do not slide, nor are they geared together, but simply attached to vibrating shafts of the bracket A^1, and held together by a spiral spring, A^2, as shown. On the shaft of the lower one of the sliding pawls a trip-arm, c^2, is fastened, and it hangs pendent from the shaft of said pawl. In rear of the bracket A^1 another bracket, A^2, is bolted on the frame A, and in this bracket a clutch-shaft, B B^1, is fitted to revolve. The parts of this shaft are connected by a sliding clutch, B^2, which is operated by a clutch-lever, B^3. On the front end of this shaft a plate, C, with a crank-pin or roller, c^1, set in it near its circumference, is applied. On the rear end a small bevel-pinion, *d*, is applied, and this pinion gears with a bevel-wheel, *e*, on the back shaft E of the revolving rolling die of the machine. The sliding pawls take hold of the bar *z* and move it just the length required, through and past the shears. This movement is produced by the crank-pin c^1 of the plate C striking the trip-arm c^2 of the lower pawl. The stationary pawls prevent the bar slipping back while the sliding pawls are automatically moved back by the spring *d* for a new bite upon and feed of the bar forward. The pinions of the pawls keep them in proper position, relatively, while making their reciprocations, and they also allow them to open and close, to accommodate the bar. The closing of and bite of the pawls upon the bar *z* is produced, just before their forward movement begins, by the contact of the crank-pin with the trip-arm, and at the completion of the feed-movement of the pawls the gravity of the

trip-arm causes the pinion to which it is attached to turn, and thereby open the pawls and release them from their bite upon the bar *z*. D are the shears, formed of two pieces pivoted together, and adjustably bolted to the frame A a short distance forward of the bracket A^1. One jaw, *f*, of these shears is stationary, and the other, f^1, movable. The movable jaw f^1 has a lever-extension, f^2, formed on it, which rests upon a cam portion, *g*, of the shaft E, and this jaw is opened and closed twice during the revolution of this shaft by the cam projections *g* on the shaft. The shape of the jaws of the shears is very similar to the matching teeth of two rag-wheels, and on each side of the cutting-edges *h* h^1 of the shears a broad bevel surface, h^2, is formed, for the purpose of squeezing or upsetting the ends of the metal during the act of cutting off the lengths for the horseshoes. F F^1 F^2 are three disk-rollers, revolving with their geared shafts G G′ E. These rollers are set so that F and F^1 work upon one another first, and then F^1 and F^2 work upon one another. H H are rests for the support of the lengths of iron which are cut off from the bar. I I are side levers, which have friction-rollers *h h* on their front ends, just in rear of the rests H H, and in close proximity to the sides of the roller F, as shown. These levers are pivoted to the top of a standard or pillar, A^4, of the frame A, and vibrate laterally in a horizontal plane. The rear ends of these levers extend back and over the shaft E, and bear, by means of friction-rollers on their under side, against notched cam-collars *i i* of the roller F^2, which give to their front ends a movement corresponding to the outside of a horseshoe. The roller F is constructed with one or more male dies, *j*, which in outline correspond to the horseshoe which is to be bent and pressed. Through the top of each of these dies a slot, *k*, is cut down to a proper depth, and in this slot the guide and support *l* of a sliding horseshoe-iron carrier, *m*, of semi-elliptical form, is fitted. The carrier, which is about half as long as a horseshoe, and somewhat broader than the slot, is fitted upon the outer face of the male die, as shown. This form of carrier is adopted in order to avoid marking the iron when it takes hold of it. The guiding-support of this carrier extends from the carrier along in a slot cut in the circumference of the roller, and is connected by a hinge-joint, *n*, to a lever-link, *o*, which is also in a slot, and is pivoted in rear of the hinge-joint to the roller F, as shown at *p*. On the back of the link *o* a cam projection, *o′*, is formed. The hinge-joint of the link and guide plays in and out of notches *q*, formed on the circumference of the roller F. The jointed links of the carrier *m* form a toggle, and as the joint is depressed the carrier *m* slides in the slot of the die *j*. In order to move this carrier back to its normal position a spiral spring, *r*, is placed under the joint of the toggle, as shown. M is a rolling stop hung in a stationary bracket of the frame just in front of the roller F and about in a plane with its shaft. This roller acts as a permanent means whereby the joint of the toggle is depressed and the carrier *m* caused to move up against a length of horseshoe metal which is resting in the supports at the moment the die of the roller F is in the act of beginning to match and enter the female die of the roller F^1. This stop is struck by the cam projection of the toggle-link, and as the cam cannot pass by it until the spring under the joint yields, the toggle must of necessity be depressed during the contact of the projection with the stop, and by this depression the carrier is caused to slide inward with great force against the piece of metal and carry it to the toe end and bottom of the female die. As the metal is thus carried forward, the side rollers *h h* on the ends of the levers I I are caused by the cams *i i* to move in conformity with the shape of the desired horseshoe, and these rollers in thus moving bear upon the iron as it is forced by the carrier, and subsequently drawn by the die-rollers into the female die. The roller F^1 is constructed with a female die or dies, *s*, in its circumference. The bottom of this die has a frog, *t*, set on it for forming the bevel or concave on the upper side of the shoe, and the sides of the die-cavity are inclined outward, so as to have an under bevel at all points, as shown at *u*. These sides are formed on laterally sliding circular collars or flanges F^3, having long hubs, which fit upon the shaft of the roller F^1, and are kept from turning independently of the roller by feathers or keys. Through the roller, or into each of its ends, spiral springs *v* are placed, and against these flanges F^3 are set, and by means of the springs the flanges are caused to slide when freed from restraint. N N are cam projections on the frame A, and N′ N′ cam-notches in the ends of the hubs of the flanges F^3. When the notches N′ coincide with the cams N, the springs are free to slide the flanges, and thereby open the die *s;* but when the cams and notches do not coincide the die is closed and the springs cannot open them. In the drawings, Figs. 1 and 2, I have illustrated how the flanges of the die *s* may slide and expand the die for the purpose of discharging a shoe that has been bent and pressed by the machine. The circumference of the roller F^1 is grooved and scored in order to afford the necessary room for the toggle and projecting portions of the roller F, and in the cam-collars *i i* of the shaft E notches are cut in order to allow the bearing-levers to move out of the way when the widest portion of the male die comes in contact with the rollers on their front ends. The roller F^2 has a finishing male die or dies, W, upon its circumference, which exactly fit the female dies *s*, and by means of these two dies coming together the shoe is pressed as thin as desired on its inner side, or that side

where the concave is formed, while on the outer edge the shoe is pressed so as to have, when in use, an inward inclination from top to bottom.

It will be understood that the bottom of the die *s* is straight, and that as the back roll travels over the shoe it is pressed down to a straight surface, and is confined under the edge of the die *s*, from whence it is delivered, when the die W is out of the die *s*, by the notches N′ N′ coming in a coinciding relation with cam-projections N, and the springs being allowed to expand the die *s*, as before described.

By my plan I effect four very important objects: First, the concave of the shoe is produced, and the degree of thinness is far greater than has heretofore been effected by rolling in horseshoe-machines; second, the outer edge of the shoe is inclined inward; third, the shoe is turned out straight, and there is no necessity for passing it through a straightening process; fourth, the shoe being formed in a die, instead of around a die, the heavy fin which presses out at the side of the shoe, as heretofore made, is avoided, and the expense of taking it off with an emery-wheel saved.

The machine is operated by a pulley-shaft, O, on which is a fast and loose pulley, P P^1, and a small pinion, P^2, and a balance-wheel, P^3. Pinion P^2 gears with a master spur-wheel, Q, on the shaft of the roller F^1. On the same shaft there is a spur-wheel, R, which gears with two spur-wheels, S and T, of the same diameter, but these are on the shafts of the rollers F F^2, as shown.

Motion being imparted to the pulley-shaft, the pinion on it sets in motion the large spur-wheel, and this sets in motion the spur-wheel of roller F^1, and this wheel, in turn, sets in motion the wheels of rollers F and F^2, and also the bevel-wheel *e*, and this sets in motion the pinion *d* of the clutch-shaft, on which is the crank-plate for operating the feed.

What I claim as new is—

1. The combination, substantially as described, of the toggle-lever *o*, having the cam *o′*, and carrying the sliding carrier *m*, with the roller F, spring *r*, and stop M, for the purpose set forth.

2. The under bevel *u*, formed on the inner walls of the two halves F^3 F^3 of an expansible horseshoe-die, said halves having hub-extensions, and being applied upon a revolving support, G′, substantially as and for the purposes described.

3. The combination, substantially as described, of the flanged hubs F^3 on the shaft G′, forming the expansible die, and having cam-shaped ends N′, with the spring V and projections N, for the purposes set forth.

4. The combination, substantially as described, of the roller F, male die *j*, sliding carrier *m*, stop M, roller F^1, expansible die *s*, roller F^2, die W, and side rollers *h h* on levers I I, for the purposes set forth.

5. The combination, substantially as described, of the stationary pawls a^1, spring a^2, sliding pawls *a*, geared together by pinions *c*, spring *d*, trip-arm c^2, and crank-pin c^1, for the purposes set forth.

6. The combination, substantially as described, of the cutting and swaging shears *f* f^1 with a feeding device of a horseshoe-machine, for the purposes set forth.

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