(Model.) 5 Sheets—Sheet 1

L. S. PARRÉ.

Machine for Forging Horseshoe Nails.

No. 241,413. **Patented May 10, 1881.**

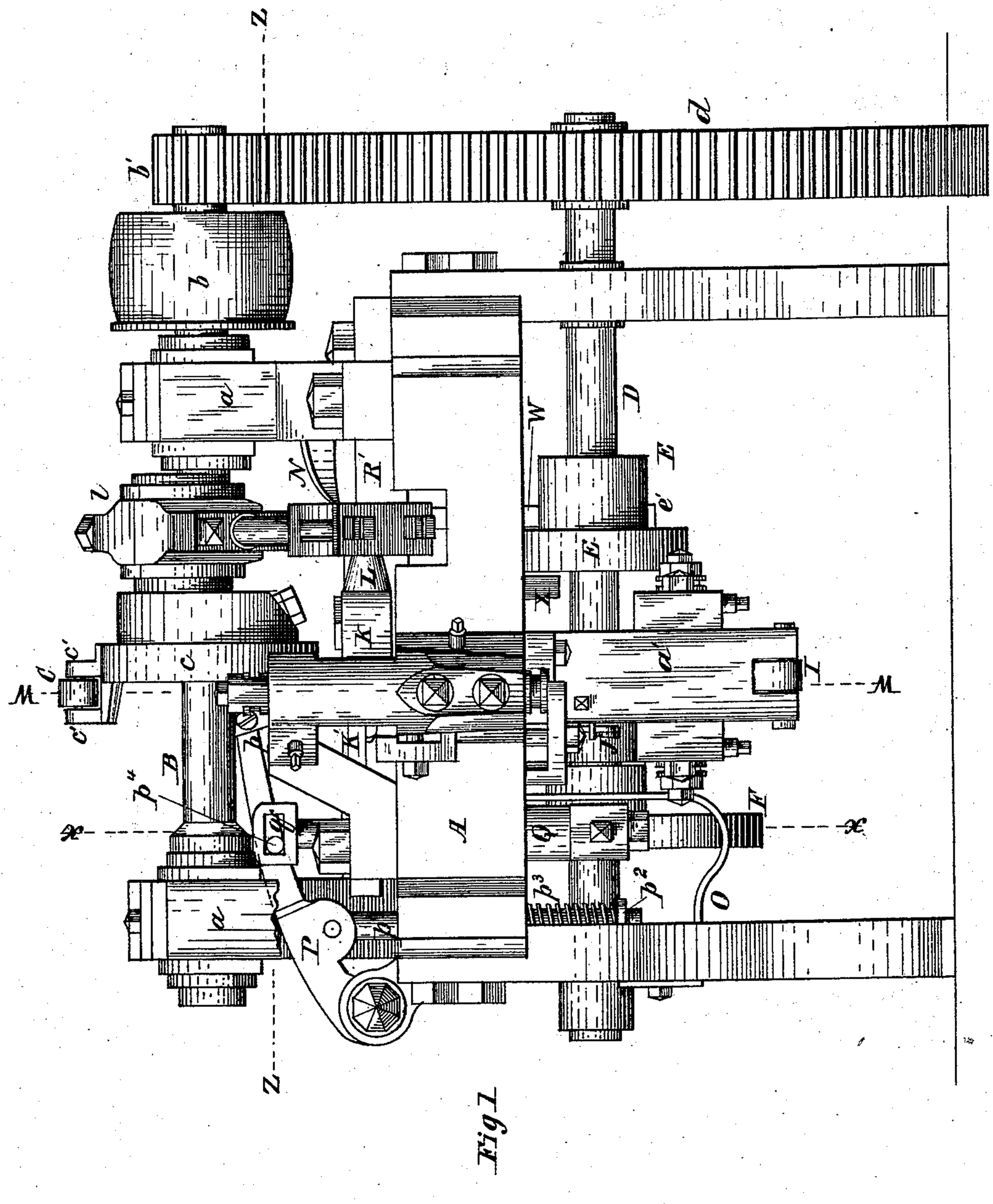

Fig 1.

Witnesses

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(Model.) 5 Sheets—Sheet 2.

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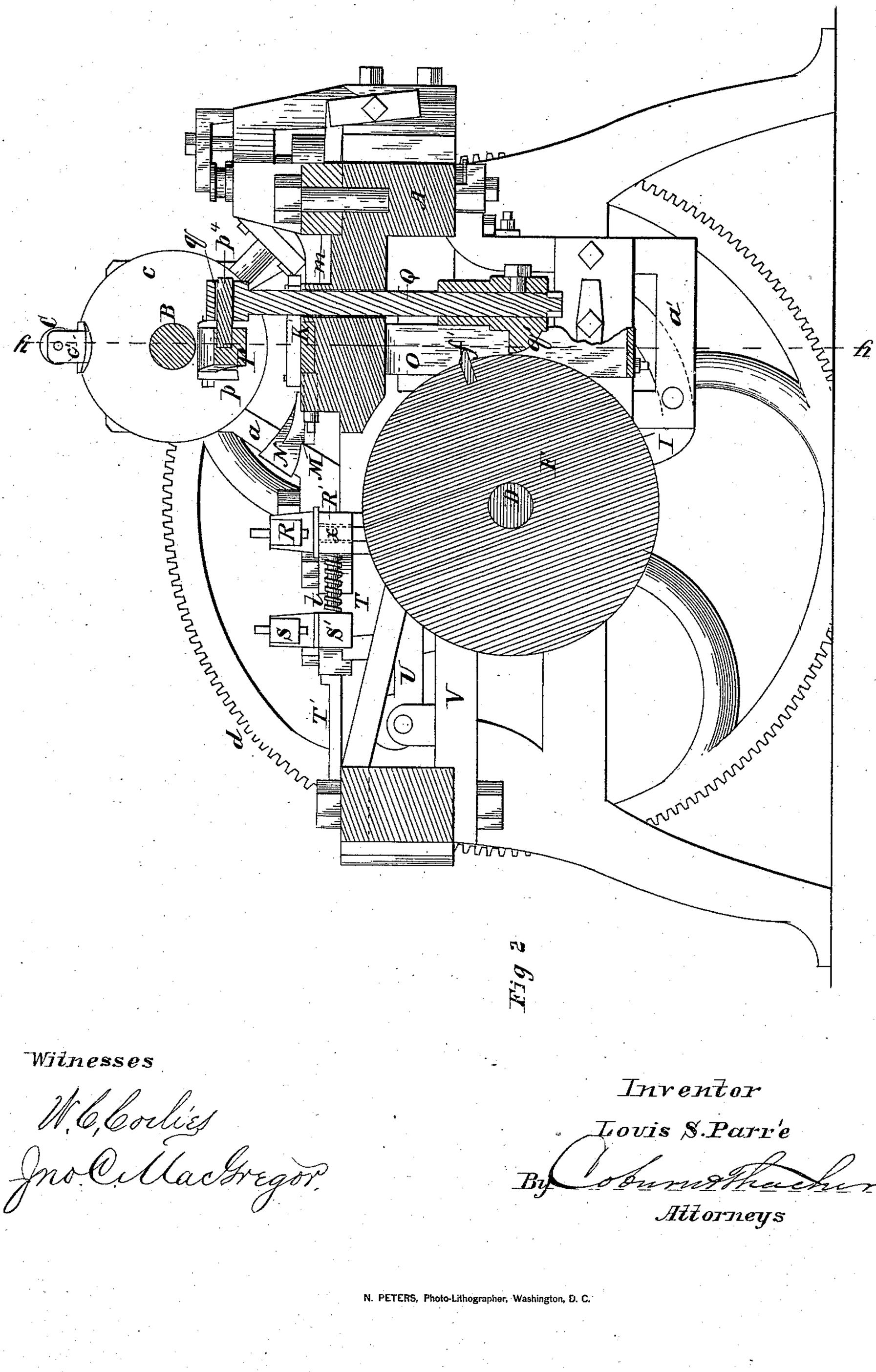

Fig 2

Witnesses

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(Model.) 5 Sheets—Sheet 3.

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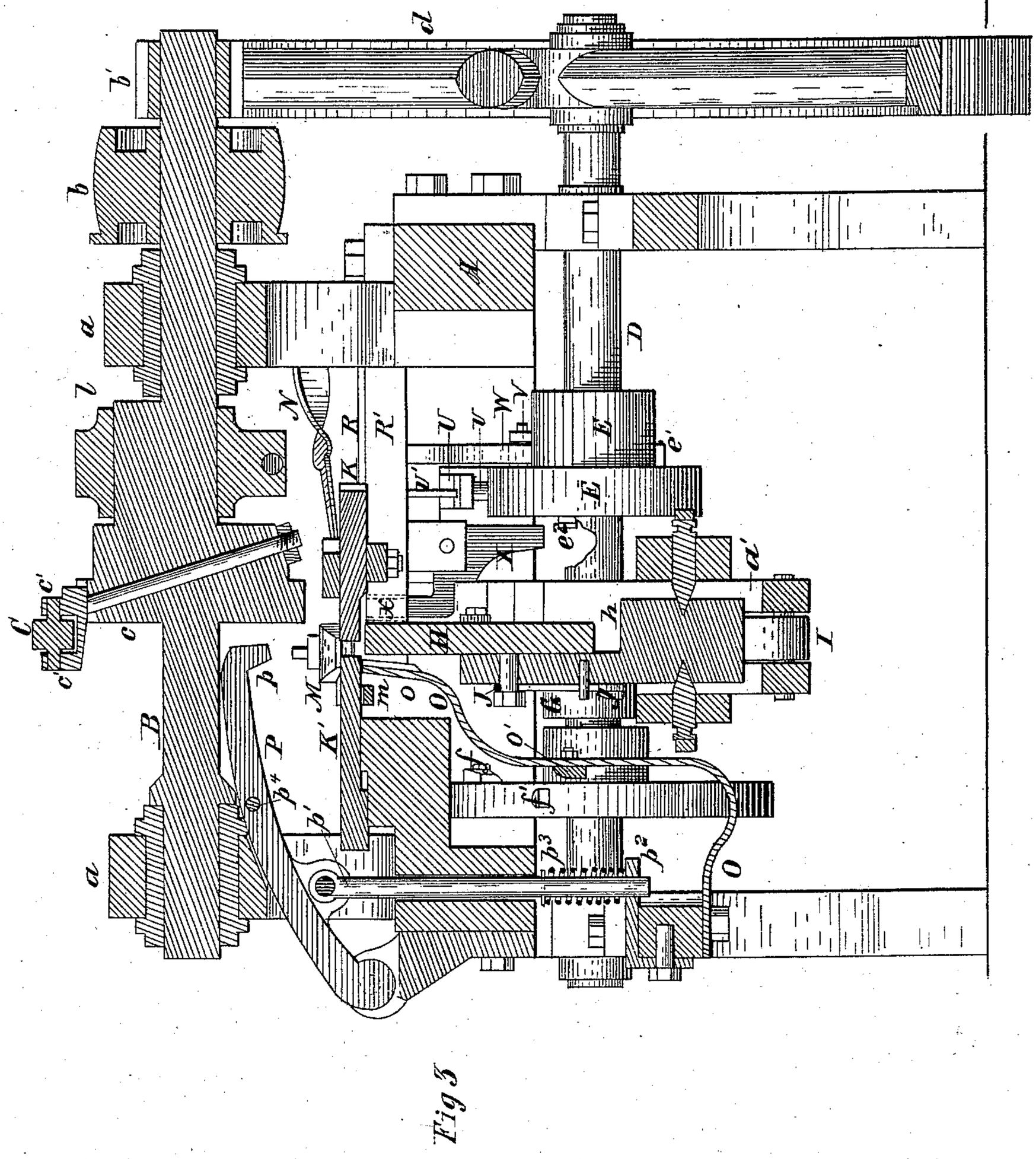

Fig. 5.

Witnesses

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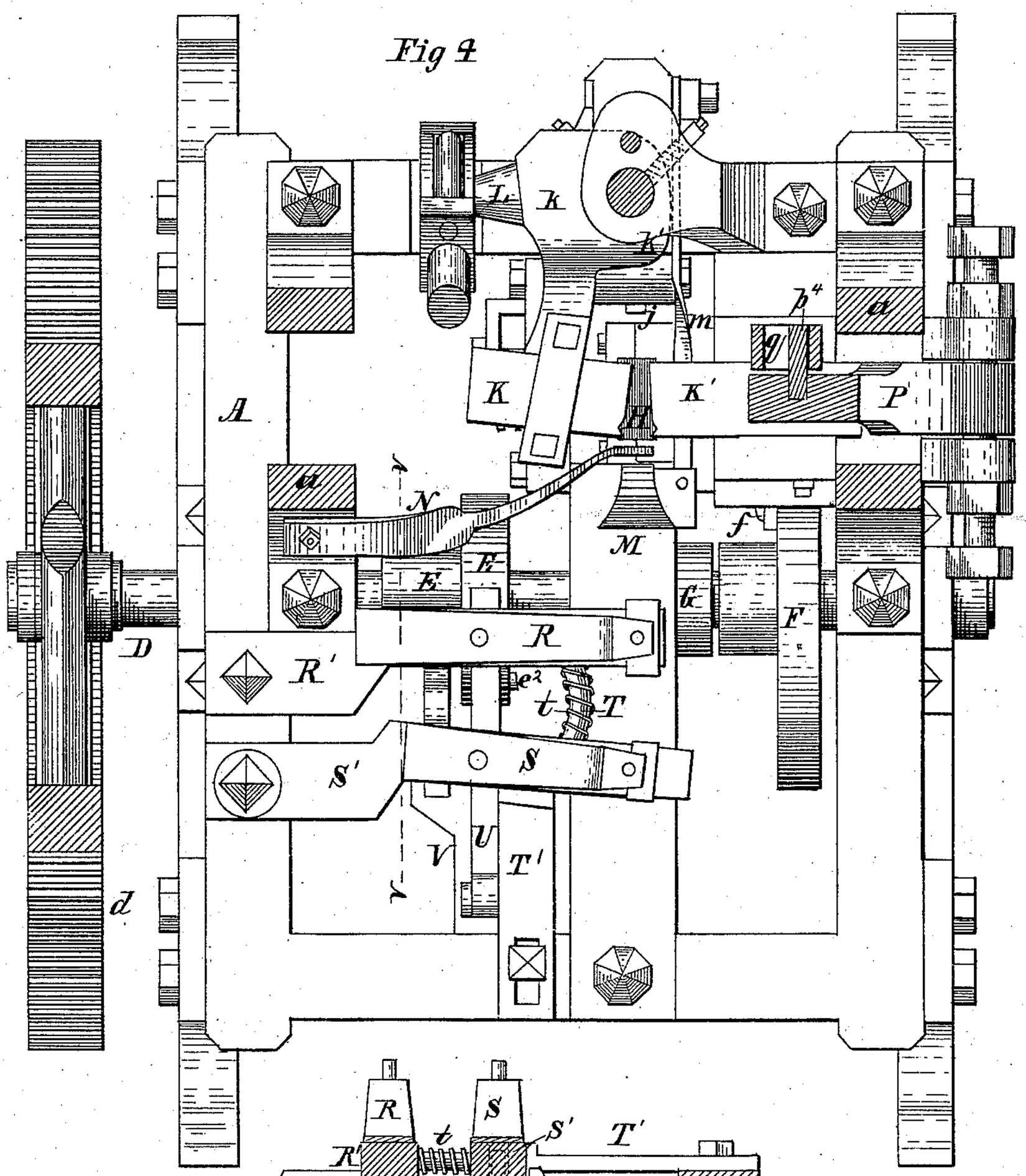
(Model.) 5 Sheets—Sheet 4.

L. S. PARRÉ.

Machine for Forging Horseshoe Nails.

No. 241,413. **Patented May 10, 1881.**

Fig 4



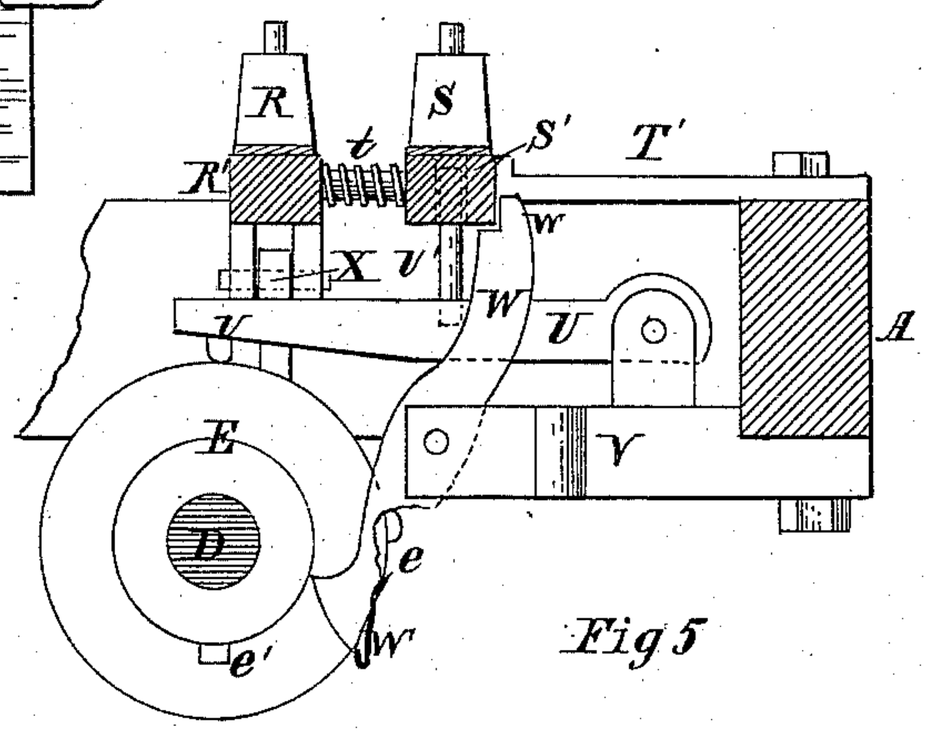


Fig 5

Witnesses

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(Model.) 5 Sheets—Sheet 5.

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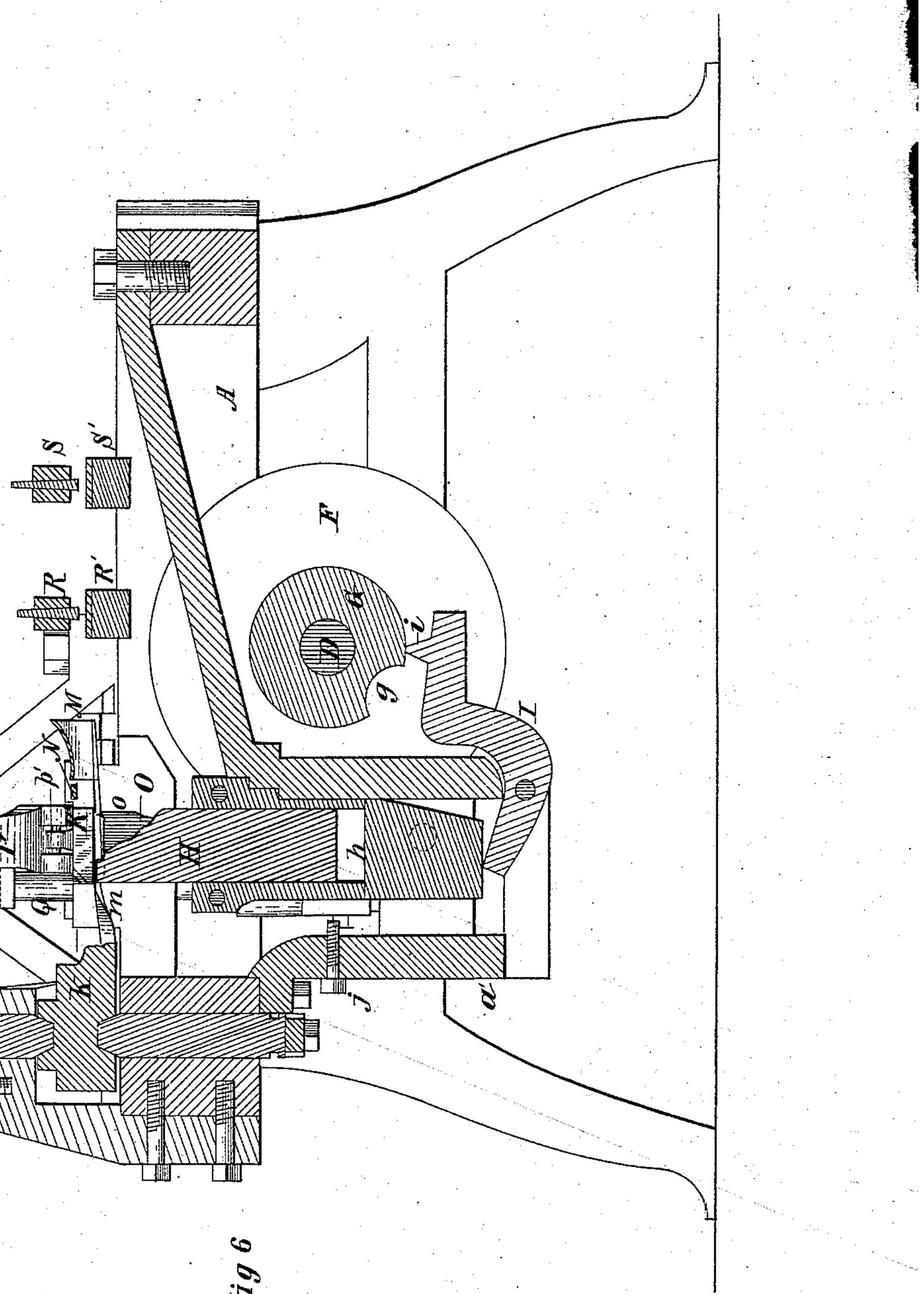

Fig 6

Witnesses

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UNITED STATES PATENT OFFICE.

LOUIS S. PARRÉ, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO ABRAHAM W. KINGSLAND, OF SAME PLACE.

MACHINE FOR FORGING HORSESHOE-NAILS.

SPECIFICATION forming part of Letters Patent No. 241,413, dated May 10, 1881.

Application filed March 8, 1880. (Model.)

To all whom it may concern:

Be it known that I, LOUIS S. PARRÉ, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Forging Horseshoe-Nails, which are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a rear elevation of a machine embodying my improvements; Fig. 2, a vertical section of the same, taken on the line *x x*, Fig. 1; Fig. 3, a transverse vertical section taken on the line *y y*, Fig. 2; Fig. 4, a plan section taken on the line *z z*, Fig. 1; Fig. 5, a detail vertical section taken on the line *v v*, Fig. 4, and Fig. 6 a longitudinal section taken on the line *w w*, Fig. 1.

My invention relates to machines for forging horseshoe-nails in which a revolving roller-hammer is employed in connection with a striking-hammer; and its object is to effect the cutting of the nail and feeding forward of the rod without losing a stroke of the roller-hammer, and also to feed the rod to the dies automatically.

The invention consists in various devices and combinations of devices for accomplishing these purposes. The construction of these devices and one mode of organizing them in an operative machine will be hereinafter fully described, and the special improvements which are believed to be new pointed out definitely in claims.

In the drawings, A represents the main or supporting frame of the machine, which may be of any suitable construction adapted to receive and sustain the several operative parts of the machine, and to provide bearings wherever they are required. A main or driving shaft, B, is mounted on suitable standards *a* rising from the bed of the main frame, and constructed to receive suitable journal-bearings for this shaft. A driving-pulley, *b*, is fastened on one end of this shaft, outside of one of the standards, and outside of it is a small pinion, *b'*. The roller-hammer C is also mounted on this shaft, being attached to a cylinder, *c*, secured to the shaft. In machines of this class heretofore this roller-hammer has been arranged directly over, or in the same plane with, the cylinder by which it is carried. I arrange the standards *c'*, in which the roller-hammer is mounted, in such way that one of them stands entirely outside of the cylinder, so that the roller-hammer itself, when mounted in its bearings, is just outside the plane of the cylinder, or overhangs the latter, as shown in Fig. 1 of the drawings. In other respects this roller-hammer and its carrying-cylinder are of any usual construction.

Underneath the bed of the main frame is a second shaft, D, mounted in bearings on suitable side bars belonging to the frame of the machine. On one end of this shaft, outside of the frame, is secured a large gear-wheel, *d*, which engages with the pinion on the driving-shaft, from which latter motion is communicated to the lower shaft.

On the lower shaft, D, within the frame and next to the gear-wheel *d*, is a cam, E, and on the opposite end of the shaft is another cam, F, while between the two is a third smaller cam, G, all of which are fastened to the shaft in any suitable manner, and the functions of which will be presently described.

The anvil H is supported by a suitable hanger, *a'*, beneath the bed of the frame. The anvil is mounted in a carrier or holder, *h*, which is pivoted at its lower end to the hanger, the line of the pivot being parallel to the shaft of the roller-hammer, thereby providing for the vibration or swinging of the anvil in a direction at right angles to said shaft, or in other words in line with the line of action of the roller-hammer. The anvil is arranged directly underneath the roller-hammer and is held up in suitable working position with reference to the latter by means of a lever, I, pivoted to the lower end of the hanger and arranged with its outer end bearing up against the lower end of the anvil-carrier at a point in rear of the pivot of the latter, while its inner end is carried underneath the cam G, and is provided with a projection, *i*, working against the face of this cam, which holds the anvil in proper position for the operation of the roller-hammer so long as the regular circular portion of the cam remains in contact with the lever. At a certain point in the cam there is a depression, *g*, into which, at each revolution of the cam, the

projection on the lever drops, thereby for the moment relieving the anvil from the cutting of the lever.

two bars, which operates to hold the bars apart unless otherwise actuated.

A gage, T′, is attached to the front end of the frame, and extends rearward to limit and regulate the backward throw of the swinging clamp-arm. This gage is slotted to provide for adjustment. Underneath the clamp-arms and at right angles thereto is a lever, U, pivoted at its forward end to a suitable support or bracket, V. At its inner end it is provided with a projecting pin or cam, *u*, on its under side, with which a projection, *e*, on the rim-face of the cam E comes in contact, to raise the lever at the proper moment. Between the pin *u* and the pivot of the lever is a pin, *u′*, resting loosely in a recess or socket in the upper side of the lever and passing up through the clamp-bar S′ until its upper end strikes the clamping-spring S, thereby providing for slightly raising the clamping-spring by throwing upward the lever. An upright lever, W, is also pivoted to the bracket V, the upper end of which is provided with a toe, *w*, projecting up just in front of the pivoted clamp-bar S′. The lower end of this lever is bent and shaped to form a cam, *w′*, which is actuated by a cam-projection, *e′*, on the smaller rim of the cam E, to vibrate the lever at the moment desired, to throw forward the clamp-arm S′.

A bell-crank lever, X, is pivoted to suitable brackets depending from the lower side of the clamp-bar R. The lower end of the lever passes down by the side of the inner cam, E. The upper end of this lever is provided with a pin, *x*, which passes up through a hole in the clamp-bar R′ until it strikes the under side of the spring-clamp R. A cam-projection, e^2, on the inner face of the cam E strikes against the lower end of the lever X at the proper moment to vibrate the latter outwardly, thereby raising the upper end and slightly lifting the spring-clamp R to release its hold upon the rod.

The operation of this machine is as follows: The pinion on the driving-shaft and the gear-wheel *d* are constructed with such a relative number of teeth that a certain definite number of revolutions of the main shaft will be required to effect one revolution of the shaft D, which, for convenience, may be called the "cam-shaft." The several devices above described are constructed, arranged, and timed so as to move at the proper intervals to secure the operations and in the order as hereinafter named. Suppose, now, the parts are in the position shown in Fig. 1 of the drawings, just after the cutters have been operated, the anvil being returned to working position and the roller-hammer about to descend, and suppose the rod to be placed underneath the spring-clamps R and S, and projecting upon the anvil just sufficient to form a nail-blank, the rod will be held in position by the clamps, and the machine being set in motion, the blank will be forged by the combined operation of the roller-hammer, anvil, striking-hammer, and stationary die, in the usual manner in machines of this description. In the drawings the relation of the gears is such that nine revolutions of the main shaft are required to produce one revolution of the cam-shaft. These nine revolutions will give nine strokes of the roller-hammer and nine strokes of the side-striking hammer, which will produce the nail-blank. The elastic vibrating support M and spring-support N prevent the blank from sticking to the dies during this operation. Just as the ninth stroke of the hammer is made the anvil is vibrated to the rear beyond the face of the stationary die, and at the same time the lower cutters are thrown inward into the place lately occupied by the anvil, and the upper cutters are brought down to cut off the nail which lies between the cutters *o* and *p*. The instant the cutting is performed the cutters are released and spring back to their former positions, and at the same time the inner clamp, R, is released and the outer clamp, S, is swung forward to feed the rod forward the proper distance. The instant this feed is accomplished the outer clamp, S, is released, and the inner clamp, R, is let down upon the rod, when the clamp S swings back to its former position and again takes hold of the rod. Simultaneously with the feed the anvil springs back to its working position. All of these movements of the cutters, feed mechanism, and return-vibration of the anvil, are effected during the single revolution of the main shaft and before the roller-hammer is brought round to make another stroke after finishing the last or ninth stroke, which completes the blank. It will thus be seen that not a single stroke of the roller-hammer is lost, the tenth stroke being, in fact, made when all the parts are again in working position, so that it becomes, in fact, the first stroke in making another blank. During this revolution of the main shaft there is, however, a single vibration of the striking-hammer completed just after the blank is cut off and at the moment the cutters spring out of the way. This vibration of the striking-hammer is, therefore, useless, but with this exception there is no lost motion in the entire operation of the machine. This advantage is obtained from the peculiar arrangement of the cutters in connection with the vibrating anvil, and the construction and arrangement of the cutters, which permit them to be operated in the place of the anvil without attaching them to movable parts, are rendered possible only by the overhanging arrangement of the roller-hammer.

Obviously, therefore, the nail-blanks are forged and cut by this machine with a less number of strokes than with machines heretofore used, in which there has always been one or more lost strokes while the blank was cut off and the rod fed forward. This result is believed to be of very great advantage in the operation of my improved machine. At the same time it will be noticed that the main operative parts are independent of each other, so that the anvil may be removed without affecting the cutters, and vice versa, and also any one

of the hammers removed without disturbing any of the other parts. This independence of construction and operation is also believed to be an advantage in my machine, and it will be seen that the cutters, anvil, and hammers are operated by separate mechanisms, so that either one may be operated without absolute dependence upon the others.

The arrangement of the roller-hammer overhanging its supporting-carrier is a very important improvement, for it is this construction which enables me to hold the upper cutters in a state of rest underneath the driving-shaft in the plane of the roller-hammer, so that the latter in its revolutions passes under the cutters. This permits the cutters to be operated quickly without moving their support bodily into working position, and without moving the nail after it is formed, so that the whole operation of cutting and feeding is accomplished during a single revolution of the hammer-shaft.

I have shown in the drawings, and described above, a machine so geared that nine strokes are made in forging a single nail-blank. This is a merely arbitrary relation, however, and is a larger number of strokes than is really required to forge a blank, as I have found by actual experiment that seven, or even less, blows in my machine are sufficient for this purpose, so that I am able to make a nail-blank for every seven revolutions of the main or roller-hammer shaft and a single revolution of the cam-shaft without the loss of any motion whatever, except a single stroke of the side hammer—a result which, so far as I know, has never been obtained in any nail-forging machine heretofore used or invented.

I have herein shown and described a complete machine, including all the devices and mechanisms organized for practical use. Obviously, however, many of these devices may be modified in construction and arrangement, and to some extent in organization, so long as the advantageous results which constitute the gist of my invention are obtained in substantially the same manner.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a horseshoe-nail machine, the combination of the following elements: a revolving roller-hammer, an anvil mounted on a pivotal support, mechanism whereby the anvil is alternately held stationary and then oscillated in the plane of revolution of the said hammer when the nail is forged, cutters for severing the forged nail, and mechanism to cause the cutters to take the place of the anvil to cut off the nail.

2. In a horseshoe-nail machine, the combination of the following elements: a revolving roller-hammer, a pivoted anvil, a stationary side die and a side-striking hammer, and mechanism whereby the anvil is alternately held stationary and then oscillated in the plane of rotation of the roller-hammer on the completion of the forging operation.

3. In a horseshoe-nail machine, a revolving roller-hammer, in combination with a pivoted anvil, mechanism whereby the said anvil is held stationary during the forging of the nail and then oscillated to permit the cutters to operate, cutters mounted independently of the anvil, and mechanism for operating the said cutters, whereby the nail is cut off when the anvil is moved out of the way without moving the nail, substantially as described.

4. In a horseshoe-nail machine, a revolving roller-hammer, arranged to overhang the carrier by which it is revolved, in combination with the vibrating anvil and upper cutters, arranged to vibrate in a plane perpendicular to the plane of revolution of said hammer and to cut the nail without removing it from the path of the latter, substantially as described.

5. In a horseshoe-nail machine, a revolving roller-hammer arranged to overhang its carrier, in combination with the vibrating anvil, and a vibrating cutter arranged to stand while in a state of rest over the anvil and in the plane in which said hammer revolves, substantially as and for the purpose set forth.

6. In a horseshoe-nail machine, a pivoted anvil, in combination with mechanism for oscillating the anvil at intervals, a revolving roller-hammer overhanging its carrier, and a vibrating cutter arranged to operate in the place of the anvil when moved from its working position, and to stand while at rest between said anvil and the hammer-shaft, substantially as described.

7. In a horseshoe-nail machine, a revolving roller-hammer overhanging its carrier, in combination with a pivoted anvil arranged to oscillate in the plane of the roller-hammer, and independent vibrating upper and lower cutters, operating to cut the nail in the place of the anvil when removed, substantially as described.

8. In a horseshoe-nail machine, a revolving roller-hammer, in combination with an oscillating anvil arranged to stand stationary during the forging operation and then to oscillate from its working position, a side stationary die, a side-striking hammer, cutting devices for cutting off the nail when formed, feeding devices for feeding forward the rod, and mechanism for holding and oscillating the anvil, whereby the latter is moved out of its working position and again returned, and the cutting and feeding devices are operated to cut off the nail and feed forward the rod, all during a single revolution of the roller-hammer, to prevent any lost stroke of the latter, substantially as described.

9. The roller-hammer C, arranged to overhang its carrier *c*, in combination with the oscillating anvil H and cutters *p*, mounted on the pivoted vibrating arm P, all arranged and operating substantially as described.

10. The cutters *o*, mounted on an elastic support, O, in combination with the cam F, provided with the side cam-projection, *f*, substantially as described.

11. The pivoted anvil, in combination with the spring J, lever I, provided with the cam-

projection *i*, and cam G, provided with depression *g*, substantially as described.

12. The spring-clamp S, mounted on the pivoted bar S′, in combination with the lever W, and cam E, provided with the cam-projection *e′*, substantially as and for the purpose set forth.

13. The spring-clamp R, mounted on a stationary support, in combination with the spring-clamp S, mounted on the vibrating bar S′, the lever U, provided with pins *u u′*, the bell-crank lever X, provided with pin *x*, the lever W, and the cam E, provided with the cam-projections *e′* and e^2, substantially as and for the purpose set forth.

14. In a horseshoe-nail machine, a pivoted anvil arranged to stand stationary while the nail is forged, in combination with a revolving roller-hammer arranged upon a shaft above the anvil, mechanism whereby the anvil is vibrated at the completion of the forging operation to remove it from underneath the nail, upper cutters arranged above the anvil, and mechanism whereby said cutters are vibrated in the plane of revolution of the roller-hammer to cut off the nail in the place of the anvil when removed, substantially as described.

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