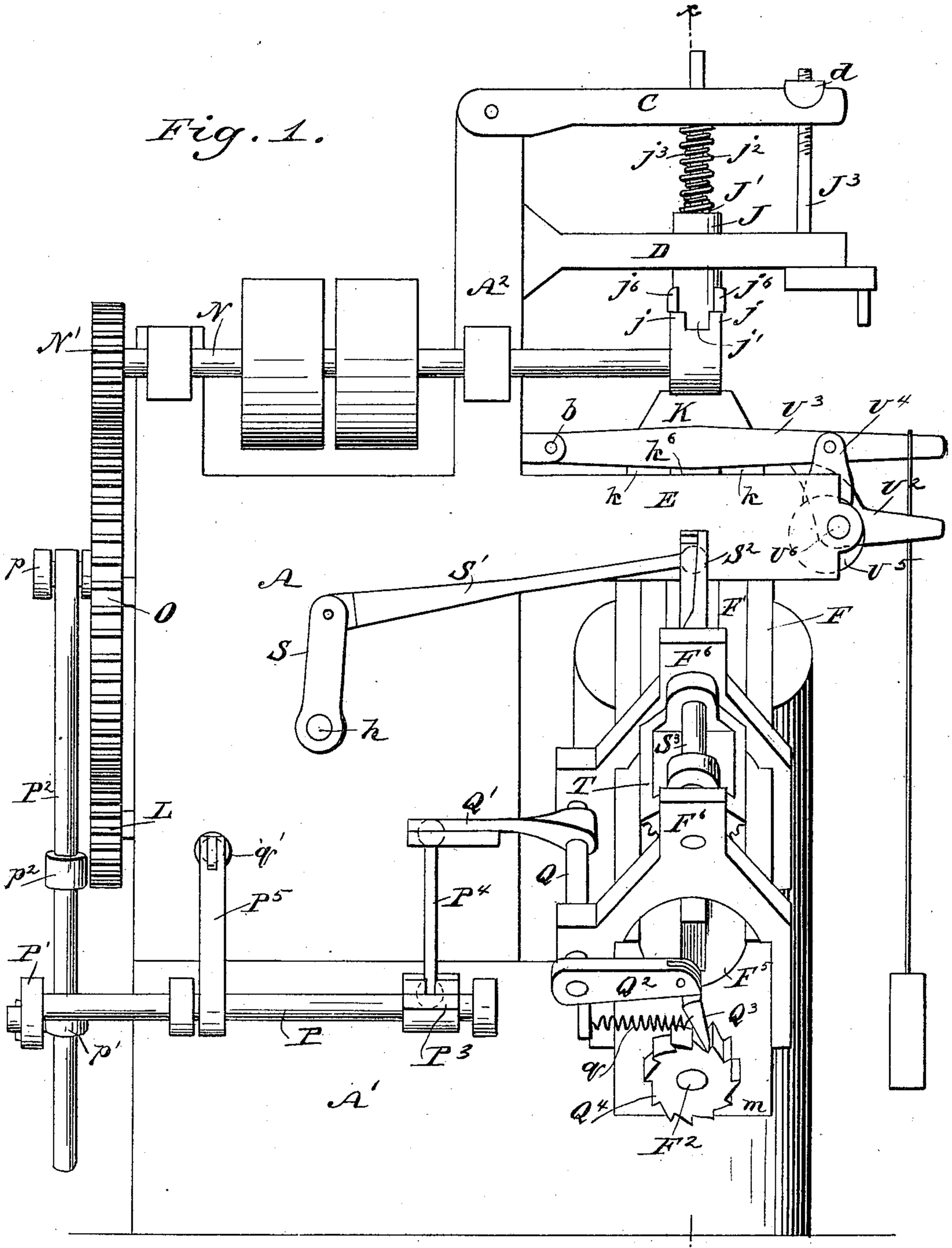
(No Model.) 5 Sheets—Sheet 1.

P. S. STOKES.

RASP CUTTING MACHINE.

No. 397,254. Patented Feb. 5, 1889.

Fig. 1.



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RASP CUTTING MACHINE.

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Fig. 2.

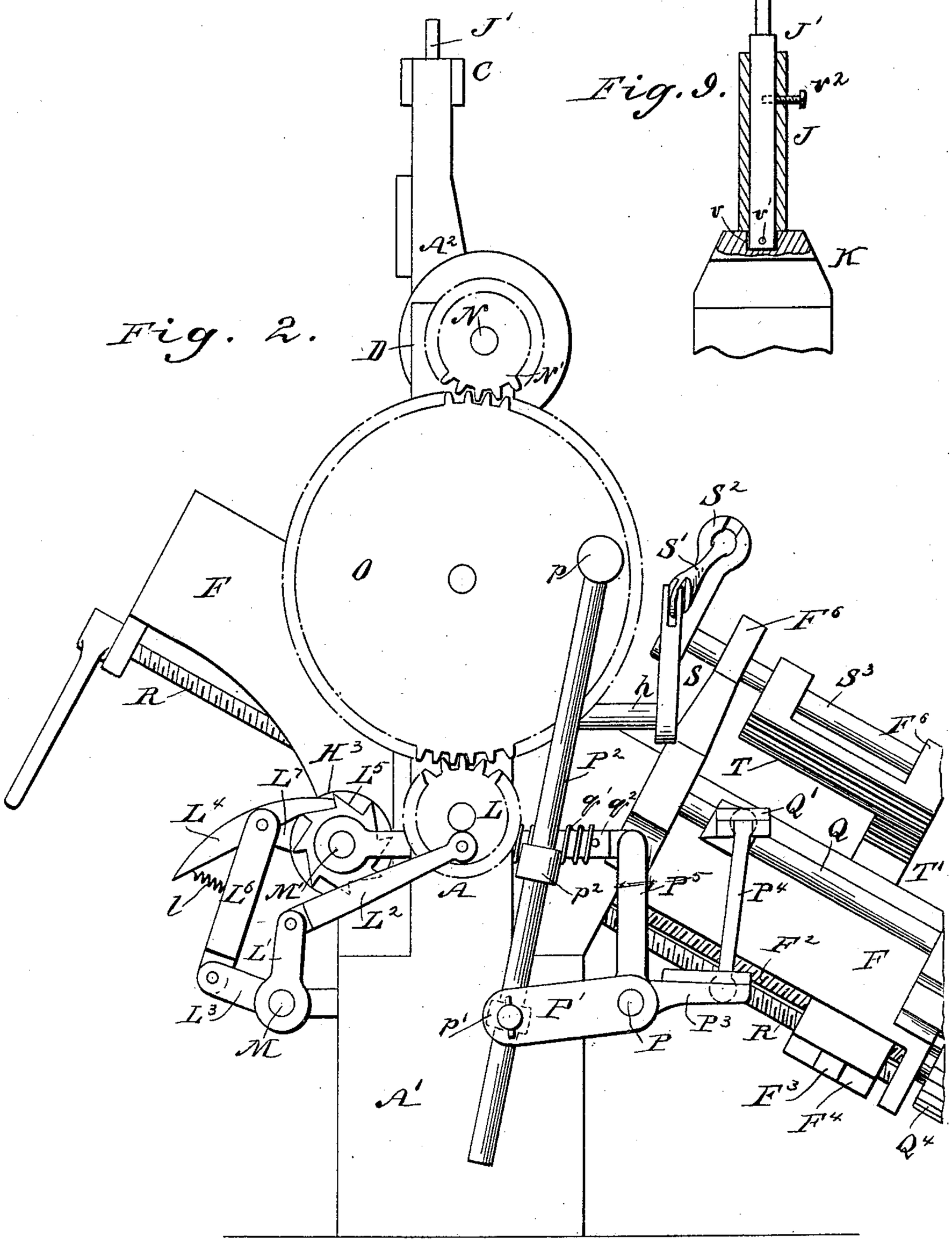

Fig. 1.

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RASP CUTTING MACHINE.

No. 397,254. Patented Feb. 5, 1889.

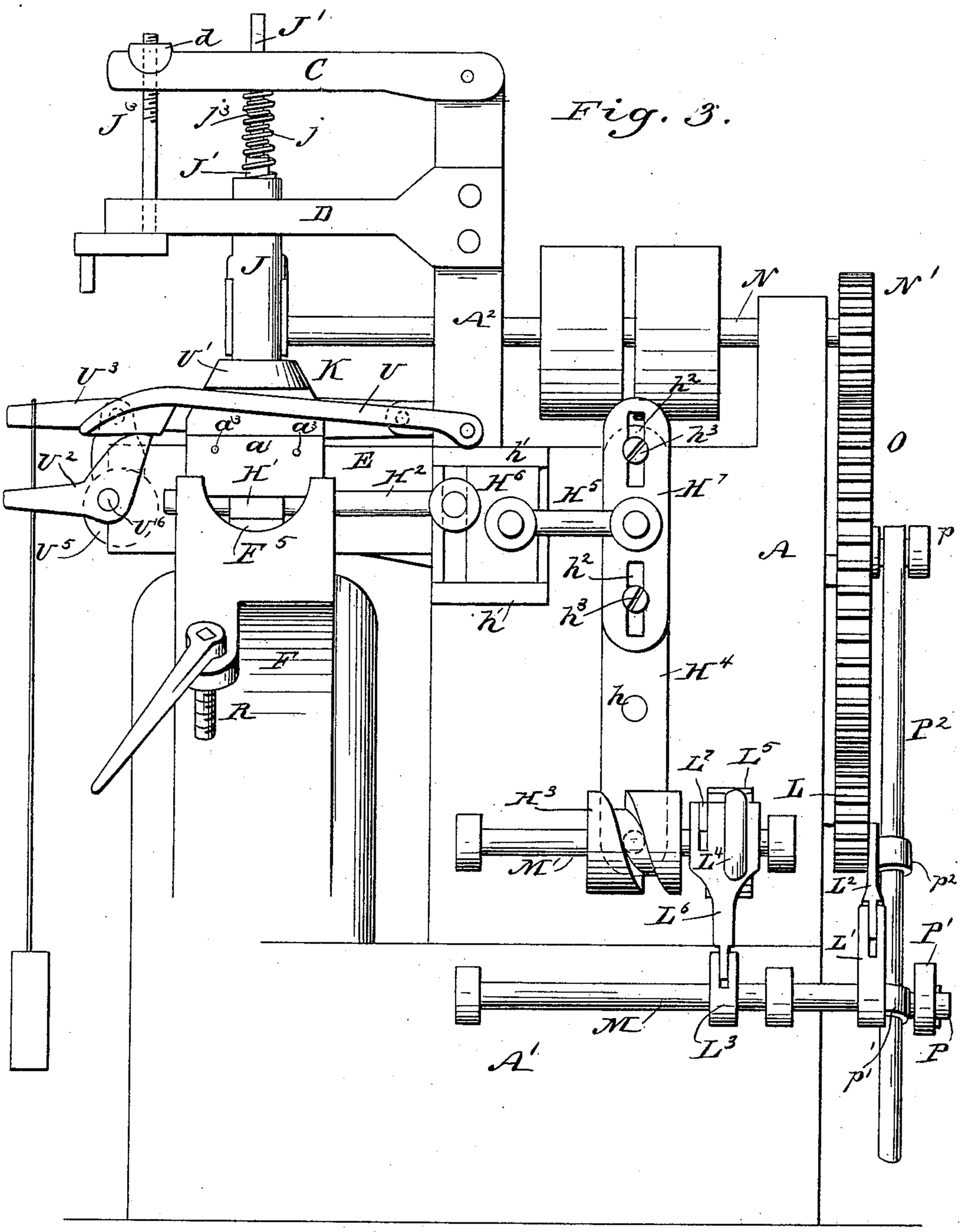

Fig. 3.

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RASP CUTTING MACHINE.

No. 397,254. Patented Feb. 5, 1889.

Fig. 5.

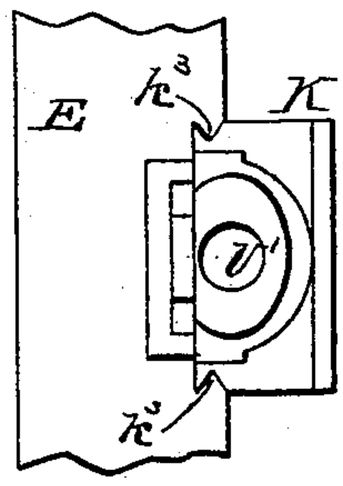
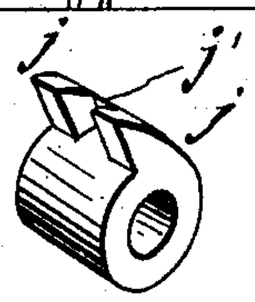


Fig. 4.

Fig. 6



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(No Model.) 5 Sheets—Sheet 5.

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RASP CUTTING MACHINE.

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Fig. 10.

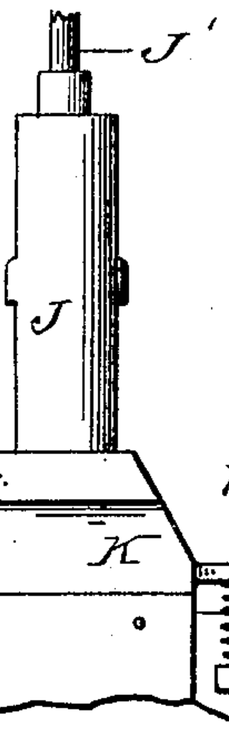


Fig. 7.

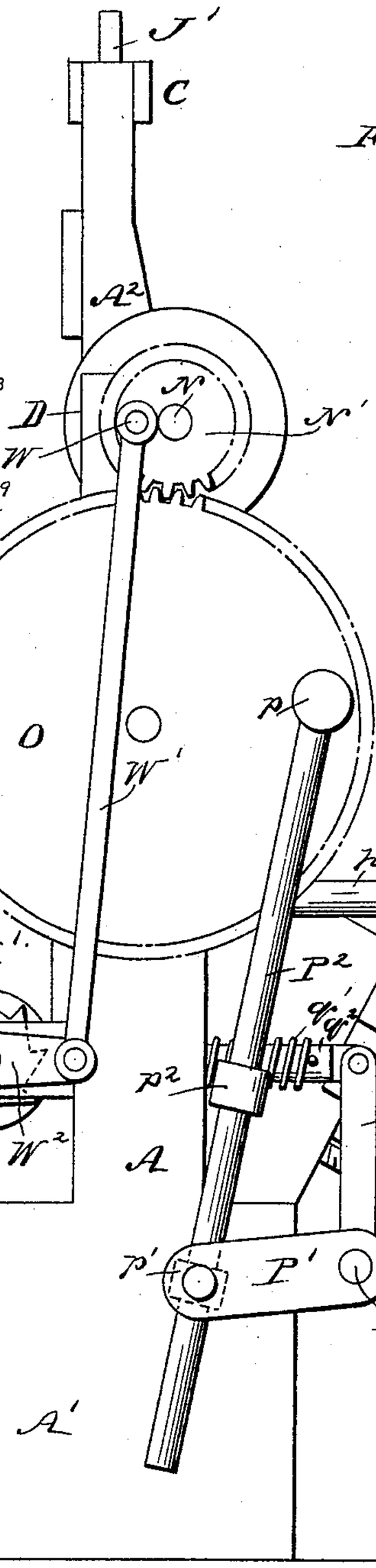
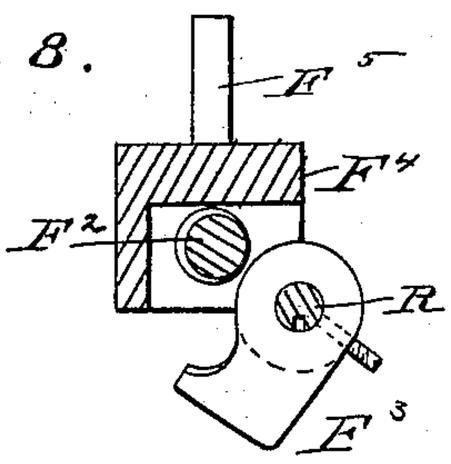


Fig. 8.



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UNITED STATES PATENT OFFICE.

PHILIP S. STOKES, OF TENNENT, NEW JERSEY.

RASP-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 397,254, dated February 5, 1889.

Application filed October 5, 1888. Serial No. 287,298. (No model.)

To all whom it may concern:

Be it known that I, PHILIP S. STOKES, of Tennent, in the county of Monmouth and State of New Jersey, have invented a new and Improved Rasp-Cutting Machine, of which the following is a full, clear, and exact description.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a front elevation of the machine. Fig. 2 is a side elevation of the same. Fig. 3 is a rear elevation of the machine. Fig. 4 is a sectional elevation taken on the line x x of Fig. 1. Fig. 5 is a detailed plan view of a portion of the arm E and the anvil-frame. Fig. 6 is a perspective view of the cams for lifting the hammers. Fig. 7 is a side elevation showing a modification. Fig. 8 is a detail view of the feed-screw F^2, yoke, and hinged plate. Fig. 9 shows a modification of the anvil-frame and hammers, and Fig. 10 shows the anvil-frame arranged to be lifted by springs.

A represents the main upright portion of the frame of the machine, mounted upon the base A′. Rising from one corner of the upright A is the post A^2, from which extend the pivoted horizontal arm C and the rigid horizontal arm D. Another horizontal arm, E, projects from the edge of the upright A, and between this arm and the base A′ is the inclined table F, which supports the feed-table F′, on which the rasp-blank G is held while being cut by the chisel or punch H, secured in the stock H′, which is pivoted on rod H^2, so that the punch will have a yielding and backward swinging action at the top while the point is entering the rasp-blank for lifting the tooth. The backward movement of the upper end of the stock H′ is against the pressure of the springs a, acting upon the plate a'. (Shown clearly in Fig. 4.) The said springs are placed in sockets a^2, made in the anvil-frame K upon rods a^3, passed through the springs, and screwed into the said plate a. These springs return the stock and punch to normal position—that is, to position to bring the punch in upright position—after each blow of the hammers, and they also prevent the tilting of the punch too readily until the point of the punch has entered the blank sufficiently to form the point of the tooth.

J J′ represent two hammers for driving the chisel or punch H into the rasp-blank, which hammers are respectively elevated by the cams j j' against springs j^2 j^3 and permitted to drop, delivering their blows, one preceding the other, upon the stock H′ and punch H. The said anvil-frame K is attached to the horizontal arm E of the main frame of the machine by the dovetailed ways k^3 k^3 at each side, as shown in Fig. 5; but any suitable means of attaching the anvil-frame to the arm E which will permit up-and-down movement may be adopted in place of the said dovetail ways. The bolt k' serves to hold the foot k^4, which serves in connection with the sliding plate k^6 and weighted lever U^3 (see Figs. 1, 3, and 6) to hold the rasp-blank solidly upon the bed. The bolt k' works in a slot, k^2. (Shown in Fig. 4.) The said anvil-frame receives no lateral movement; but the stock H′ and punch H are intermittently moved transversely across the blank to form the rows of teeth. The power for thus moving the stock and punch is derived from the cam H^3, (see Fig. 3,) which reciprocates the lever H^4, connected above its pivot h by rod H^5 to the sliding plate H^6, held in fixed ways h', and to which the rod H^2 is pivoted. By pivoting the said rod H^2 to the sliding plate H^6 the anvil-frame K is free to move up and down the short space required to clear the punch from the teeth formed in the blank. The connecting-rod H^5 is not connected directly to the lever H^4, but to an auxiliary plate, H^7, which is made vertically adjustable by means of bolts h^3 and slots h^2, so that the distance of each intermittent movement of the block H^6 may be varied to form teeth of greater or less size in the blank.

The cam H^3 is turned intermittently to impart the above-described motion to the punch, preferably by the means shown in Fig. 2, consisting of the crank L′ on shaft M, operated from the pinion L by connecting-rod L^2, the arm L^3 on said shaft M, intermediate arm, L^6, pawl L^4, and ratchet-wheel L^5, attached to the

shaft M′, on which the cam is secured. The intermediate arm, L^6, is attached to the shaft M′ by a link, L^7, and the pawl L^4, pivoted at the upper end of the said intermediate arm, is acted upon by a spring, *l*, for holding said pawl in contact with the teeth of the ratchet-wheel. The pinion L is revolved from the drive-shaft N through the pinion N′ and large intermediate gear, O.

The shaft N carries the above-mentioned cams *j j* and *j′*, (see Fig. 6,) which lift the hammers J J′. The central cam, *j′*, lifts the small hammer J′ by acting upon the arm j^5. This hammer is by preference inclosed by the hammer J, which is made tubular for that purpose, and a slot, j^4, is formed for the arm j^5. The upper end of the hammer J′ works in a passage formed in the above-mentioned pivoted arm C, and the spring J^3 of said hammer is comparatively light, and the cam *j′* precedes the cams *j j*, so that with every revolution of the shaft N and the cams the hammer J′ will be lifted and will deliver a light preparatory blow upon the anvil-frame K before the main hammer J descends.

The cams *j* act upon the arms j^6, attached to the hammer J, and the spring j^2 of said hammer is very heavy, so that the blow delivered by the hammer J will sink the punch the proper distance into the rasp-blank and lift the teeth the proper height. The pressure of the springs j^2 j^3 may be regulated by the adjusting-screw J^3, which works in the fixed arm D and in a screw-cap, *d*, attached to the pivoted arm C. The lower ends of the springs rest upon shoulders formed on the hammers, as shown clearly in Fig. 4.

By the employment of the two hammers, as described, one delivering a light blow preceding the heavy blow of the other, the point of each tooth is made very perfect and sharp, and danger of breaking the point of the punch is in a great measure obviated.

With each blow of the hammers upon the anvil-frame the punch-stock and the punch are shifted one tooth until a row of teeth are formed across the rasp-blank G. At this time the feed-table F′ is moved upward the distance of the space between the rows of teeth by the feed-screw F^2, so that the opposite intermittent movement produced by the cam H^3 will form another row of teeth across the blank, and with each row of teeth formed the feed-screw F^2 will be turned, moving the feed-table F′ and blank G upward to the punch. The said feed-screw F^2 is journaled in the plates *m m*, and is connected to the feed-table F′ by the yoke F^4, arm F^5, and hinged screw-plate F^3 on rod R, and is revolved intermittently from the large gear-wheel O. The mechanism for this purpose consists, by preference, of the shaft P, Figs. 1 and 2, arm P′, attached thereto, and the rod P^2, connected to the gear-wheel O by the crank-pin *p*. The rod P^2 passes through an eye, *p′*, attached to the arm P′, and is provided with a collar, p^2, so that the downthrust of the rod P^2 after collar p^2 strikes the eye *p′* will depress the arm P′ and turn the shaft P. This movement of the shaft will elevate the horizontal arm P^3, attached to said shaft, and through the connecting-rod P^4 lift the horizontal arm Q′ and turn the inclined shaft Q, which is provided with the arm Q^2. (See Fig. 1.) To this arm is pivoted the pawl Q^3, which engages the ratchet-wheel Q^4, attached to the lower end of the feed-shaft F^2. The said pawl is held in contact with the said ratchet-wheel by the spring *q*. In this manner with each revolution of the large gear-wheel the feed-table F′ and the rasp-blank are given a movement upward the distance of a row of teeth. After the collar p^2 has engaged the eye *p′* the shaft P and all parts connected therewith are returned to their normal position by the spring *q′* on rod q^2, attached to the vertical arm P^5, attached to the shaft P, as shown in Fig. 2. The pinion L makes five complete revolutions to a single revolution of the large gear O, so that the punch will form five teeth in the rasp-blank to each of its upward movements. When the feed-table F′ has been moved upward as far as it should go, it is returned for further action by turning the worm-shaft R, which works in the yoke F^4, the screw-plate F^3 being turned back out of engagement with the feed-shaft F^2, as shown clearly in Fig. 8.

In cutting rounded rasps the blank G must be rotated to bring the blank properly into line with the thrust of the punch, and for this purpose I make the inclined fixed table F concaved at its upper surface, as shown at F^5, and I form the feed-table F′ to correspond, so that the latter may be rocked in the table F to properly present a rounded rasp-blank to the point of the punch.

The motion for rocking the feed-table is by preference derived from the above-described cam H^3, lever H^4, and pivot *h*, which latter is a shaft passing through the frame of the machine, and is rotarily reciprocated by the movement of the lever H^4. To the end of this pivot or shaft *h* is secured the vertical arm S, as shown in Figs. 1 and 2. This is connected by rods S′ to the arm S^2, attached to the shaft S^3, journaled on the uprights F^6 F^6, rising from the inclined table F. To this shaft is secured the toothed segmental frame T of a length equal to the distance of movement of the feed-table F′. The teeth of this segmental frame mesh with the segment T′, attached to or formed as a part of the lower end of the feed-table. By this arrangement it will be seen that the intermittent rotating movement of the feed-table F′ will be coincident with the lateral movement of the punch H, which is necessary to the required result.

The anvil-frame K may be lifted to raise the punch H out of contact with the rasp-blank and the hammers out of contact with the cams by means of a lever, U, pivoted to the upright A^2 and projecting under the lip U′, as shown clearly in Fig. 4, and in connection with this lever I use a cam-lever, U^2, by

which the lever U may be conveniently operated for the purpose stated. The lever U and cam-lever U^2 act only upon one side of the anvil-frame. Upon the opposite side I employ the above-referred-to weighted lever U^3, which is fulcrumed at *b* and connected to the presser-foot bar k^6, (see Fig. 4,) and this lever rests in contact with the eccentric U^5. This eccentric is attached to the shaft U^6, to which the cam-lever U^2 is secured, so that when the said lever U^2 is turned the said eccentric will be turned, causing it to lift the lever U^3, so that adjustment of the presser-foot will be effected at the same time the hammers are lifted out of contact with the cams by a movement of the single lever U^2.

In Fig. 7 I rotate intermittently the shaft M′ and cam H^3 directly from the pinion N′, omitting the pinion L, shaft M, and the intermediate connections shown in Fig. 2. This motion from pinion N′ is effected by means of the crank-pin W, connecting-rod W′, walking-beam W^2 on shaft M′, and pawl L^4. The movement of the walking-beam produced by the rod W′ operates the pawl L^4, which engages with the teeth of the ratchet-wheel L^5 and intermittently revolves the shaft M′ and cam H^3, producing the same result as is produced by the mechanism shown in Fig. 2.

In Fig. 9 I have shown the top of the anvil-frame K recessed, as shown at *v*, in which the inner hammer, J′, strikes, and through the anvil-frame and lower end of the hammer are formed corresponding orifices through which a pin, *v*′, may be passed for locking the anvil-frame and the inner hammer together, so that the said frame will be lifted with the inner hammer and dropped. This is important in doing light work, and enables the machine to be run quite rapidly. In case the work is very light it is practicable to run the machine at very high speed, and for this purpose I connect the inner hammer, J′, with the anvil-frame K, and then connect the two hammers J J′ together by a set-screw, v^2, (shown in Figs. 4 and 9,) so that both hammers and the anvil-frame will all be operated as one.

In Fig. 10 the anvil-frame is supported by springs k^8, which serve to lift the punch out of contact with the rasp-blank after each stroke of the hammer. These springs rest upon lugs k^9, formed on the arm E, and act under lugs k^{10}, formed on the sides of the anvil-frame, as shown clearly in Fig. 10.

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

1. The punch-stock held in the anvil-frame and pivoted at or about its center, in combination with a spring or springs applied to its upper end above the pivot, the cutter or punch being held in the stock with its point below the pivot, substantially as shown and described.

2. The hammers J and J′, acted upon by springs and cams, one preceding the other, in combination with the anvil-frame and the punch-stock and punch, substantially as described.

3. The anvil-frame and pivoted punch-stock H′, in combination with the two hammers J and J′ and means for operating the hammers so that one will deliver its blow before the other, substantially as described.

4. The anvil-frame and pivoted punch-stock and the plate *a*′, acted upon by springs for returning the punch-stock, in combination with the hammers, substantially as described.

5. The anvil-frame having the pivoted rod H^2 passed therethrough, in combination with the punch-stock H′, secured to the said shaft H^2, the sliding plate H^6, and means, substantially as described, for moving the said plate, substantially as described.

6. The punch-stock H′, attached to rod H^2 and the anvil-frame K, and means for moving the rod H^2 and punch-stock laterally, in combination with the hammers, means for operating them, the table F, feed-table F′, and means for moving the same, substantially as described.

7. The combination, with the rod H^2, punch-stock H′, anvil-frame K, sliding plate H^6, rod H^5, and lever H^4, of the spirally-grooved cam H^3 and means, substantially as described, for turning the said cam intermittently, as and for the purposes set forth.

8. The pinion N′, crank *w*, and rod W′, in combination with walking-beam W^2, pawl L^4, ratchet L^5, shaft M′, cam H^3, and plate H^4, substantially as described.

9. The pinion L, connecting-rod L^2, shaft M, and arms L′ L^3, connected to the shaft, and the arm L^6 and pawl L^4, pivoted to the upper end of the same, in combination with the shaft M′, ratchet L^5, cam H^3, lever H^4, connecting-rod H^5, sliding plate H^6, shaft H^2, punch-stock H′, and anvil-frame K, substantially as described.

10. The inclined table F, the punch-stock, means for operating the same, the hammers, and means for operating them, in combination with the feed-table F′, held in the inclined table F, and means for intermittently moving the same longitudinally, substantially as described.

11. The inclined table F, made concaved at its upper surface, the feed-table F′, the rock-shaft S^3, elongated segmental rack T, secured to the said shaft, and the segmental rack T′, secured to the said table and meshing with the said elongated rack T, in combination with worm-shaft F^2, connected to the said table F, the rock-shaft Q, pawl Q^3, and ratchet-wheel Q^4, attached to the worm, substantially as and for the purposes set forth.

12. The large gear-wheel O, provided with crank-pin *p* and rod P^2, in combination with the shaft P, arm P′, opposite arm, P^3, connecting-rod P^4, opposite arm, Q′, shaft Q, arm Q^2, pawl Q^3, ratchet-wheel Q^4, feed-shaft F^2, and the feed-table F′, connected thereto, substantially as described.

13. The lever H^4, attached to the shaft *h*,

the cam H^3, and means for intermittently turning the same, in combination with the arm S, attached to the shaft *h*, the connecting-rod S′, arm S^2, shaft S^3, elongated segment T, and segment T′, attached to the feed-table F′ for rocking the same, substantially as described.

14. The anvil-frame K, formed with shoulder or projection U′, and the pivoted lever U, engaging with said projection, in combination with the weighted lever U^3, connected to the presser-foot, the cam-lever U^2, acting on lever U, and the eccentric U^5, connected to said cam-lever and acting on the weighted lever U^3, substantially as described.

15. The combination, with the anvil-frame, the hammer, and punch, of supporting-springs for the said frame arranged to lift it and the punch out of contact with the blank, substantially as described.

16. The vertically-movable anvil-frame K, in combination with the hammers J J′, adapted to be connected together and to the anvil-frame to operate as one, substantially as described.

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