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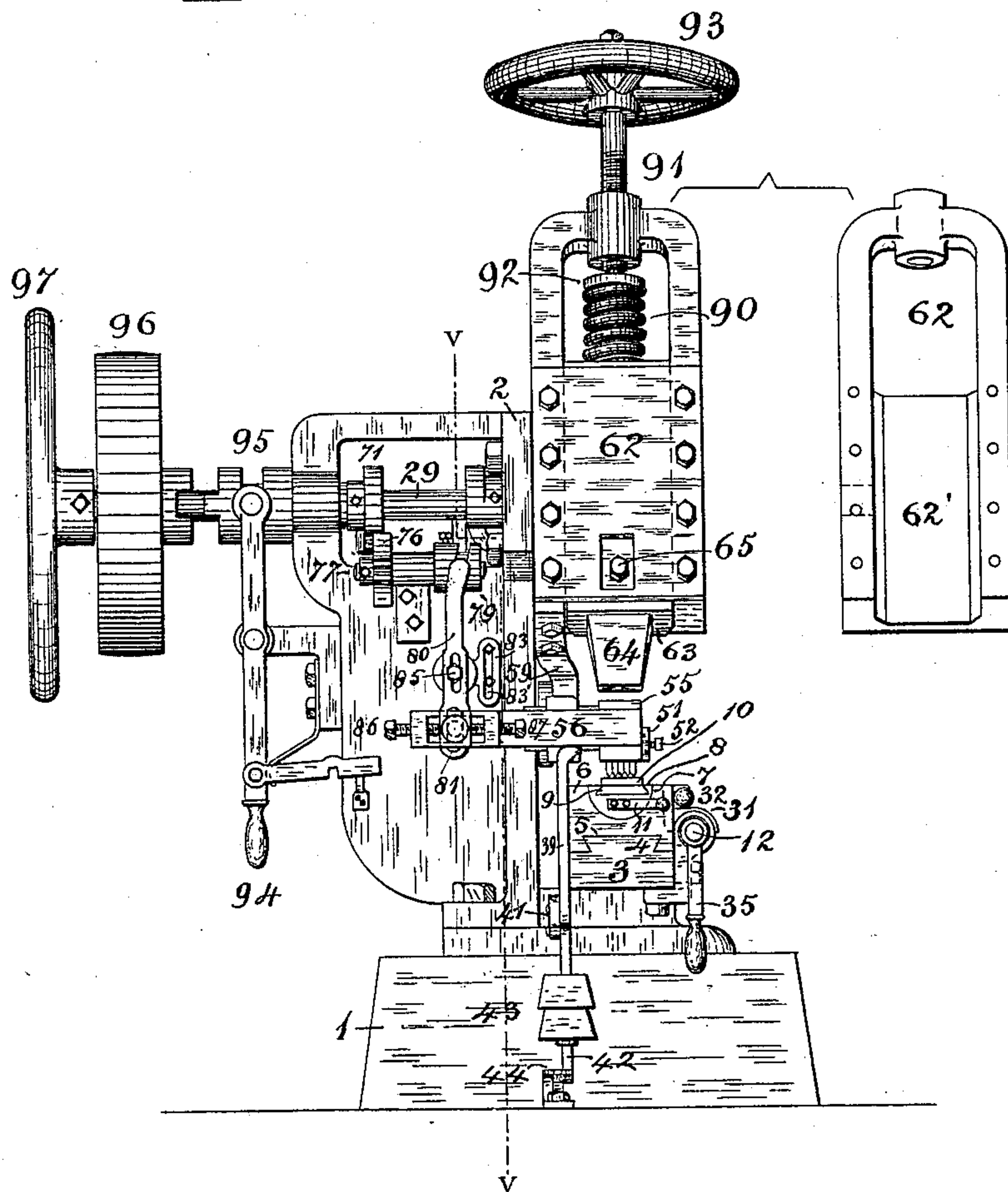
4 Sheets—Sheet 1.

C. LOGAN.
MACHINE FOR MAKING RASPS.

No. 428,011.

Patented May 13, 1890.

Fig. I.



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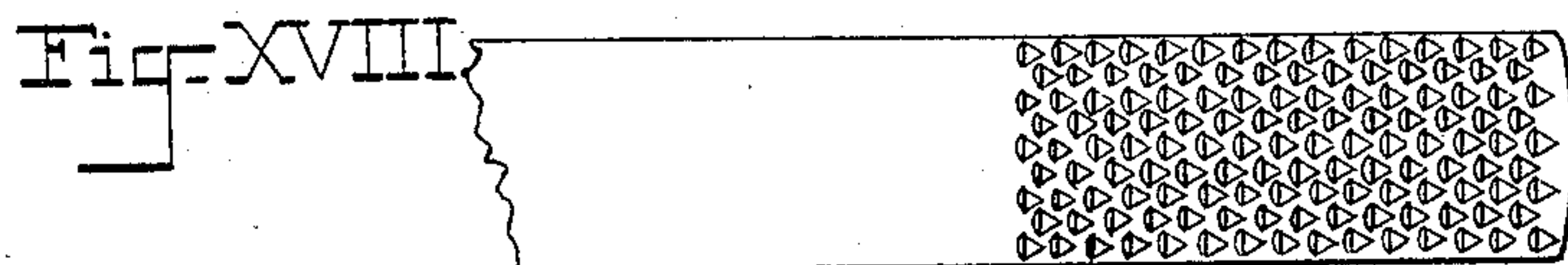
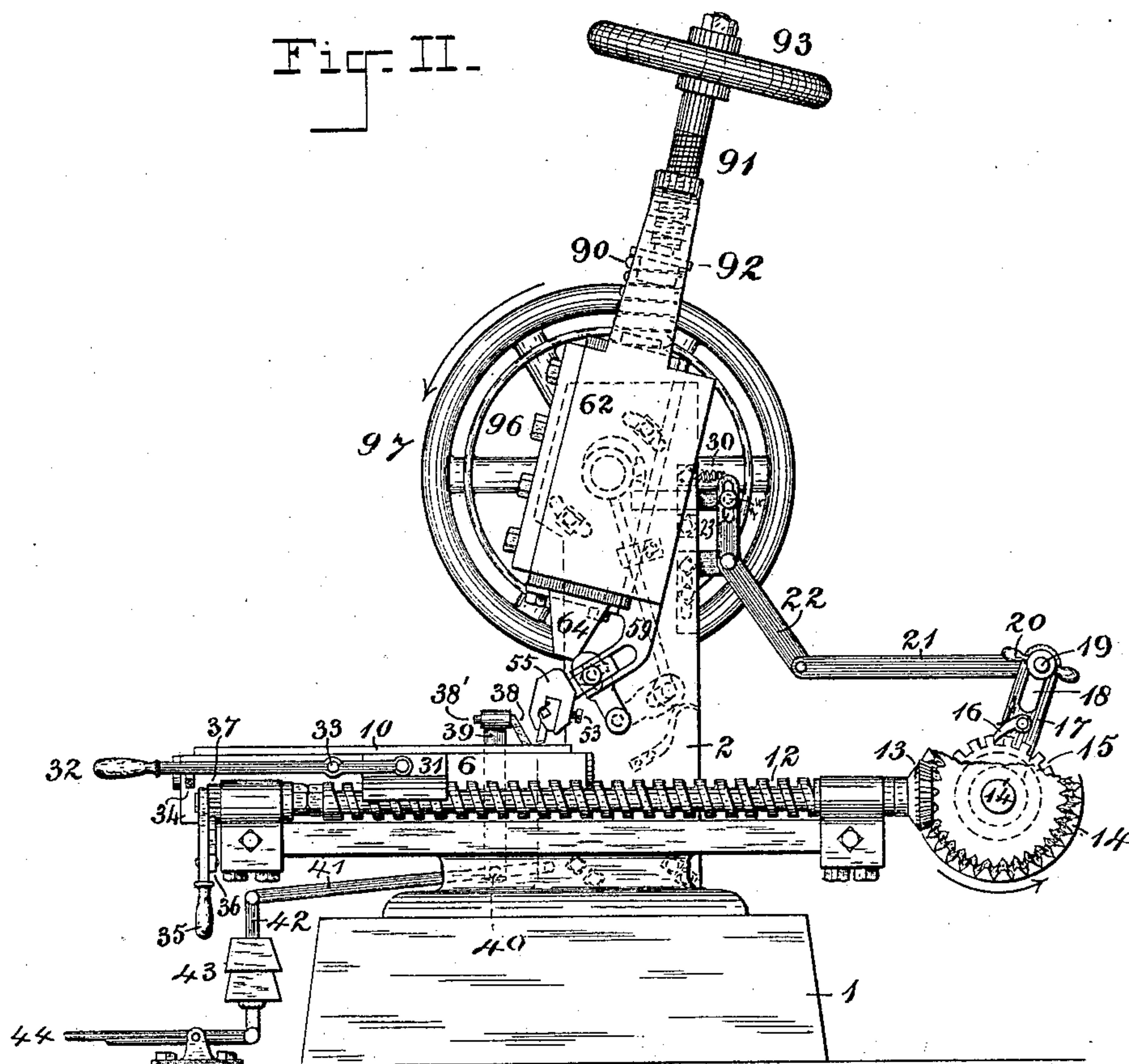
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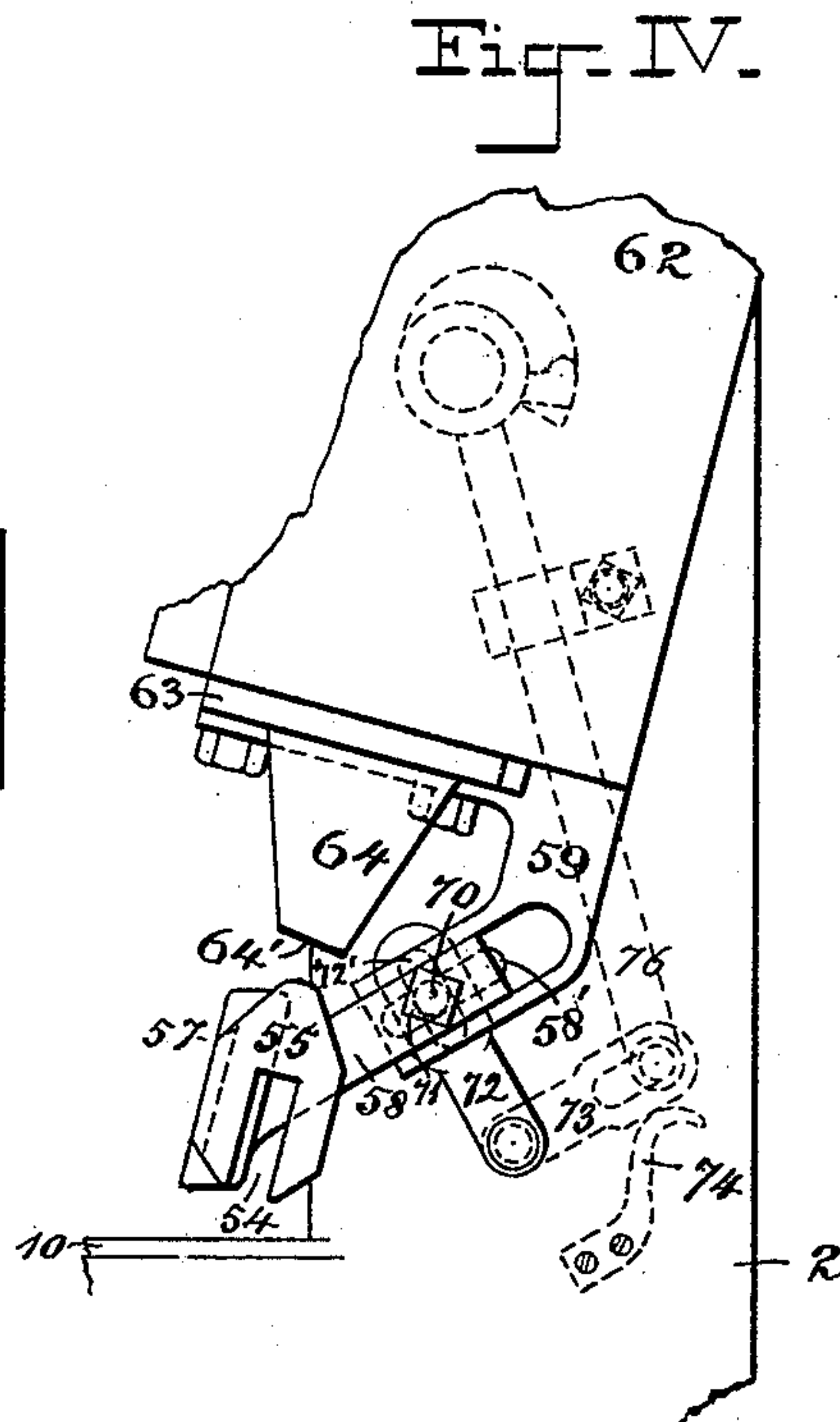
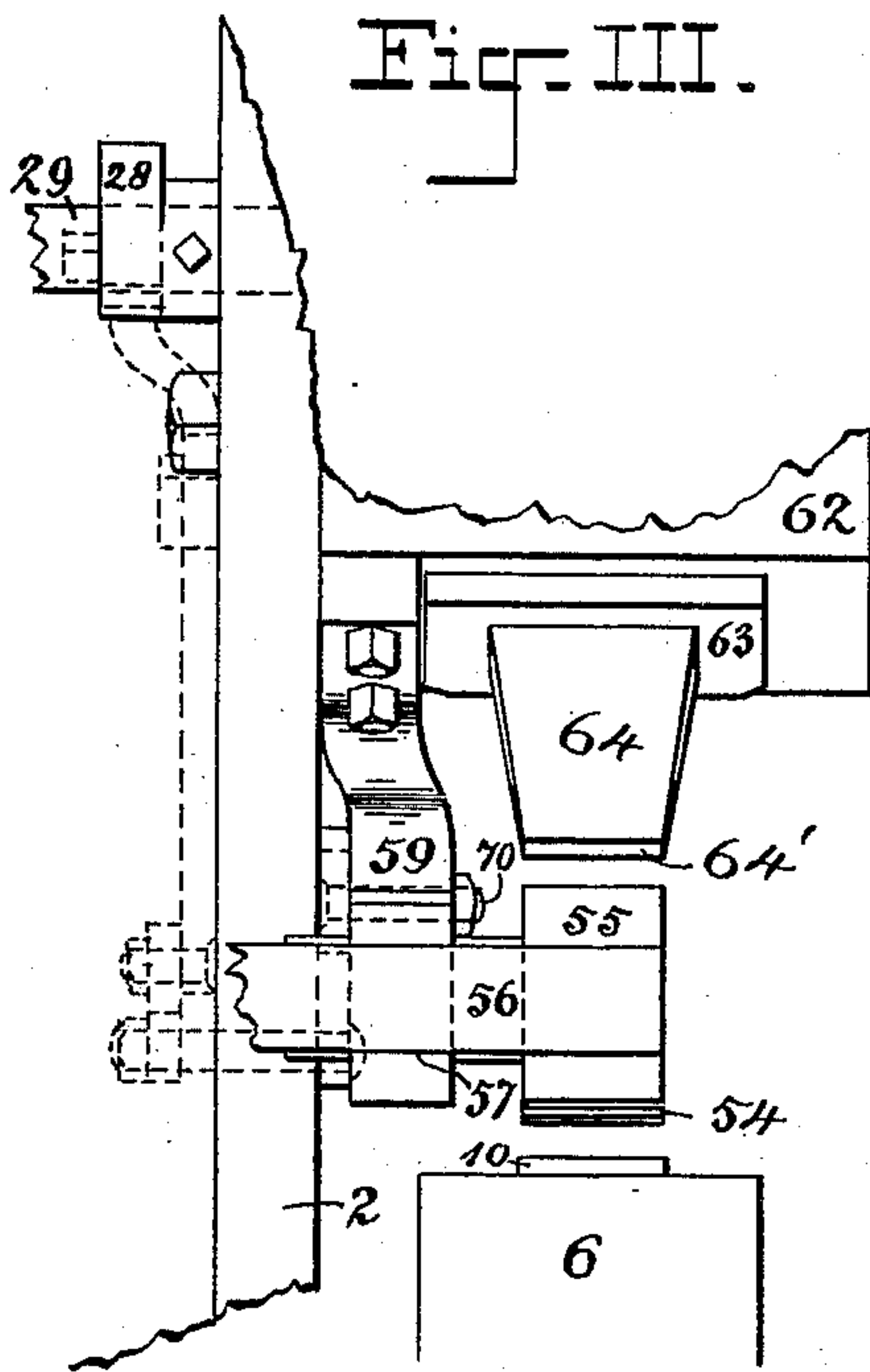
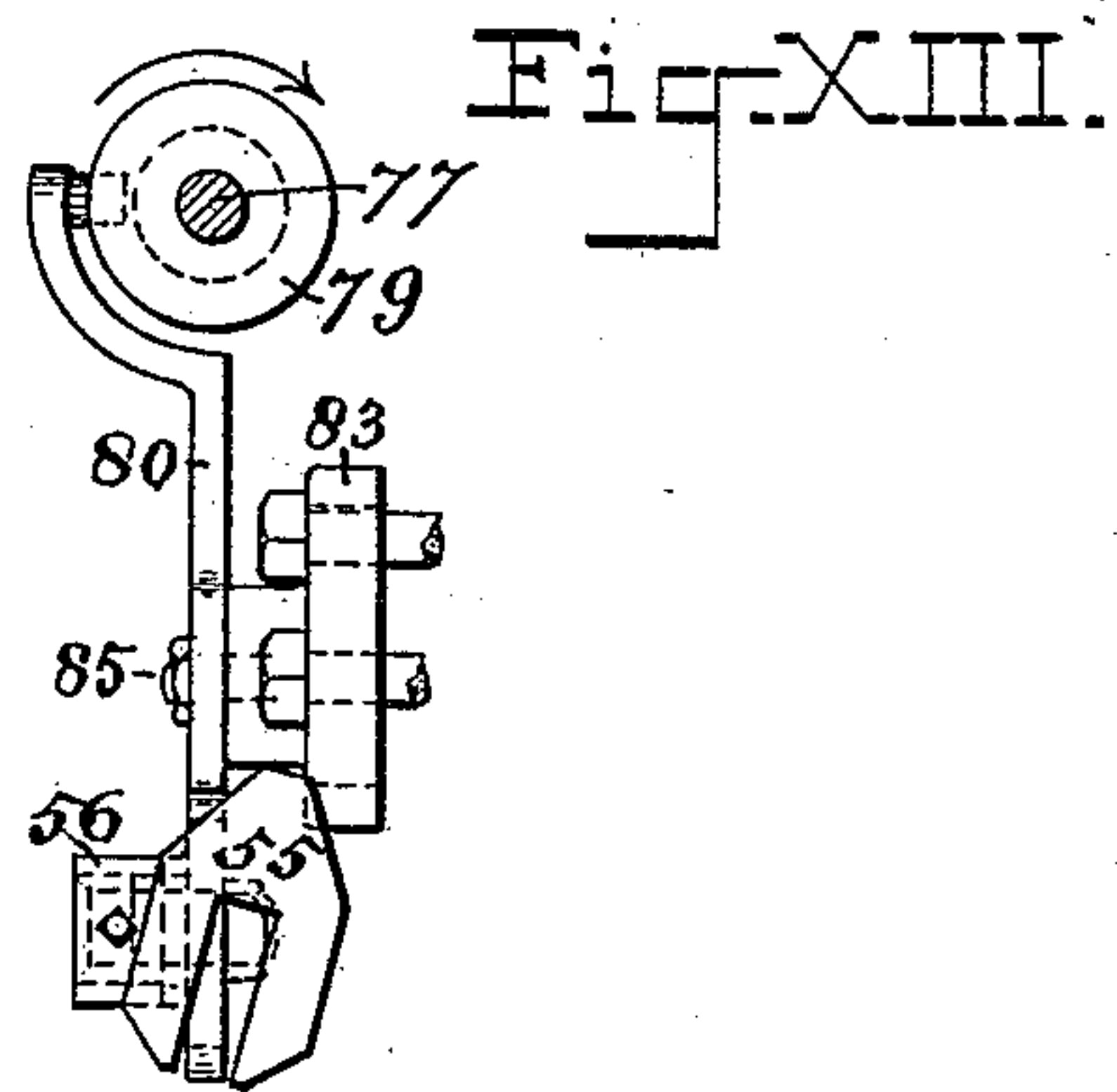
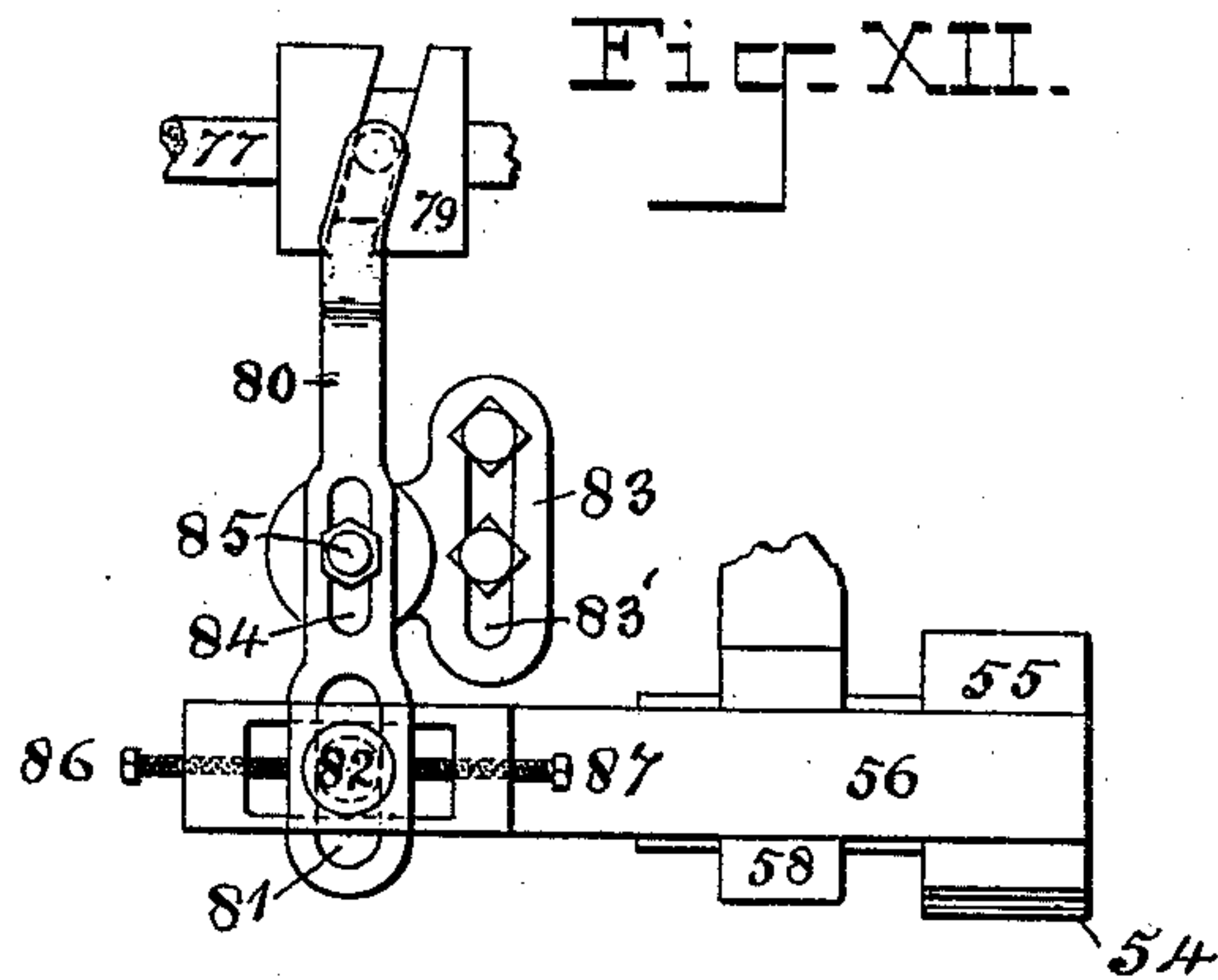
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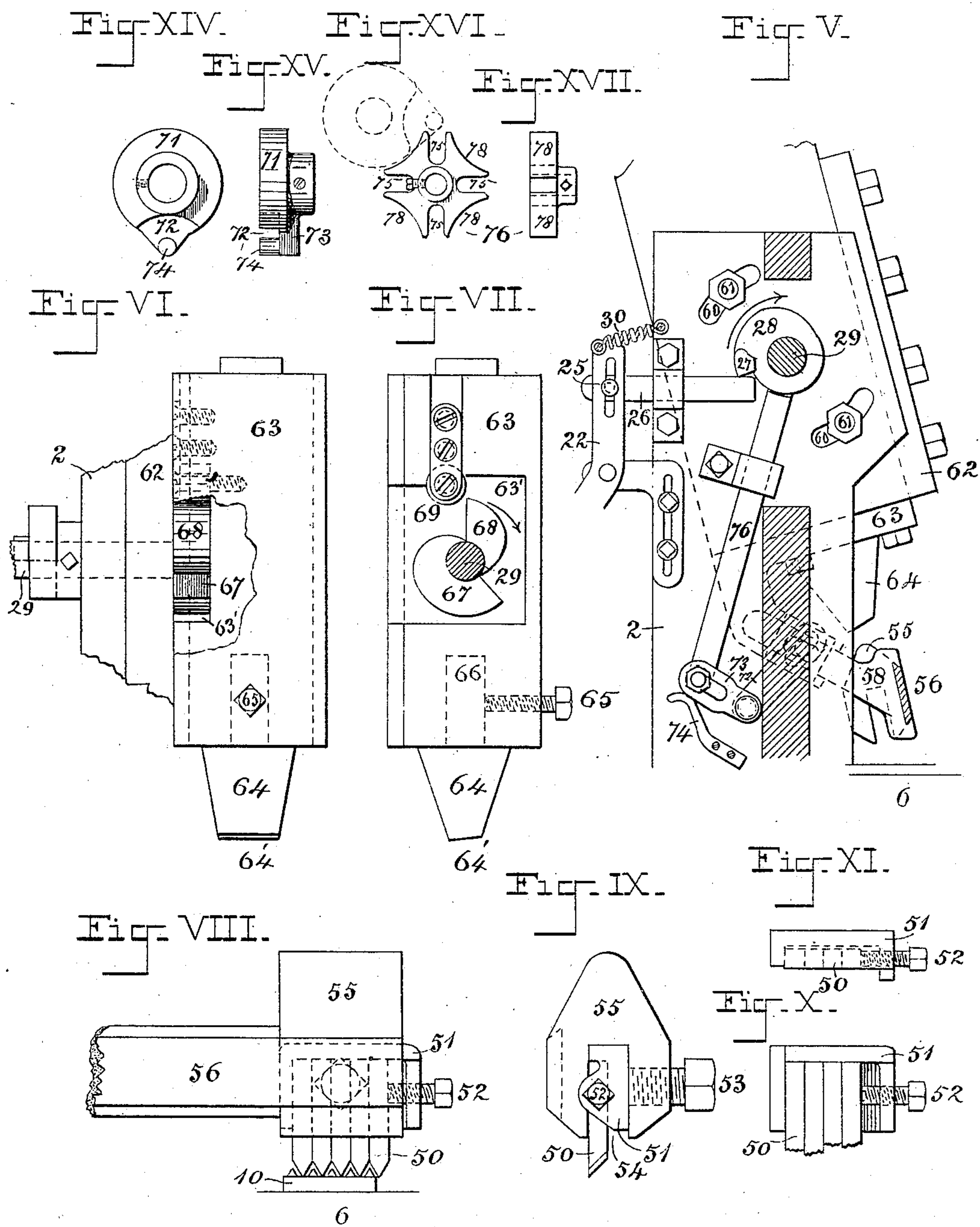
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UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING RASPS.

SPECIFICATION forming part of Letters Patent No. 428,011, dated May 13, 1890.

Application filed February 25, 1890. Serial No. 341,648. (No model.)

To all whom it may concern:

Be it known that I, COLIN LOGAN, a citizen of the United States, residing at Newark, county of Essex, State of New Jersey, have
5 invented a new and useful Machine for Making Rasps, of which the following is a specification.

My invention relates to an automatic machine for the expeditious and accurate formation of teeth upon a suitable blank to form a rasp.

Referring to the accompanying drawings, which form a part of this specification, Figure I is a front elevation of a rasp-machine embodying my invention. Fig. II is a side elevation of the same. Fig. III is a front and Fig. IV is a side elevation (on the right-hand side of the machine) of the punch-holder, together with portions of the bed, the hammer, and the supporting and guiding frames. Fig. V is a partly-sectional elevation (on the left-hand side of the machine) taken on line V-V of Fig. I. Fig. VI is a front view of the hammer and hammer-stock or plunger. Fig. VII is a side view of the same with the duplex lifting-cam shown in the position in which the lifted hammer is released for the final stroke. Fig. VIII is a front and Fig. IX is a side view of the punch-holder with a gang of punches secured within it. Fig. X is a front and Fig. XI is a top view of the punch-clip. Fig. XII is a front and Fig. XIII is a side elevation of the side-shifting mechanism. Fig. XIV is an end and Fig. XV is a side elevation of the pin which operates the notched collar on the grooved cam-shaft. Fig. XVI is a face and Fig. XVII is an edge view of the said notched collar. Fig. XVIII represents a portion of a partly-finished rasp.

1 represents a pier or foundation which supports the frame 2 of my machine. The base 3 of said frame has a dovetail ridge 4, which occupying the corresponding groove 5 in the bottom of the slide, carriage, or feed-rest 6, the said rest is thereby supported for the punching operation and guided for the longitudinal shift. The top of the said slide-rest has a semi-cylindrical trough or socket 7 for block 8, which is recessed at top to hold a dovetailed soft-metal bed 9 for support of the blank 10 to be operated on. Elastic straps 11
40 45 50 coact with the rounded form of the block 8

to hold the bed 9, and consequently the blank 10, normally level, yet to permit momentary self-adaptation of the upperside of the blank 55 to the gang of punches at the instant of impact and self-rectification after such impact. By this means equal penetration of the punches is secured across the breadth of the blank, notwithstanding any slight inequality 60 of thickness at its two edges or lack of absolute parallelism of the bed and the gang of punches.

Automatic operation of the necessary intermittent "feed" of the slide-rest or carriage 6 65 is secured by the following means:

12 is a screw, which is journaled near its extremities to the base 3. This screw is given such pitch and speed of rotation as to secure the desired advance of the carriage at each 70 interval between punch actions. A bevel-pinion 13 at one end of the said screw meshes in a corresponding wheel 14, of larger diameter, to whose rear side is secured a ratchet-wheel 15, in which engages a pawl 16 on an 75 arm 17, whose slot 18 receives a screw-threaded pin 19, which has a nut 20, by which said pin can be retained at any desired radial distance from the shaft 14' of the wheel 14. By adjusting the same pin to a greater or less radial distance any desired amplitude of feed 80 may be secured. A rod 21 connects the pin 19 to lever 22, whose upper limb has a slot 23 for a screw-threaded pin 24, (having a nut 25,) which couples to said lever a tongue 26, 85 which is at proper intervals pressed backward by a projection 27 of the cam 28 on the principal shaft 29. This pressing back retracts the pawl 16, and on release of the tongue 26 from the cam projection 27 a spring 30 re- 90 stores the tongue to the normal position shown in Fig. II and causes a partial rotation of the screw 12 by the pawl action on the wheel 15.

Motion is communicated from wheel 12 to 95 the carriage 6 by said screw's engagement in a half-nut 31, that occupies a dovetailed groove in the carriage, which half-nut is held down on said screw (or lifted at will) by lever 32, pivoted to the carriage at 33, which lever 100 becomes locked to the effective position shown in Fig. II by engagement over catch 34.

A lever 35, having a pawl 36, which engages in a ratchet-wheel 37, enables rotation of the

feed-screw 12 by hand on temporary disengagement of the pawl 16.

The blank is held firmly down upon the bed 9 by a finger 38, which is made to press upon the blank immediately in front of the punches, as shown in Fig. II. With this object in view said finger is pivoted (as at 38', centrally over and parallel to the median line of the blank) to bar 39, which is pivoted at 40 to a lever 41, to whose outer extremity is pivoted a pendant 42, which carries one or more weights 43, and to which is hinged a treadle 44, which, being depressed by the operator, momentarily relieves the blank from the pressure of the finger 38.

Having in the above description set forth the means employed by me to hold the blank upon the bed, and also the means which I use to feed or advance the bed and its supported blank in the intervals between the consecutive punchings, I now proceed to explain the construction and arrangement of my punches and the means which I employ for operating the same.

I provide as many punches (say five) as constitute a single rank or transverse row on the manufactured rasp and secure the same in a rank or gang 50 within a clip 51, having a pinching-screw 52. This clip with its gang of punches is secured by a screw 53 in notch 54 of the chuck or punch-holder 55. A dovetailed shank 56, that extends laterally from the said holder, occupies a correspondingly dovetailed groove 57 in the head 58, which is held in and guided by a bracket 59, which, projecting from the hammer-guide at the angle represented, operates to hold the punches at the desired inclination for effective action and guides them at a more acute angle into the substance of the blank after the punch-points have been so effectually engaged as not to slip along the surface of the blank without obtaining any hold thereon.

The frame 2 has near its upper part, concentric with the main shaft 29, two arcuate slots 60 for bolts 61, that extend through said slots from the angularly-adjustable box or hammer-guide 62, whose slot 62' forms the guide and holder of the stock or plunger 63 of the hammer or striker 64, which is held to its said stock by screw 65 binding on stem 66 of said hammer.

The punch-holder 55 being set to exact alignment with the hammer, and the supporting-bracket 59 of the said punch-holder being a rigid projection of the hammer-guide, it follows that the hammer and the punch-gang may, without disturbing their alignment, be bodily adjusted to any angular presentation with respect to the work, and be held to such adjustment by means of the screws 61.

An excavation 63' in the stock 63 affords room for a duplex cam 67 68, which is forged in one piece with the main shaft 29. The said cam has two tabs or lifters, which successively elevate the hammer and allow the same to drop twice upon the punches without

shifting the blank. The taps 67 68 elevate the hammer by pressing upward against a roller 69, which is journaled to the hammer-stock. Of these tabs, the tab 67, which first engages the hammer-stock, has about three-fourths of the radial dimension or lift of the finally-acting tab 68, and a portion of its periphery is concentric, so as to hold the hammer up a sufficient period to allow of the described feeding and shifting operations.

The parts are so arranged that for about one-third of each rotation of the shaft 29, during which the hammer is upheld by the concentric part of the periphery of the tab 67, both the feed of the blank and the lateral shift (to be presently described) of the punches are accomplished during this third of a revolution. The descent of the hammer on escaping from the point of the tab 67 operates to drive the punches into and to indent the blank, and the second blow got from escape of the hammer from the point of the tab 68 causes the punches to penetrate to their extreme depth and to finish one rank of teeth. In this repeated operation the direction of penetration of the punch-points approximates more and more closely to the comparatively acute angle of the bracket 59, causing the points to drive underneath and to raise the teeth without peening the blank. To still further facilitate this acute direction, the nose 64' of the hammer 64 is given the oblique presentation shown in Figs. I to VII, inclusive.

I have found it advisable that the punches should be held firmly to their place on the blank preparatory to hammer impact, and with this object in view a pin 70, which is secured at the desired part of slot 58' by means of a nut 71, engages in a slot 72' of arm 72 of a bell-crank, whose other arm 73 is so pressed by a spring 74 as to hold the punches firmly down at all times, except when temporarily elevated by cam 28 on the main shaft, depressing a rod 76, whose lower end is coupled to the arm 73 of the bell-crank. This momentary elevation of the punches permits the blank to be advanced (its last-formed rank of teeth passing under the punches) to the next position. It is during this temporary elevation of the punches that their lateral shift is effected, so as to bring the gang central over the blank for punching of a five-hole rank, then to one side the distance of half a tooth, so as to place four punches over the blank, and whether five or four punches are presented the presentation is symmetrical with respect to the blank.

The normal level of the blank face is maintained, and when disturbed is restored by said symmetrical punch presentation in coaction with the following features, to wit: the elastic strap-connection 11 of the block 8 with the carriage 6, the finger 38, pivoted at 38', centrally over and parallel to the median line of the blank, and the parallelism with the rank of punch-points of the transverse lines of the striking and guiding faces.

In order that the teeth of each rank may come opposite to the spaces of the preceding and following ranks, I provide means for shifting the gang of punches laterally to right and left of the median position. By reference to Fig. XVIII it will be seen that midway between each two ranks of five teeth each is a rank of four teeth in which each tooth comes opposite to one of the four spaces of the preceding rank. Starting with five-tooth rank, with its central tooth on the median line of the blank in which all five punches are effective, (see Fig. I,) the gang of punches, while in the elevated position, is shifted half a tooth distance to the right, so as to place the extreme right-hand punch outside the limits of the blank, as seen in Fig. VIII. In this position of the punch gang a rank is formed of four teeth which "dodge" those of the preceding rank, or, in other words, come opposite their spaces. The gang is then shifted back to the median position, so as to produce another rank of five teeth. The next shift of the gang is again for four teeth, but is now as far to the left as the former shift was to the right, so as to throw the extreme left punch out of service. In the next shift of the gang it recovers its median position and the process is repeated. By this means a gang of punches is made to last longer than if the shift for the four rank were always to the same side of the blank.

The described lateral shift of the punch gang is accomplished by the following means: The main shaft 29 carries a disk 71, having a face-depression 72, and a lug 73, which has a pin 74, which at a certain period of each rotation of the main shaft engages in one of the four notches 75 of a notched collar or sprocket-wheel 76 on the counter-shaft 77, which, being thereby rotated ninety degrees, is then held against further rotation by engagement of one of the concavities 78 of said sprocket-wheel against the periphery of the said disk 71 until rotated another ninety degrees by engagement of the pin 74 in the next notch, and then again held by the next concavity. The counter-shaft 77 carries an obliquely-grooved cam 79, in whose groove there engages one end of a lever 80, whose other end has a slot 81, which receives a pin 82, that projects from the shank 56 of the punch-holder.

Figs. I and XII represent the above parts in the position they assume for striking a five-tooth rank. Slots 83' in brackets 83 and 84 in lever 80 enable the setting of the fulcrum 85 for a greater or less throw of the punch-holder, and set-screws 86 87 enable the said throw to be accurately centered on the blank.

When it is desired to shift the carriage 6 independently of the feed-screw 12, the operator disengages the lever 32 from the catch 34, and, depressing the lever, thereby lifts the half-nut 31 from the said screw, whereupon the said carriage 6 can be pushed along its

track either forward or backward quite independently of said screw. The feed-screw can be then rotated, either in conjunction with or independently of the cam mechanism 17 to 27, inclusive, by either using or releasing the pawl 16.

The percussive force of the striker due to gravity may be aided to any desired extent by a strong helical spring 90, which is caused to press on the top of the hammer-stock with any desired force by a screw 91, which bears on a follower 92, fitted to the upper end of the said spring and furnished with a hand-wheel 93.

94 may represent a customary starting and stopping lever communicating with any suitable clutch whose movement leftward operates to couple the loose driving-pulleys 96 with the cam-shaft. The cam-shaft may be provided with a fly-wheel 97.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In an automatic machine for making rasps, a gang of punches 50, secured in a suitably-guided holder 55, and combined with an intermittently-reciprocated hammer 64, for the simultaneous striking up of an entire rank or transverse row of rasp-teeth, substantially as set forth.

2. In an automatic machine for making rasps, the combination, with the punch-holder, of spring 74, cam 28, and suitable transmitting mechanism 72 73 76, whereby the punches are momentarily lifted from the blank and over the last-formed rank of teeth to permit advance of the blank and lateral shift of the punch gang, and are then returned to and held firmly down upon the blank preparatory to the next hammer action, as explained.

3. In a machine for the automatic manufacture of rasps, the combination, with a suitable hammer or striker, of the duplex cam 67 68, for imparting two successive blows to the punches at the formation of each transverse row or rank of teeth, substantially as and for the purposes set forth.

4. In a device for the automatic manufacture of rasps, the combination, with the punch-holder, of the guide 58 at a more depressed angle than that of the punches and striker, as and for the purpose set forth.

5. In a machine for the automatic manufacture of rasps, the combination, with the inclined punch-holder 55 and the still more inclined guide 58 therefor, of the striker 64, having the obliquely-formed nose 64', for the object stated.

6. In a machine for the automatic manufacture of rasps, the means for lateral shift of the punch gang in the intervals of punch action, which consist of the combination of intermittently-acting driving and locking pin-disk 71 on the main shaft 29, the quadruply notched sprocket-wheel 75 on the counter-shaft 77, the lever 80, and the shank 56 of the punch-holder, substantially as set forth.

7. In a machine for the automatic manufacture of rasps, the semi-cylindrical bed-block 8, held in corresponding trough or socket 7 in the carriage 6 by one or more elastic straps 11, as and for the purpose set forth.

8. In a machine for the automatic manufacture of rasps, the combination, with feed-screws 12, journaled in the base 3, and with the carriage 6, of the half-nut 31, which occupies a groove in the carriage, the lever 32, pivoted to the carriage, and the catch 34, as and for the purpose set forth.

9. In a machine for the automatic manufacture of rasps, the combination, with the bed-block 8 and bed 9 on the carriage 6, of the transverse finger 38, pivoted at 38' centrally over and parallel to the median line of the blank and held down thereupon by weights 43, placed under control of the operator by a treadle 44, in the manner explained.

10. In a machine for the automatic manufacture of rasps, the combination, with a suitable guide 59, of the chuck adapted to receive and hold a gang of punches, and which consists of a clip 51, having a pinching-screw 52, which, together with its gang of punches, is secured by a screw 53 in notch 54 of holder 55, substantially as set forth.

11. In a machine for the automatic manufacture of rasps, the combination, with a suitable bed for supporting, holding, and feeding the blank, of the combined hammer and punch guides, capable of being swung about the cam-shaft as a center to a greater or less inclination with respect to the said bed and retained thereto by bolts that occupy arcuate

grooves concentric with said shaft in the supporting-frame, as set forth.

12. In a machine for the automatic manufacture of rasps, the means, substantially as set forth, whereby the gang of punches are in the intervals of punch action shifted from the median position one half-tooth distance to the right, thence back to the median position, thence one half-tooth distance to the left, thence back to the median position, and thence again to the right in continuous repetition, as and for the purposes explained.

13. In a machine for the automatic manufacture of rasps, the combination, with a hammer or striker, of the duplex cam 67 68, which makes two revolutions between every two consecutive feeds of the bed, and whose initial tab 67 is of less diameter than its finishing tab 68, and has a portion of its circuit concentric with the cam-shaft, for the purposes explained.

14. In a machine for the automatic manufacture of rasps, the combination, with laterally-shiftable punch gang and with intermittent mechanism driven from the cam-shaft, of means for centering and adjusting the throw of the punch shift, consisting of lever 80, whose fulcrum 85 occupies a slot 83 in a slotted bracket 84 upon the main frame, the same being combined with set-screws 86 87, as set forth.

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Witnesses:

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