

(No Model.)

7 Sheets—Sheet 1.

A. CAVALLI.

MACHINE FOR SCREW THREADING WIRE.

No. 312,084.

Patented Feb. 10, 1885.

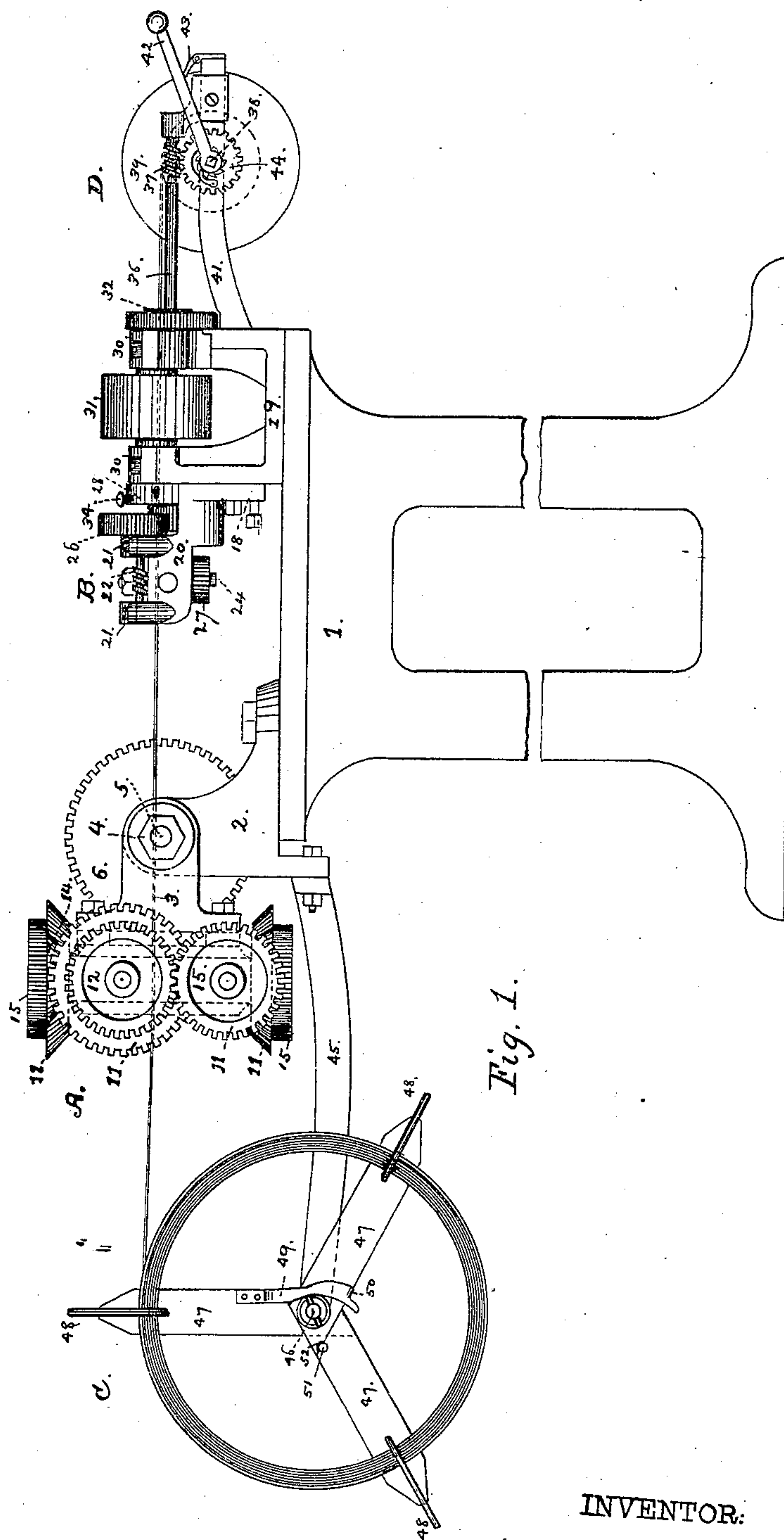


Fig. 1.

WITNESS:

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Jos. L. Faggard

INVENTOR:

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W. B. Brown Attorney.

(No Model.)

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7 Sheets—Sheet 2.

MACHINE FOR SCREW-THREADING WIRE.

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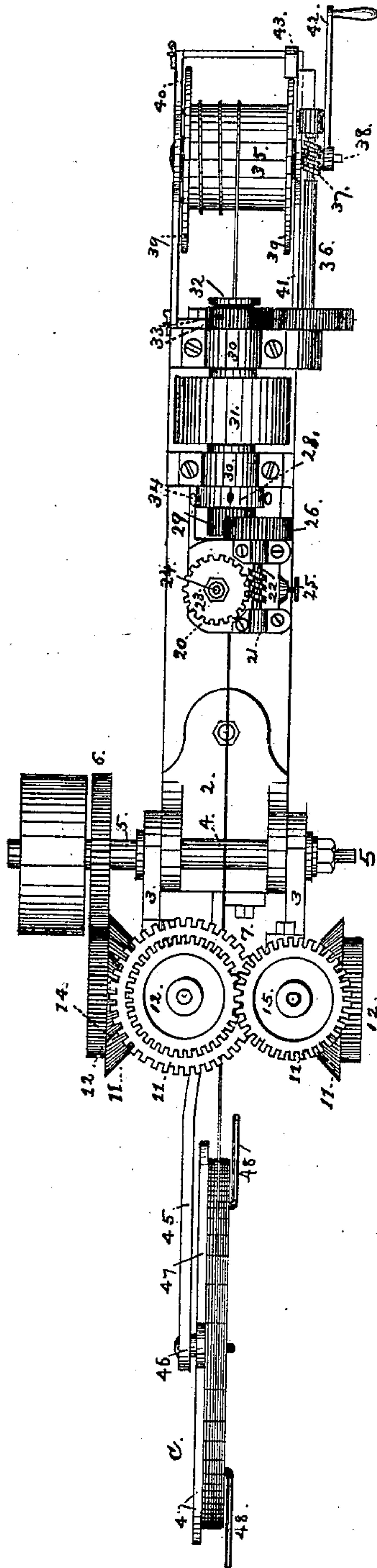


Fig. 2.

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7 Sheets—Sheet 3.

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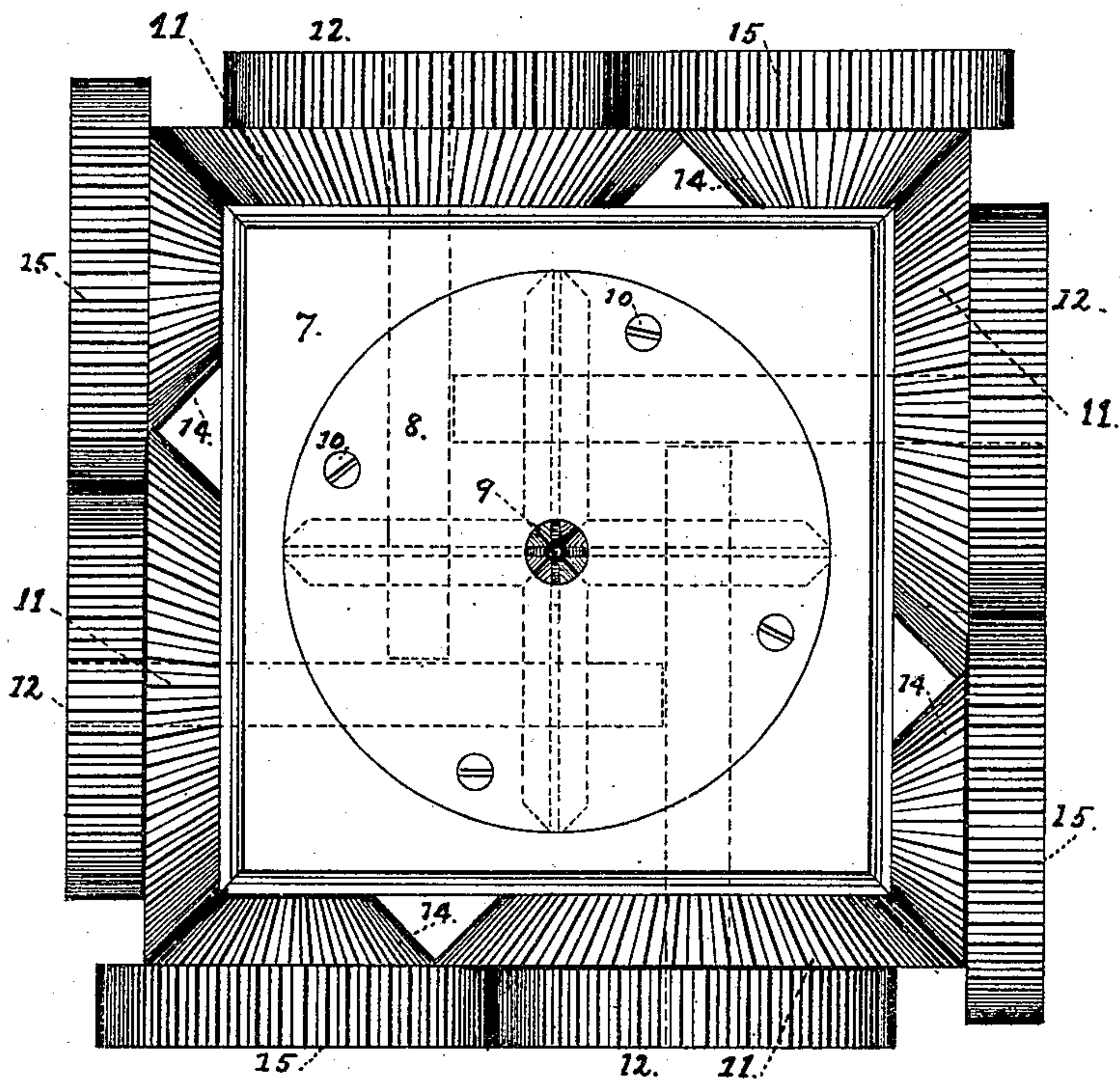


Fig. 3.

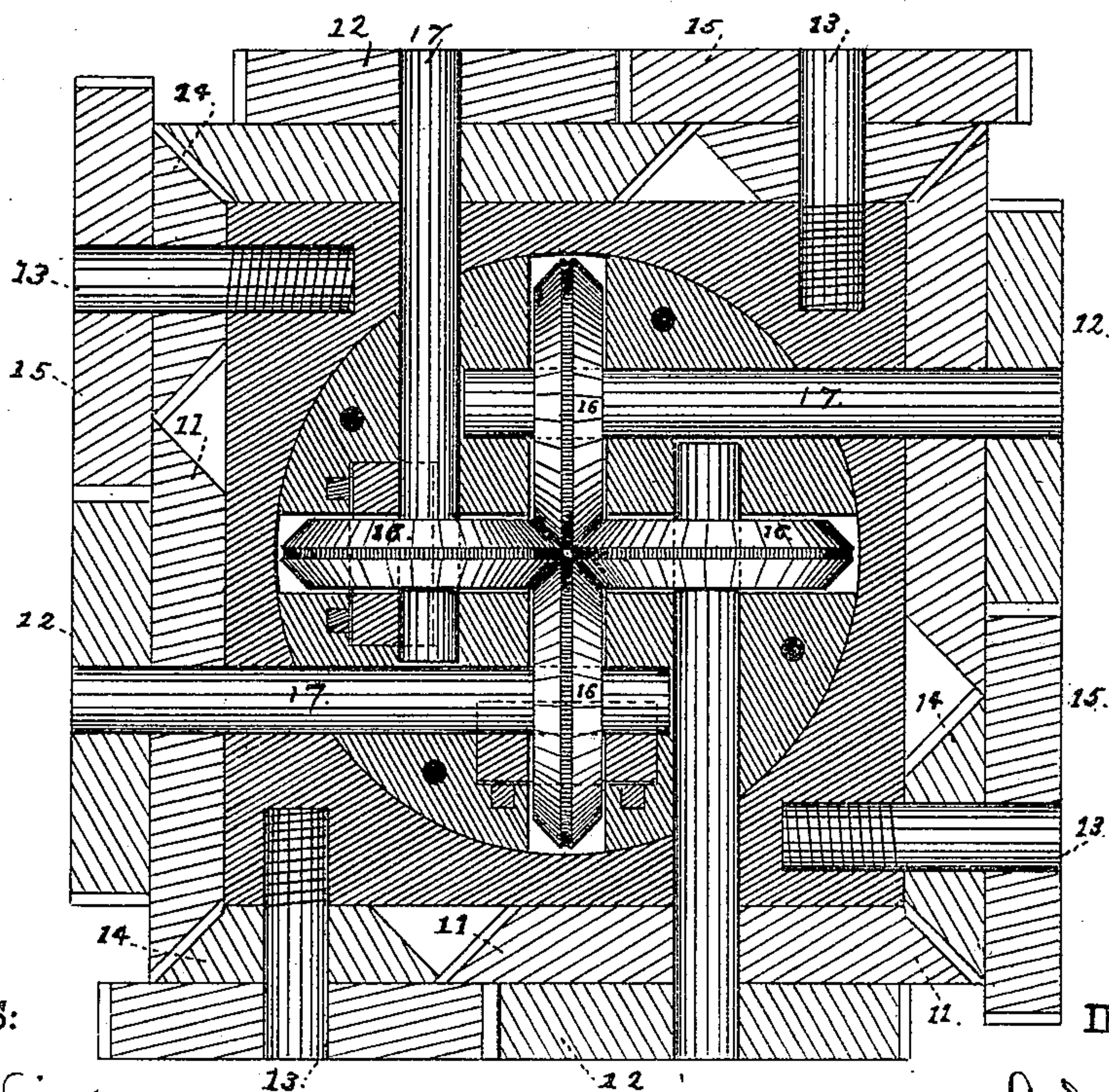


Fig. 4.

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7 Sheets—Sheet 4

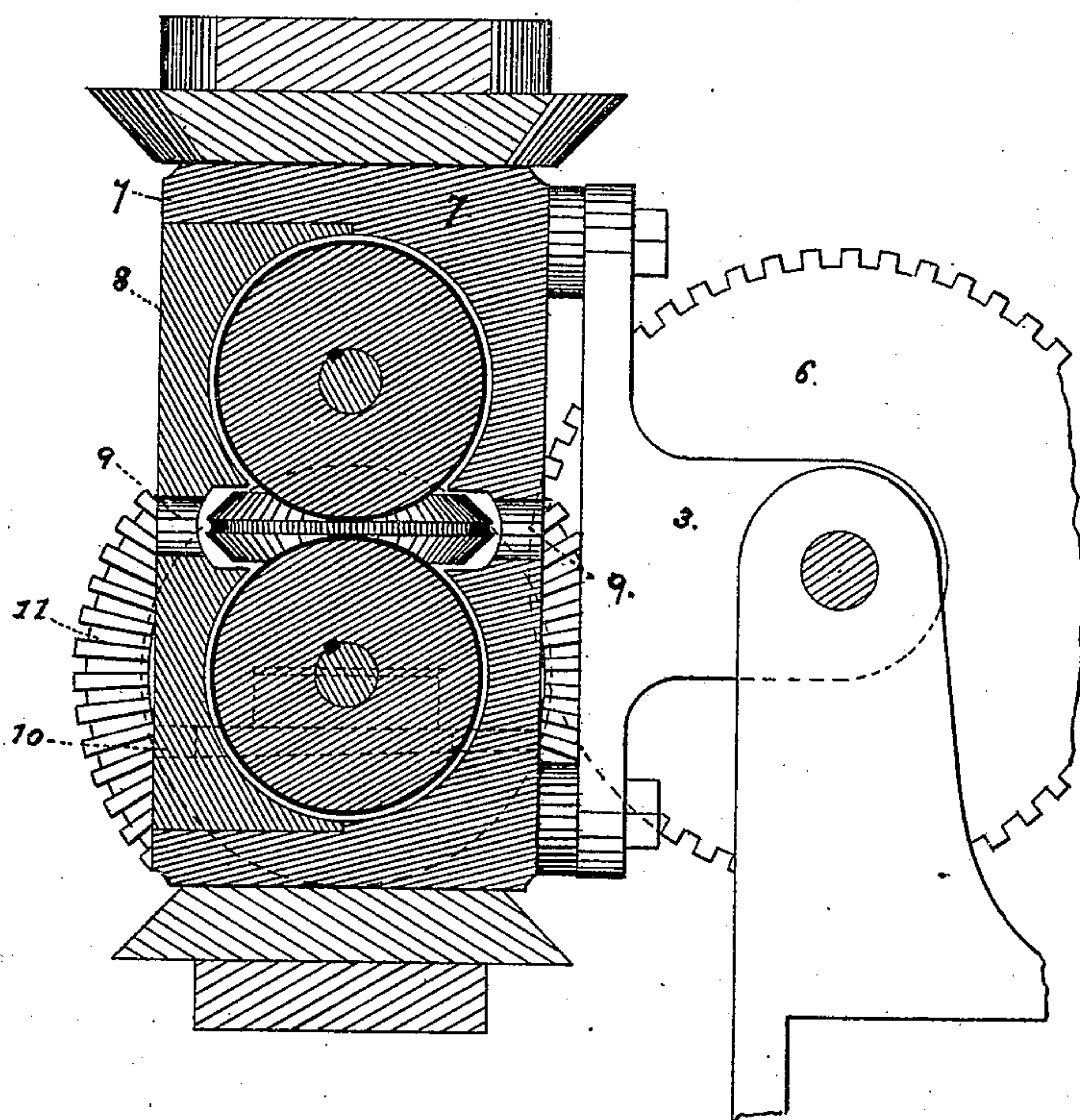
A. CAVALLI.

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Fig. 5.



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7 Sheets—Sheet 5.

MACHINE FOR SCREW THREADING WIRE.

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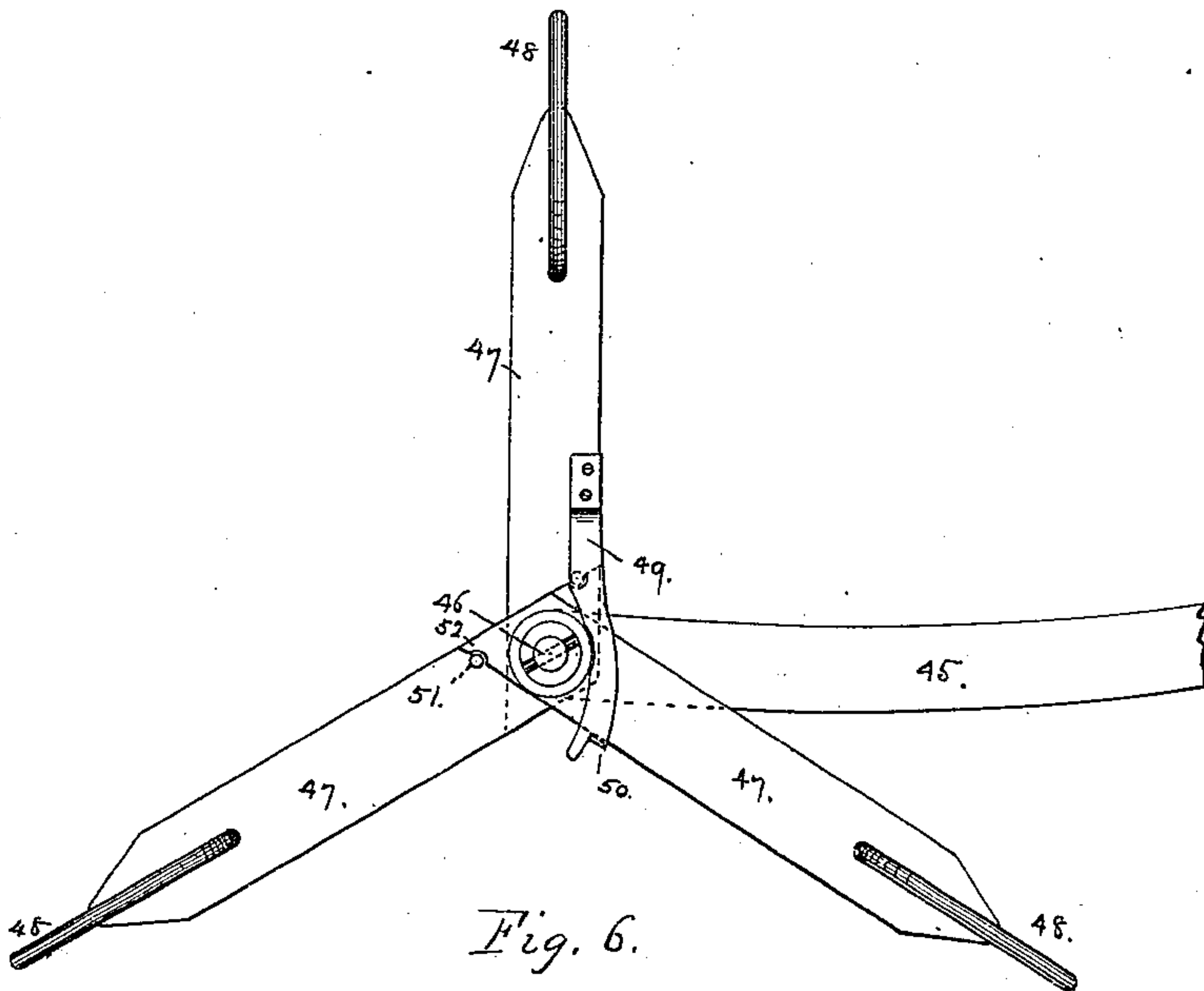


Fig. 6.

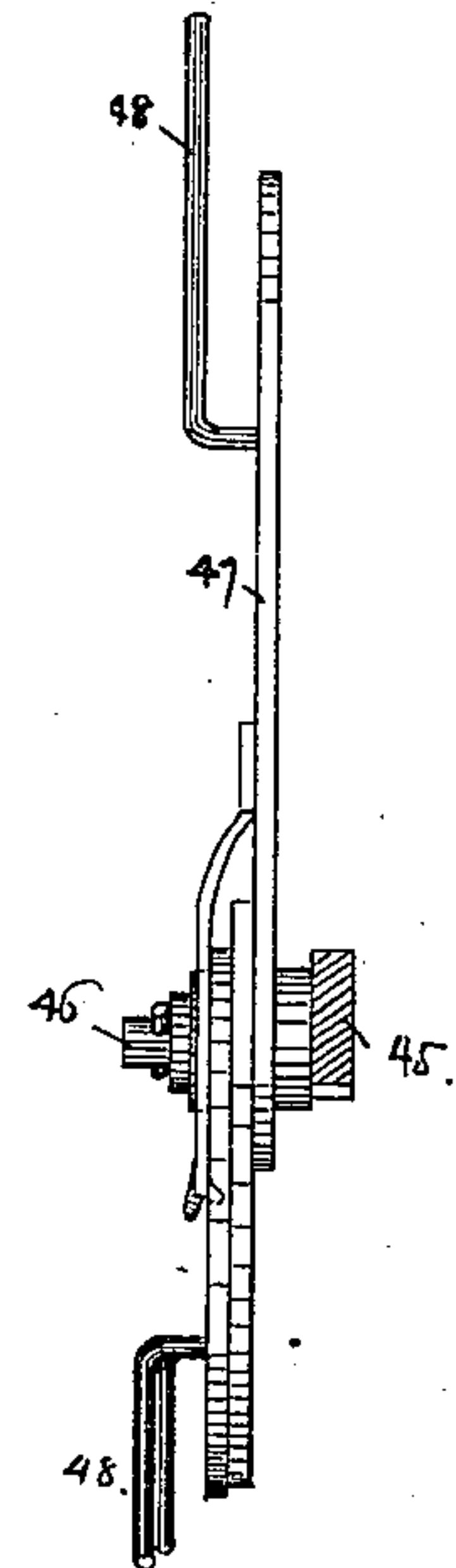


Fig. 7.

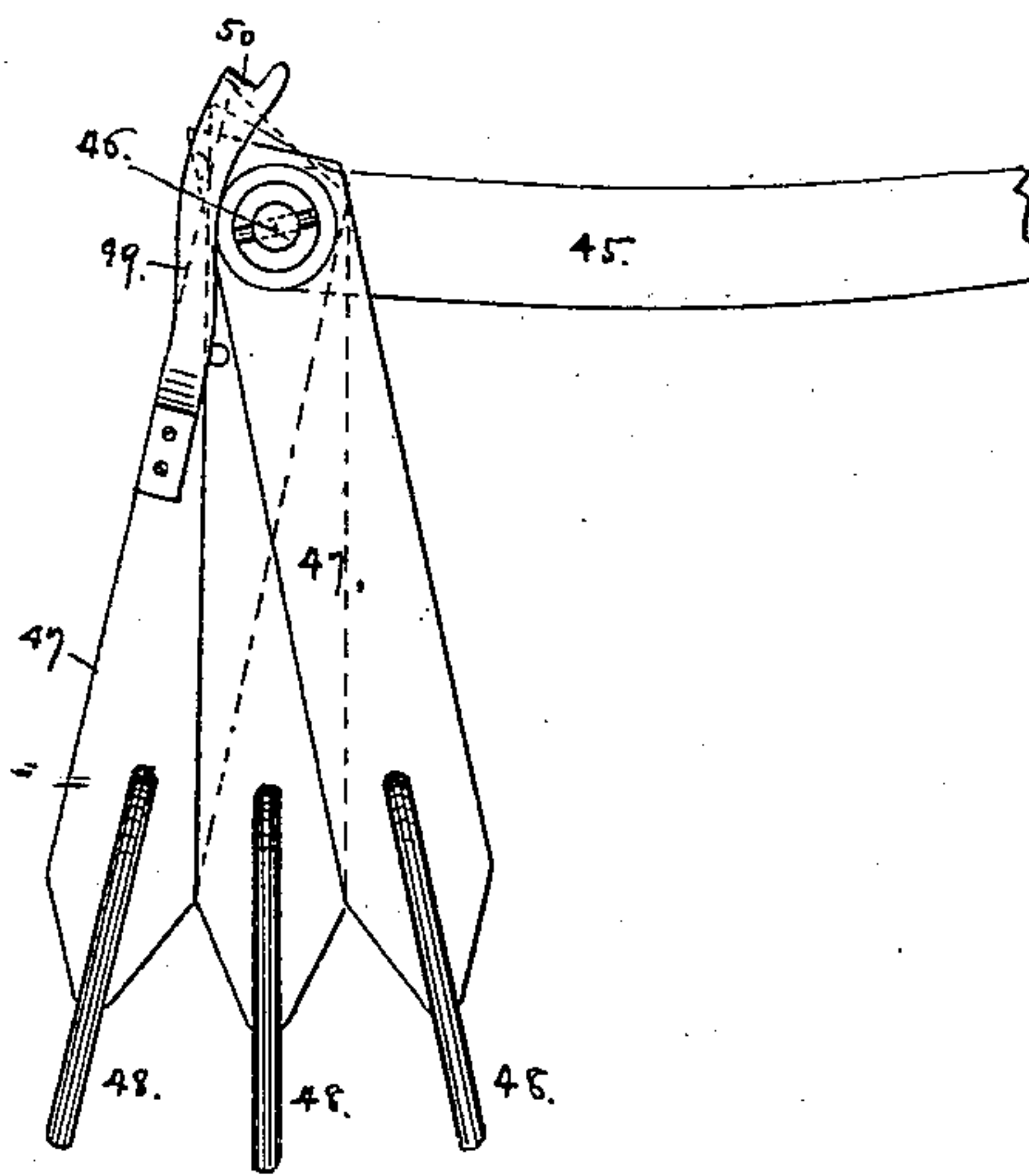


Fig. 8.

WITNESS:

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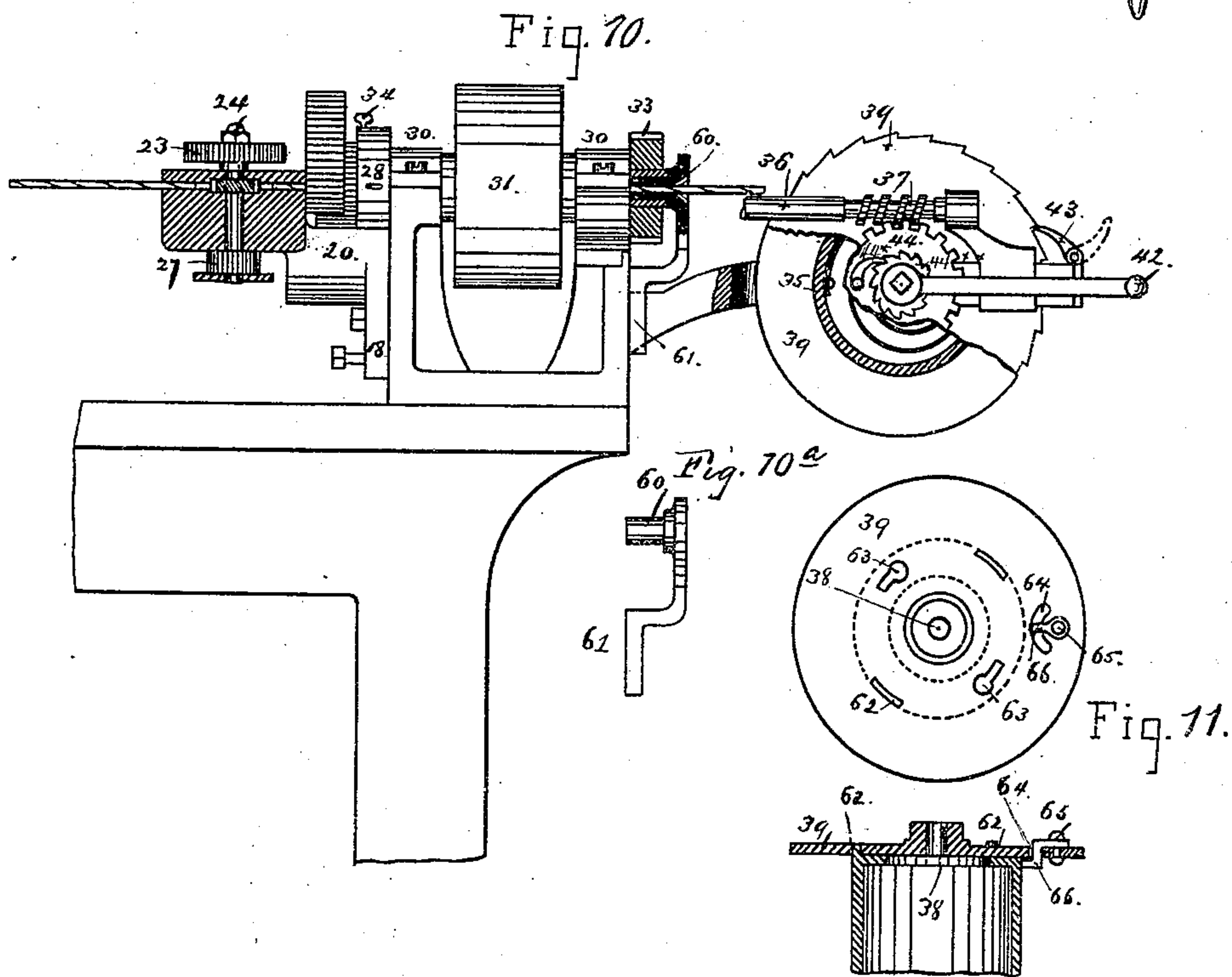
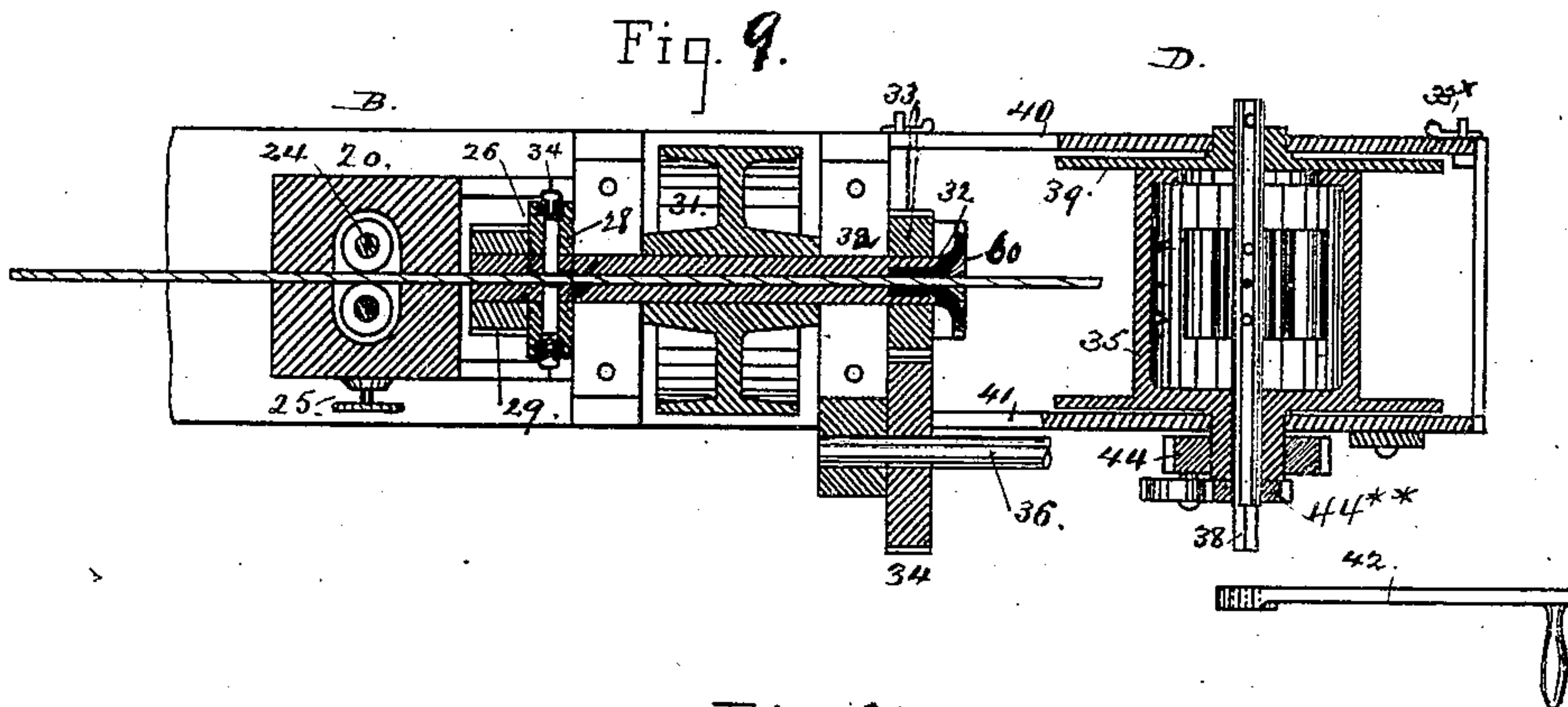
7 Sheets—Sheet 6.

A. CAVALLI.

MACHINE FOR SCREW THREADING WIRE.

No. 312,084.

Patented Feb. 10, 1885.



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(No Model.)

7 Sheets—Sheet 7.

A. CAVALLI.

MACHINE FOR SCREW THREADING WIRE.

No. 312,084.

Patented Feb. 10, 1885.

Fig. 12.

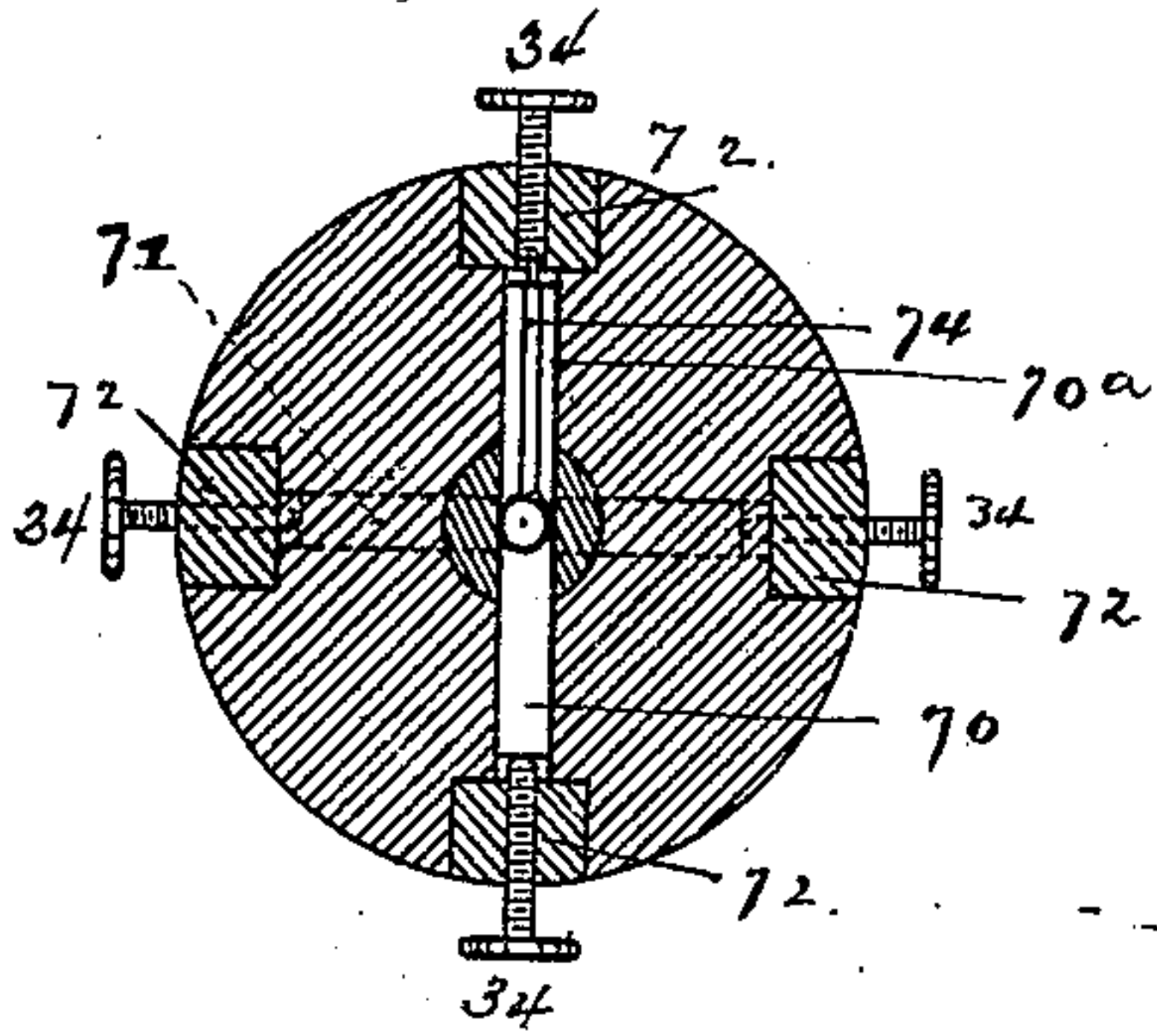


Fig. 13.

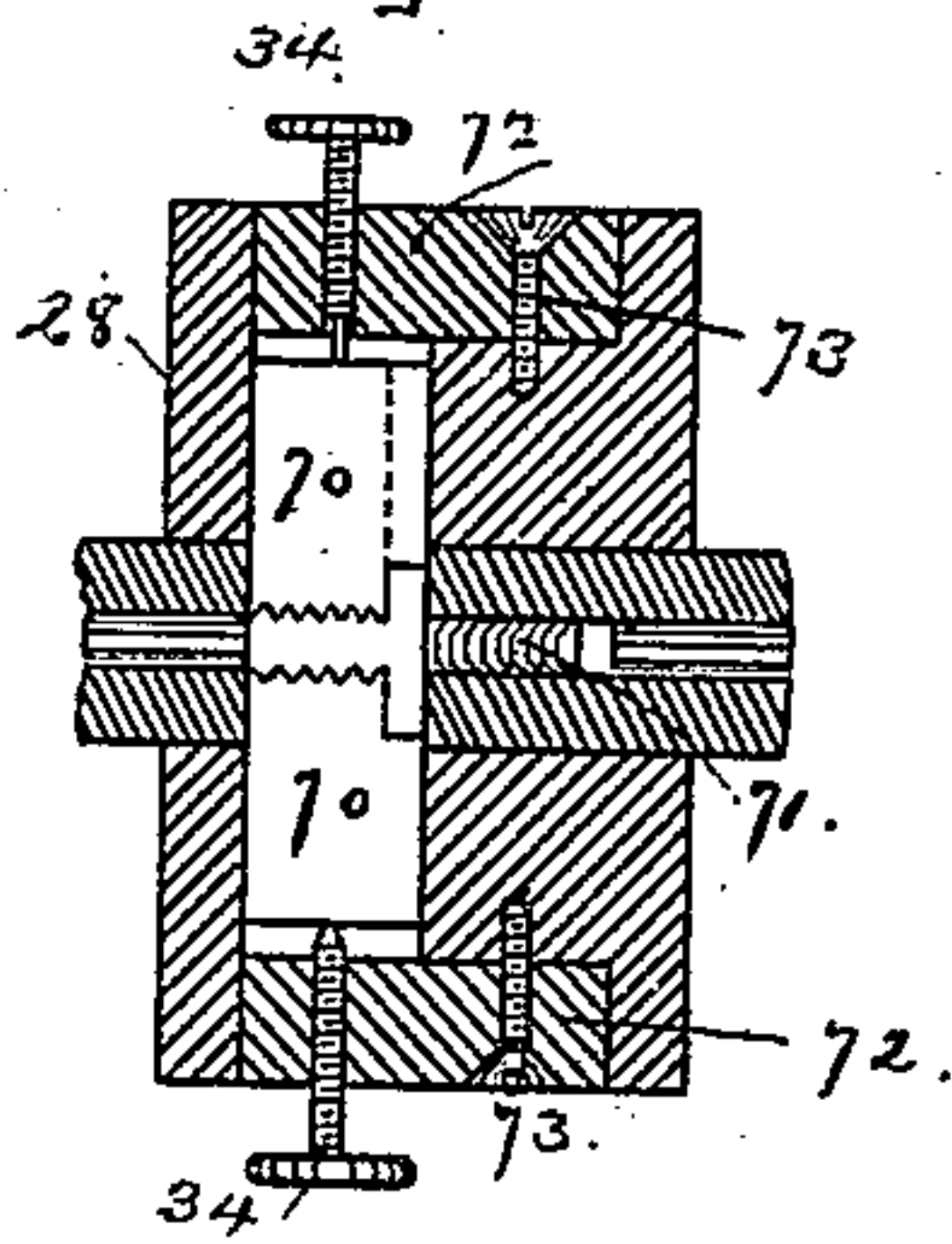
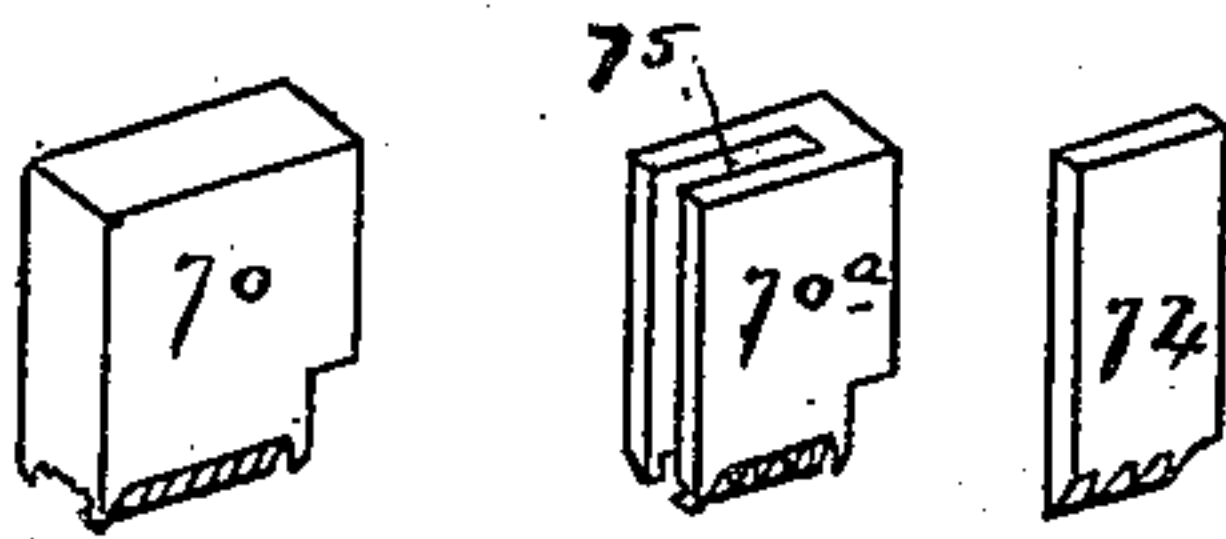


Fig. 14.



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UNITED STATES PATENT OFFICE.

ANDREA CAVALLI, OF SAN FRANCISCO, CALIFORNIA.

MACHINE FOR SCREW-THREADING WIRE.

SPECIFICATION forming part of Letters Patent No. 312,084, dated February 10, 1885.

Application filed September 7, 1883. (No model.)

To all whom it may concern:

Be it known that I, ANDREA CAVALLI, a citizen of the United States, residing in the city and county of San Francisco, in the State of California, have made and invented certain new and useful Improvements in Forming Spiral-Threaded-Wire Fastenings; and I do hereby declare that the following is a full, clear, and exact description of my said invention, reference being had to the accompanying drawings by figures and letters.

My invention relates to the production and manufacture of screw-fastenings, for use in the various arts and trades, as a substitute for nails and other metal fastenings, and in place of sewing and stitching.

The object sought to be attained is to form a spirally grooved or threaded wire by compressing the substance of the wire instead of by cutting or chasing the groove; and I accomplish this by combining together a set of grooved circular rolls around a center, and in such position that the space inclosed by the peripheral grooves forms a circular aperture. These rolls are therefore circular revolving dies, their grooves are suitably milled, and they are geared together to rotate in time. By combined pressure and rotation they form a continuous spiral thread in and around a length of wire that is caused to pass through them. A reel at the front and a set of feeding or drawing rollers constitute the means for presenting the wire and carrying it forward at suitable tension. In connection with this part or feature of my invention I employ a separate finishing device to remove burrs and produce a smooth continuous groove or thread.

The following description fully explains the nature of my said invention, and the manner in which the same is constructed, combined, arranged, carried out, and employed by me.

In the accompanying drawings, Figure 1 is a side elevation of a machine constructed in accordance with and to attain the objects of my invention. Fig. 2 is a top view of the machine, Fig. 1. Fig. 3 is a front view of the head or frame and the revolving dies. Fig. 4 shows the frame and the driving-gears in vertical section. Fig. 5 is a section taken through the center of the vertical dies of the set in a plane transverse to the

section Fig. 4. Figs. 6, 7, and 8 show details of the reel. Fig. 9 is a horizontal central section of the winding-drum, mandrel, chuck, and feeding-rollers. Fig. 10 is a partial side elevation and vertical section of the same. Fig. 10^a shows in detail the mouth-piece for the mandrel. Fig. 11 shows an elevation and section of the drum-head; Fig. 12, a vertical section of the chuck taken transversely to the line of the machine. Fig. 13 is a vertical section of the same, taken in the longitudinal line of the machine. Fig. 14 shows details of the chuck-dies.

The parts of a complete machine include a reel, C, to hold a coil of wire, the thread-forming dies A, the drawing-rolls B, to draw off from the reel and feed or advance the wire through the dies, a set of finishing-dies, and a winding-drum, D, to take up the finished wire and form it in coils for future use. A machine of such structure and parts handles the wire and performs all the operations mechanically. The thread-forming dies and the finishing mechanism may be used separately, however, and as two distinct tools or devices to which the wire can be presented in two successive operations and at different times, instead of being arranged in close relation to each other, as they are herein shown. A suitable bench or frame, 1 2, is provided, and on the front end thereof a bracket, 3, is bolted to support a head or frame, A. In this bracket are bearings for a driving-shaft, 5, and the back plate of the head is secured to the same by a hollow bolt taking through the ears of the bracket. This bolt is a sleeve having the driving-shaft 5 passed through it. The head is a solid block, 7, with a circular recess in the front fitted with a removable block, 8, in which are bearings for the shafts of the set of revolving dies. Segmental cavities at the back of the recess conform to the shape of the dies, and the back of the block 8 is recessed correspondingly, so that each die works in a close circular recess or chamber in the head. The two sections, Figs. 4 and 5, taken at right angles to each other, will enable the form of these chambers to be understood. The front block, 8, is secured in the head 7 by screws. Bearings for the shafts or spindles 17, that carry the revolving dies, are provided in the two parts 7 8, and the spindles then extend across

the circular chambers, one at each chamber, and at the inner ends rest in bearings in the block 8, their outer ends projecting outside the rim or edge of the head far enough to take the bevel and spur-gears by which connection of the whole set of spindles is made, and the required uniform and positive rotation together is effected. The dies are circular disks 16, having concentric concave grooves with milled faces around the center of their rims. The form and size of this groove in each die is governed by the number of dies employed in the head. In the construction here shown and described a set of four dies is employed, and the milled groove in each die constitutes a quarter of the entire circle of the aperture through which the wire is drawn; but in changing the number of dies it will be evident that the groove in the rim of each die in the set will require a corresponding change to form a segment of the complete circle required. The edges of the dies 16 are beveled to give inclined faces around the rim, so that when the grooves are properly brought together the beveled faces will run closely against one another in the set and bring the edges of the milled grooves into exact line to form a complete circle. In a set of four dies these beveled edges will have an angle of forty-five degrees with the face of the die. If a different number of dies are used, these bevels will be changed accordingly. Through the circular aperture formed by the milled grooves a length of wire is drawn by the joint action of the revolving dies and the feeding or drawing rollers behind the head. The simultaneous and uniform rotation of the dies is produced by the system of gears shown in full and in sectional views, Figs. 3 and 4. The spindle of each die has a bevel-gear, 11, and a spur-wheel, 12, both fast and turning regularly together. Interposed between one spindle and the next is a short spindle or stud, 13, fixed into the body of the block 7, and carrying two idler-gears, 14 15, one a bevel and the other a spur wheel. The idler-gears run loosely on the stud, although they are coupled or locked together to run regularly and one drive the other. By the combination of these bevel and spur gears the motion is transmitted from one die-spindle around the corner of the block 7 to the next die-spindle at right angles. The bevel-pinion 14 receives motion from the spur-gears 12 15, and by engagement with the bevel-gear 11 of the next spindle 17 the connection between every two die-spindles is completed. The spur-wheel 12 of the lowest horizontal spindle, 17, meshes with the spur-wheel 6 on the driving-shaft 5, and the entire set of dies receives motion, through the combination of gears and spindles, from a single driver. The feeding-rolls are fixed in a box, 20, bolted to the front of the stock or head 19, at the rear end of the bench, by bolts 18. The rolls are small disks or wheels with concave faces or rims suitably grooved to engage with the spiral groove or thread in the wire, and they

are fixed on vertical spindles 24, that have bearings in the top and bottom of the box 20, and are connected together by gears 27. One of these gears is seen in Fig. 1, the other gear being immediately behind it, and upon the spindle 24 of which the upper end projecting outside the box has a worm-wheel, 23, fast on it, and by means of the worm-shaft 22, mounted in bearings 21 21 on top of the box, and the gears 26 29, motion is taken from the revolving spindle 32, that carries the chuck 28. Rotation of this spindle 32 is obtained by the pulley 31, and the driving-pinion 29 is situated on the extreme end of the spindle against the face of the chuck, and is hollow to afford passage for the wire. In the chuck are fixed the finishing-dies by which the burrs or rough edges and film left on the wire in the spiral threads are turned off and a smooth continuous groove produced around the wire for any required length. As the wire has no rotary motion, but only a progression through the parts of the machine, these finishing-dies are rotated while the wire passes through them. The chuck carries four small dies or removable jaws set radially, and held and moved by set-screws 34, the edges of which jaws being notched or serrated to correspond with the size of the spiral groove previously formed in the wire, and by engagement therewith turn off and finish the edges of the spiral thread by the revolving motion of the spindle. A degree of tension upon the wire sufficient to keep it properly distended and to produce uniform movement through the dies is maintained by using a revolving drum, D, to which rotation is given from the chuck-spindle 32 by means of the short shaft 36, having a spur-gear in mesh with a pinion, 33, on the end of the spindle, and a worm, 37, taking into a worm-wheel, 44, loose on the axle of the drum. This wheel 44 is provided with a pawl, 44*, which engages with a ratchet, 44**, fast upon the shaft 38, so that the shaft 38 will be moved when the wheel 44 is moved; but the shaft 38 may be rotated independently of the wheel, and this is done by means of the crank 42. This crank and independent movement of the shaft 38 are provided for the purpose of partially winding up the spring contained in the drum before starting the machine. By winding up the spring at the beginning sufficient power is accumulated, that of course could not be obtained by the action of the gearing alone upon the spring. The crank therefore affords means for starting with any degree of tension on the wire required in working the machine. The frame 41 has one side, 40, jointed, so that it may be opened and one head of the drum taken off to remove the coiled wire as often as the drum is filled. The cylinder 35 of the drum is hollow, and contains a spring-barrel connected to the axle 38, so that when wound up it shall by reaction maintain an increased tension or pull upon the wire. This spring is wound up for action by applying a crank, 42, to the axle, the nec-

5 necessary ratchet and pawl being provided to
 hold the spring when wound. This spring is
 brought into action at the time when the ac-
 cumulating coils of wire have increased the
 10 diameter of the drum, and at such time it
 serves to relieve the shaft 36 and gears from
 the increasing strain. One of the heads of
 the winding drum is fast to the barrel. The
 other head is made detachable, so that the
 15 fastenings holding the side 40 of the frame be-
 ing first removed, this head can be taken off
 and the finished coil slipped from the barrel.
 A pawl, 43, is thrown over to engage with
 notches in the rim of the head 39, for the pur-
 20 pose of locking the drum when the winding
 up of the spring takes place. At the front
 of the frame or bench an arm, 45, carries a
 reel, C, from which wire in a continuous length
 can be drawn by the mechanism upon the
 25 frame behind. This reel is of such construc-
 tion that it is readily set and fixed into the
 center of a bundle of wire in the coil as it is
 put upon the market, so that special wind-
 ing for the purposes of this machine is not
 30 required, and the time and labor necessary to
 properly prepare and fix wire in the coil are
 dispensed with. The reel is composed of
 three separate arms pivoted on a central hub,
 so that they can be closed up one upon the
 35 other, and also be set apart radially. In this
 latter position, for service, the arms are held
 at equal distance apart by the conjoint action
 of the stops 51, the notches 52 on the inner
 ends of the arms, and the spring-catch 49.
 40 The arms 47 have wire hooks 48 on the sides
 to take the wire. In its closed position the
 reel can be readily placed in the middle of a
 coil of wire, and on being opened out and set
 radially at equal distance the locking studs
 and notches 51 52 and the spring-catch, with
 45 its hooked end 50, operate to keep the reel
 distended and fixed for service. In this man-
 ner I construct a machine having the capac-
 ity to turn out a spirally-grooved wire in the
 50 form of a cable or a continuous length, and to
 produce them at a low cost of manufacture.
 Such grooved wire is useful for uniting soles
 to boot and shoe uppers, in harness-work, and
 in light cabinet-work. The wire is fed to the
 55 revolving chuck by the rollers 24 in the head
 20, one roller being geared into the spindle by
 gears 23 and the short worm-shaft 22, and the
 other roller receives motion from the spindle
 of its fellow through the gears 27. The spin-
 60 dle 32 is hollow and carries on the end the
 chuck 28, formed of a solid disk in which
 are fixed two sets of cutters or finishing-dies,
 70 70, having movement in their slots or seats
 in the chuck toward the center to take up
 wear and regulate the depth of the cut or
 finishing action upon the grooved wire. These
 cutters are set in pairs diametrically across
 the disk; but one set is placed back of the
 other, and not in the same plane, so that the
 65 wire in its passage is acted on by one and then
 by the other of the sets. Each movable die
 is confined in place by a block, 72, that is

fixed into the end of the recess and held by a
 screw, 73, and a thumb-screw, 34, working
 through a threaded socket in the block, and 70
 has its point set against the head of the die
 beneath, so that the block 72 is fixed and the
 die free to move in the recess, the screws af-
 fording adjustment of the cutting-point as re-
 quired by the character of the work. In one 75
 of the dies 70 is fixed a chaser or auxiliary
 cutter, 74, having adjustment independent of
 the die and adapted to be projected beyond
 the general cutting or finishing edge of the
 general tool. This adjustment is effected by 80
 means of the thumb-screw 34, the point of
 which is set against the head of this chaser,
 as shown in Fig. 12. This movable piece 74
 is set into a groove, 75, in the body of the
 cutter. The spindle 32 is rotated by the pul- 85
 ley 31, that receives motion through a belt
 from a convenient shaft-pulley overhead, and
 from the same source both the feeding-roll-
 ers and the winding-drum are operated, the
 spindle being geared into the feed-rolls, as 90
 before described, at one end, and into the
 drum at the other end by the shaft 36, the
 gears 33 34, and the worm 37 and gear 44,
 the gear being loose on the journal of the
 drum and the worm being on the shaft. Into 95
 the outer end of the spindle, where the fin-
 ished wire passes out to the drum, is in-
 serted a stationary tube, 60, with a flaring
 mouth, the office of which is to prevent con-
 tact of the rapidly-revolving surface at the 100
 open end of the spindle with the finished sur-
 face of the wire. This piece or tube 60 is part
 of a bracket, 61, by which it is fixed to the
 frame of the machine. This protection is nec-
 essary to keep the wire from being rubbed 105
 and the finished surface destroyed by the mo-
 tion of the spindle, as this part runs at a very
 high speed in operation. To permit the coiled
 wire to be taken from the drum as often as it
 becomes filled, it is provided with a removable 110
 head, and one side of the frame is formed of
 a separate bar detachable from the other side.
 This bar 40 has eyes in the ends that fit over
 the studs or pins 33^x on the fixed part of the
 frame, and keys or wedges are fitted into slots 115
 in these pins to hold the bar in place. The
 head 39 is locked to the end of the barrel 35
 by means of slots 63 63 in the head, and screws
 or buttons on the end of the barrel, as will be
 readily understood from the detail views, 120
 Fig. 11. This construction enables the drum
 to be emptied as often as it is filled, and the
 finished wire to be formed into coils of any
 desired size.

A clamping device to hold the end of the 125
 wire at the beginning of the winding opera-
 tion is provided on one of the heads. It con-
 sists of a small pivoted dog, 66, pivoted to the
 head 65, and having a bent end that works
 through a slot, 64, in the head. The end of 130
 this part is notched or roughened, and being
 carried through the slot in the manner shown,
 is brought next to the surface of the drum, so
 that it is sufficiently close to this surface to

clamp and hold the end of the wire between them.

The reel for containing the wire is not claimed in this application, it having been made the subject-matter of an application for patent filed August 29, 1884, Serial No. 141,791.

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

10 1. In a machine for forming grooved cable-wire fastenings for use in boot and shoe work and similar purposes, as described, the combination of a head having a central aperture around which are arranged grooved revolving
15 circular dies, and the mechanism by which uniform rotation is imparted to said dies, a set of feed-rollers having regular rotation and adapted to engage with and draw the wire forward through said head and between the
20 revolving dies thereof, a revolving head or chuck carrying a set of finishing-dies and placed in line with the travel of the wire, so that the action of the feed-rollers shall move the wire regularly forward through said re-
25 volving head, and a winding-up drum having rotation regularly with respect to the feed-rollers, all substantially as hereinbefore described.

30 2. The combination, in a suitable head or frame, of a set of spindles, 17, carrying grooved circular dies, a set of intermediate idler-spin-

dles, 13, and the series of bevel-gears and spur-gears 11 12 14 15, by which positive and uniform rotation of all the dies is effected.

3. The combination, in a suitable frame, of 35 the spindles 17, carrying the grooved revolving dies, the intermediate spindles or studs, 13, the bevel-gears 11 14 and spur-gears 12 15, the driving-shaft 5, geared into one of said spindles, a reel in front of said revolving dies 40 to hold a coil of wire, and a means, as the drum, spring, and winding-gears described, for drawing off the wire from the coil and through the said dies at suitable speed and tension, as hereinbefore described. 45

4. In a machine for threading wire, the combination, with the revolving spindle and chuck carried thereby, of the stationary flaring mouth-piece 60, held in the exit end of the spindle, and the winding-drum and operating 50 mechanism, as described.

5. The combination, with the revolving chuck-carrying spindle 32, of the winding-up drum, and the coil-spring and winding mechanism, consisting of the gears and worm-shaft, 55 constructed substantially as described, to operate as set forth.

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Witnesses:

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