

No. 848,190.

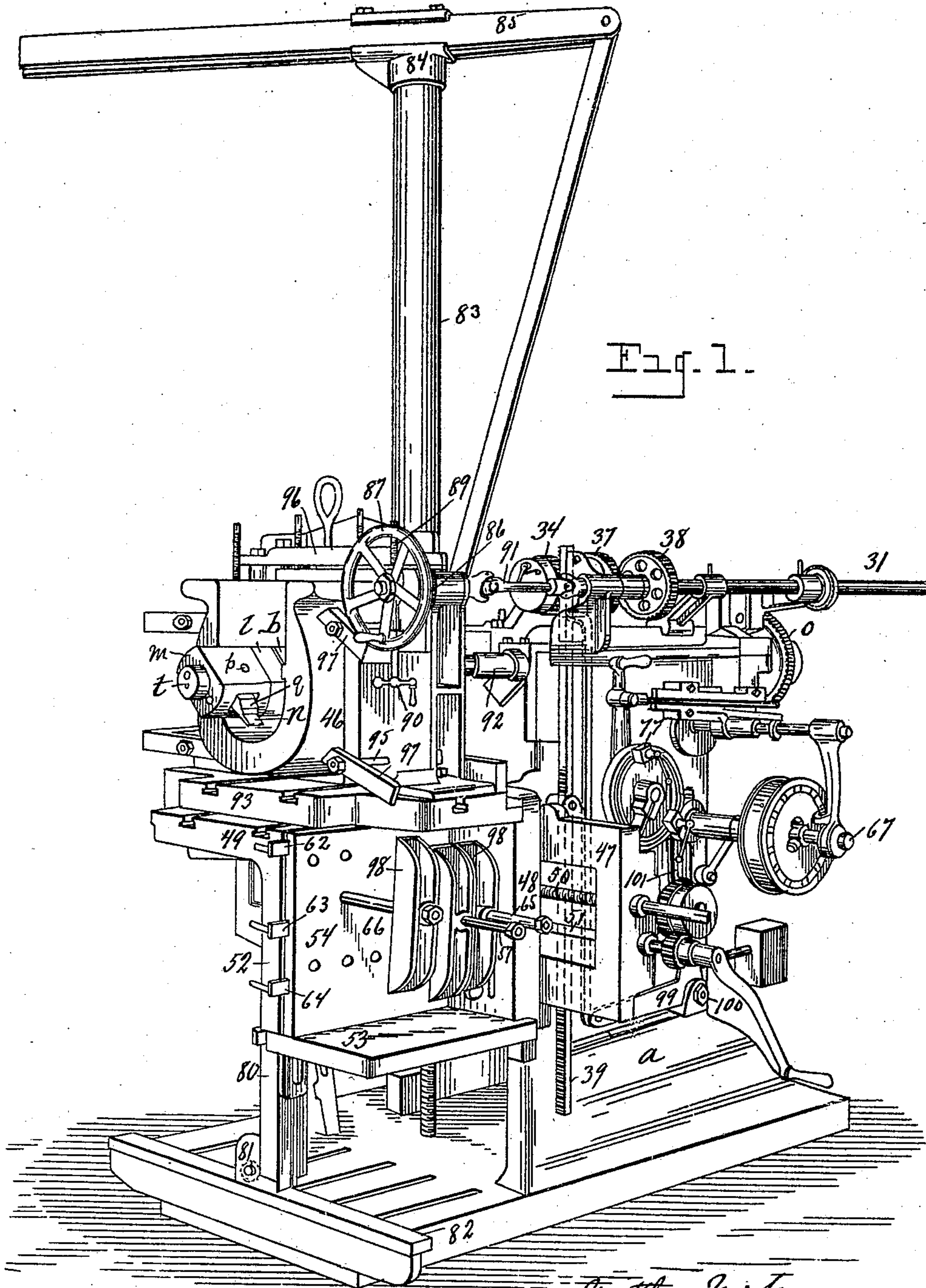
PATENTED MAR, 26, 1907.

M. & H. E. MORTON.

SHAPER FOR CROWNING AND FINISHING DRIVING BOXES ON LOCOMOTIVES, &c.

APPLICATION FILED MAY 15, 1905.

7 SHEETS—SHEET 1.



Witnesses:

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By *their* Attorney

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SHAPER FOR CROWNING AND FINISHING DRIVING BOXES ON LOCOMOTIVES, &c.

APPLICATION FILED MAY 16, 1905.

7 SHEETS—SHEET 2.

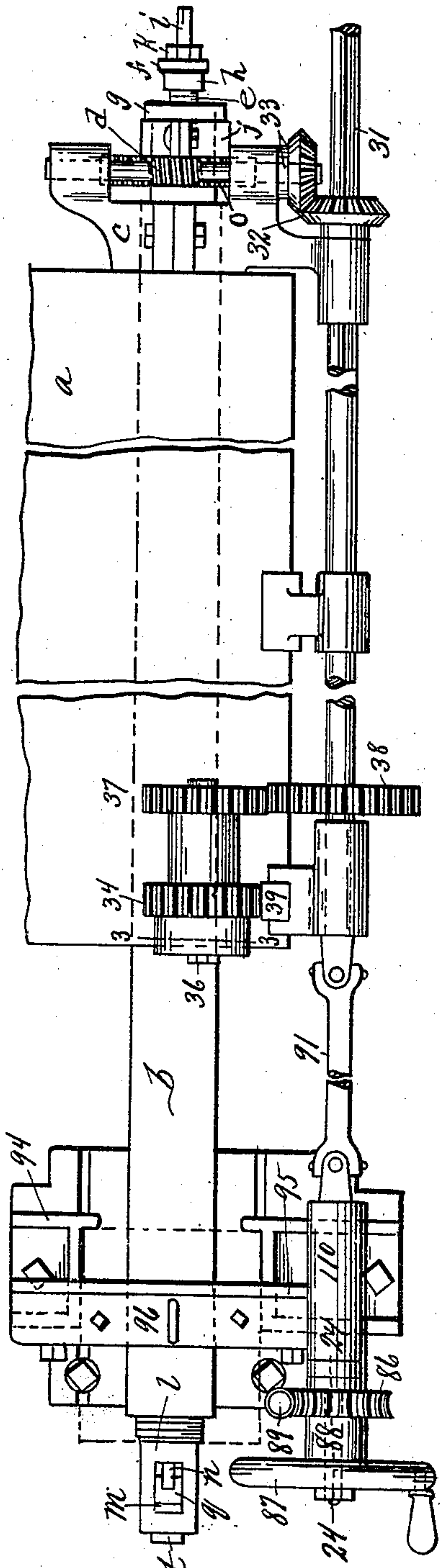


Fig. 1.

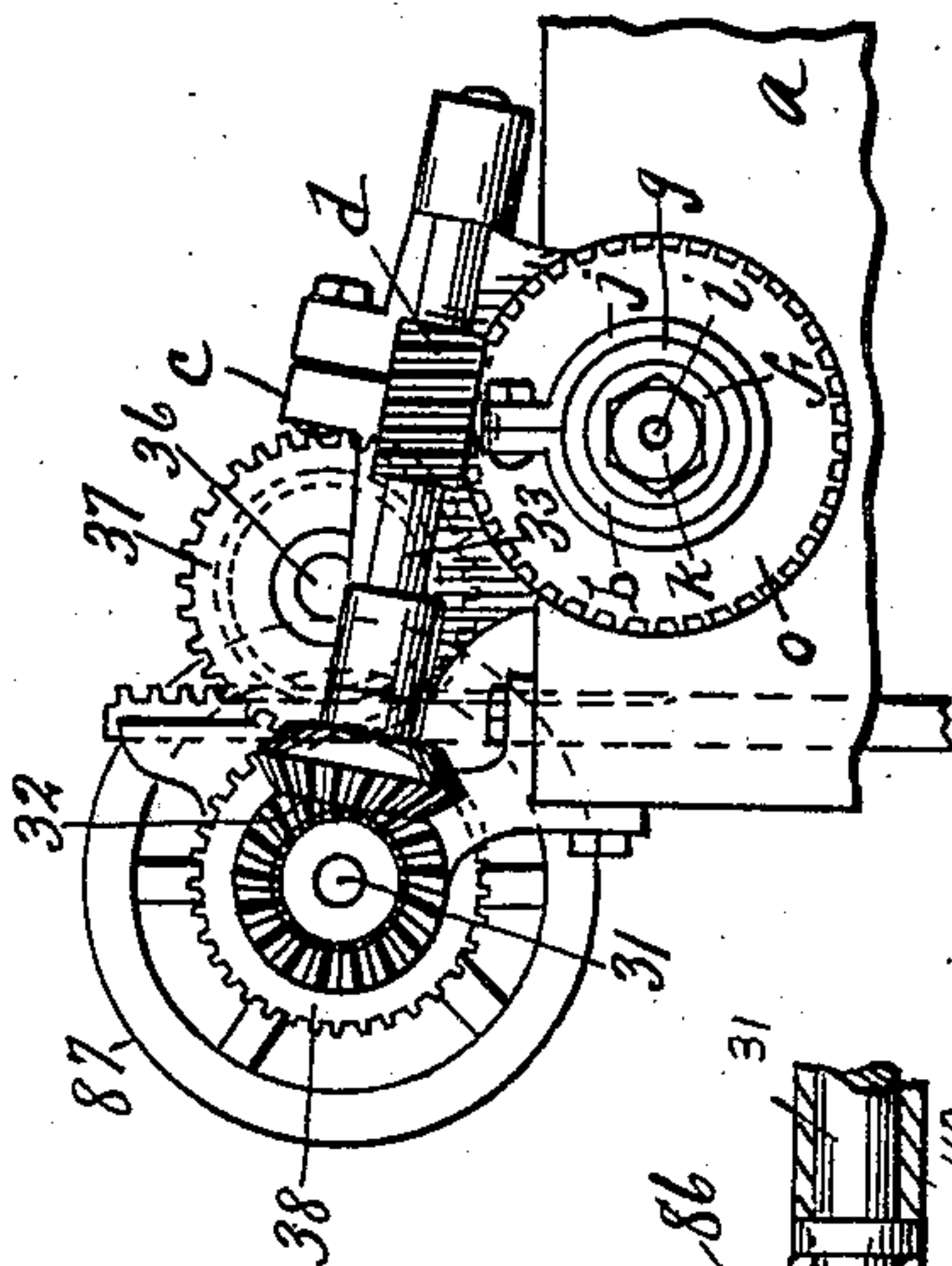


Fig. 2.

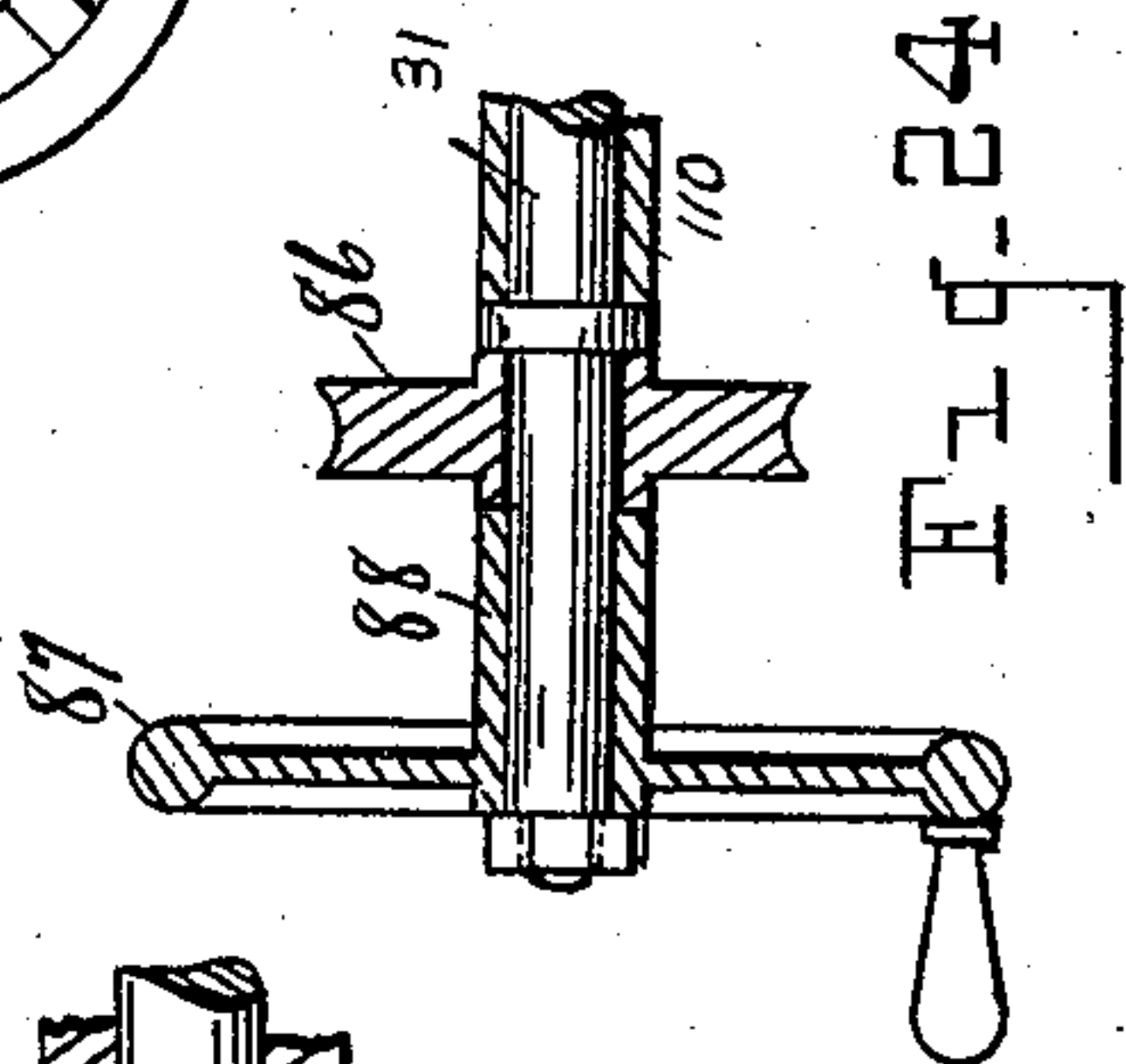


Fig. 3.

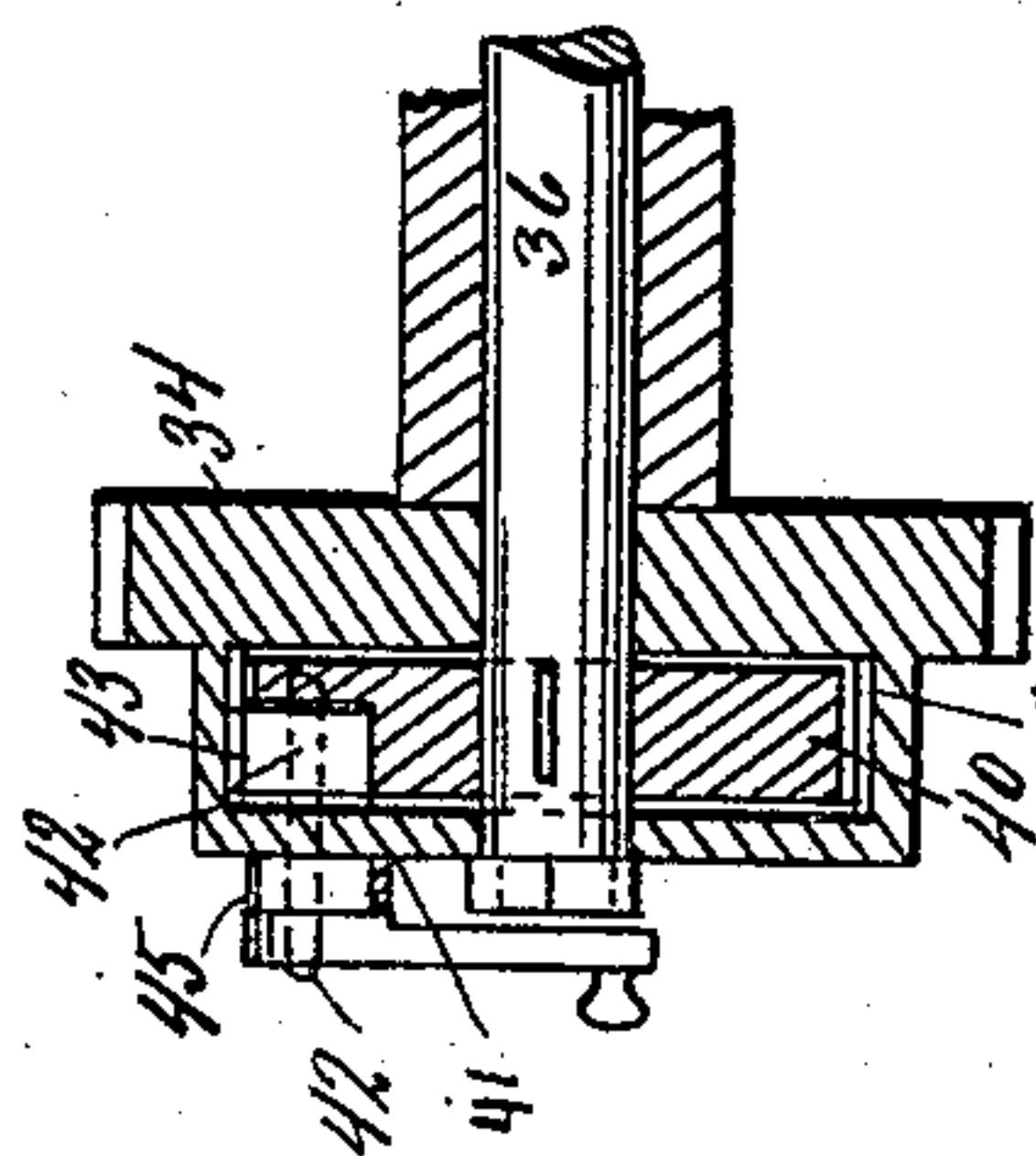


Fig. 4.

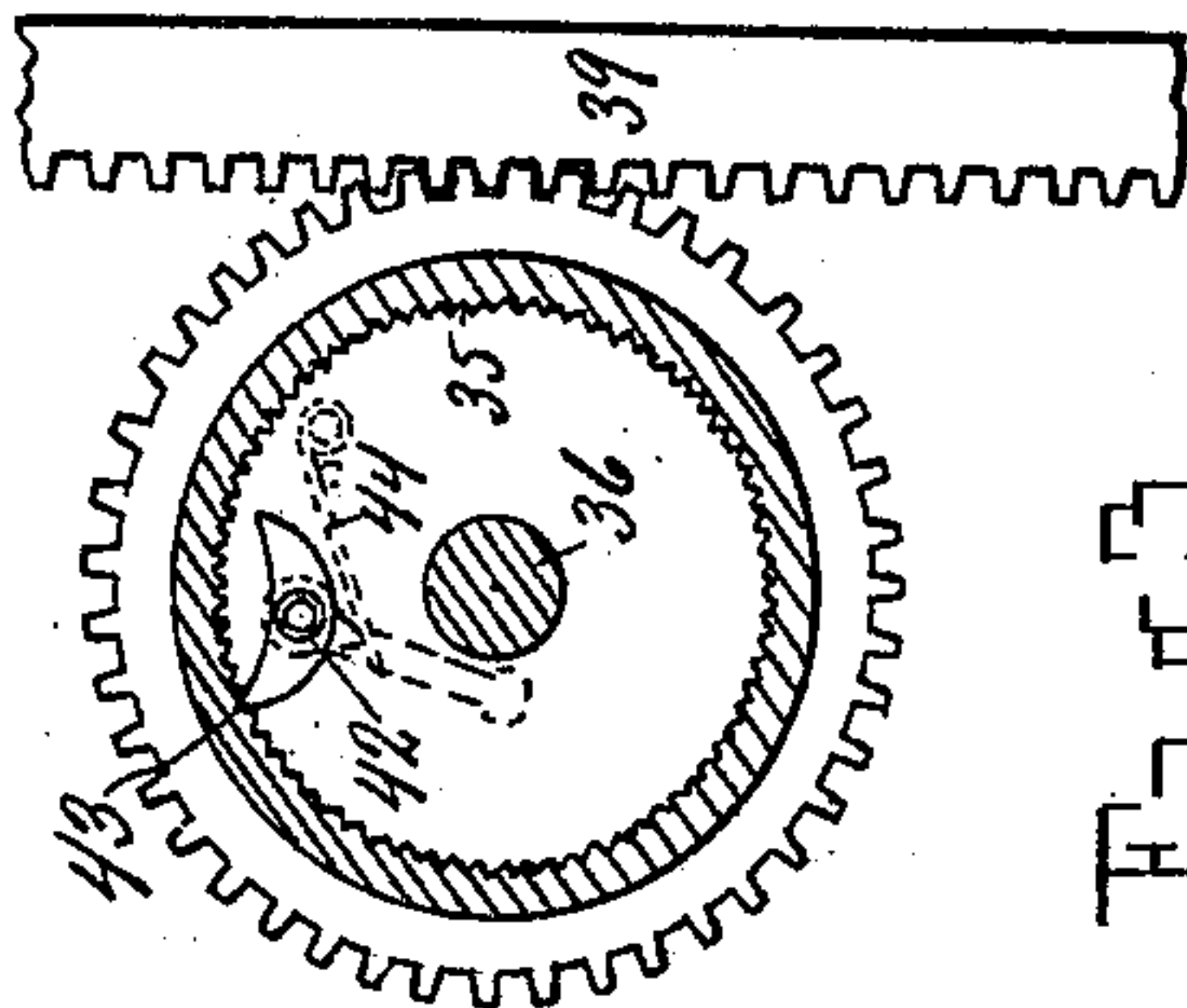


Fig. 5.

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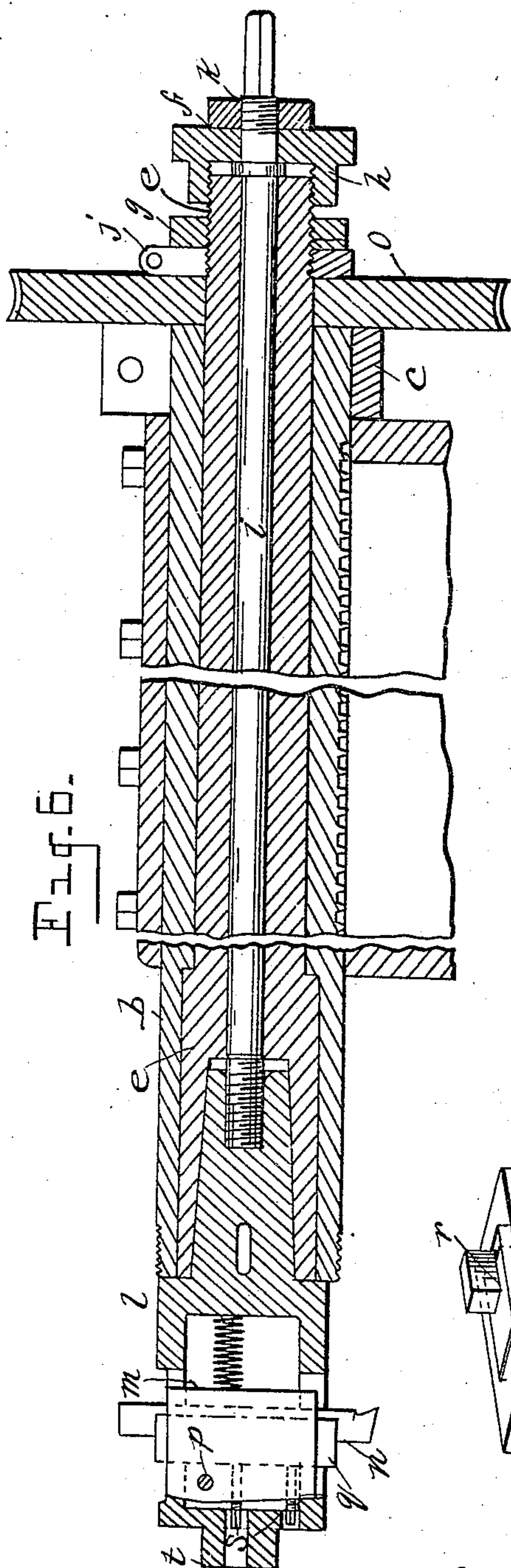


Fig. 6.

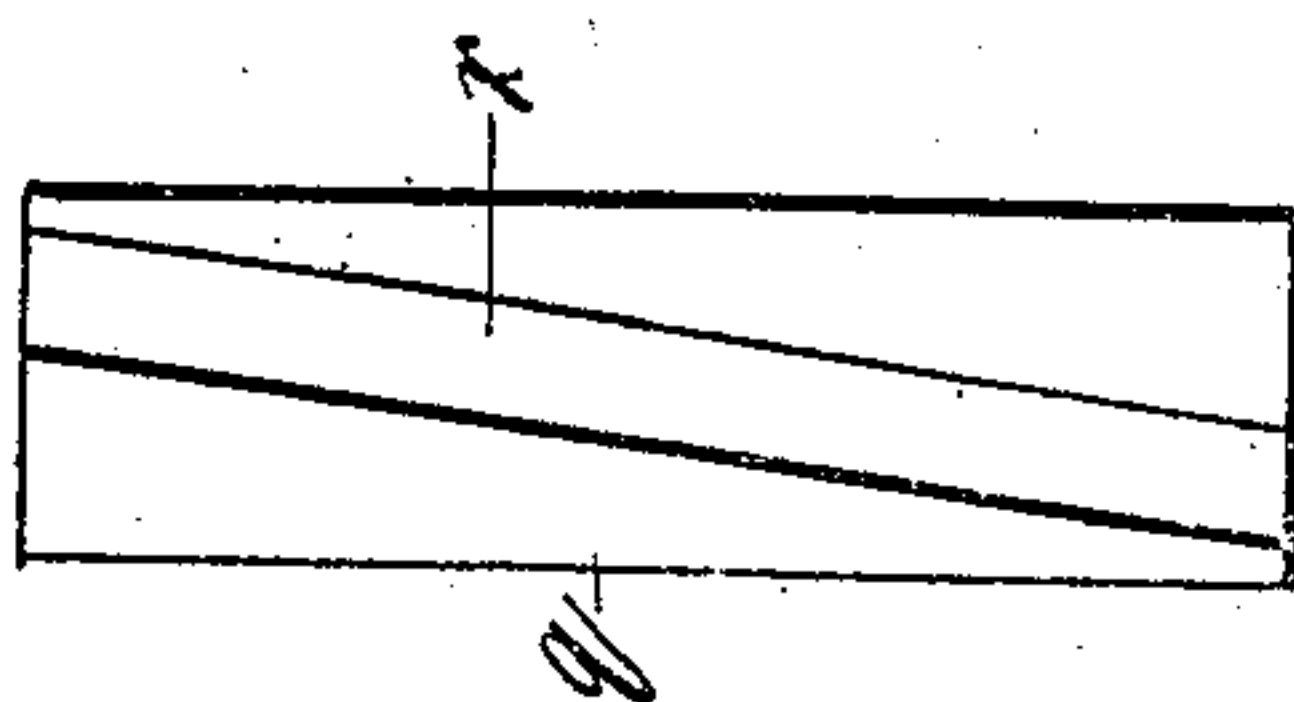


Fig. 10.

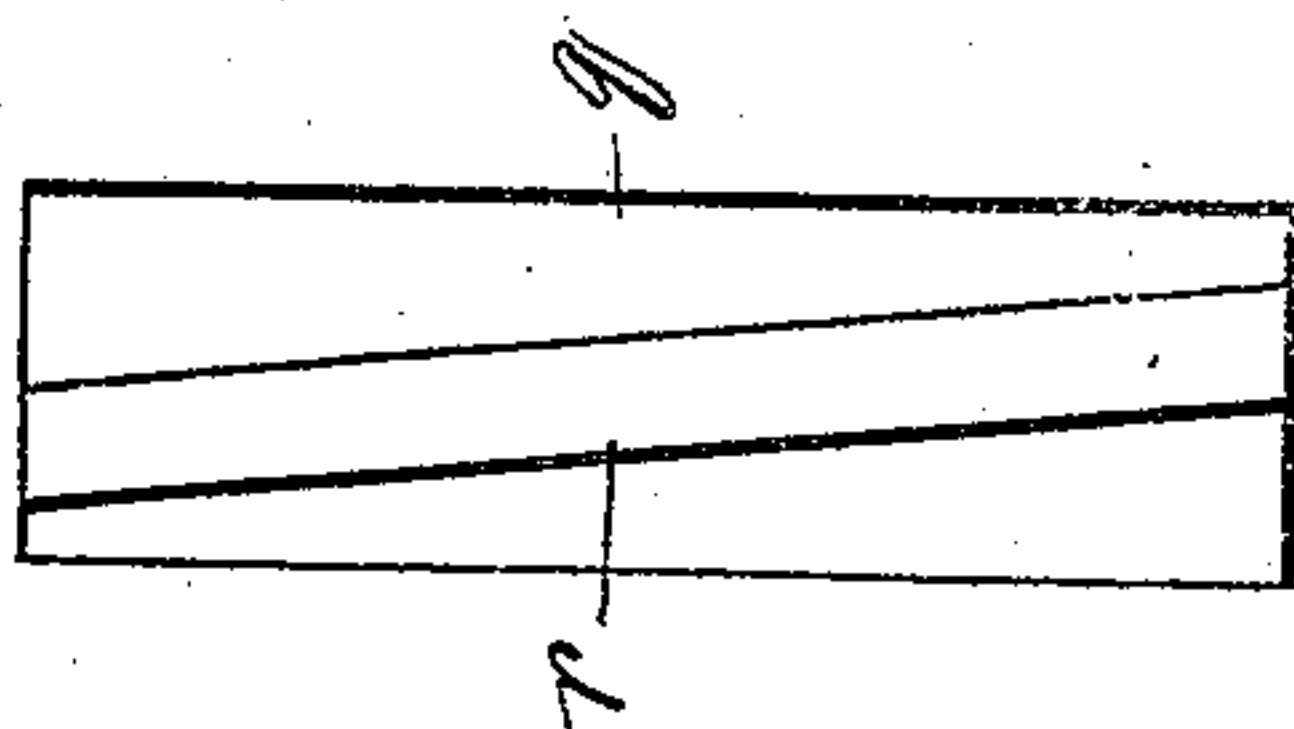


Fig. 9.

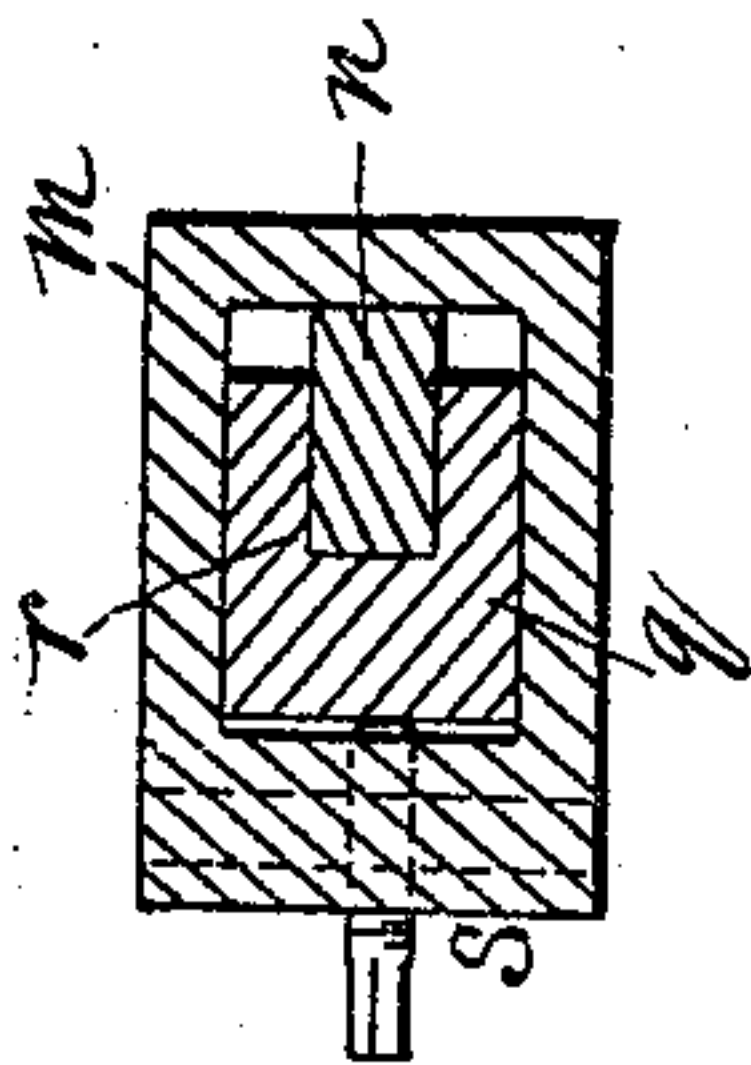


Fig. 8.

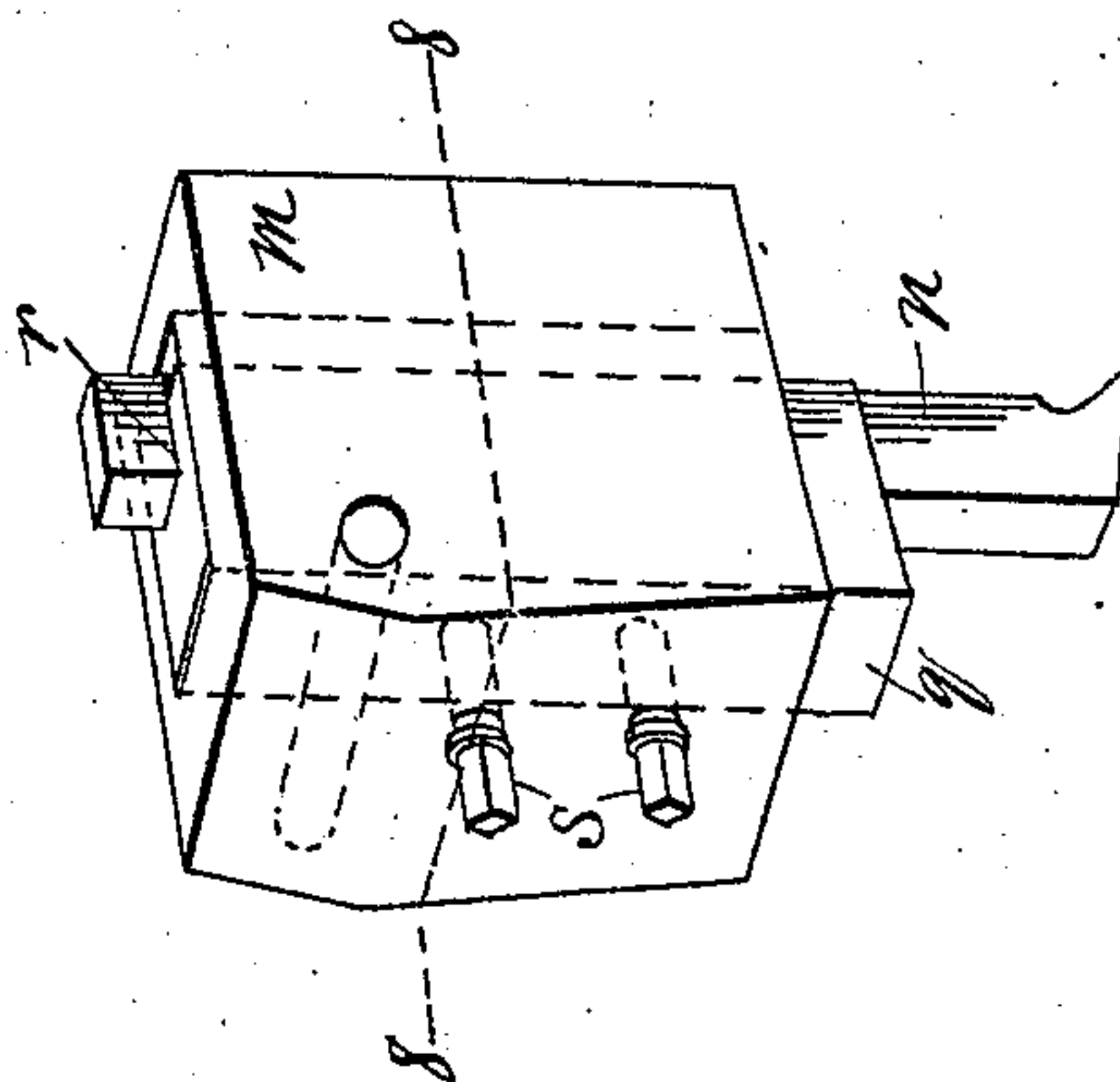


Fig. 7.

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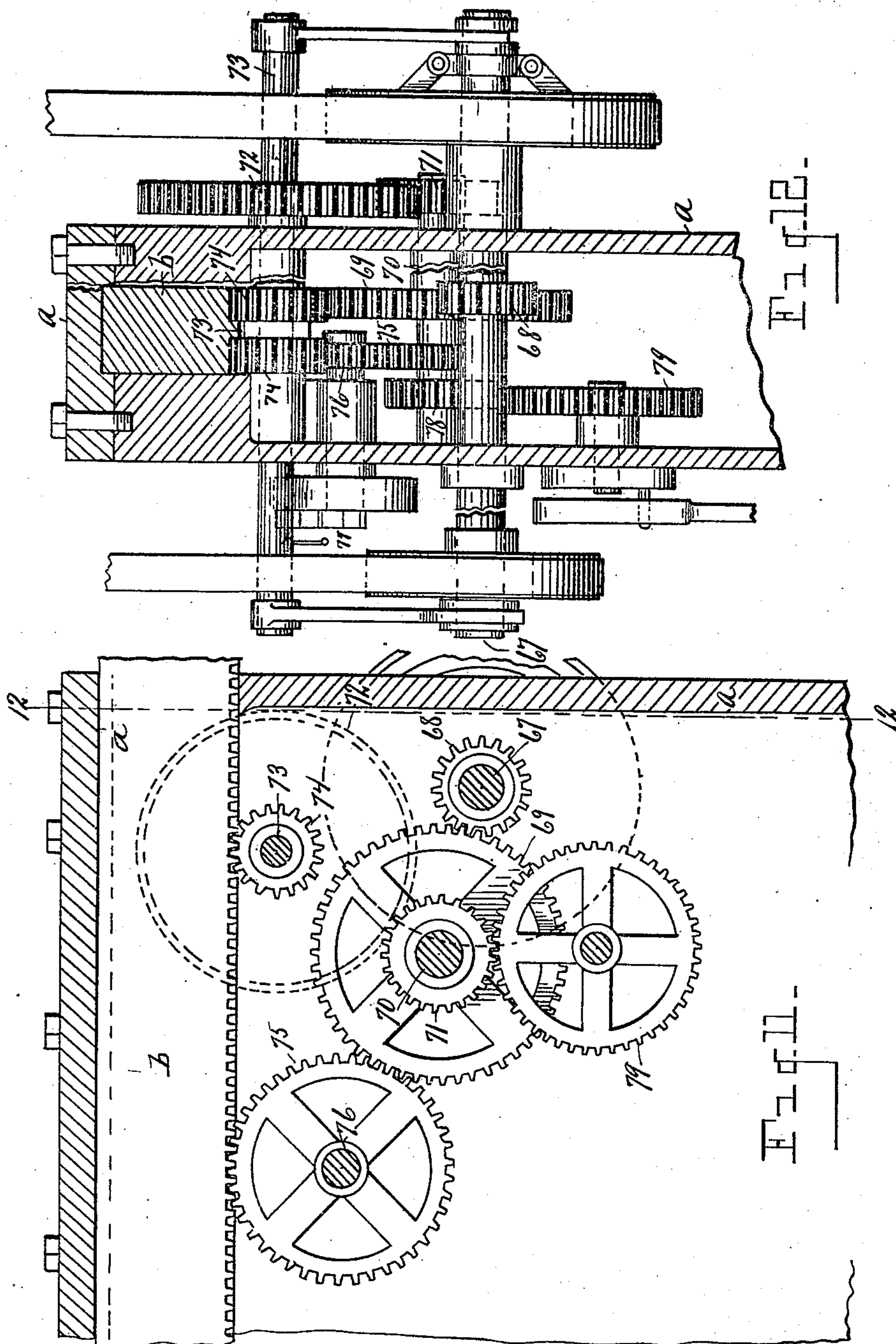
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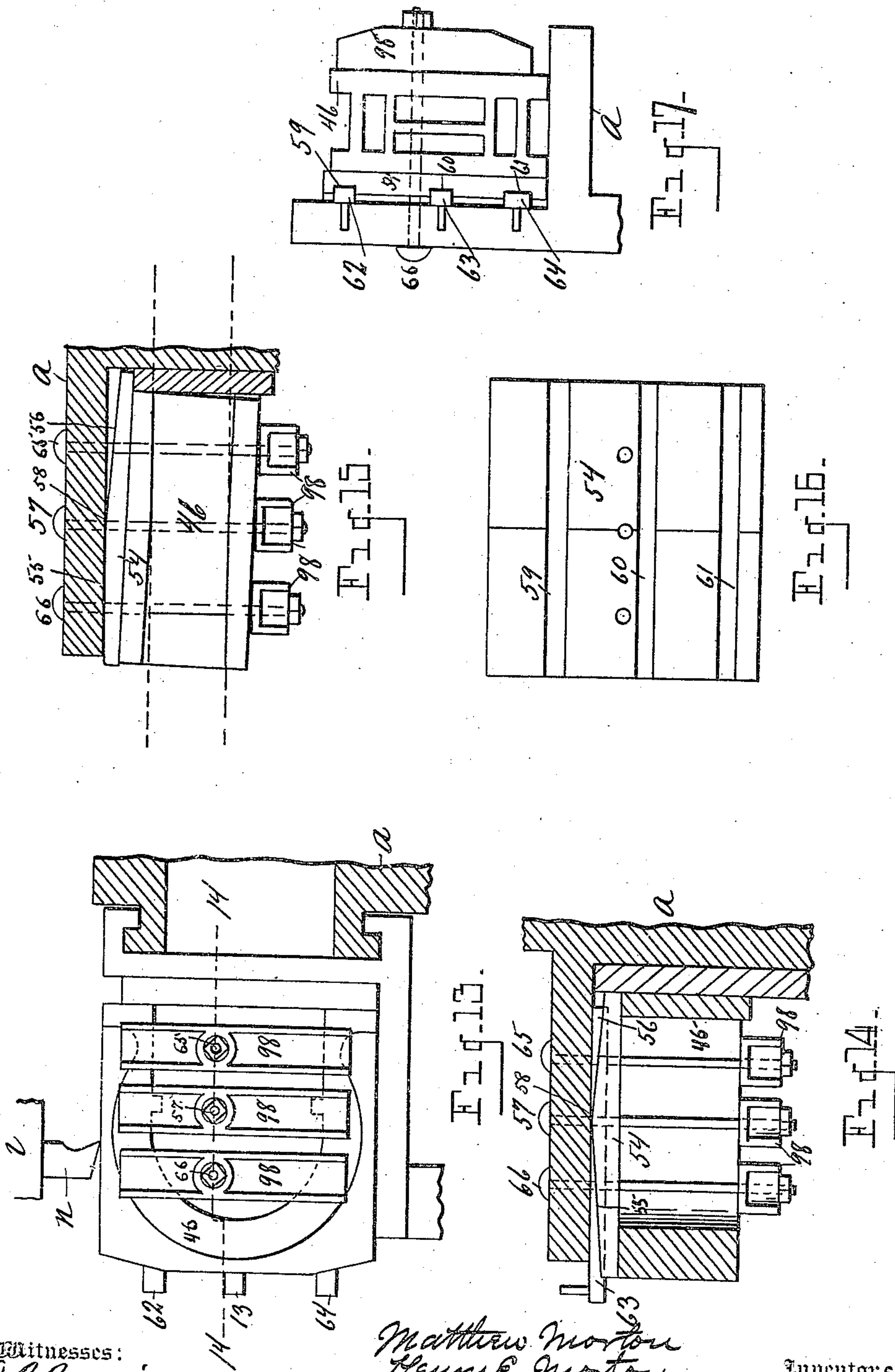
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7 SHEETS—SHEET 5.



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7 SHEETS—SHEET 6.

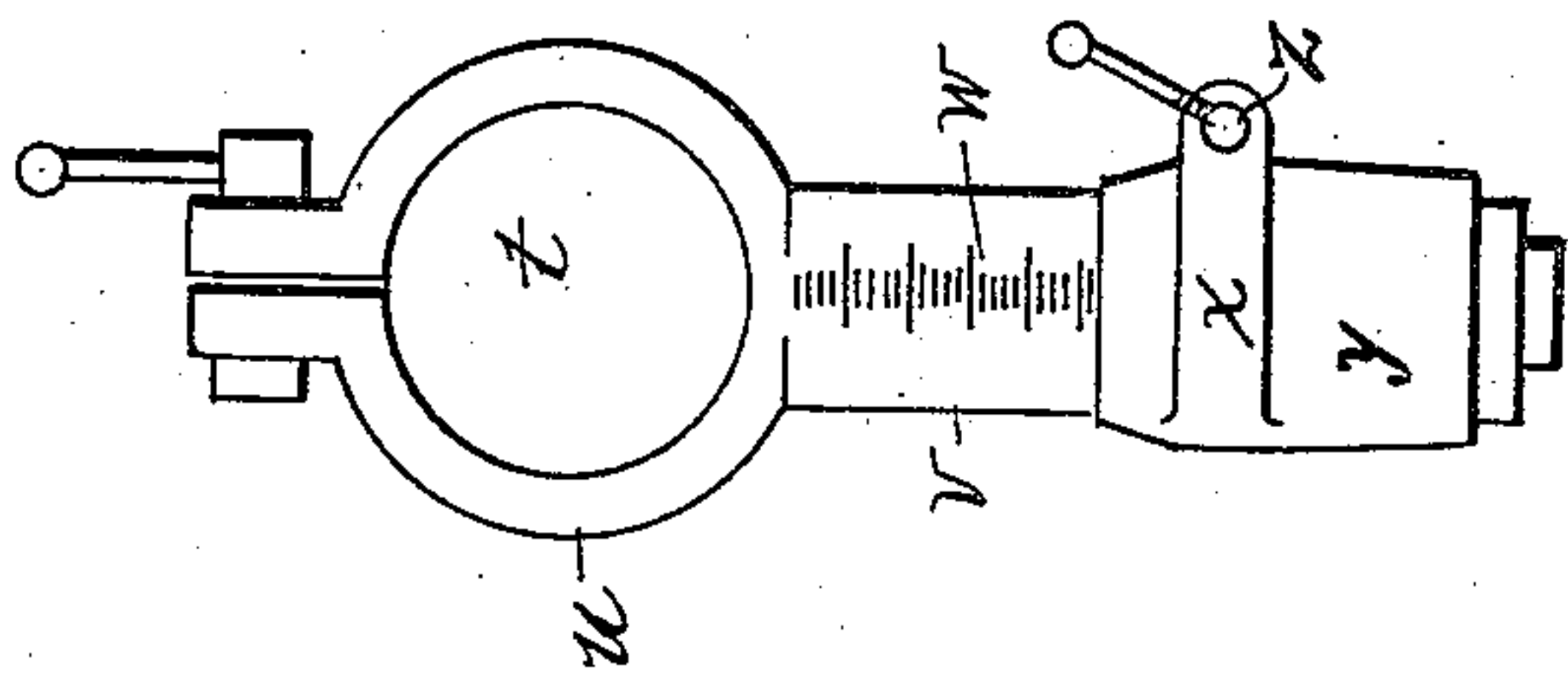


Fig. 20.

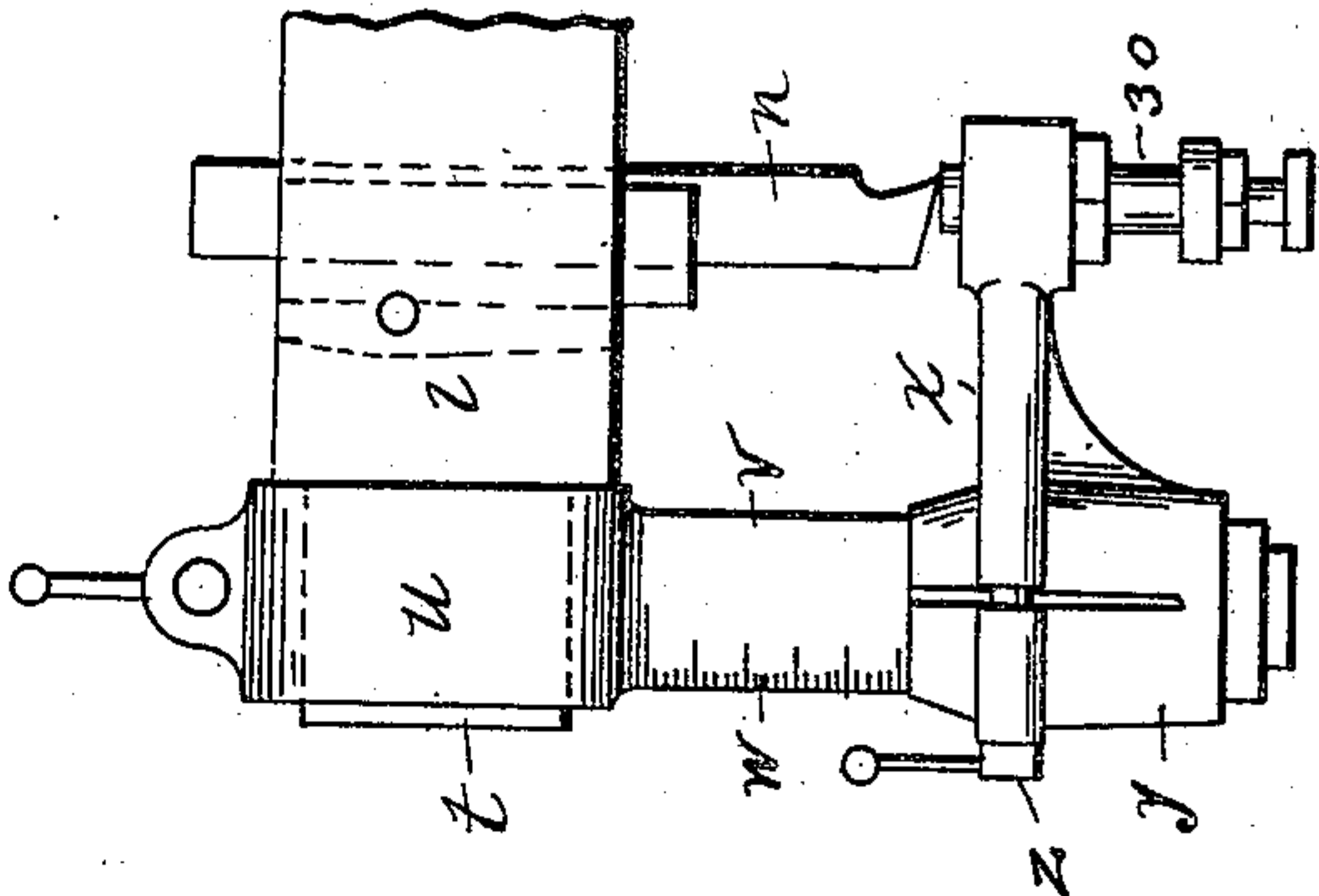


Fig. 19.

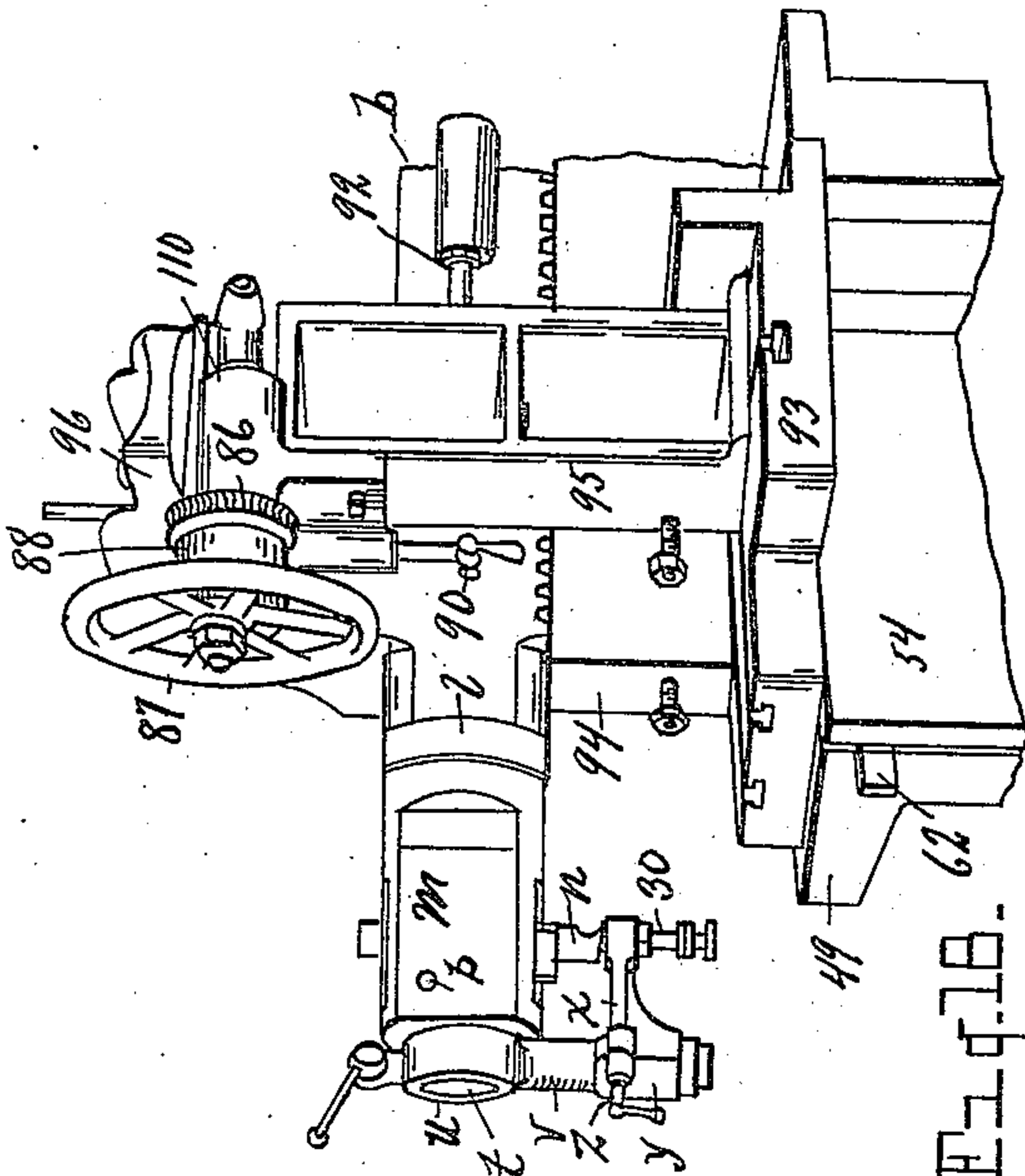


Fig. 18.

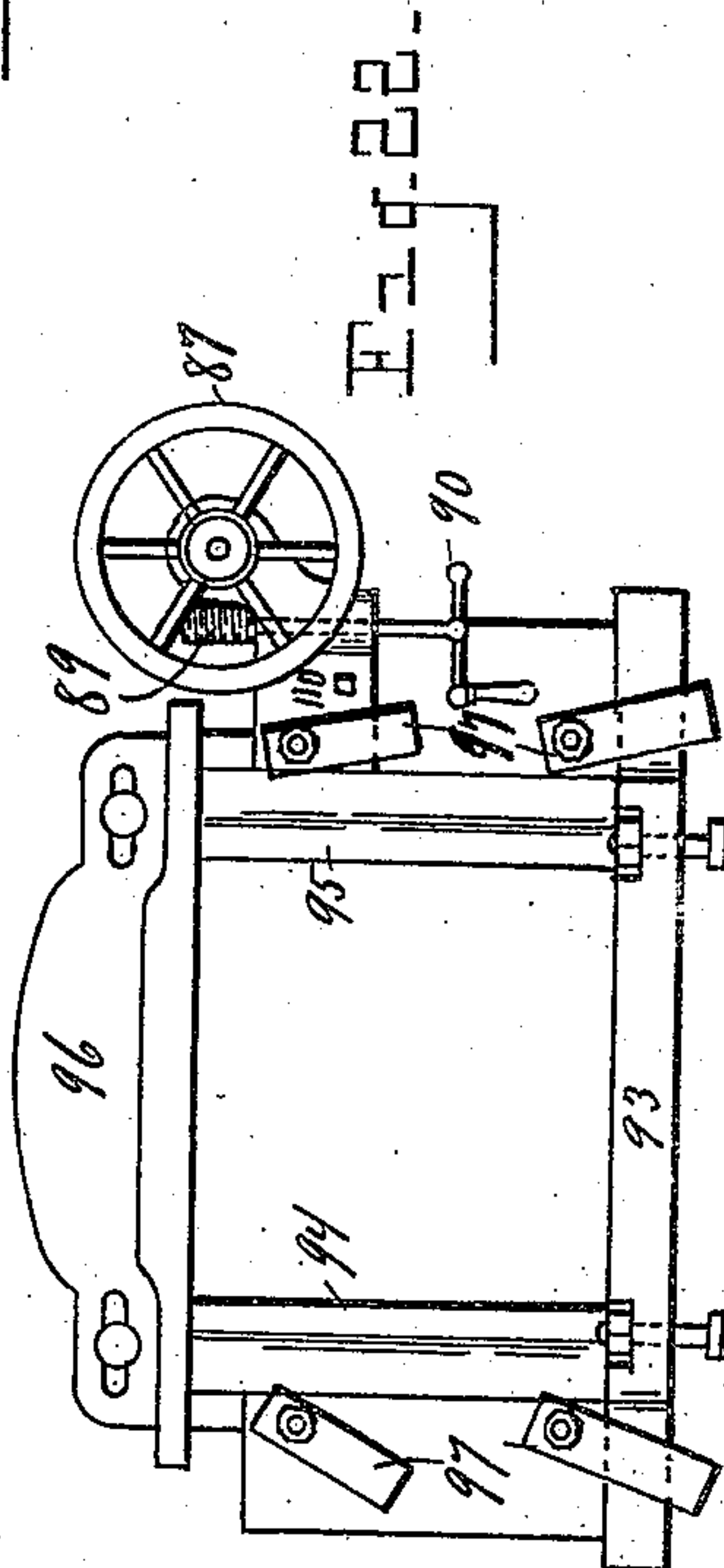


Fig. 22.

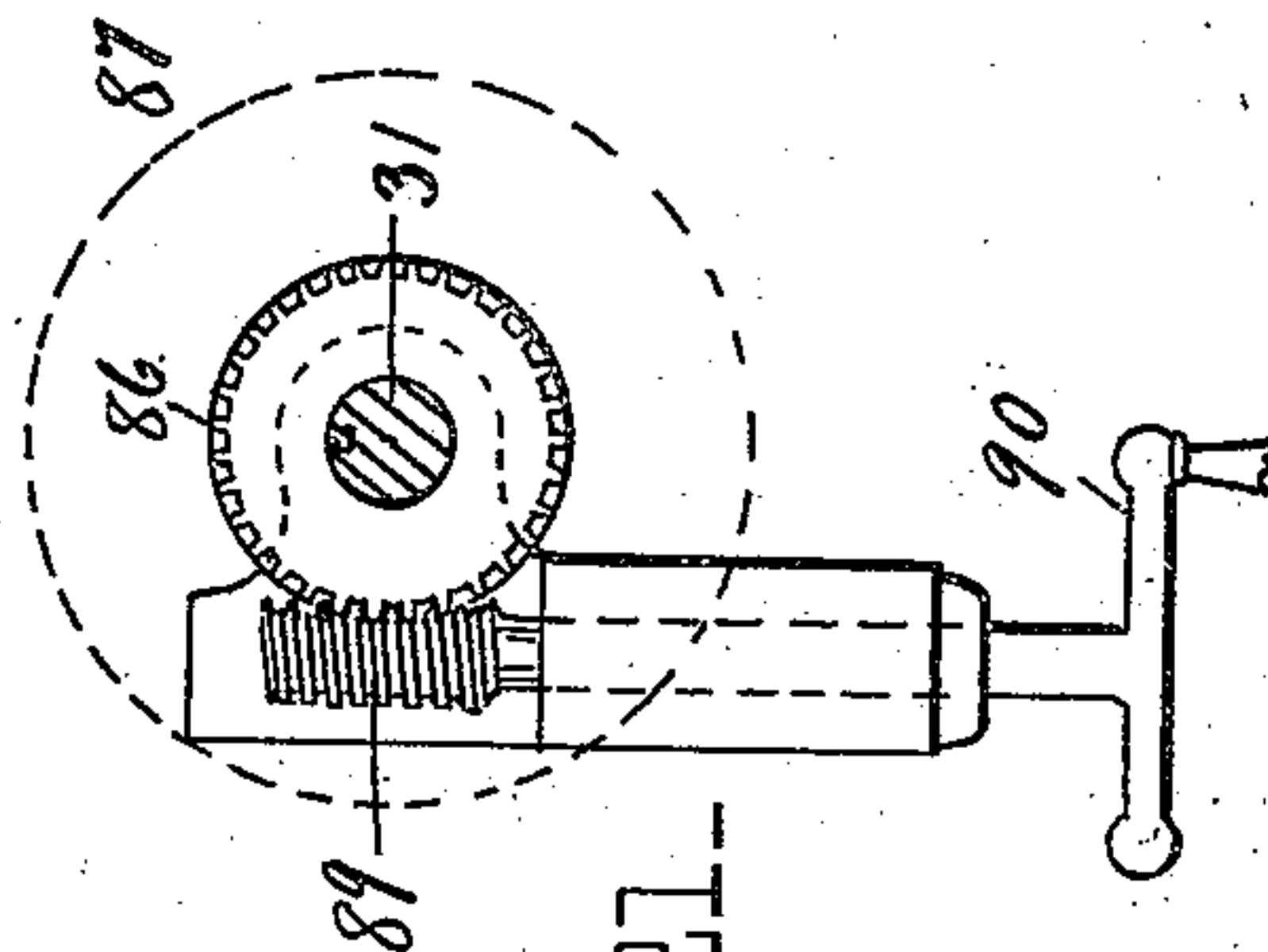


Fig. 21.

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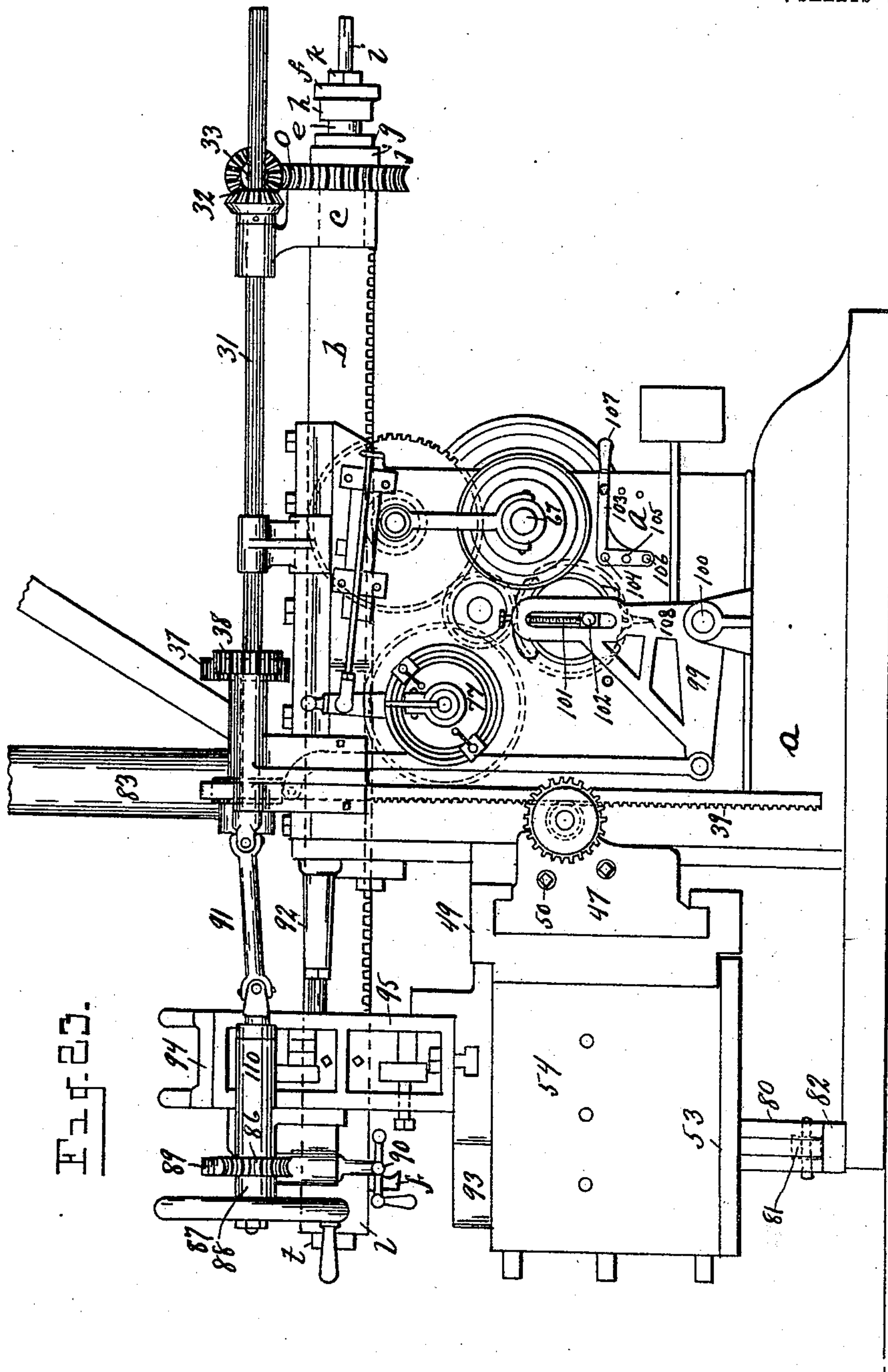
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APPLICATION FILED MAY 15, 1905.

7 SHEETS—SHEET 7.



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UNITED STATES PATENT OFFICE.

MATTHEW MORTON AND HENRY E. MORTON, OF MUSKEGON, MICHIGAN.

SHAPER FOR CROWNING AND FINISHING DRIVING-BOXES ON LOCOMOTIVES, &c.

No. 848,190.

Specification of Letters Patent.

Patented March 26, 1907.

Application filed May 15, 1905. Serial No. 260,538.

To all whom it may concern:

Be it known that we, MATTHEW MORTON and HENRY E. MORTON, citizens of the United States, residing at Muskegon, county of Muskegon, State of Michigan, have invented a certain new and useful Improvement in a Shaper for Crowning and Finishing Driving-Boxes on Locomotives and other Work, of which the following is a specification, reference being had to the accompanying drawings, which form a part of this specification.

Our invention is designed to provide a shaper or planer adapted for various kinds of work, the same being particularly fitted, for example, for crowning and finishing the driving-boxes on locomotives, including the planing of the exterior surfaces of said boxes. Our invention contemplates, however, any and all uses to which our improved apparatus may be applied.

Our invention consists of the construction, combination, and arrangement of devices and appliances hereinafter described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a view in perspective, illustrating features of our invention. Fig. 2 is a plan view showing certain portions of the machine for rotating the arbor which holds the cutting-tool. Fig. 3 is a detail view in section on the line 3 3, Fig. 2, illustrating the feeding ratchet mechanism. Fig. 4 is a view in longitudinal section through the feeding ratchet mechanism. Fig. 5 is a rear end view of the mechanism for turning the arbor that holds the cutting-tool. Fig. 6 is a view in longitudinal section of the ram. Fig. 7 is a detail view showing the tool-block in perspective. Fig. 8 is a view in section on the line 8 8, Fig. 7. Fig. 9 is a detail view of a tool-holding block. Fig. 10 is a similar view showing a modification in the construction of the tool-holding block. Fig. 11 is a fragmentary view in cross-section through the case, showing the internal driving mechanism. Fig. 12 is a view in section on the line 12 12, Fig. 11. Fig. 13 is a side elevation of the mechanism for holding the work when the surface is to be finished. Fig. 14 is a view in section on the line 14 14, Fig. 13. Fig. 15 is a similar view to Fig. 14, but showing the mechanism in a different position and certain elements omitted. Fig. 16 is a detail view of the rear of one of the plates. Fig. 17 is an end elevation. Fig. 18 is a view

in perspective, showing the gage for setting the tool in place upon the machine. Fig. 19 is a view of the gage in side elevation. Fig. 20 is a view of the gage in front elevation. Fig. 21 is a view in section, showing the hand-feed. Fig. 22 is an end view of the mechanism for holding the work for finishing the inside of the driving-box. Fig. 23 is a view of a shaper in side elevation to which our invention is applied. Fig. 24 is a view in section on the line 24 24, Fig. 2.

Our invention is an improvement upon mechanism of this class for which a patent was granted to Matthew Morton, April 5 1892, No. 472,061, and Matthew Morton and Henry E. Morton November 19, 1895, No. 550,004.

It is well understood that since the adoption of the large locomotives now in use and the heavy duty which they are called to perform resort has necessarily been made to steel driving-boxes, which are very hard to machine by any of the old methods heretofore employed. Hitherto analogous work has been accomplished by means of slotting-machines; but our apparatus is designed to provide mechanism for finishing steel driving-boxes in a superior, economical, and simple manner.

Our improved apparatus is particularly adapted for use in repair-shops, as well as in the building of the driving-boxes.

We carry out our invention as follows: As applied to a driving-box, shaper, or planer, as shown in the accompanying drawings, *a* represents a supporting base or column of a suitable shaper, to which and in which the gearing, shafting, feeding, and other mechanisms are applied. The upper portion of the base or column is slotted, as shown, to receive a ram *b*, said ram having a toothed portion on its under side, as shown, engaged by corresponding gearing in said column, as hereinafter described. By the use of suitable mechanism, as hereinafter specified, the ram is made to reciprocate. Attached to the rear end of the ram is an adjustable bracket or frame *c*, on which is suitably attached a worm-pinion *d*. Passing through the ram is a hollow rotatable arbor *e*. The front end of the arbor is recessed or bored tapering, as shown more particularly in Fig. 6, and upon the rear end is movably attached a worm-wheel *f*, keyed to the arbor and made adjustable longitudinally of the arbor. The rear end of the arbor is threaded and pro-

jects sufficient to receive the compensating nut *f*. The nut *f* is constructed with a shoulder *h*. A collar-bolt *i* passes through the arbor and through the nut *f*. Located on the arbor is a collar *j* and nut *g*, and upon the outer end of the bolt *i* is located a nut *k*. By turning the nut *f* the bolt *i* may be forced in either direction and held in given position by means of the nut *k*. The bolt *i* is squared or similarly constructed at the rear end thereof, as shown, to receive a crank for the purpose of revolving the bolt quickly. The opposite end of said bolt is threaded to engage a rotatable head *l*, constructed with a tapered end fitted and feather-keyed into the taper bore in the arbor *e*. The tapered end of the head is tapped to engage the threaded end of the bolt *i*. It will be seen that when the bolt is turned said head will be drawn to its proper position. Then by turning the nut *f* the head will be firmly held in position. When it is desired to remove the head, it is only necessary to turn the nut *f* in the proper direction. The rotatable head *l* is constructed to receive a suitable tool-holder *m*, constructed to receive and hold in position various tools *n*. We prefer to hold the tool-holder or clapper-box *m* in position by means of a pin *p*, the holder revolving upon said pin, so as to relieve the cutting-tool on the return stroke of the ram. A supplementary tool-holder *q* is also preferably employed in the clapper-box, provided with a slot *r*, in which the cutting-tool is engaged. The cutting-tools and holder *q* are secured in position by set-screws *s* in the clapper-box.

On the end of the head *l* is a round and extended portion *t*, turned true and located centrally with the body of the rotating head. Movably attached to said portion is a gripe-collar *u*, having a depending arm *v* of desired length. Said arm is provided with a suitable measuring-scale, as shown more particularly in Figs. 19 and 20 at *w*. Movably attached to said arm *v* is a bracket *x*, being engaged upon a sleeve *y* by screws *z*, by loosening which the sleeve may be adjusted vertically upon the arm *v*. The bracket *x* extends at right angles to the arm *v* a sufficient distance to reach in under the cutting-tool *n*. The end of the bracket *x* is provided with a micrometer-screw (indicated by the numeral 30) adjustable in said bracket and by means of which the cutting-tool may be set at any desired point or distance from the center of the head *l* and by means of which the tool may readily be set any number of times alike. The arbor *e* is made to rotate by means of the worm-wheel *o* and gear *d*, the worm-gear *d* being geared with a shaft 31, as indicated at 32. The shaft of the worm-gear is indicated at 33. The shaft 31 extends parallel with the arbor to the front of the machine.

The shaft 31 is a splined shaft. A ratchet

feeding-gear 34, constructed with an internally-toothed ring 35, attached thereto, revolves a shaft 36, provided with a gear 37, meshing with a gear 38 upon the shaft 31 to rotate said shaft. The ratchet feeding-gear is actuated in a manner to be described by a rack-bar 39. Attached to the shaft 36 is a hub 40, filling the bore of the ring, said hub provided with an opening 41 in the side thereof. A pin 42 passes through this opening, upon which is attached a double pawl 43, which is adjustably held in position by a spring 44. When the ratchet-gear 34 revolves in one direction, the gear drives the hub 40 and the pawl and causes the shaft 36 to make a partial revolution. When the ratchet-gear revolves in the opposite direction, the pawl passes over the teeth of the ring, the shaft not turning. The pawl may be turned to engage at either end thereof with the ring 35 to turn the ratchet-gear in the opposite direction. The pawl may readily be manipulated by a lever 45 and may obviously be turned so that neither end will engage the toothed ring, in consequence of which the shaft 31 will not be rotated. The rack is reciprocated in any suitable manner, as by a friction-feed common to all planers and embodied in Letters Patent granted to us November 19, 1895, No. 550,004.

The bevel-gears 32 are carried by the ram, one of said gears being in sliding engagement with the splined shaft 31. As the ram reciprocates, the arbor *e*, it will be evident, will be made to rotate intermittently. The machine is thus enabled to plane any portion of a true circle and is particularly adapted for crowning driving-boxes.

A driving-box to be shaped is indicated at 46. Movably attached to the front side of the column *a* is a cross-rail 47, to which is movably attached a saddle or apron 48 and a knee or bracket 49. The cross-rail also carries a screw 50 for feeding the apron horizontally in the manner fully described in said Patent No. 550,004. The knee or bracket 49 is provided with an angular side 52 and with a plate 53, bolted to the lower edge thereof. A plate 54 is movably attached to said bracket, said plate being planed off on a taper each way from a given point, as indicated at 55 and 56, on the contact side. A center bolt 57 passes through the point indicated at 58, from which the plate is tapered. In Figs. 14 and 15 the taper is shown slightly exaggerated for greater clearness. Three slots are shown planed through the plate (indicated at 59, 60, and 61) of sufficient depth to receive parallel strips, (indicated at 62, 63, and 64.) When said strips are in position, the front side of the plate will be in perfect alinement with the ram. The object of this construction is so that after a parallel cut has been taken said strips may be removed, and by tighten-

ing the inner bolt 65 the plate may be drawn around to relieve a portion of the surface tapering, and so that by loosening the inner bolt 65 and tightening the outer bolt 66 the plate may be placed at an angle to relieve a portion of the surface tapering in an opposite direction. The object of relieving a portion of the sides tapering is to permit the box in passing around a curve to swivel slightly in the jaws of the locomotive-frame.

As described in said Patent No. 550,004, the main driving-shaft, as indicated at 67, is provided with a pinion 68, meshing with a gear 69 upon a shaft 70, provided with a pinion 71, meshing with a gear 72 upon a shaft 73, provided with double pinions 74, meshing with the ram *b*. A gear 75 upon a shaft 76 meshes with the ram also. The shaft 76 is provided with suitable tappet mechanism 77 to move the belt-shifter. The shaft 70 is provided with an additional pinion 78, meshing with the gear 79, which drives the feed mechanism, all as fully set forth in said Patent No. 550,004.

The bracket 49 is strengthened for supporting heavy weights by an adjustable vertical bearing 80, provided with a roller 81 at its lower end. This roller operates upon a removable rail 82, bolted to the base of the machine. The strengthening mechanism is only used when heavy weights are to be supported or machined.

Our improved machine is preferably provided with a crane comprising a mast 83, journaled in any suitable manner upon the machine, said mast arranged in such a manner that it may revolve in a full circle. Attached to the upper end of the mast is a casting 84, carrying the jib-arms 85, on which a trolley (not shown) may roll, thereby rendering the machine independent of other cranes or similar appliances.

The holders *q* may be slotted, as at *r*, on an acute angle lengthwise thereof to hold a cutting-tool. The holders may be made to hold cutting-tools to cut to the right or to the left, as indicated more particularly in Figs. 9 and 10. It will be seen that the cutting-tool may thus be rotated circumferentially, together with the head. By placing one of these holders in the clapper-box for use with a side-cutting tool it will readily be seen that the tool will relieve on the side cut, also in forming out the corners of driving-boxes.

Upon the feed-rod 31 is a worm-wheel 86, loosely mounted upon the rod. A hand-wheel 87 is provided with a hub 88, engaged upon the end of the rod, the hand-wheel and its hub being arranged to be tightened up against the worm-wheel to rigidly engage the worm-wheel in place, so that when the worm-wheel is rotated the rod 31 will be turned thereby. A worm-pinion 89 has its shaft provided with an operating handle or crank 90, by turning which the rod 31 may be ma-

nipulated. Said rod is geared, as already described, with the shaft of the worm-wheel *d*, whereby the cutter may be fed to the work or backed away from the work by operating the worm-gear 86. The rod 31 is preferably provided with a link 91, jointedly interposed therein to permit the elevation and lowering of the front end of the feed-rod, as may be desired. A back bearing for the chuck that holds the work is indicated at 92. The chuck for holding a driving-box upon the shaper to finish the interior of the box is indicated in Figs. 1, 2, 18, and 22 and comprises, essentially, a base-plate 93, attachable to the knee-bracket 49 of the machine, supporting thereupon cheek-plates 94 and 95, made adjustable upon the base-plate 93. A cross-piece 96 is adjustably engaged upon the top of the cheek-pieces, so as to hold the work rigidly in planing the same in every direction. The cheek-pieces are provided with clamping devices 97 to clamp upon the work. For planing the side of the box to fit the jaws of the frame of the locomotive the holder consists, as already described, of the plate 54, arranged as hereinbefore set forth, and clamps 98, secured upon the work by the bolts 57, 65, and 66. It will be understood that the plates 54 and 93 are not used at the same time.

The feeding mechanism is described in our Patent No. 550,004 and embodies a releasing device 107, a triangular bell-crank arm 99, fulcrumed at 100 and having formed therein at one extremity a slot 101, in which reciprocates a wrist-pin 102, carried in a customary manner upon a rotatable friction device. Adjacent thereto we locate a lever 103, fulcrumed, as at 104, and provided at its inner end with the pin 104 and pins 105 and 106. The lever may be set and held in various positions by a spring-bolt (indicated at 107) engaging the side of the shaper. By adjusting the lever the releasing device 108 may strike one of the points 104 105 106, so that three changes of feed are thus provided for in a very simple manner.

The operation of our improved mechanism will now be understood.

What we claim as our invention is—

1. In a draw-cut shaper the combination of a hollow reciprocatory ram, a hollow arbor therewithin adapted to be rotated, a removable head engaged in one end of the arbor and projecting forward of the ram and rotatable with the arbor, a rod extending through the arbor engaged with said head to longitudinally adjust the head in the arbor, and means engaging the opposite end of the rod to longitudinally adjust the rod in the arbor.

2. In a draw-cut shaper the combination of a hollow reciprocatory ram, a hollow arbor therewithin adapted to be rotated and provided at one end thereof with a tapered recess, a removable head rotatable with the

arbor provided with a tapered shank to fit into the corresponding recess of the arbor, a separately-constructed tool-holder engaged in said head, an adjusting-rod extending through the arbor and engaging said head, and means engaging the opposite end of the rod to draw the rod longitudinally of the arbor.

3. In a draw-cut shaper the combination of a hollow reciprocatory ram, a hollow arbor therewithin adapted to be rotated, a removable head engaged in one end of the arbor and rotatable therewith, an adjusting-rod passing through said arbor engaged at one end with said head, a separately-constructed tool-holder engaged in said head, and means engaging the opposite end of the rod to longitudinally adjust said head in said arbor.

4. In a draw-cut shaper the combination of a hollow reciprocatory ram, a hollow arbor therewithin adapted to be automatically rotated provided with a conical recess in one end thereof extending longitudinally of the arbor, a removable head provided with a conical shank engaged in the recessed end of the arbor, a separately-constructed tool-holder engaged in said head, and adjusting mechanism to tighten the shank of said head in the recess of said arbor, whereby the head and the arbor will be simultaneously rotated.

5. In a draw-cut shaper the combination of a rotatable head, a tool-holder engaged with said head, a tool in said holder, said head provided with a hub projecting forward of the tool-holder, and index mechanism engageable upon said hub for setting said cutting-tool.

6. In a draw-cut shaper the combination of a rotatable head, a tool-holder engaged with said head, a tool in said holder, said head provided with a hub projecting forward of the tool-holder, and index mechanism removably engaged upon said hub and projecting under the lower end of the cutting-tool to set the cutting-tool.

7. In a draw-cut shaper the combination of a chambered rotatable head, a separately-constructed tool-holder pivotally engaged in the chamber in said head provided with a separately-constructed supplementary slotted holder extending lengthwise therethrough, and a cutting-tool engaged in the slot of the supplementary holder to rotate circumferentially together with the head, the slot of the supplementary holder extending there-through at an acute angle to the perpendicular to hold the cutting-tool, whereby the cutting-tool may be set to cut to the right or to the left of the longitudinal center of the head at the will of the operator.

8. In a draw-cut shaper the combination of a reciprocatory ram, a tool-holder engaged with said head, said head provided with a hub projecting forward of the tool-holder, a depending arm provided with a scale removably engaged upon said hub, a bracket vertically adjustable upon said arm and extending underneath the cutting-tool, and a micrometer-screw carried by said bracket for adjusting the position of the cutting-tool.

9. In a draw-cut shaper the combination of an arbor, a head engaged in said arbor, a tool-holder pivotally engaged in said head to oscillate longitudinally of the head, an interchangeable supplementary holder engaged in said head provided with an upright slot, and a cutting-tool engaged in the slot of the supplementary holder, whereby the cutting-tool will relieve from the work on its return stroke.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

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HENRY E. MORTON.

Witnesses:

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