

No. 680,903.

Patented Aug. 20, 1901.

C. D. WILEY.
MACHINE FOR PRODUCING TWIST DRILLS.

(Application filed May 25, 1901.)

(No Model.)

3 Sheets—Sheet 1.

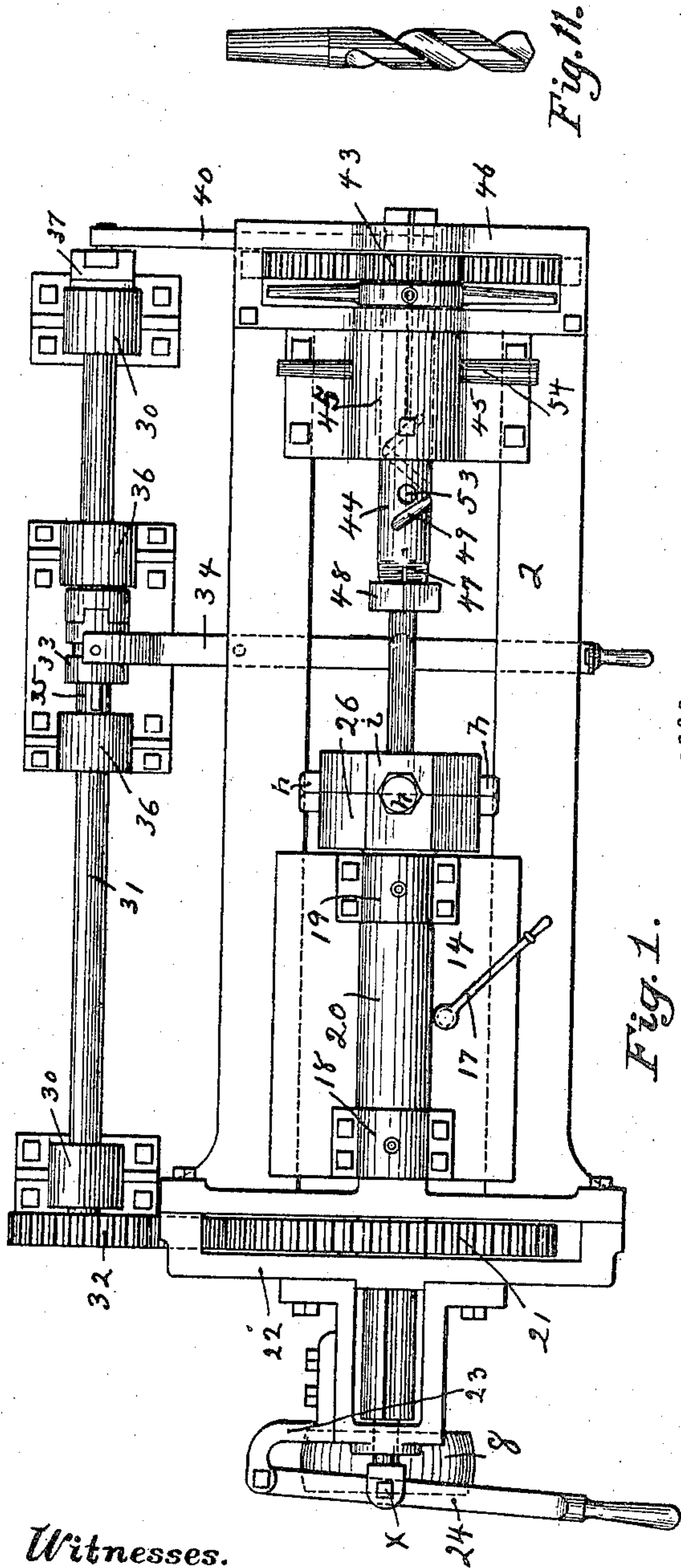


Fig. 1.

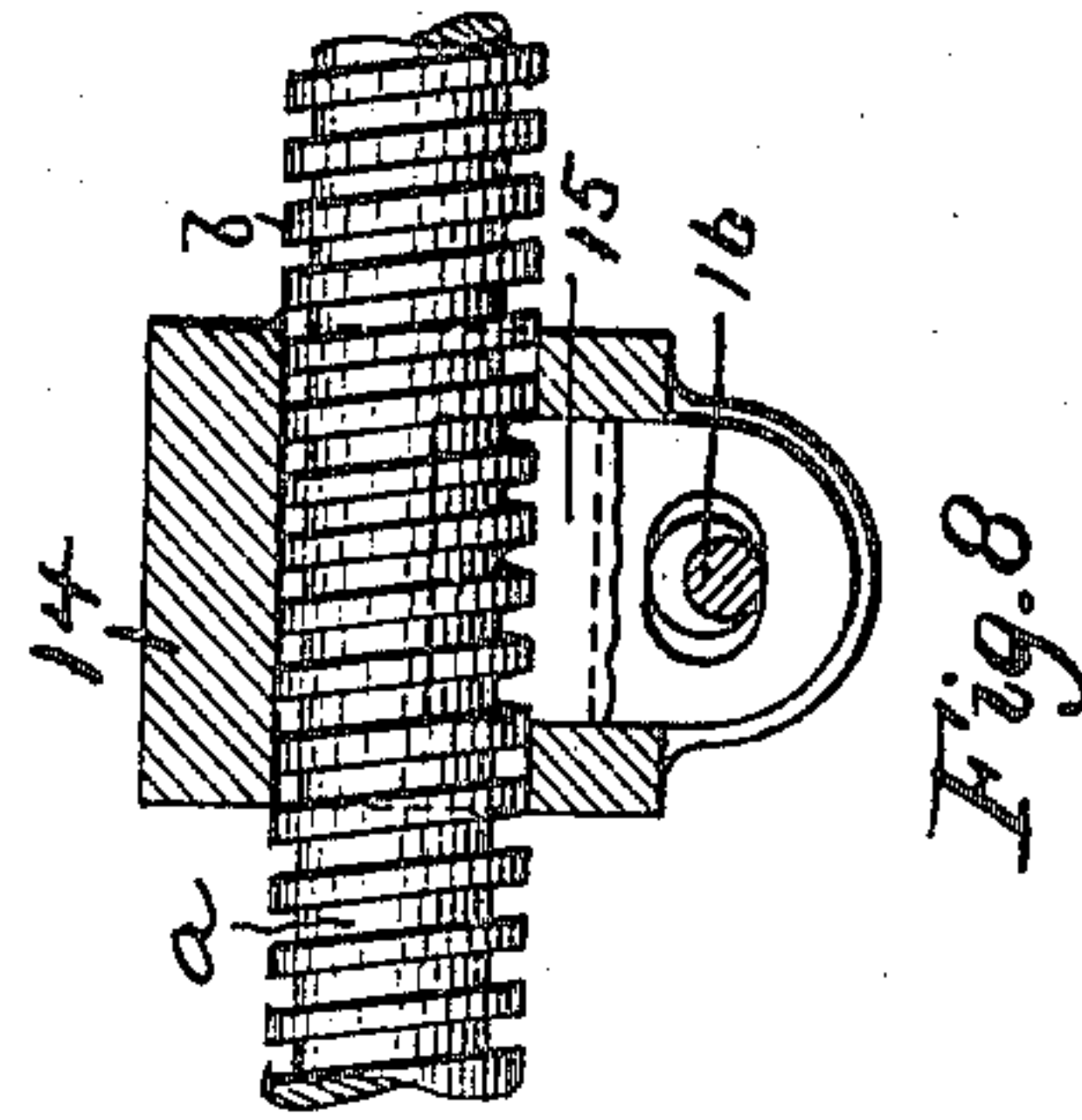


Fig. 8.

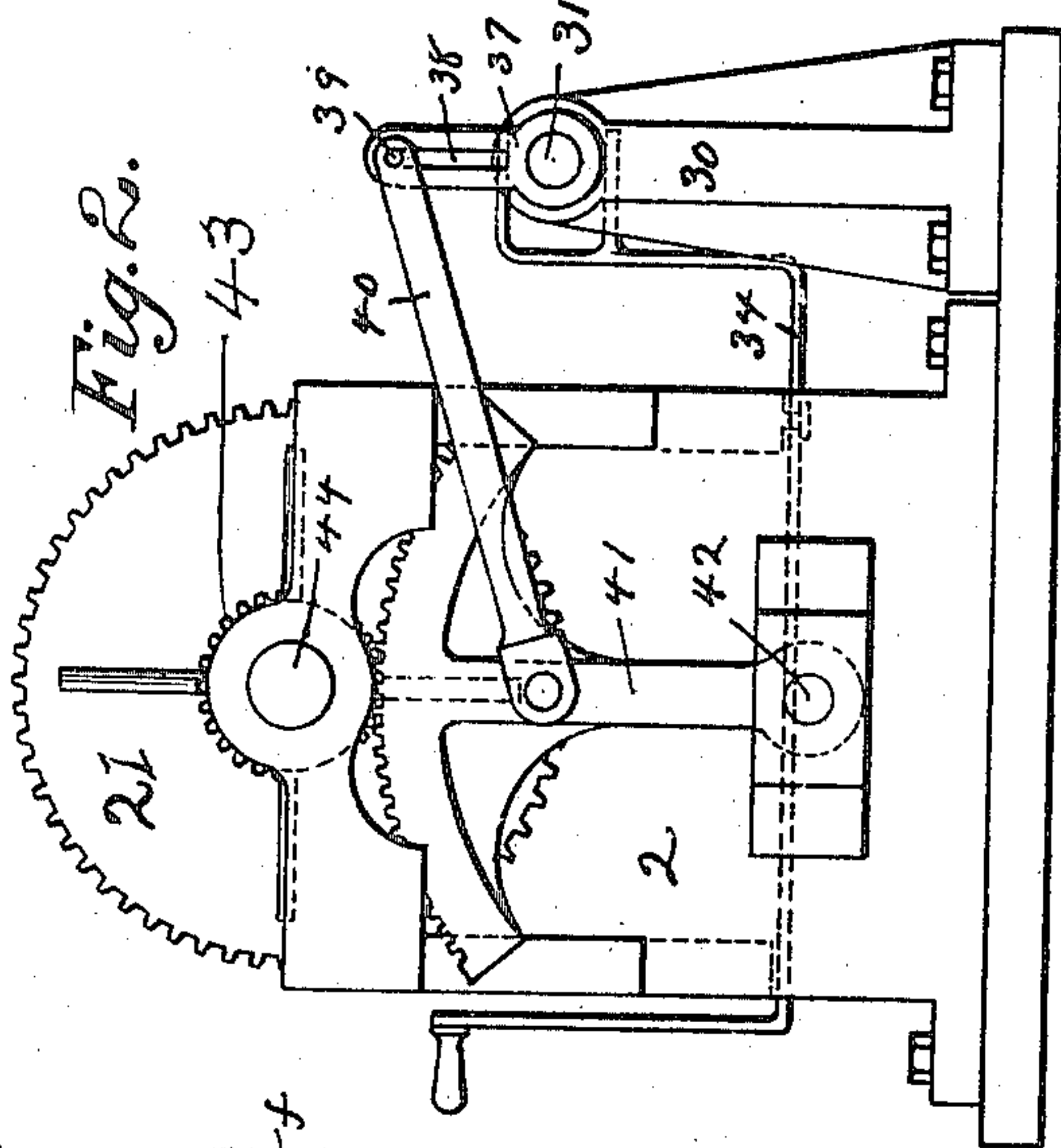


Fig. 2.

Fig. 9

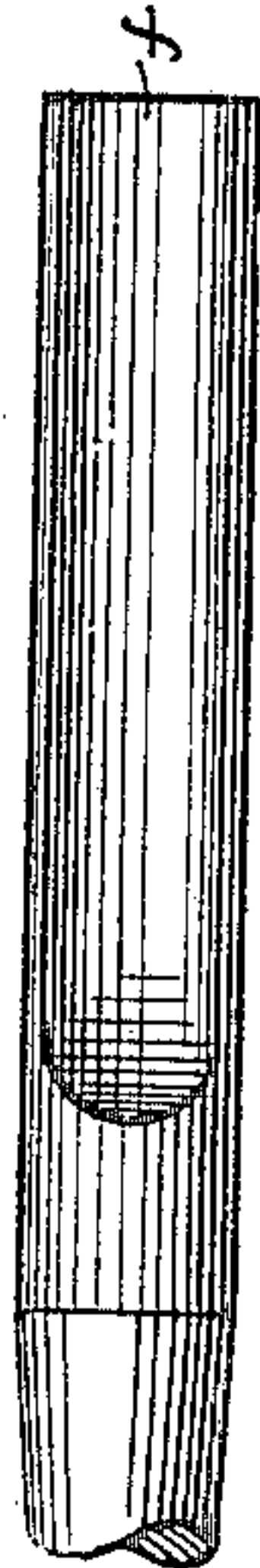


Fig. 10.



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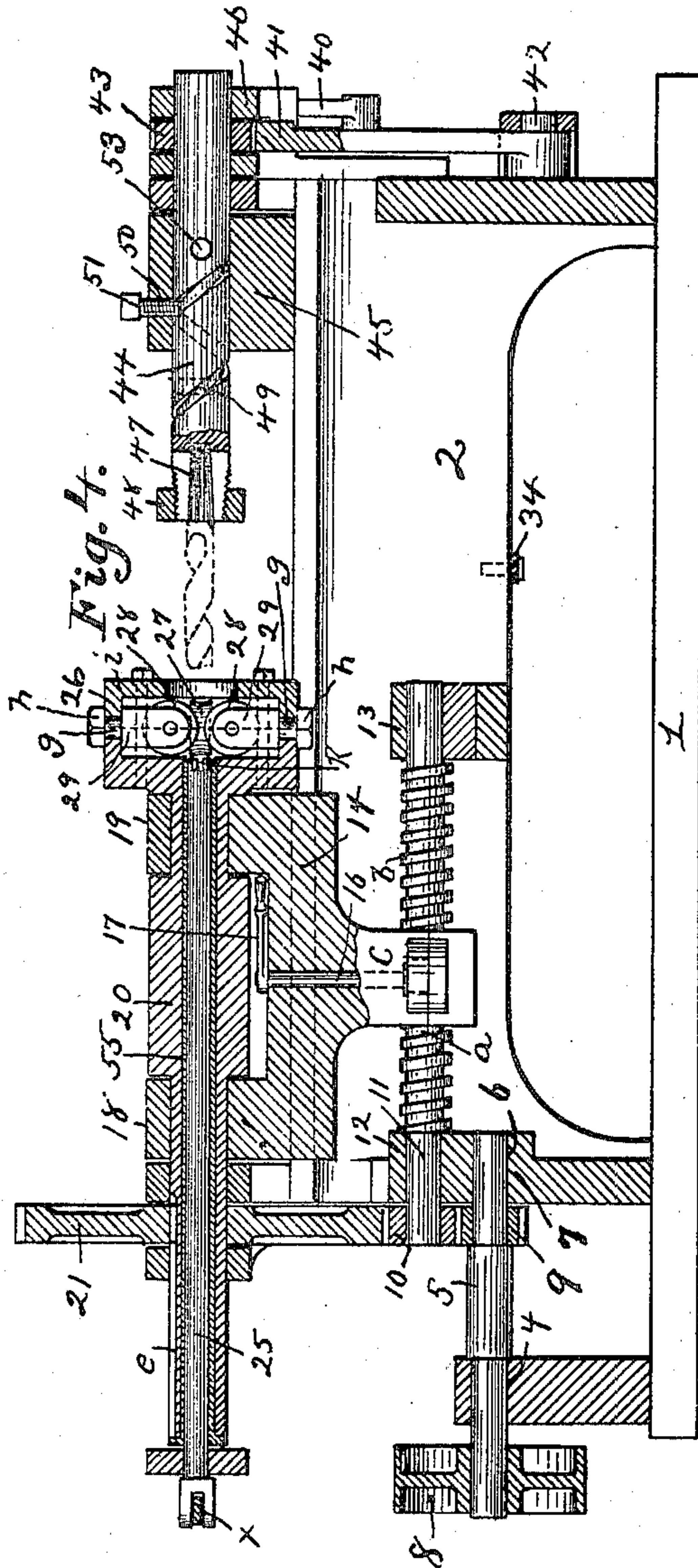
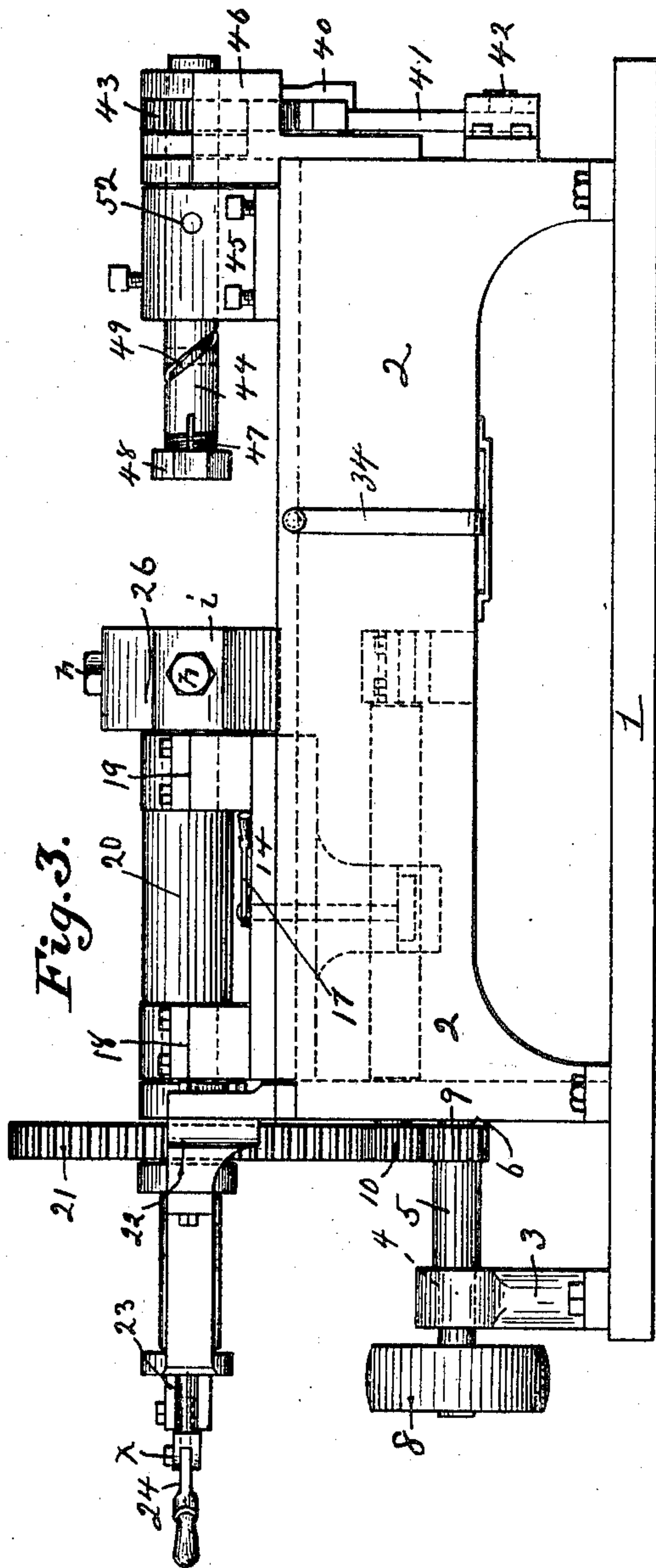
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3 Sheets—Sheet 2.



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Fig. 5.

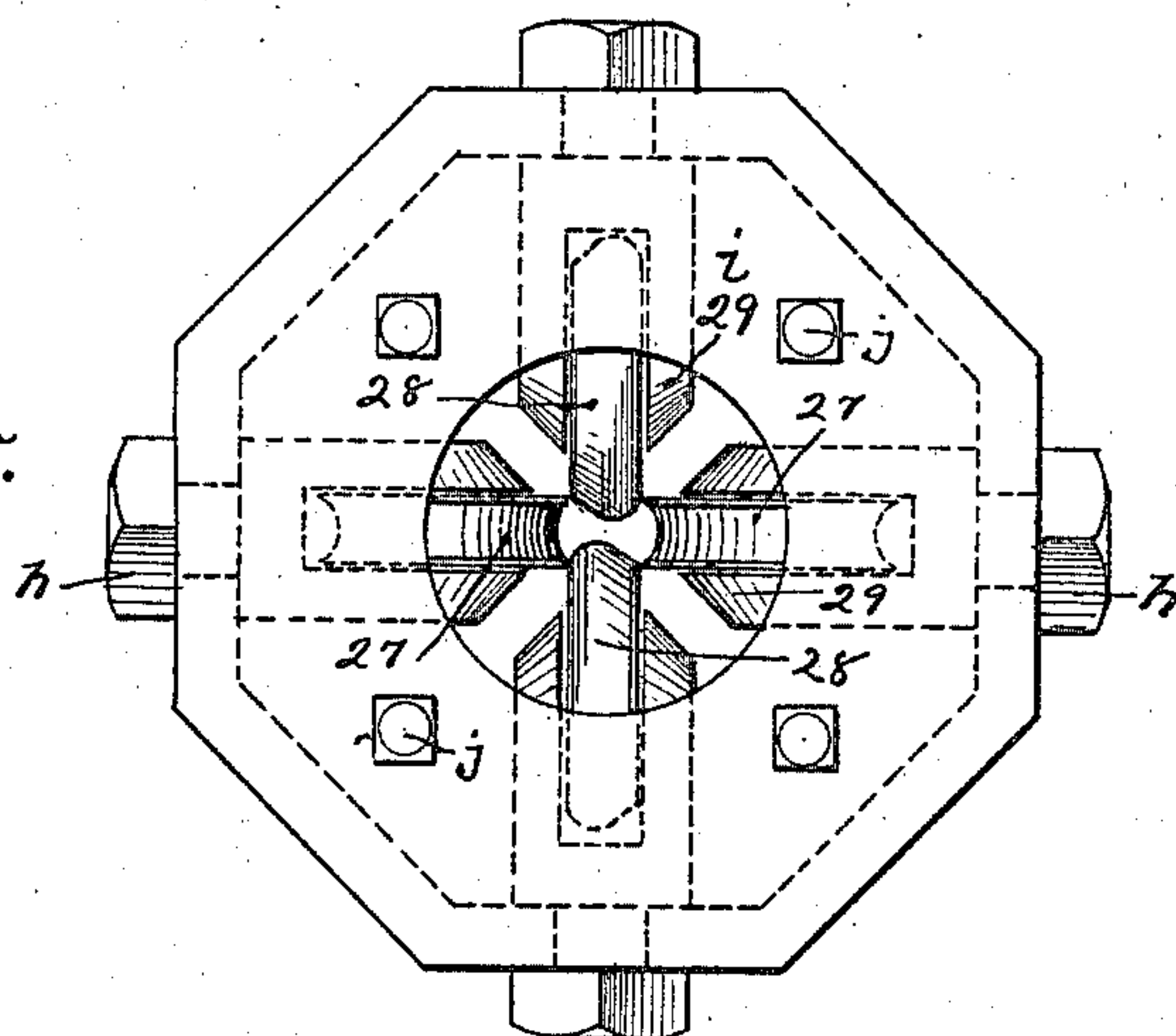


Fig. 6.

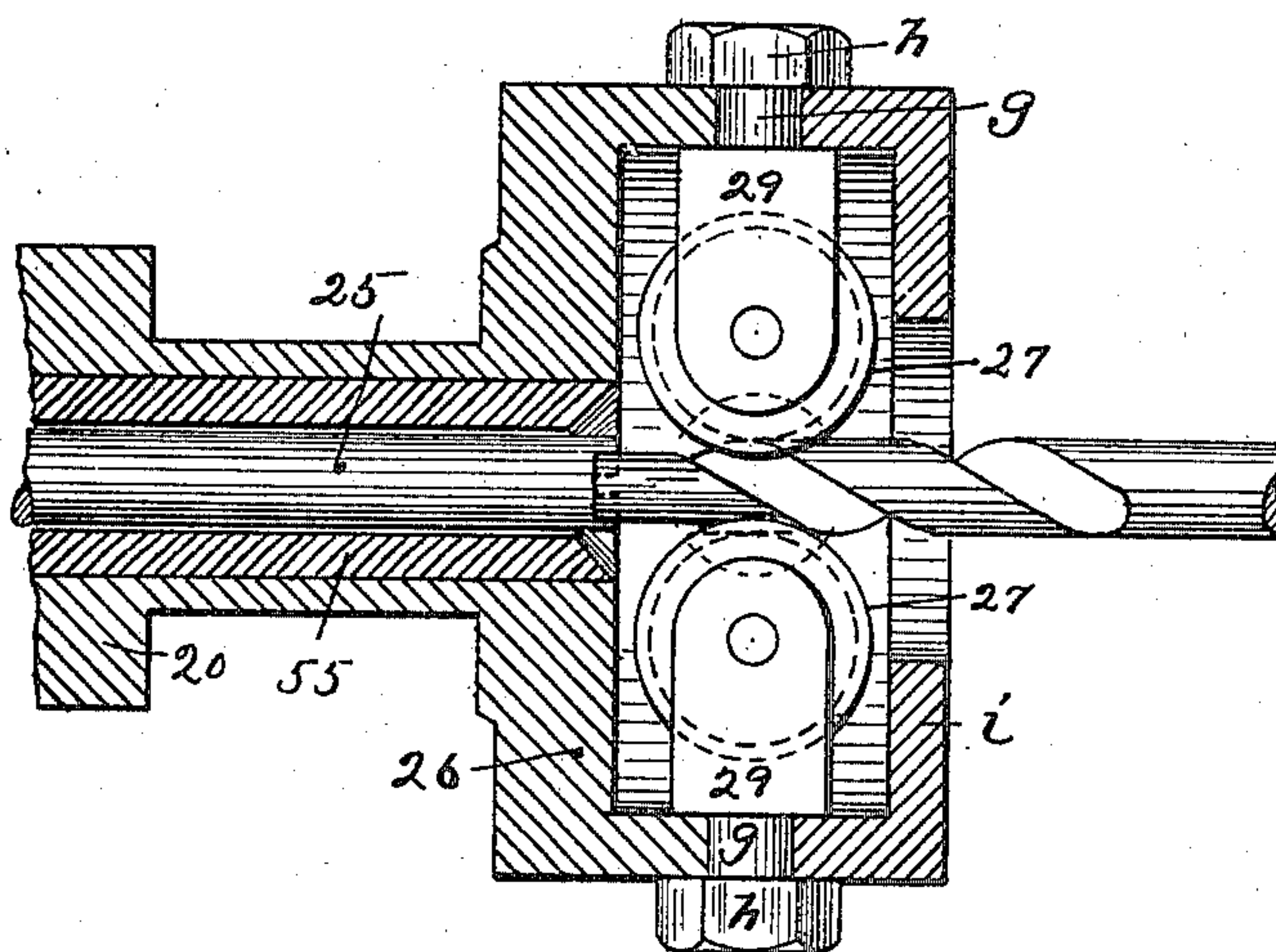
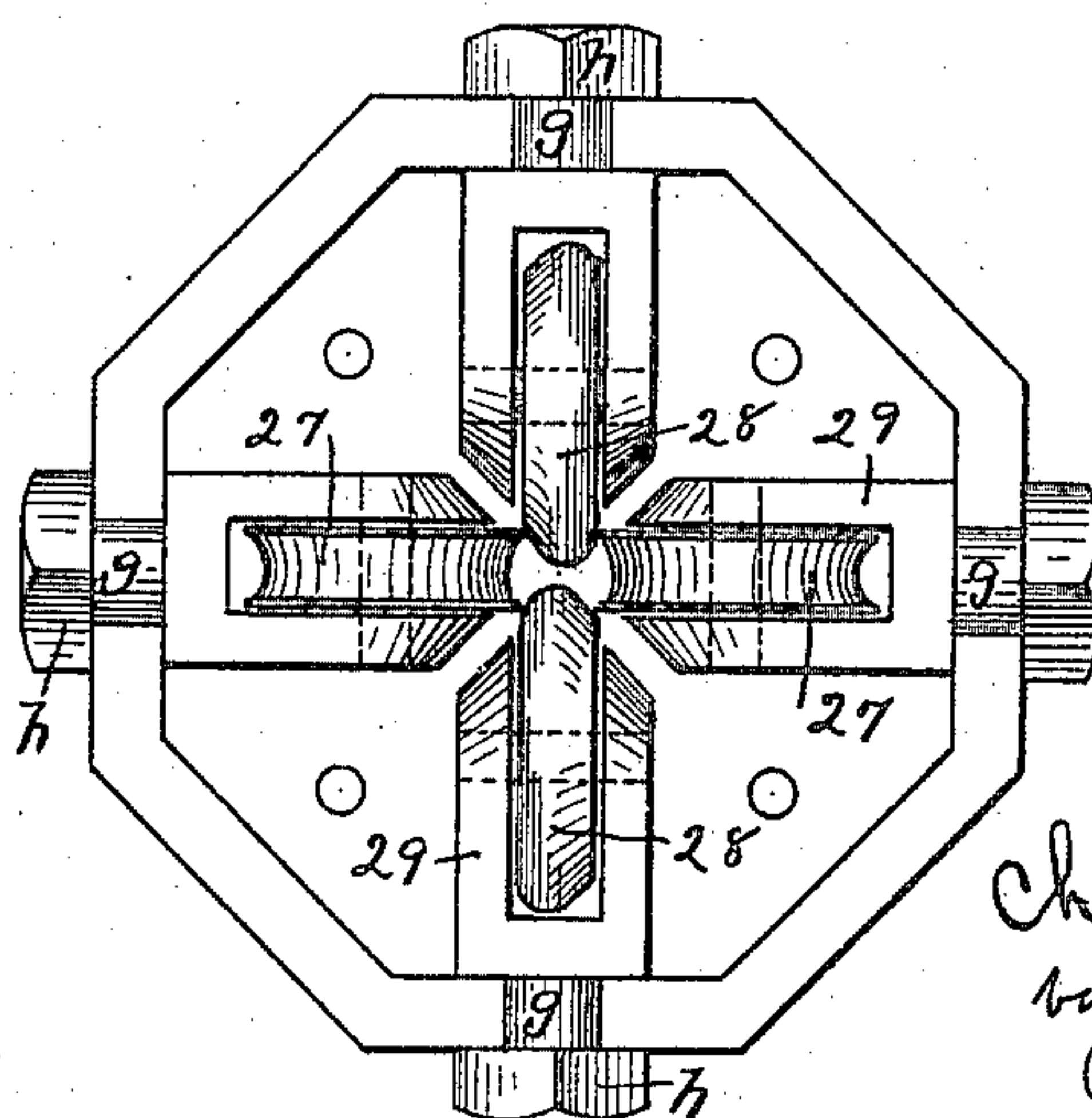


Fig. 7.



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UNITED STATES PATENT OFFICE.

CHARLES D. WILEY, OF PITTSBURG, PENNSYLVANIA.

MACHINE FOR PRODUCING TWIST-DRILLS.

SPECIFICATION forming part of Letters Patent No. 680,903, dated August 20, 1901.

Application filed May 25, 1901. Serial No. 61,854. (No model.)

To all whom it may concern:

Be it known that I, CHARLES D. WILEY, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Machines for Producing Twist-Drills, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 indicates a plan view of my improved machine for making twist-drills; Fig. 2, an end elevation of the same; Fig. 3, a side elevation of the same; Fig. 4, a central longitudinal section of the same; Fig. 5, an elevation of the die or roll housing; Fig. 6, a sectional view of the same, showing the forward portion of the drill-holding device within the mandrel or shaft; Fig. 7, an elevation of the roll or die housing, the front plate thereof being removed; Fig. 8, a detail view of the feed-screw and nut; Fig. 9, a plan view of the drill-blank; Fig. 10, a cross-section of the same, and Fig. 11 a side view of a completed drill.

My invention relates to improvements in apparatuses or machines for producing drills commercially known as "twist-drills;" and the object of my invention is to produce a machine adapted to reduce the liability of the blank being operated upon getting out of alinement during the twisting operation and to hold the same in perfect alinement and accurately and uniformly twist the same and after the completion of the operation pass or reciprocate the twisted blank rapidly through dies or rolls for the purpose of truing the twist and straightening the drill.

Another object of my invention is to produce a machine compact and simple in construction and efficient in operation and capable of producing practically perfect twist-drills at much less cost in time and labor than has heretofore been accomplished; and to these purposes my invention consists in the novel construction, combination, and arrangement of parts hereinafter set forth, reference being had to the accompanying drawings, which form a part of this specification, in which like reference characters indicate like parts wherever they occur throughout the several views.

Referring to said drawings, 1 is the base or bed plate of said machine, on which is bolted or otherwise secured the frame 2 and a stand- 55
ard 3, in which one of the bearings 4 of the power-shaft 5 is formed, the other bearing 6 for said shaft being formed in the lower front end 7 of the frame 2. On the ends or near the ends, respectively, of said shaft 5 are 60
mounted the belt-pulley 8 and the small cog-wheel 9, respectively, the said cog-wheel 9 meshing with and transmitting motion or power to a similar cog-wheel 10, which is 65
mounted on the extreme outer end of the shaft 11. The enlarged portion *a* of said shaft 11 intermediate the bearings 12 and 13 thereof is provided with a thread or screw *b*, on which is mounted the downwardly-projecting tongue or strap *c* of the carriage 70
14. The said tongue *c* is adapted to be engaged and disengaged upon said screw *b* by means of the nut 15, the bolt 16, attached thereto, and a lever 17, secured to the upper end of said bolt, whereby the nut 15 is thrown 75
into and out of engagement with the screw *b* and the carriage 14 is caused to travel longitudinally backward and forward on slides formed on the top of the frame, dependent upon the direction of the power applied when 80
the nut is engaged with the screw and to remain stationary when the nut is disengaged therefrom. The top of said carriage 14 is provided with pillow-blocks 18 and 19, arranged on the ends thereof, in which are 85
formed bearings for the contracted portion of the hollow shaft or mandrel 20, the enlarged portion *d* of said hollow shaft or mandrel intermediate said bearings forming abutments or shoulders adjacent to the same, whereby 90
when said carriage 14 is caused to travel in either direction said shaft or mandrel is likewise caused to travel a corresponding direction. The said hollow shaft is also caused to rotate in its bearings by motion transmitted 95
thereto from the large gear-wheel 21, which meshes with and receives power from a cog-wheel 10, so that it is caused to rotate by movement of the large gear-wheel 21, which is secured to the outer end thereof by means 100
of a spline engaging in a slot *e* in the end of said shaft simultaneously it is carried by the carriage. The said shaft 20 is supported in bearings formed in the bracket 22, which is

bolted or otherwise suitably secured to the upper part or front end of said frame. 23 is a bracket secured upon said bracket 22, projecting outwardly therefrom, to the extreme outer end of which is pivotally secured a horizontally-disposed hand-lever 24, which is pivotally connected at x to the extreme outer end of the horizontally-disposed rod 25, which projects into the hollow of said shaft and constitutes the drill-blank holder, having a slot k in the end thereof in which the part f of the drill-blank is adapted to be secured. The inner end of said shaft is connected to and carries the housing 26, in which are supported the rolls or dies 27 28, the said rolls 27 being horizontally disposed and concave in configuration and the said rolls 28 convex on their faces and vertically disposed, both of said sets being mounted in shanks 29, bifurcated on their inner ends in which the rolls are mounted and having a collar or neck g intermediate the inner end and the head h , which is loosely mounted in the orifice formed in the body of the housing and the plate i thereof, which is secured to said body by means of threaded bolts j . This manner of arranging the rolls enables the same to turn and be movable upon their necks during the twisting operation.

Upon one side of the bed or base plate 1 are suitably secured standards 30 30, in the upper ends of which are formed bearings for the counter-shaft 31, upon the extreme outer end of which is mounted a gear-wheel 32, which meshes with and receives power from the large gear-wheel 21. The inner end of said shaft has mounted thereon a clutch-collar 33, adapted to be operated by the lever 34 to throw the same into and out of engagement with the female portion of the clutch mechanism on the end of the short shaft 35, which is supported in bearings formed in standards 36, in alinement with the standards 30. On the extreme outer end of shaft 31 is mounted a crank 37, which is provided with a slot 38, in which the crank-pin 39 projects and is adjustably secured to the crank-shaft 40 for the purpose of varying the stroke of said crank, the opposite end of said crank-shaft being pivotally secured to the segmental rack 41, which is mounted on a short shaft 42, secured in bearings in the end of said frame 2. The said rack 41 engages with and transmits power to the gear-wheel 43, which is mounted on the outer end of the tail-stock 44, which is mounted in bearings formed in a pillow-block 45 and a bracket 46, respectively, which are respectively secured upon the top of the frame and the end thereof.

The inner end of said tail-stock 44 is provided with a centrally-disposed slot 47 longitudinally thereof for the purpose of receiving one end of the drill-blank. The said slotted end of said tail-stock is tapered and provided with a thread, on which is mounted a nut 48 for the purpose of securely holding the end of the drill-blank inserted in said chuck or slot

47, so as to prevent the same from rotating or turning during the operation of reciprocating or passing the said drill through the dies or rolls for the purpose of truing and straightening the same after the completion of the twisting operation. The exterior of said tail-stock 44 is provided with a spiral groove 49 of a pitch corresponding with the pitch of the drill being operated upon. The pillow-block 45 is provided with an orifice 50 in the top thereof, in which the guide screw or bolt 51 projects and enters the groove on the surface of said tail-stock for the purpose of imparting to said tail-stock a spirally rotary and reciprocatory movement, for the purpose hereinafter specified. The said pillow-block 45 is also provided with an orifice 52, which extends through the sides of the same, a corresponding opening 53 being formed in the tail-stock 44, being in direct alinement with the openings in said pillow-block 45 when the tail-stock is withdrawn the farthest distance from the roll-housing carried by the mandrel, in which position the said tail-stock is held against or prevented from movement in its bearings by inserting the lock-pin 54 through the opening in the pillow-block and tail-stock.

The bushing 55 of the mandrel or shaft is removably secured therein for the purpose of permitting the ready removal of the same and the insertion of a thicker bushing to accommodate or receive drills of different diameters.

The operation of the apparatus is as follows, viz: The carriage being at the end of the frame farthest removed from the tail-stock and the tail-stock inserted in its bearings until the nut on the end thereof abuts against the pillow-block and prevented from rotation by inserting the lock-pin in the orifice nearest the end of said tail-stock, the blank is then inserted in the hollow shaft between the dies or rolls and the end grasped by the drill-holding device therein. The opposite end of the blank is inserted loosely in the end of the chuck in the end of the tail-stock in order to permit this end of the blank to revolve therein. Power is then applied, whereby the carriage is caused to travel toward the tail-stock, and the mandrel being carried with the carriage and revolving in its bearings, then the rolls travel over the blank in a longitudinal direction and spirally around the same. The blank at one end is held against revolution, and the opposite end being loosely held in the chuck the blank is twisted or convoluted. The carriage is then disengaged from its operating-screw and the end of the drill-blank held by the drill-holding device released. The opposite end of the blank is firmly held in the chuck of the tail-stock by tightening the nut thereon. The lock-pin being withdrawn from the orifice in the tail-stock and pillow-block, the clutch is then thrown into engagement with the counter-shaft, whereby power is transmitted to the segmental rack and thence to the tail-stock. Upon completion of these adjust-

ments the drill is rapidly reciprocated through the dies or rolls for the purpose of truing or straightening the same. The drill being removed after completion, the operation is repeated.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a machine for making twist-drills, the combination of a carriage, a mandrel connected to said carriage, means to rotate said mandrel simultaneously the same is carried longitudinally by the carriage, a tail-stock adapted to be held stationary during the twisting operation, and means to impart to said tail-stock a reciprocatory rotary movement from and toward the mandrel after the completion of the twisting operation for the purpose of truing and straightening the drill.

2. In a machine for making twist-drills, the combination of a longitudinally movable and rotatable mandrel or hollow shaft, a tail-stock in exact axial alinement therewith, the said tail-stock being adapted to be held stationary during the twisting operation and to be given a rotary reciprocatory movement from and toward the hollow shaft or mandrel after the completion of the twisting operation.

3. In a machine for making twist-drills, the combination of a frame or table, a mandrel or hollow shaft supported in one end of said frame and adapted to be revolved and moved longitudinally simultaneously, a tail-stock supported on the opposite end of said frame in exact alinement with said hollow shaft or mandrel and adapted to be held stationary during the twisting operation and to be given a rotary reciprocatory movement from and toward the hollow shaft after the completion of the twisting operation.

4. In a machine for making twist-drills, the combination of a frame or table, a mandrel or hollow shaft supported in one end of said frame adapted to be revolved and moved longitudinally simultaneously, a tail-stock at the opposite end of said frame in exact alinement with said hollow shaft, and provided with a chuck to receive one end of the drill-blank, rolls or dies supported in the outer end of said hollow shaft, and means within said hollow shaft to hold the point of the drill-blank during the twisting operation.

5. In a machine for making twist-drills, the combination of a frame, a mandrel or hollow shaft supported in one end thereof, the outer end of which terminates in a head or housing, rolls or dies supported in said head, a tail-stock supported in the opposite end of said frame, means within said hollow shaft to hold the point of the drill-blank inserted in said hollow shaft, means connected with said tail-stock to loosely grasp the opposite end of the drill-blank, means to revolve the said hollow shaft, and means to simultaneously carry said shaft longitudinally toward the tail-stock whereby the dies or rolls are caused to travel spirally and longitudinally over the blank to form the twist thereon.

6. In a machine for making twist-drills, the combination of a carriage, a mandrel or hollow shaft mounted on said carriage, means to move the carriage longitudinally, means to rotate or revolve the mandrel or hollow shaft simultaneously with the movement of the carriage, a tail-stock supported in the end of the frame opposite to the carriage, means to revolve said tail-stock, means within the hollow shaft or mandrel to firmly hold the point end of the drill-blank, and means connected with the tail-stock to loosely grasp the opposite end of the drill-blank, in combination with means to hold the tail-stock stationary during the twisting operation.

7. In a machine for making twist-drills, the combination of a frame, a carriage mounted thereon, a hollow shaft or mandrel supported on said carriage, means to simultaneously revolve the hollow shaft and move the carriage longitudinally, a tail-stock mounted on the frame in direct alinement with the mandrel the inner end of the same having a chuck for the reception of one end of the drill-blank and the exterior surface thereof having a spiral groove with a pitch corresponding with that of the drill, means to engage in said groove during the revolution of said tail-stock, and means to revolve said tail-stock, in combination with means to hold said tail-stock stationary during the twisting operation.

8. In a machine for making twist-drills, the combination of a carriage, means to move the same longitudinally, means to disengage the same and its actuating-screw, a mandrel or hollow shaft mounted in said carriage, means to revolve the same thereon simultaneously with the movement of said carriage, the said hollow shaft or mandrel having a head or housing, rolls mounted in said housings, a tail-stock the inner end of which is provided with a chuck for the reception of one end of the blank and the exterior surface thereof a spiral groove corresponding in pitch with that of the drill, a guide pin or screw, means to hold said tail-stock stationary during the twisting operation, in combination with means to revolve the same.

9. In a machine for making twist-drills, the combination of a longitudinally-disposed screw, threaded to produce the required pitch in the drill, a carriage connected to said screw and adapted to be moved thereby, a hollow shaft or mandrel mounted on said carriage the outer end of which is provided with a housing in which is mounted twist-forming dies or rolls, a horizontally-disposed shaft or rod inserted within said hollow shaft or mandrel the inner end thereof being adapted to hold the point end of the drill-blank and prevent revolution of the same during the twisting operation, means to simultaneously revolve the said hollow shaft and the said screw, means to withdraw the drill-holding device from engagement with the point of the drill, a tail-stock having a chuck on the inner end

for the reception of one end of the blank and having on the exterior surface thereof a spirally-disposed groove of a pitch corresponding with the pitch of the drill and a guide pin or screw engaging therein, in combination with means to revolve said tail-stock after the completion of the twisting operation.

10. In a machine for making twist-drills, the combination of a frame, a longitudinally-disposed screw correspondingly pitched or threaded with the required pitch of the drill, a carriage connected thereto by a sectional feed-nut, means to engage and disengage said feed-nut with said screw, a revoluble hollow shaft or mandrel mounted on said carriage the outer end thereof being provided with twist-forming dies or rolls, a tail-stock mounted on the frame in direct alinement with the said hollow shaft or mandrel, a counter-shaft one end of which is provided with a gear-wheel adapted to mesh with and transmit power from a gear-wheel which revolves the said hollow shaft or mandrel, an adjustable crank-arm mounted on the opposite end of said counter-shaft, a clutch mechanism mounted on said counter-shaft intermediate the said gear-wheel and the said crank-arm, a segmental rack connected to said crank-shaft and adapted to be oscillated thereby, a gear-wheel splined upon the outer end of the tail-stock and

adapted to mesh with said segmental rack whereby power is transmitted to said tail-stock, in combination with a horizontally-disposed shaft or rod inserted within said hollow shaft or mandrel the inner end of which is provided with a slot to receive the point end of the drill-blank and the opposite end connected with a lever adapted to hold said shaft in engagement with the point of the drill and to disengage the same therefrom.

11. In a machine for making twist-drills, the combination of a carriage, means to move the same longitudinally, a hollow shaft or mandrel provided with removable bushing, and adapted to be rotated simultaneously with the movement of the carriage and having on its outer end twist-forming dies or rolls, a tail-stock having a chuck for one end of the drill-blank and a spirally-disposed groove of a pitch corresponding with the pitch of the drill, a guide pin or screw engaging in said groove, means to rotate said tail-stock, in combination with means within the hollow shaft or mandrel to hold the point end of the drill-blank against rotation during the twisting operation.

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