

No. 703,014.

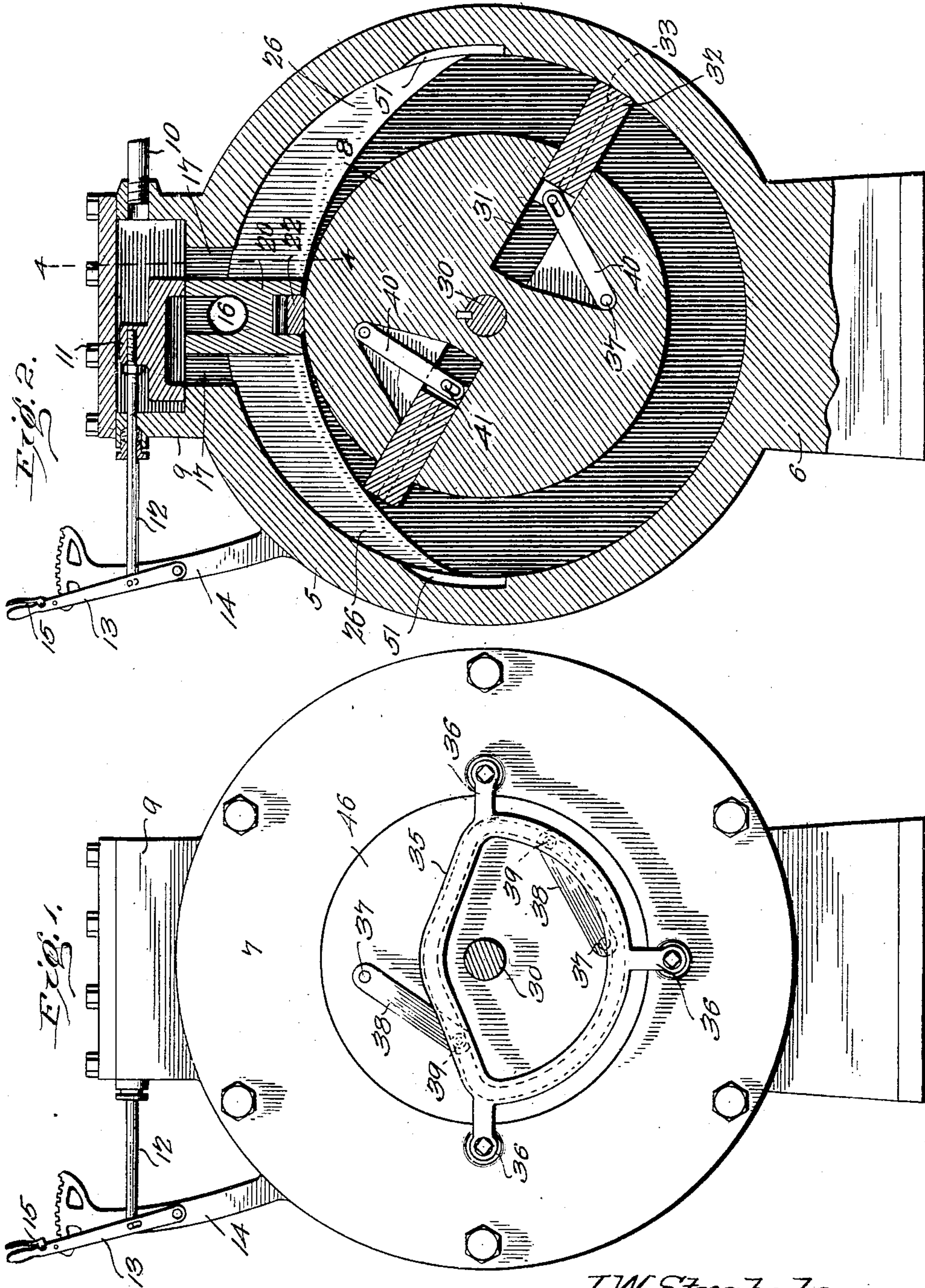
Patented June 24, 1902.

J. W. STRABALA.
ROTARY ENGINE.

(Application filed Dec. 5, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses
[Signature]
[Signature]

J. W. Strabala
Inventor
by *[Signature]*
Attorneys

J. W. STRABALA.
ROTARY ENGINE.

(Application filed Dec. 5, 1901.)

(No Model.)

2 Sheets—Sheet 2.

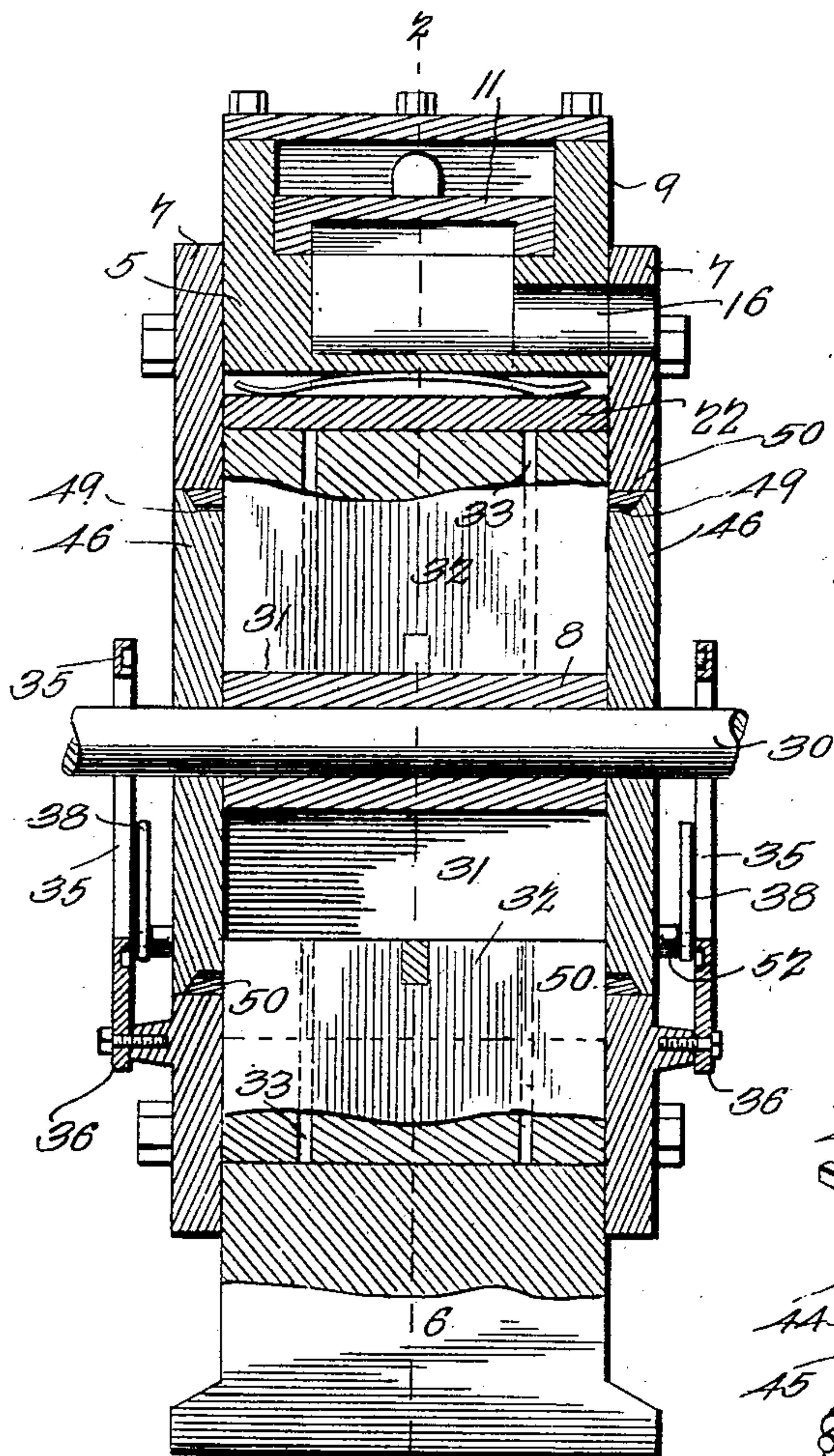


Fig. 3.

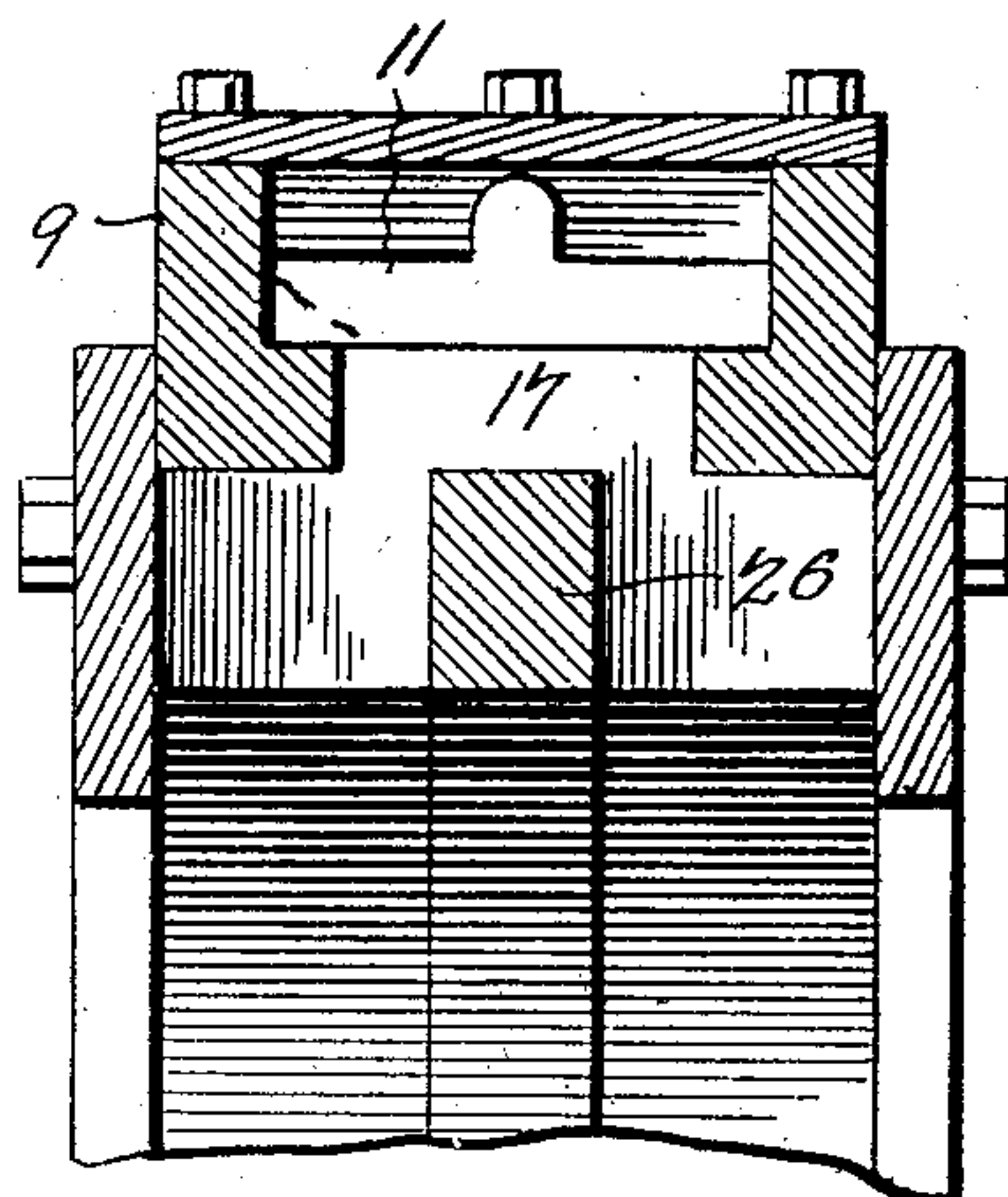


Fig. 4.

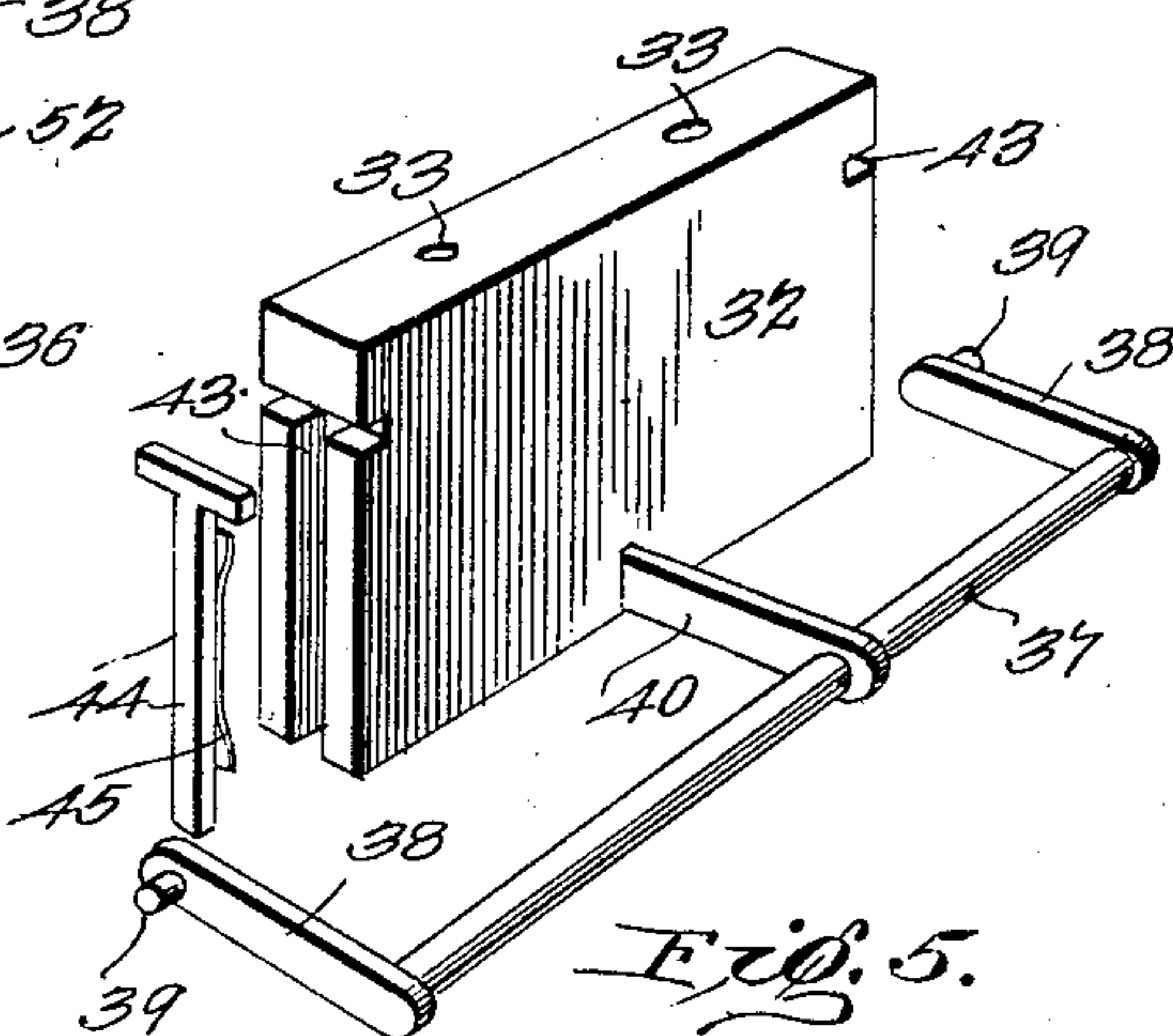


Fig. 5.

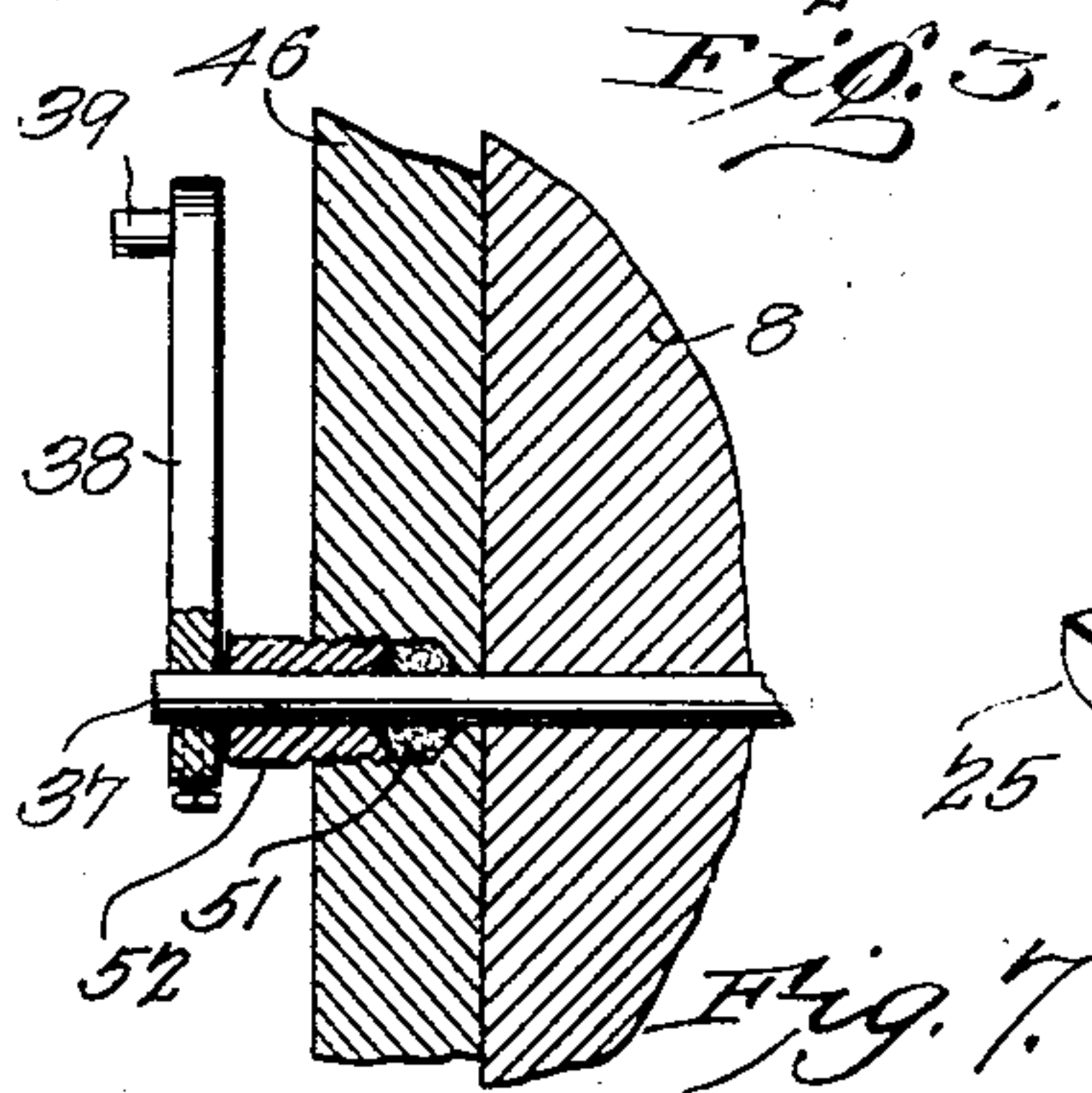


Fig. 7.

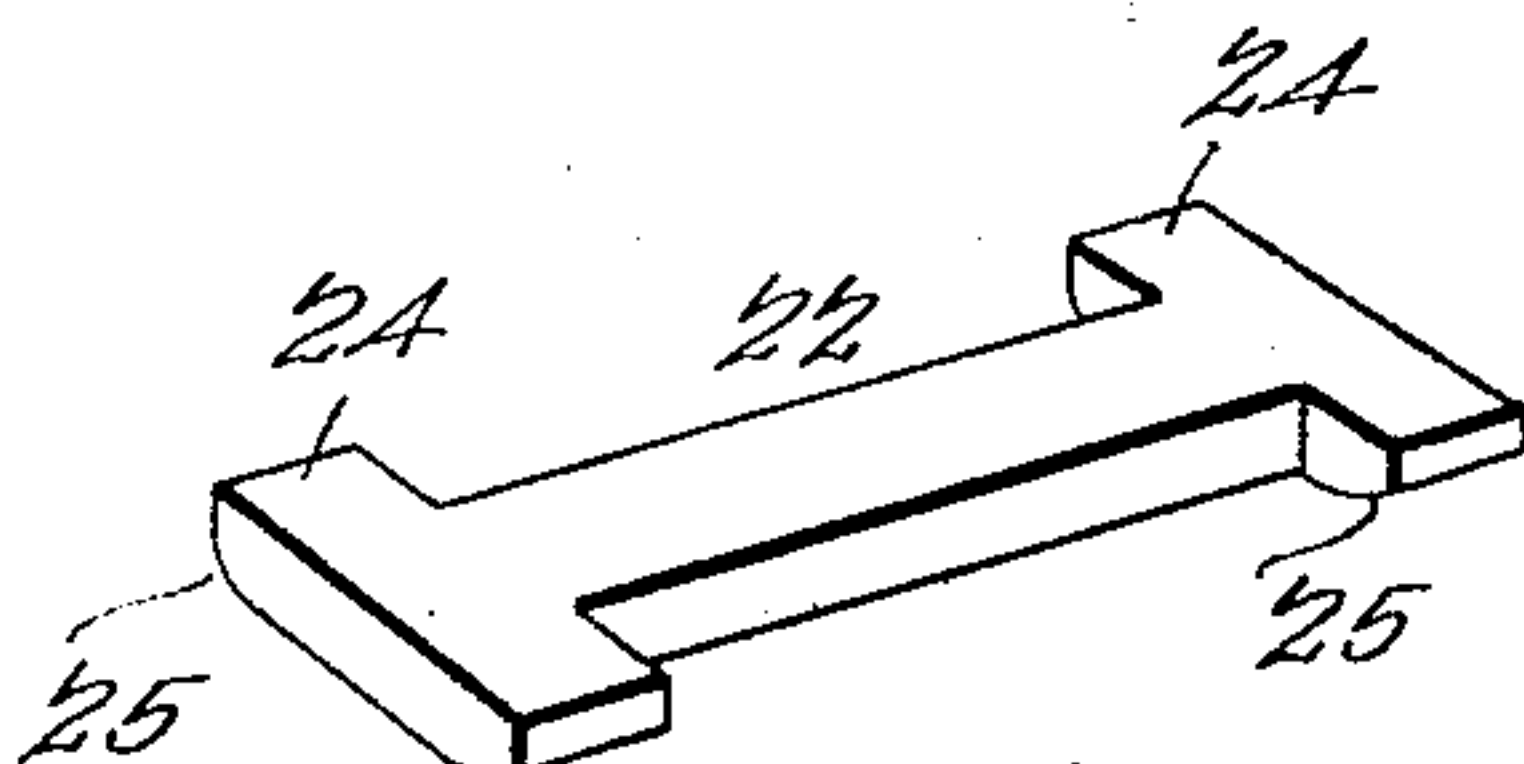


Fig. 6.

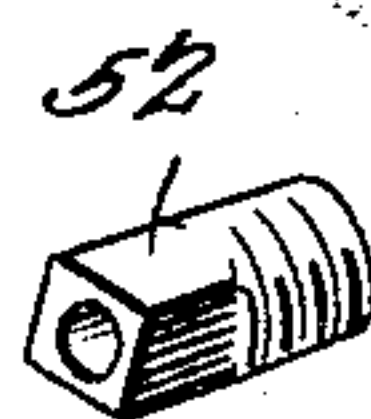


Fig. 8.

Witnesses
E. C. Stewart
John C. Carter

J. W. Strabala
Inventor
by *C. A. Snow & Co.*
Attorneys

UNITED STATES PATENT OFFICE.

JOSEPH W. STRABALA, OF KALONA, IOWA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 703,014, dated June 24, 1902.

Application filed December 5, 1901. Serial No. 84,789. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH W. STRABALA, a citizen of the United States, residing at Kalona, in the county of Washington and State of Iowa, have invented a new and useful Rotary Engine, of which the following is a specification.

This invention relates to certain improvements in rotary engines, and has for its principal object to provide a readily-reversible engine of simple construction in which the steam-pressure will be utilized to the greatest advantage.

In the accompanying drawings, Figure 1 is an end elevation of a rotary engine embodying the invention. Fig. 2 is a sectional elevation of the same on the line 2 2 of Fig. 3. Fig. 3 is a transverse sectional elevation through the center of the engine. Fig. 4 is a similar view of a portion of the engine on the line 4 4 of Fig. 2. Fig. 5 is a perspective view of one of the traveling abutments and its attached operating-levers. Fig. 6 is a detail perspective view of the fixed abutment which separates the steam-ports. Fig. 7 is a sectional elevation of a portion of the engine, illustrating the rock-shaft packing. Fig. 8 is a detached perspective view of the rock-shaft gland or follower.

Similar numerals of reference are employed to designate corresponding parts throughout the several figures of the drawings.

The cylinder of the engine comprises a circular drum or casing 5, having a suitable supporting-base 6, which may be formed integral with the cylinder, if desired. To the opposite open sides of the drum are secured annular side pieces 7, having central openings of a diameter slightly less than the diameter of the cylindrical rotating piston 8 within said cylinder.

At the top of the cylinder is a steam-chest 9, to which leads a steam-supply pipe 10, and in said steam-chest is a valve 11 of the ordinary D pattern and connected by a rod 12 to a throttle and reversing lever 13, fulcrumed on a suitable standard 14 and provided with the usual locking-bolt 15. In the lower portion of the valve 10 are formed three ports, of which the central leads to an exhaust 16, the two side ports 17 affording a passage from

the steam-chest to the cylinder and through the medium of the valve from the cylinder to the exhaust-pipe. The valve may be moved from the position shown in Fig. 2 to that illustrated by dotted lines in said figure in order to reverse the direction of travel of the engine, or said valve may be moved to any suitable distance between the two extremes of position to reduce the volume of steam admitted from the steam-chest to the cylinder.

At a point under the exhaust and between the steam-inlet ports there is formed a fixed abutment 20, in the lower edge of which is a suitable slot for the reception of a spring-pressed packing-strip 22, normally held in contact with the peripheral surface of the piston by a plate-spring 23. In order to prevent the catching of the traveling piston-abutments with the edge of the packing-strip 22, the latter is constructed in the manner more clearly illustrated in Fig. 6, laterally-extended portions 24 being arranged at its opposite ends and the under surfaces of such laterally-extended portions being curved or beveled, as indicated at 25, so that on the approach of a traveling abutment the latter will first engage with the inclined surface 25 and will force the packing-strip within the guiding-opening of the fixed abutment, as will be readily understood. In the upper portion of the cylinder is arranged a curved rib 26, its lower face being on a curved line and its distance from the inner surface of the cylinder being greatest at the fixed abutment and thence gradually lessening toward the opposite ends, at which points the rib merges into the wall of the cylinder. This rib, as will be observed on reference to Fig. 4, is arranged centrally between the opposite side plates of the cylinder, leaving on either side a passage for the steam to travel to act on the fully-projected abutment of the engine, as will be more fully described hereinafter.

The rotating piston 8, as previously described, is cylindrical in form and is keyed or otherwise secured to a power-transmitting shaft 30, which extends out beyond the side walls of the cylinder for the purpose of transmitting the power to any desired point. In the piston, on either side of the shaft 30, are ar-

ranged diametrically-opposed slots or grooves 31 for the reception of movable abutments 32, the outer edges of which are at all times in contact with either the inner wall of the cylinder or the exposed face of the rib 26. In order to assist in the projection of the abutments, said abutments are provided with steam passages or ports 33, leading radially therethrough for the admission of steam with-
 5 in the carrying slots or grooves. The abutments are positively moved in radial lines by grooved cams 35 of suitable contour, arranged one on each side of the cylinder and fixedly secured thereto by carrying arms or
 10 brackets 36. Through the piston extend shafts 37, running parallel with the main shaft 30 and provided at their opposite ends with rock-levers 38, the latter carrying anti-friction-rollers 39 for engagement in the slots
 20 of said cams. At a central point within the piston the shafts are provided with rock-levers 40, disposed in suitably-shaped recesses within the piston, the ends of said levers projecting into the slots or grooves 31 and slot-
 25 ted for connection to pins 41, carried by the movable abutments. The arrangement and disposition of the abutment-operating mechanism is such that the outer faces of said abutment will follow closely the inner wall of
 30 the cylinder and rib, close contact being further assured by the steam-pressure exerted on the inner faces of said abutments, and there being preferably sufficient play to permit of the slight movement necessary for this
 35 purpose.

In order to produce a steam-tight joint between the side of the cylinder and the abutment, the latter is provided at each side with a substantially T-shaped slot 43, in which fits
 40 a correspondingly-shaped packing-piece 44, which is pressed outwardly into contact with the side walls of the cylinder by a plate-spring 45. This strip will normally produce a steam-tight joint between the abutment and cylin-
 45 der-wall and will automatically compensate for the wearing away of the cylinder-walls or the strips.

Secured to or formed integral with the opposite sides of the piston are circular projecting portions 46 of such diameter as to fit snugly within the circular opening in the side
 50 pieces 7, and a steam-tight joint is provided for by forming in such circular projecting portions annular grooves 49, having one or
 55 both walls inclined and adapted for the reception of a packing-ring 50 of wedge shape in cross-section and adapted under the pressure of steam to make close contact with the inclined wall of the slot and with the wall of
 60 the opening in the sides of the cylinder, and thus prevent any waste of steam. In similar manner provision is made for packing the rock-shafts 37, each shaft running through a stuffing-box 51, in which screws a gland 52,
 65 as shown in Figs. 7 and 8.

In the operation of the device the steam entering from the steam-chest will commence to

act on one of the movable abutments immediately after the latter has left the rib 26 and is fully projected and will continue to act on
 70 said abutment until the latter reaches the opposite end of the rib. As the abutment approaches the end of the rib and is about to be retracted it will come opposite a small
 75 chamber 51, formed in the inner wall of the cylinder to permit of the release of steam-pressure at the time the steam is starting to act on the abutment at the opposite side of the cylinder. From thence on the abutment
 80 will be gradually retracted, affording a free passage for the escape of steam to the exhaust, reaching the fully-retracted position as it approaches the fixed abutment 20.

While the structure herein described is that of the preferred form, it is obvious that many
 85 changes in the form, proportions, size, and minor details of construction may be made without departing from the spirit or sacrificing any of the advantages of my invention.

Having thus described my invention, what I claim is—

1. The combination in a rotary engine, of the cylinder having circular openings in its opposite side walls, a piston having a body
 95 portion of greater diameter than that of the circular openings and fitting within the cylinder, said piston having reduced and laterally-extended end portions adapted to fit within said openings, packing-strips carried by
 100 said laterally-extended portions for contact with the walls of said openings, and abutments carried by said piston, substantially as specified.

2. The combination in a rotary engine, of the cylinder having circular openings in its
 105 opposite side walls, a rotary piston having a body portion of greater diameter than that of the circular openings and fitting within the cylinder, said piston having reduced and laterally-extended portions provided with an-
 110 nular grooves, wedge-shaped packing-rings adapted to said grooves and adapted to be forced by steam-pressure into contact with the wall of the cylinder-openings, a shaft carrying the piston, and abutments carried by
 115 said piston, substantially as specified.

3. The combination in a rotary engine, of a cylinder of substantially circular form, a fixed abutment 20 arranged within the cylinder and projecting inwardly from the wall
 120 thereof, a curved rib 26 arranged centrally between the side walls of the cylinder and having its greatest inward projection at the lower edge of the said fixed abutment and from thence gradually diminishing in curved
 125 lines to its opposite end, the circular wall of the cylinder being provided with chambers or pockets 51 adjacent to the ends of said rib, a steam-escape port formed within the abutment, a steam-port arranged on each side of
 130 said abutment, a steam-chest with which all of the ports communicate, a governing-valve in the steam-chest, a rotary piston arranged for contact with the fixed abutment, and

movable abutments carried by said piston, substantially as specified.

4. In a rotary engine, the combination with a piston having movable abutments, of a fixed abutment, a packing-strip adapted to a slot in said fixed abutment, said packing-strip having at its opposite end laterally-extended portions having curved or inclined faces for preliminary contact with the piston-abutments, substantially as specified.

5. The combination in a rotary engine, of the cylinder comprising a substantially circular body portion, a rotary piston mounted therein, movable abutments carried by said piston and provided with ports or passages for the admission of steam to the inner ends thereof, opposite cylinder-heads formed of rings secured to the cylinder, the centrally-disposed circular openings of said rings being of a diameter less than that of the piston, laterally-extended end portions projecting from the piston and having bearing-supports in said rings, said end portions being grooved,

angular packing-strips arranged in said grooves and adapted to be pressed by the steam-pressure against the circular walls of the ring-openings, stationary grooved cams carried by the rings at points outside the cylinder, rock-shafts carried by the piston on lines parallel with the axis of rotation of said piston and extending out through the end portions of the piston, stuffing-boxes for said rock-shafts, crank-arms on said rock-shafts, pins or rollers carried by said crank-arms and adapted to the cam-grooves, and links arranged within the piston and connected to the movable abutments, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOSEPH W. STRABALA.

Witnesses:

SAMUEL MANATT,
J. A. SPENNER.