

No. 710,973.

Patented Oct. 14, 1902.

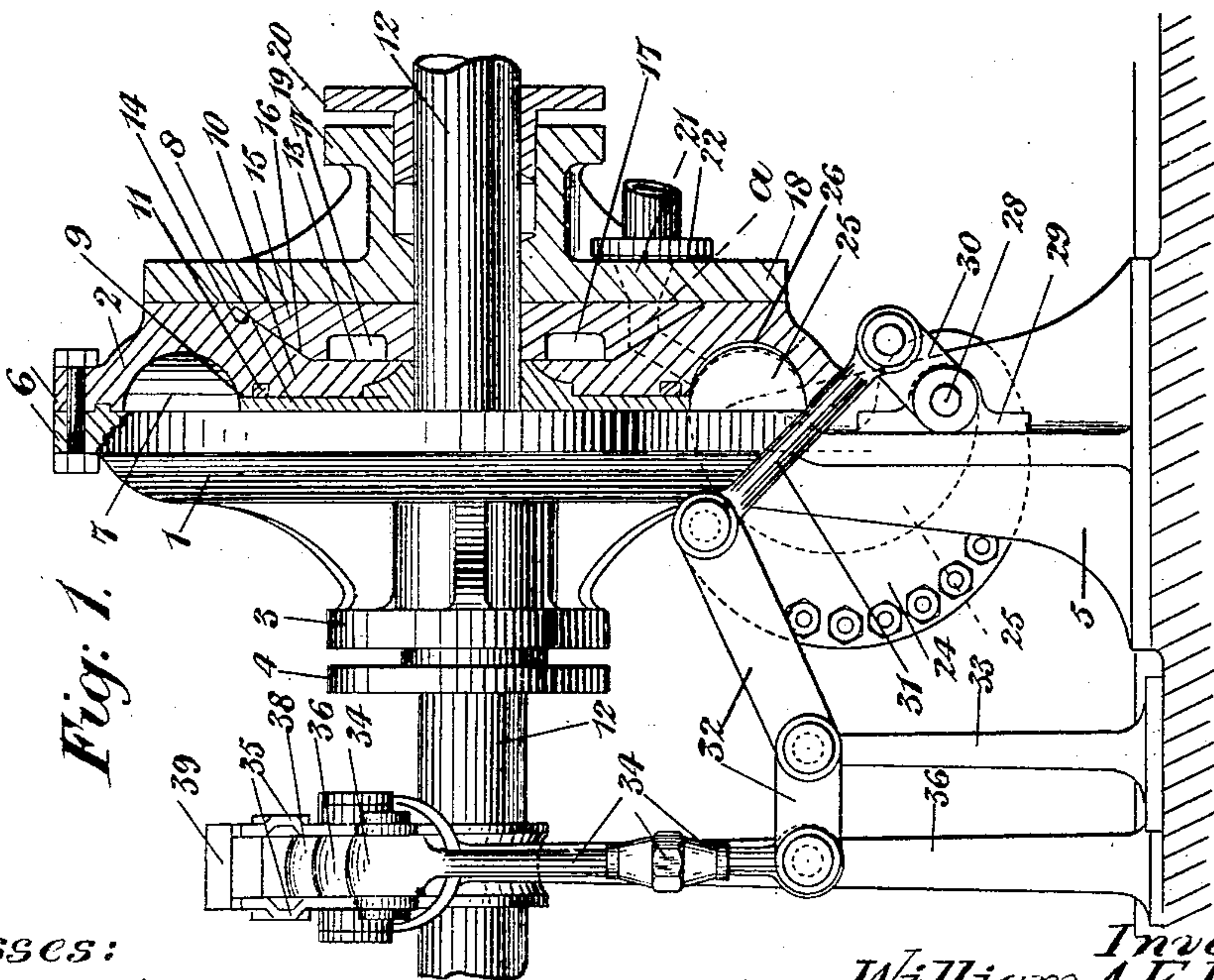
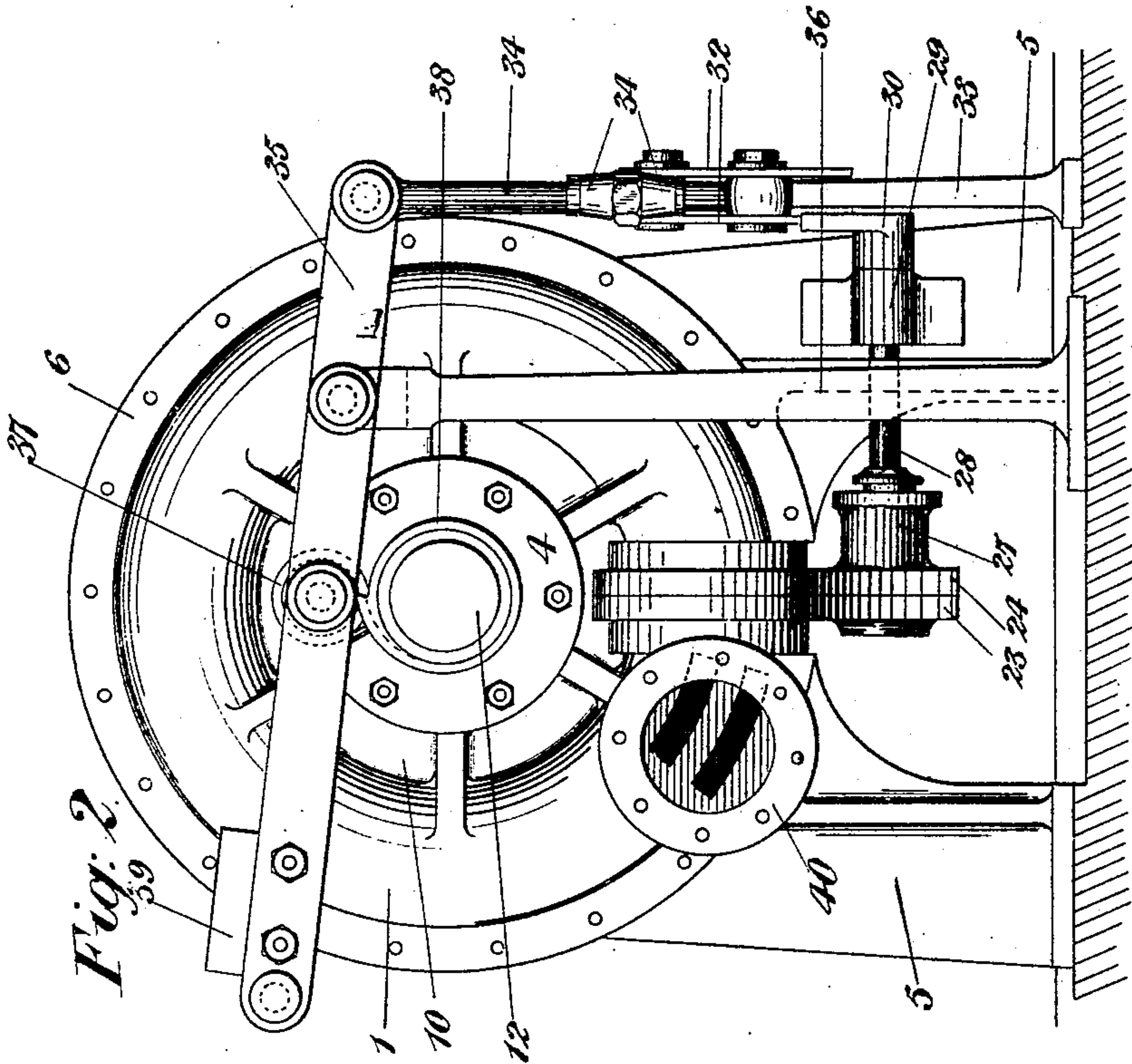
W. A. E. HENRICI.

ROTARY ENGINE.

(Application filed Nov. 19, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
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2 Sheets—Sheet 2.

Fig. 4.

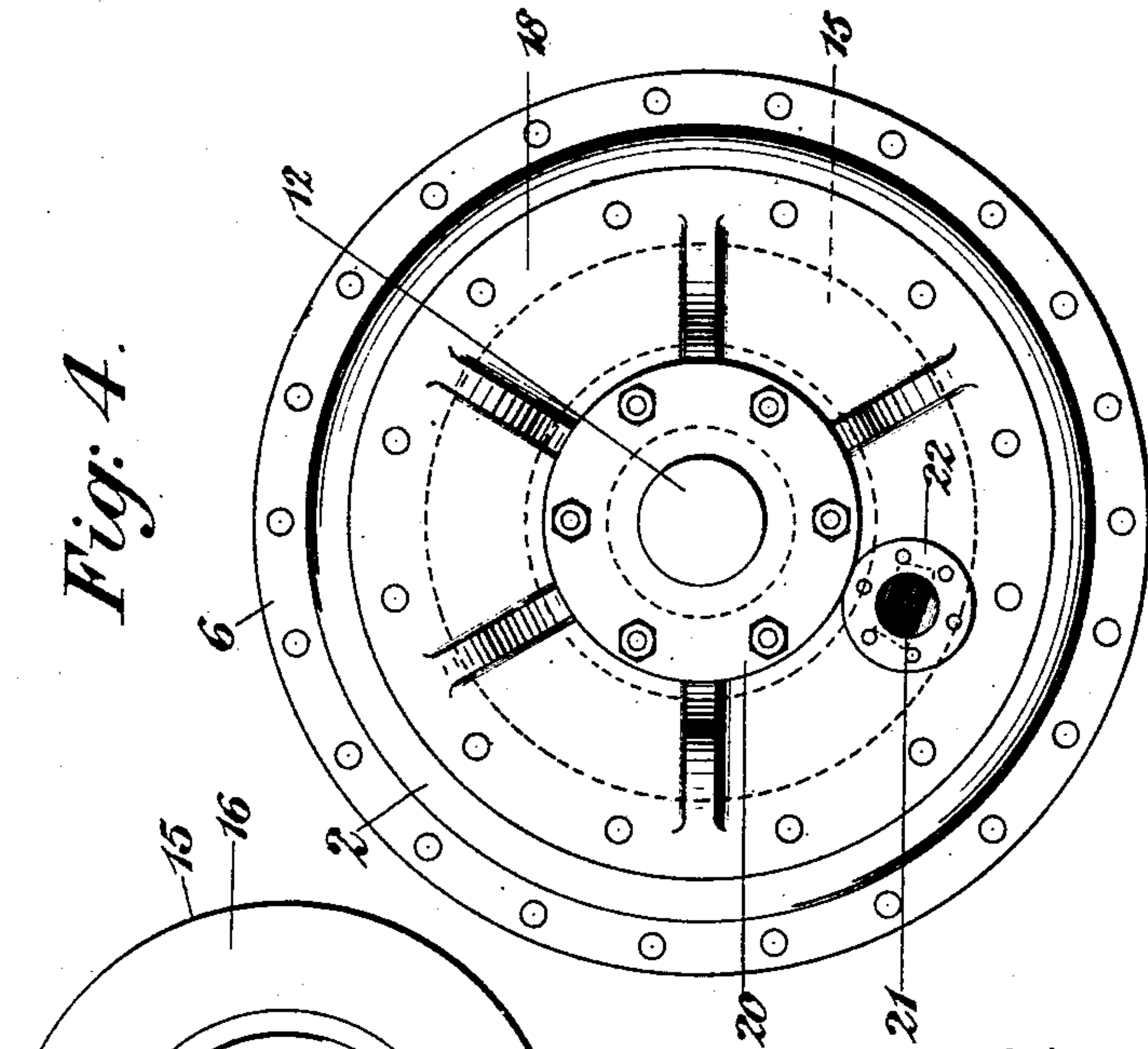


Fig. 5.

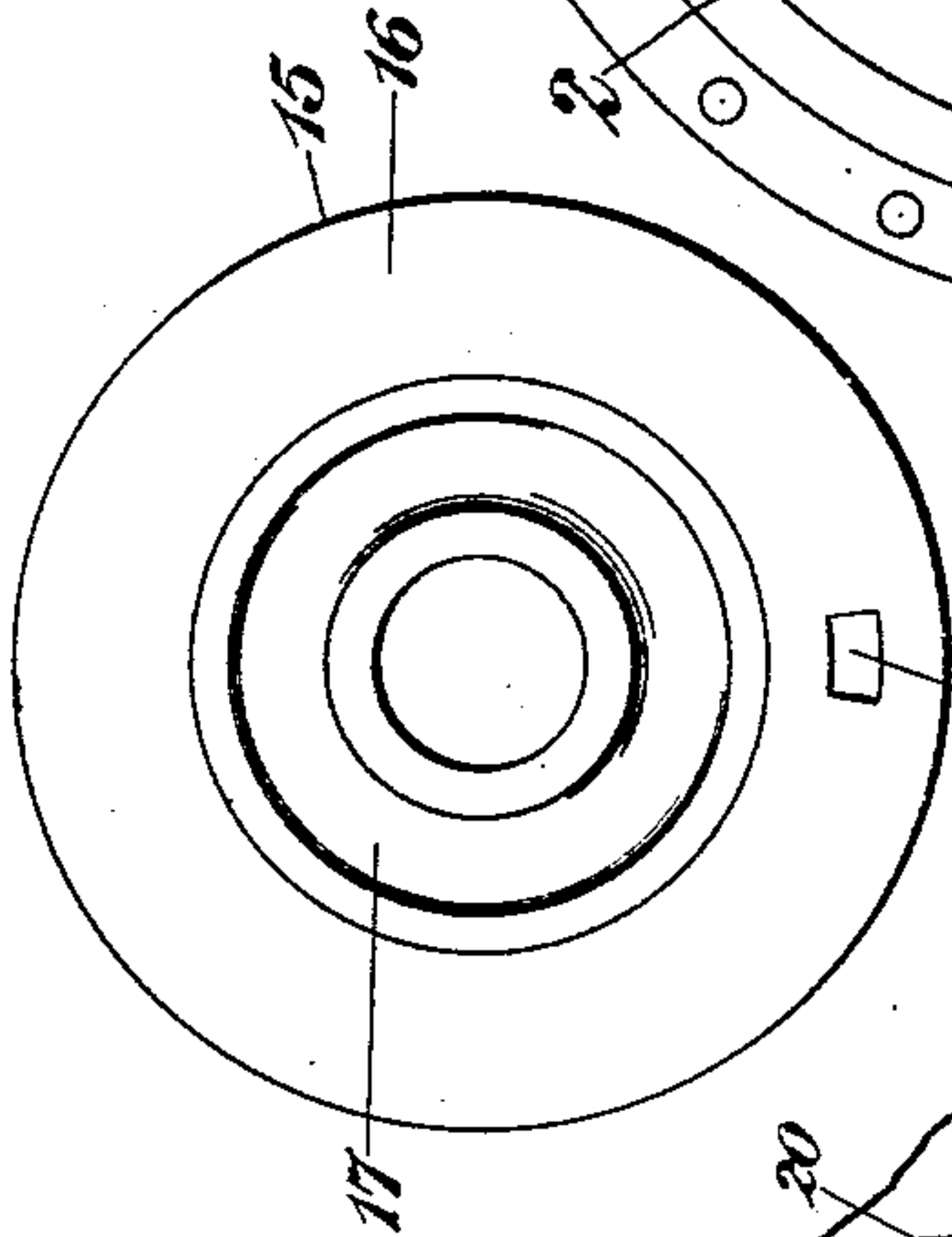


Fig. 6.

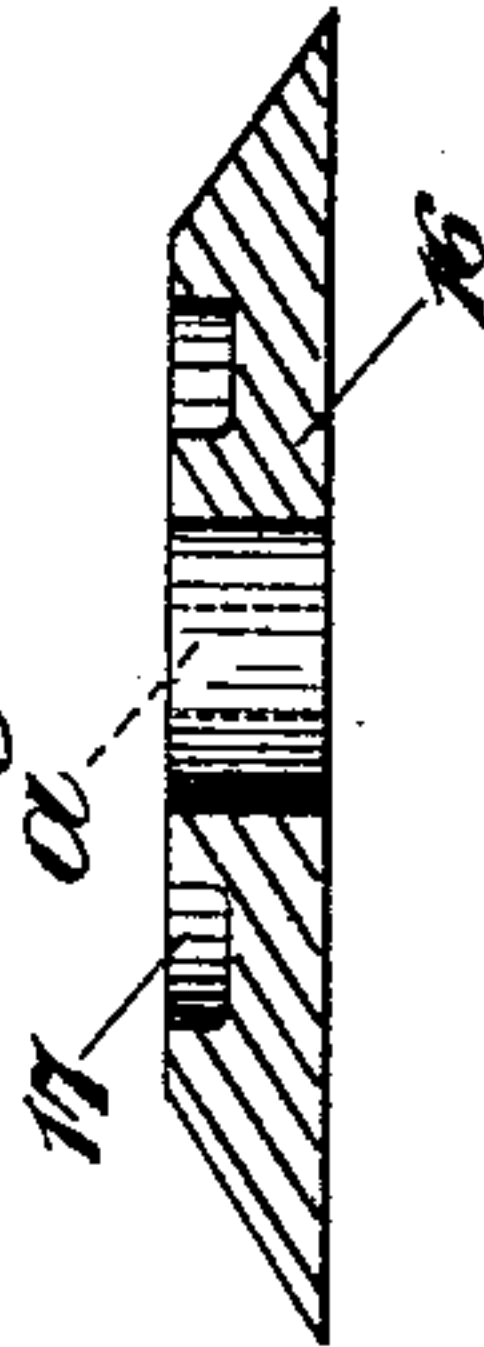
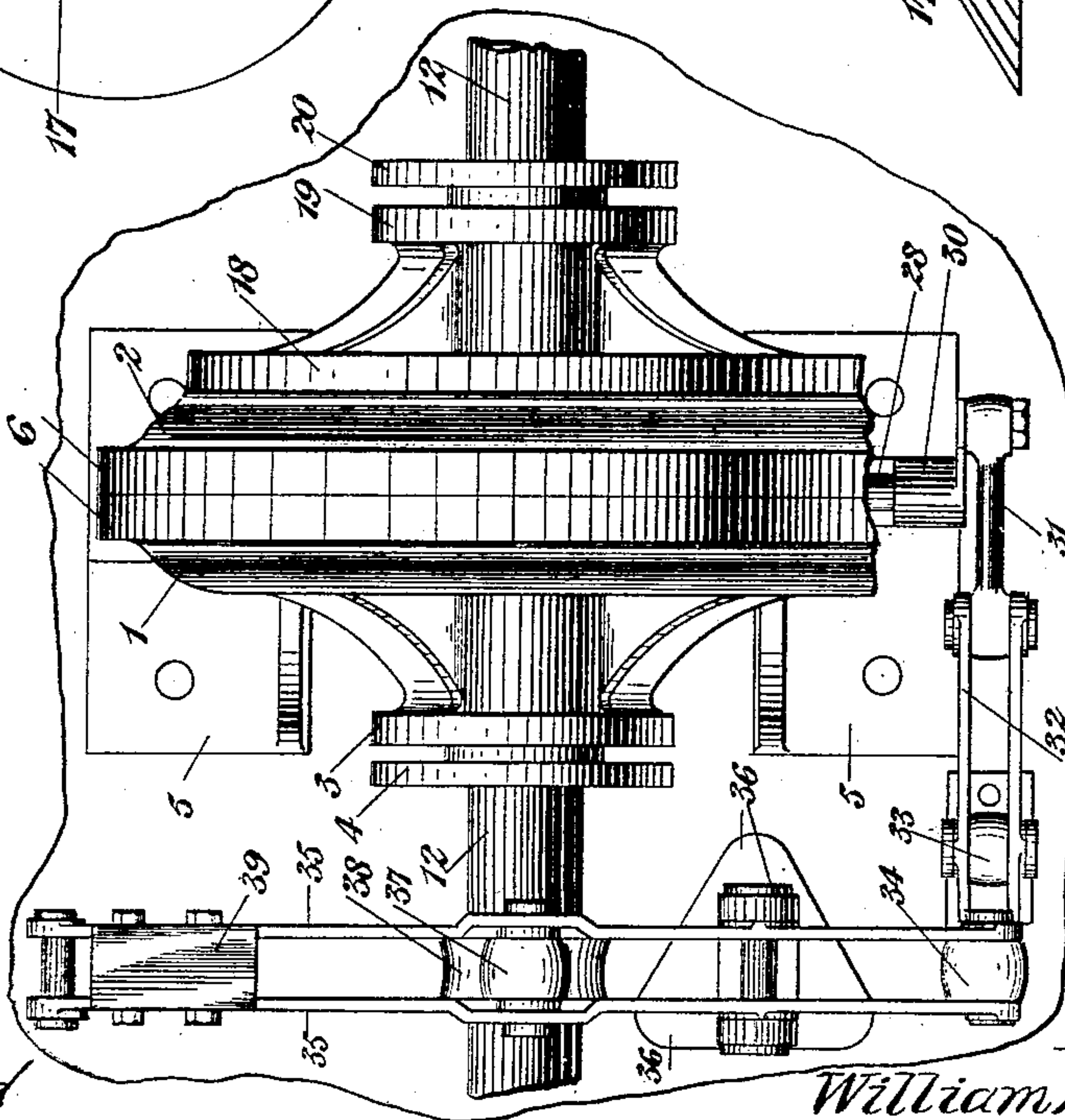


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM AUGUST EDWIN HENRICI, OF BERLIN, GERMANY, ASSIGNOR TO
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ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 710,973, dated October 14, 1902.

Application filed November 19, 1901. Serial No. 82,818. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM AUGUST EDWIN HENRICI, a citizen of the United States of America, and a resident of 37 Fruchstrasse, Berlin, Germany, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to an improved rotary engine, and has for its object to produce a simple form of engine in which the vibration usually apparent and caused by the number of actuating and intermittently-operated parts is greatly reduced by reason of the form and arrangement of the parts employed to operate the gate within the cylinder and the valve employed to regulate the steam admission to the cylinder.

In carrying the invention into effect I provide a cylinder formed in two parts capable of being bolted or otherwise secured together and having each a concentric annular channel which when the parts are secured together as aforesaid form an annular cylinder of circular cross-section. The parts composing the cylinder are provided with means whereby they may be secured upon a suitable base or support and are also provided with bearings for a shaft carrying a disk to the periphery of which is attached a suitable piston designed to travel in the cylinder aforesaid. At a suitable point in the circumference of the cylinder an opening is formed, through which passes one end of a curved plate, forming a gate adapted at stated intervals to close the bore of the cylinder and form a resistance, between which and the piston steam is admitted and expanding drives the said piston forward. A suitable casing is provided for the plate above referred to and is bolted or otherwise secured to the cylinder. The plate is provided with a spindle which passes through a stuffing-box provided upon the casing and is supported by a suitable bracket and at its outer end has secured to it a short arm, to which again is connected a rod the opposite end of which is attached to a pair of plates, forming a lever. The lever is supported at a suitable point of its length by a standard secured to the bed-plate of the

engine, and at its outer end it is connected to the lower end of an extensible connecting-rod. The connecting-rod just described is attached at its upper end to a pin passing through the end of a pair of plates, forming a lever, to which is secured a roller having a concave periphery and adapted to engage with a cam mounted upon the main shaft of the engine. The lever is supported at a suitable point of its length by a column secured to the base-plate, and at its outer end it has secured to it a weight designed to keep the roller always in contact with the face of the cam. By means of the parts last described an intermittent movement is imparted to the gate of the cylinder, which swings out of the path of the piston as the latter approaches and closes immediately after the same has passed. Upon the outer face of one of the parts of the cylinder a circular recess is formed, the edge of which is beveled or inclined away toward the face of the casting. An opening is formed leading from the recess to the cylinder, and through this opening steam is admitted thereto. Located within the recess is a disk secured to the shaft and having its periphery beveled to agree with the edge of the recess. An opening is formed in the disk, so arranged that at a predetermined point in the revolution of the shaft the two openings shall coincide for the passage of steam to the cylinder. Secured to the face of the casting is a circular plate which forms a cover for the recess and disk therein and which is provided with a flange and port for the connection thereto of a steam-supply pipe. The plate also carries a bearing for the shaft which passes through a stuffing-box and gland. Steam is exhausted through an opening formed within the opposite portion of the cylinder, which opening is always open and so located that the steam is exhausted immediately after the piston has passed the said exhaust-port.

In order that the invention may be better understood, drawings are appended, in which—

Figure 1 is an elevation, partly in section, of the improved engine. Fig. 2 is a side view. Fig. 3 is a plan. Fig. 4 is a view of the cyl-

inder alone, taken from the side opposite to that shown in Fig. 1. Fig. 5 is a view of the face of the steam-admission valve. Fig. 6 is a section of Fig. 5.

5 Referring to the drawings, 1 and 2 are respectively the front and back portions of the cylinder, which, as shown, are of circular outline, the part 1 having cast integral therewith a bearing provided with a stuffing-box 3 and
10 gland 4. Feet or supports 5 are also formed upon the part 1, by means of which it may be secured to the base-plate. The parts 1 and 2 are bolted or otherwise secured together at 6 and have each formed in them a semicircular recess which when the two parts are se-
15 curred together form the annular cylinder 7 of circular section. Within the cylinder is a piston of any suitable form attached to the periphery of the disk 8, for which recesses 9 are formed in the body 10 of the cylinder. Suitable packing-rings 11 may be provided, designed to prevent the escape of steam from the cylinder down the sides of the disk 8. The disk 8 is secured to the main shaft 12.

25 Formed upon the outer face of the part 2 is an annular recess 13, the edge of which is beveled or inclined, as shown at 14, and within this recess is located the disk 15, perforated at *a*, the periphery of which disk is also beveled at 16, the two beveled surfaces coinciding, as illustrated in Fig. 1. To reduce friction, the frictional surface of the face of the disk may be channeled, as shown at 17.

18, Figs. 1, 3, 4, is a circular plate bolt-
35 ed or otherwise secured to the outer face of the part 2 and which serves as a cover for the recess 13 and has formed upon it the stuffing-box 19, provided with a gland 20, through which passes the shaft 12. Also formed upon
40 the plate 18 is a port 21 and a flange 22, to which a steam-supply pipe may be connected. Bolted or otherwise secured to the part 1 is a casing formed in two parts 23 24 and within which is located the plate 25. (Indi-
45 cated partly by dotted lines in Fig. 1.) The free end of the plate passes through an opening in the part 1 at right angles to the bore of the cylinder, closing the same. A recess 26 is formed upon the opposite wall of the cyl-
50 inder, into which the end of the plate 25 dips, as shown in Fig. 1.

Forming part of the casing for the plate 25 is a stuffing-box 27, through which passes a spindle 28, secured to the said plate, and for
55 which a bearing 29 is provided and is secured to the face of one of the supports 5. The outer end of the spindle is provided with a short arm 30, connected at its free end to a rod 31, in its turn connected to the end of a
60 lever composed of two plates 32 32 and supported at a suitable point of its length by means of the column 33, secured to the base of the engine. To the opposite end of the lever is connected the lower end of the exten-
65 sible rod 34, the upper end of the said rod being secured to the end of a lever which, as in the preceding case, is composed of two plates

35 35. The lever is pivotally supported at a suitable point of its length by means of the column 36 and has a roller 37, which bears
70 upon the face of the cam-disk 38, secured to the main shaft 12. The roller 37 is preferably convex upon its periphery, and the face of the cam is concave to receive the roller.
75

39 is a weight secured to the end of the lever. A spring may, however, be substituted for the weight, or, again, where it is desired to dispense with both of these devices the lever may be provided with a roller projecting
80 from the side thereof and engaging with a suitable race cut in the face of a disk secured to the shaft of the engine.

40 indicates the exhaust-port, which is formed upon the part 1 of the cylinder and
85 is located upon the opposite side of the plate 25 to that upon which is placed the steam-admission port. The exhaust-port is always open, and consequently after the passage of the piston thereby the steam is immediately
90 discharged, and the said exhaust-port being open during the whole of the piston's revolution it follows that little or no back pressure is opposed to the steam actuating the piston.
95

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a rotary engine, the combination of
100 two complementary circular sections united to form an annular steam-cylinder, one of said sections being provided with a steam-port to the cylinder, and formed in its outer face with a concentric recess the inner sur-
105 face of the wall of which is beveled or inclined; a shaft passing through the sections; a disk secured to the shaft and carrying a piston working in the cylinder; a steam-admission valve consisting of a disk fitted to
110 the shaft and beveled to fit the recess of the cylinder-section, said valve having a port registering with the port in said section; a stationary cover-plate maintaining said steam-admission valve in said recess, and having a
115 steam-inlet port; a gate for opening and closing the bore of the cylinder on the passing of the piston, and means for operating said gate.

2. In a rotary engine, the combination of an
120 annular stationary steam-cylinder having a steam-inlet port, a piston, a rotary steam inlet-valve having a port registering with said cylinder-port, a stationary cover-plate main-
125 taining said valve in position and having a steam-inlet with which the port in the valve communicates at intervals, a gate for opening and closing the bore of the cylinder on the passing of the piston, said gate consist-
130 ing of a curved plate mounted upon a shaft, a bearing and a stuffing-box for said shaft, a lever actuated from the engine, and intermediate connections between said shaft and lever.

3. In a rotary engine, the combination of a
steam-cylinder; a rotatable shaft journaled
transversely of said cylinder; a peripherally-
beveled valve-disk, provided with a suitable
5 steam-port; said valve-disk being mounted
upon and secured to the shaft, and rotating
within a suitable recess in the side of the cyl-
inder; and a suitable cover inclosing said
valve-disk in said recess and having a steam-
10 passage which is formed therein and adapted
to coincide with the steam-port in the valve-

disk, at a predetermined point in the path of
rotation of said valve-disk.

In witness whereof I have hereunto set my
hand, in the presence of two witnesses, at 15
London, England, this 4th day of November,
1901.

WILLIAM AUGUST EDWIN HENRICI.

Witnesses:

JOHN H. JACK,
E. H. HARBERD.