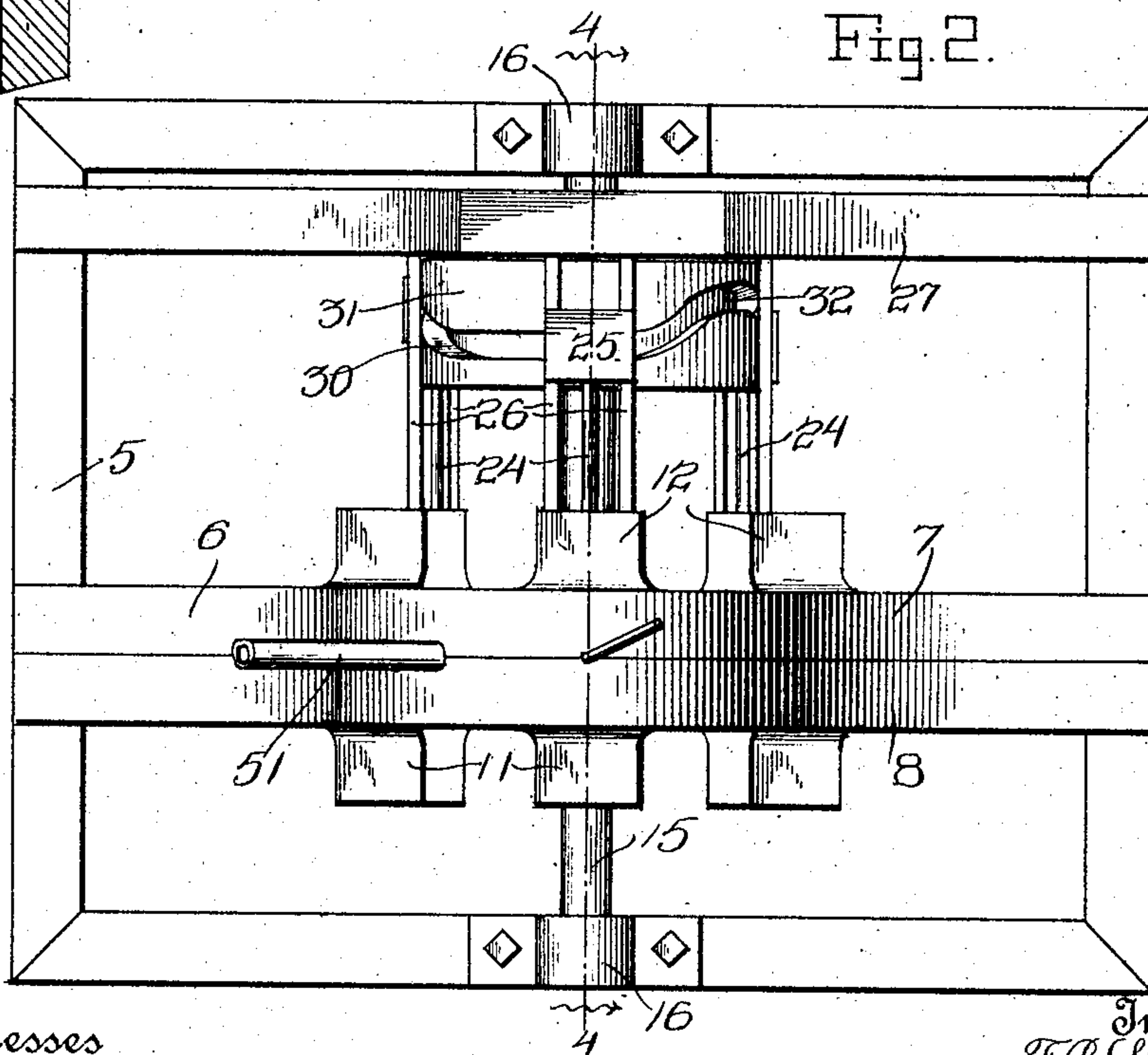
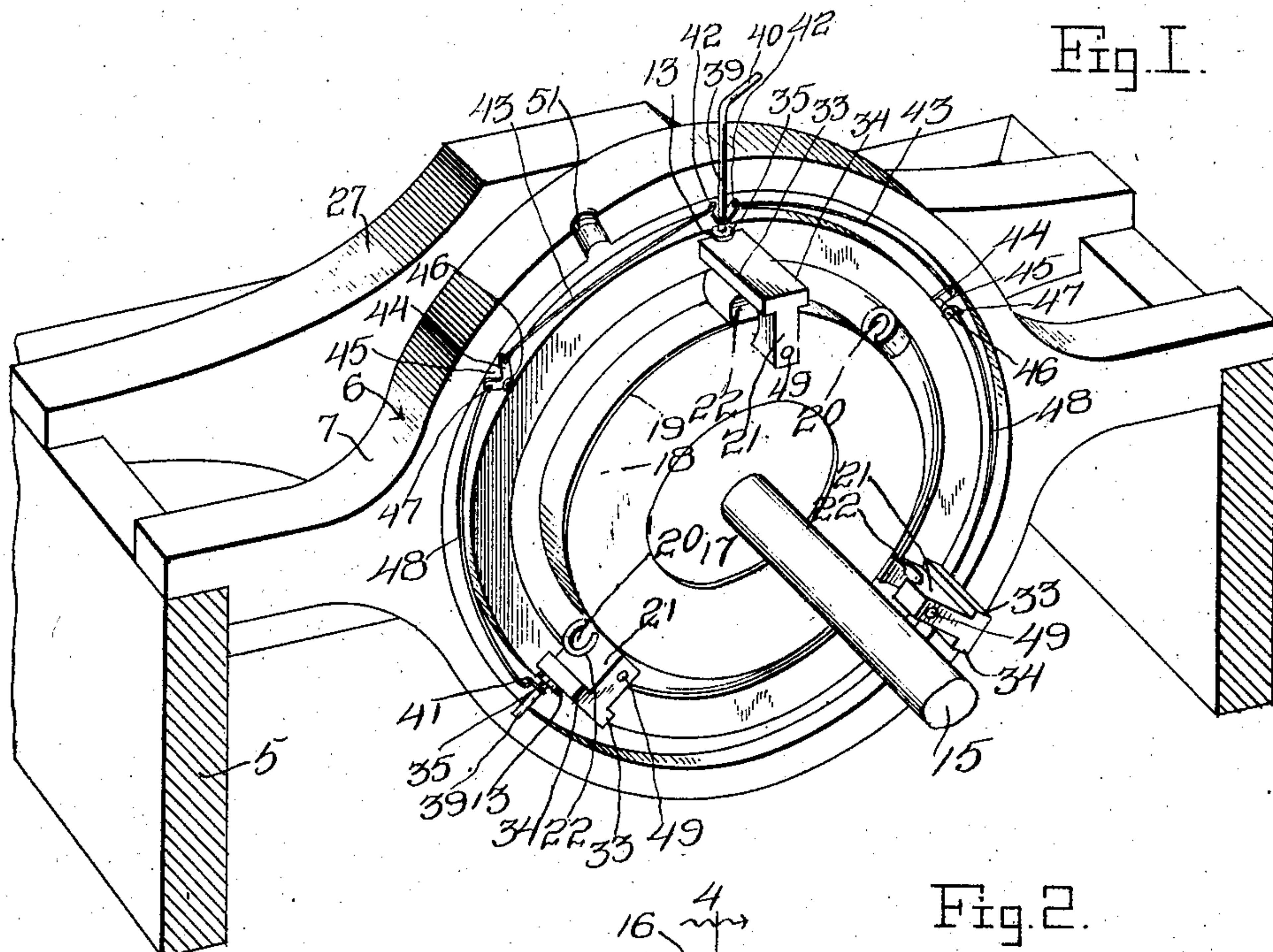


No. 780,890.

PATENTED JAN. 24, 1905.

F. C. KEITH.
ROTARY ENGINE.
APPLICATION FILED NOV. 19, 1904.

2 SHEETS—SHEET 1.



Witnesses
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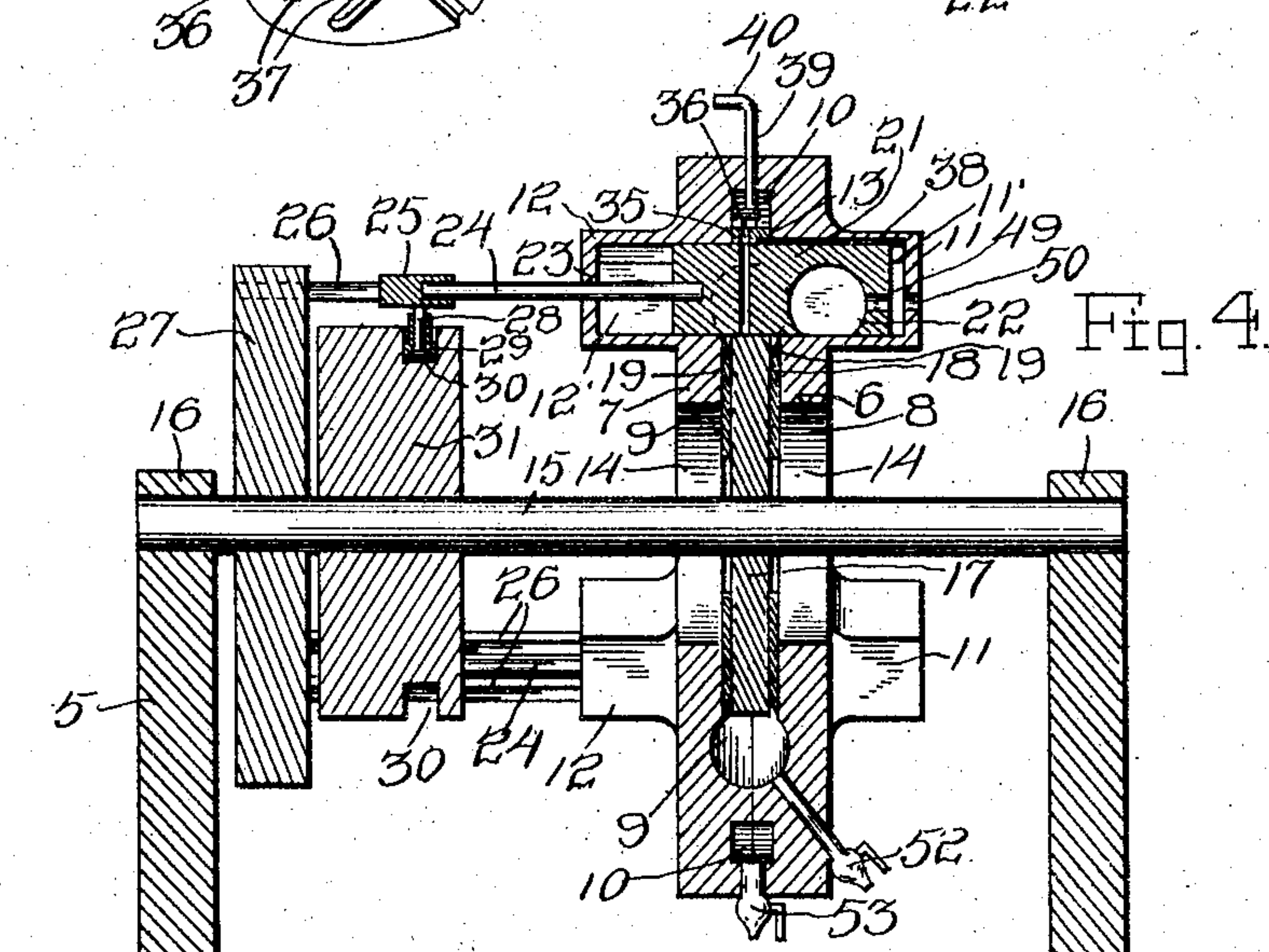
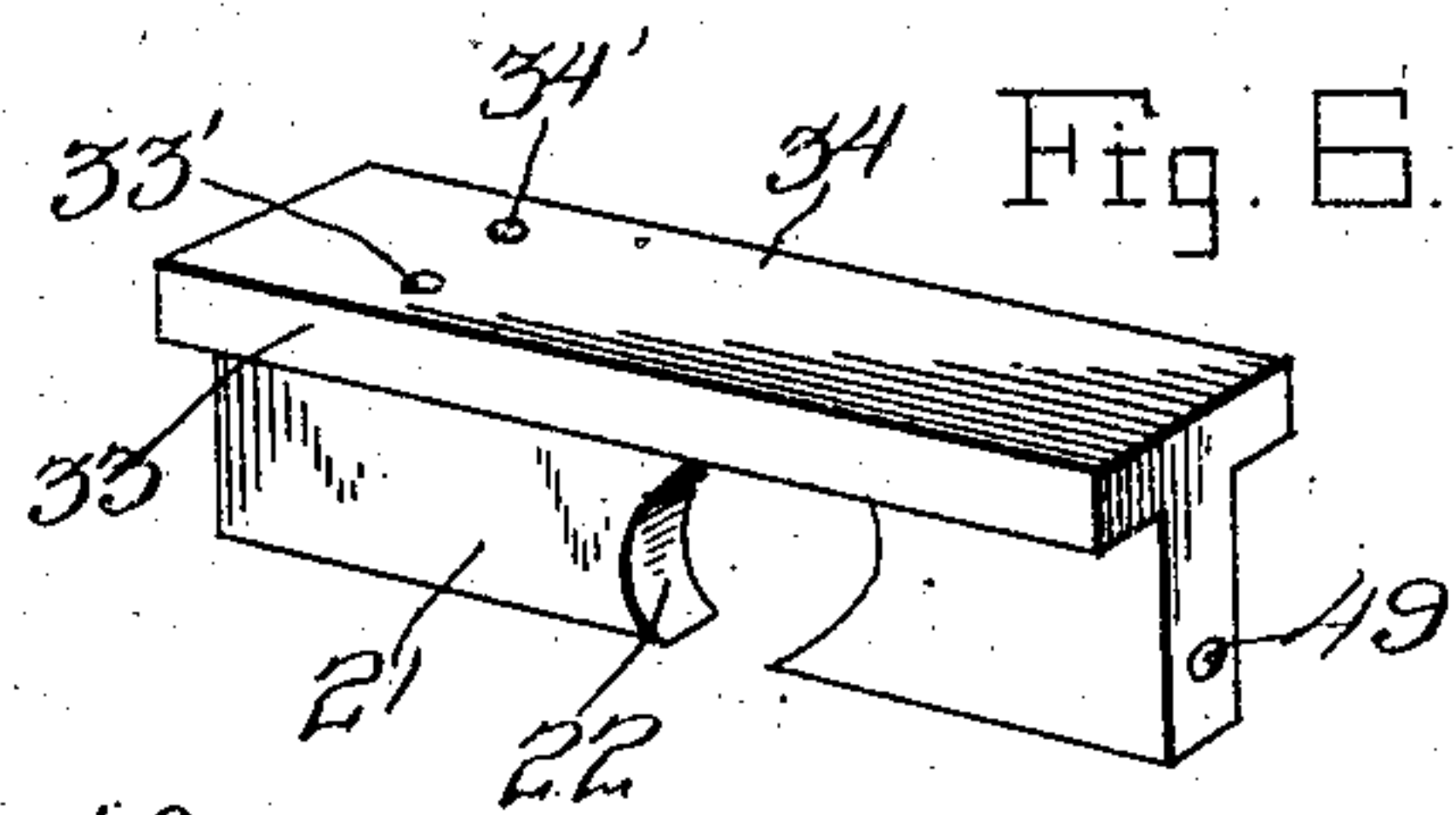
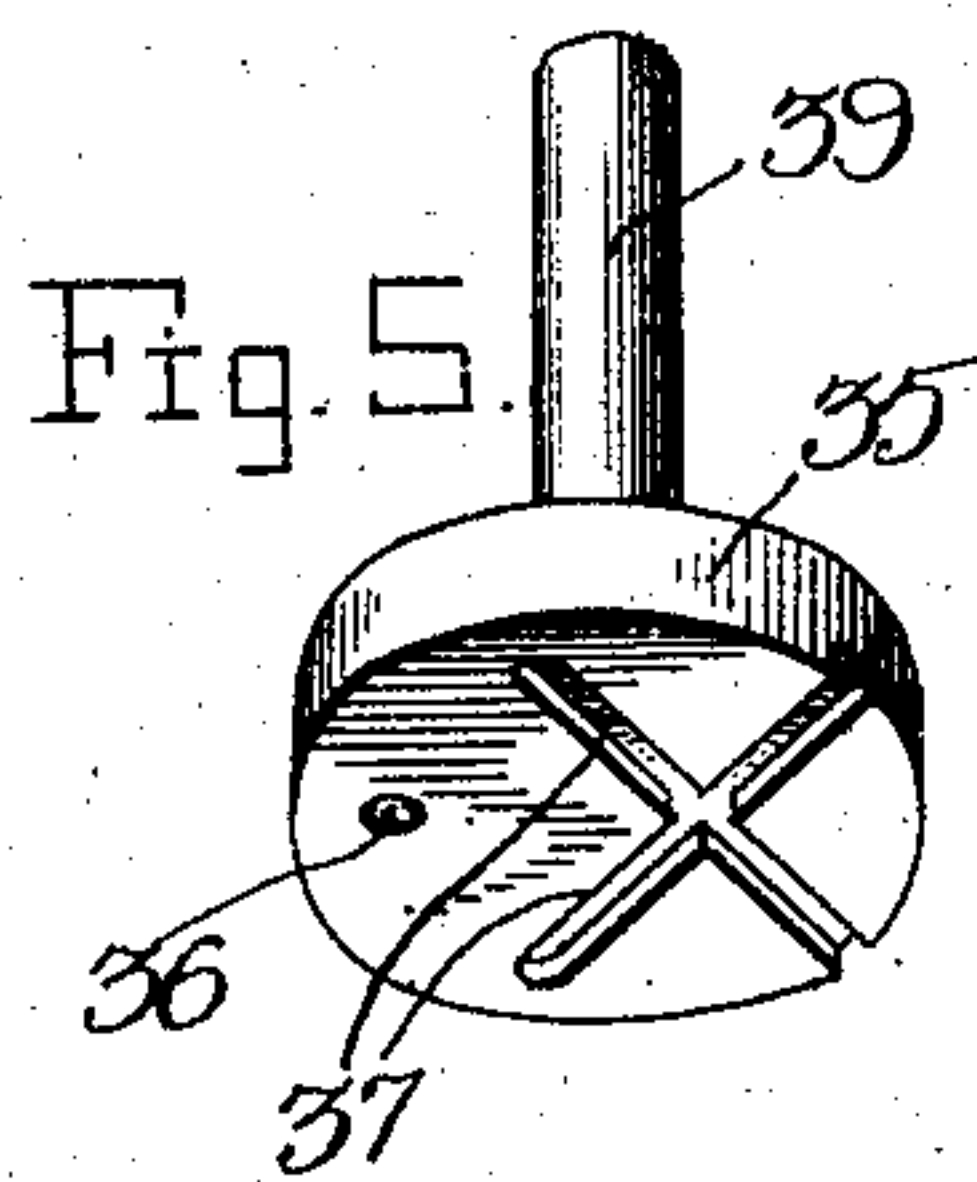
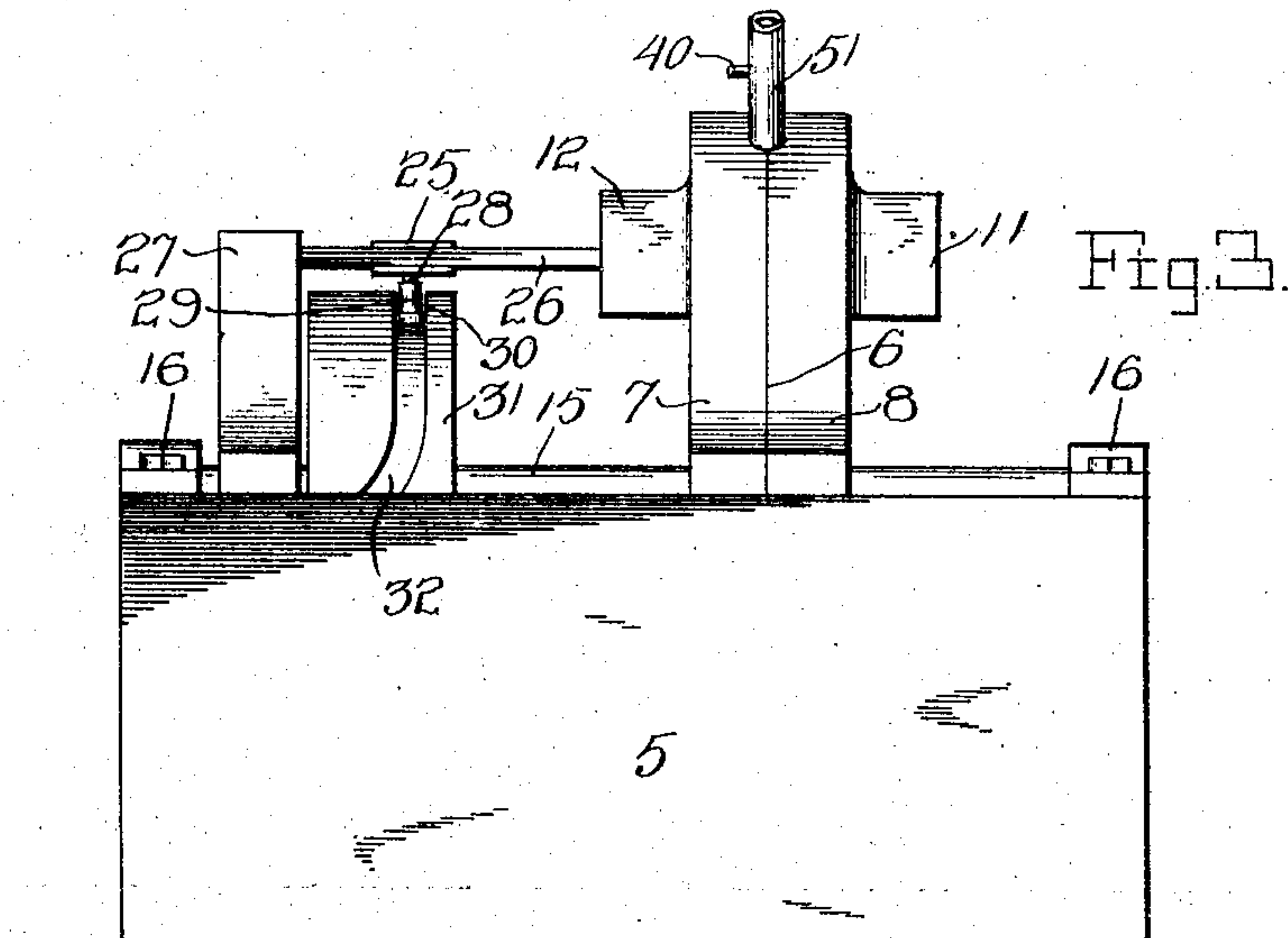
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

FINLEY C. KEITH, OF GALIGHER, OHIO.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 780,890, dated January 24, 1905.

Application filed November 19, 1904. Serial No. 233,501.

To all whom it may concern:

Be it known that I, FINLEY C. KEITH, a citizen of the United States, residing at Galigher, in the county of Guernsey, State of Ohio, have
 5 invented certain new and useful Improvements in Rotary Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable
 10 others skilled in the art to which it appertains to make and use the same.

This invention relates to steam-engines, and more particularly to rotary steam-engines, and has for its object to provide a rotary engine which will operate without the use of a
 15 fly-wheel, which may be easily reversed, and which may be adjusted to compensate for wear.

Other objects and advantages will be apparent from the following description, and it will be understood that modifications of the
 20 specific construction shown may be made, and any suitable materials may be used without departing from the spirit of the invention.

In the drawings forming a portion of this specification, and in which like numerals of
 25 reference indicate similar parts in the several views, Figure 1 is a perspective view of the engine with one-half of the casing removed. Fig. 2 is a top plan view of the engine. Fig. 3 is an end view. Fig. 4 is a section
 30 on line 4-4 of Fig. 2, taken longitudinally of one of the slides. Fig. 5 is a detail view of one of the throttle-disks. Fig. 6 is a detail view of one of the slides.

Referring now to the drawings, the present
 35 invention comprises a frame 5, in which there is secured at its ends a casing 6, which is divided longitudinally into two portions 7 and 8. Within the casing there is formed a cylindrical chamber 9, one-half of which is
 40 formed in each of the portions 7 and 8, and formed in the inner face of each of the portions outwardly of the chamber 9 and concentric therewith is a circular groove, these two grooves registering with each other to
 45 form a continuous circular passage 10, which acts as the steam-chest of the engine, as will be presently explained.

A plurality of bosses 11 are formed upon the outer face of the portion 8 of the casing,

similar bosses 12 being formed upon the outer
 50 face of the portion 7, the bosses of each portion being spaced equally from each other and those of the two portions lying in alinement with each other transversely of the casing.

Formed within the bosses 11 and opening
 55 through the inner face of the portion 8 are passages 11', these passages extending into the wall of the chamber 9 and communicating with this chamber, the outer walls of the passages lying inwardly of the inner wall of the
 60 steam-chest 10. Similar passages 12' are formed in the bosses 12 and register with the passages 11', and formed through the inner wall of the steam-chest 10 and communicating with these registering passages are circular
 65 passages 13 for a purpose to be presently described.

Openings 14 are formed through the portions 7 and 8, centrally thereof, and communicate with the chamber 9, and passed through
 70 these openings, which are concentric with the chamber 9, there is a shaft 15, journaled in bearings 16 in the sides of the frame. A piston 17 is secured to the shaft 15 and lies within the chamber 9, the piston being in the form
 75 of a disk and lying with its periphery spaced from the outer wall of the chamber. The side faces of the piston are provided with packing-disks 18, which prevent the leakage of steam between the piston and the walls of
 80 the chamber, these packing-disks being secured to the piston inwardly from their edges, so as to permit of movement of their outer portions away from the piston, and at their inner corners the packing-rings are beveled,
 85 as shown at 19, to permit the entrance of steam between the rings and the piston to force the rings against the walls of the chamber and form a close union.

The piston 17 is provided with a plurality
 90 of piston-heads 20, extending outwardly from its periphery and resting against the side and outer walls of the chamber 9.

Slidably disposed in each registering pair of the passages 11' and 12' there is a slide 21,
 95 and these slides are provided with openings 22 therethrough, communicating with their inner edges, these openings being of a size to

permit of the passage of the pistons 20 there-through, and these slides lie normally with their openings in the passages 11', the inner edges of the slides resting against the periphery of the piston 17.

Formed through the ends of the bosses 12 are openings 23, and slidably engaged in these openings are rods 24, which are secured to the slides 21. Each of the rods 24 carries a cross-head 25 at its outer end, which is adjustable longitudinally thereof and which is mounted between parallel guides 26, these guides being secured at one end to the bosses and at the other end to a member 27.

Each of the cross-heads 25 carries a stub-shaft 28, which extends in the direction of the shaft 15, these stub-shafts each carrying a roller 29, engaged in a groove 30, formed in the periphery of a disk 31, which is secured to the shaft 15. The groove 30 is provided with cam portions 32, extending away from the casing 6, the cam portions corresponding in number with the piston-heads 20 and being disposed with their centers in alinement with the slides transversely of the frame. This arrangement is such that as the disk 31 is revolved with the shaft 15 the slides 21 are retracted successively to bring their openings 22 into position to permit of the passage of the piston-heads 21 therethrough, as will be readily understood.

The slides 21 are T-shaped in cross-section, as shown, and formed vertically through the flanges 33 and 34 of the slides are openings 33' and 34', respectively, these openings being adjacent to the ends of the slides to which the rods 24 are attached, and when the slides are in their normal positions the openings 33' and 34' lie within the inclosures of the openings 13.

Revolubly disposed in each of the openings 13 there is a throttle-disk 35, each of these disks having a passage 36 formed vertically therethrough, and these passages are arranged for interchangeable registration with the openings 33' and 34', the throttle-disks resting upon the outer faces of the slides.

Formed in the faces of the disks 35 which rest against the slides are grooves 37, opening at one end through the peripheries of the disks, and these grooves are arranged for registration with the outer ends of the openings 33' and 34', one of these grooves lying in registration with the opening 33' when the passage 36 is registered with the opening 34', while the other groove lies in registration with the opening 34' when the passage 36 is in registration with the opening 33'. Formed through the portion 7 of the casing and communicating with the openings 13 are exhaust-passages 38, these passages 38 being so disposed that the ends of the grooves 37 may be interchangeably registered therewith, and the arrangement is such that when one of these grooves is registered with one of the openings

33' and 34' its outer end registers with the adjacent exhaust-passage 38.

The disks 35 are carried by shafts 39, which are journaled in suitable bearings, one of these shafts extending outwardly of the casing and being provided with a handle 40, by which it may be rotated to move its disk. The several shafts are provided with laterally-extending fingers 41. The finger of the shaft carrying the handle 40 is provided with a pair of perforations 42, in which are engaged the hooked ends of the rods 43, these rods being pivotally connected at their opposite ends with fingers 44, carried by rock-collars 45, journaled upon spindles 46, which are mounted in the steam-chest 10. The rock-collars are provided with other fingers, 47, which are connected, by means of rods 48, with the laterally-extending fingers 41 of the remaining shafts 39, it being understood that this arrangement is used when but three of said shafts are employed, the number of rods and rock-collars being increased or diminished to suit the arrangement of shafts. It will be apparent from the just-described arrangement that when the shaft carrying the handle is moved the other shafts and their disk will be similarly moved. The rock-collars, rods, &c., all lie within the steam-chest 10.

Extending longitudinally through the slides are passages 49, which open at one end through the ends of the slides which lie in the passages 11' and at the other end communicate with the openings 22. Formed through the outer ends of the bosses 11 are exhaust-ports 50, which aline with the passages 49.

A steam-port 51 communicates with the steam-chest 10, and to this steam-port steam is conducted from a suitable source. Cocks 52 and 53 are provided at the bottoms of the chamber 9 and steam-chest 10, respectively, by means of which they may be drained.

In operation the throttle-disks 35 are moved to register their passages 36 with one of the openings 33' and 34'. It shall be assumed that the passages 36 have been alined with the opening 33'. The steam admitted to the steam-chest 10 will now pass downwardly through the alined passages and openings and will expand between the slides and the piston-heads 20, which will cause the piston 17 and the shaft 15 to revolve. As the piston-heads reach the slides successively these are retracted, as mentioned above, and the piston-heads passed through the openings 22, this movement of the slides bringing their openings 33' out of alinement with the passages 36, and thus cutting off the supply of steam. Movement of the slides to bring their openings 22 into the paths of movement of the piston-heads brings the passages 49 into communication with the chamber 9, and the arrangement of the disk 31 is such that the slides remain retracted until after the piston-heads have passed some distance therebeyond, so that the expanded

steam behind the piston-heads passes out through the passages 49 and the exhaust-port 50, the exhaust-steam also passing out through the opening 34' and the grooves 37, which are in registration therewith, to the exhaust-passages 38.

When the positions of the disks 35 are reversed, the engine of course runs in the opposite direction. By reason of the fact the cross-heads 25 are adjustable upon the rods 24 the slides may be set to move at the correct time should any wear of the parts result in the engine's getting out of adjustment.

The throttle-disks 35, as will be readily understood, may be moved to bring the passage 36 out of registration with both of the openings 33' and 34' to prevent the passage of steam to the engine.

What is claimed is—

1. A rotary engine comprising a casing having a circular chamber therewithin and a continuous steam-chest inclosing the chamber, said casing having openings communicating with the chamber and with the steam-chest, a shaft revolubly mounted transversely of the casing, a piston mounted concentrically upon the shaft and lying within the chamber, the periphery of said piston lying in spaced relation to the outer wall of the chamber, piston-heads carried by the piston, slides mounted transversely of the casing and having openings therethrough, said slides being arranged for movement to bring their openings and solid portions into and out of the paths of movement of the piston-heads, said piston-heads being of a size to pass through the openings, means for moving the slides to bring their openings into the paths of movement of the piston-heads when the piston-heads are in position to pass therethrough, openings formed through the slides and opening through the side and outer faces thereof, said openings being disposed to communicate with the chamber and with the passages of the casing when the solid portions of the slides are in the paths of movement of the piston-heads, and throttle-disks disposed in the passages of the casing and having passages therethrough, said throttle-disks being arranged for simultaneous movement to bring their passages into and out of registration with the second-named openings of the slides interchangeably, said throttle-disks having exhaust-grooves formed in their faces adjacent to the slides and arranged for registration with the second-named openings of the slides with which the passages of the throttle-disks are out of registration, said casing having exhaust-openings therein arranged for registration with the exhaust-grooves, said slides having additional exhaust-passages therein communicating with

their first-named openings, said steam-chest being arranged for connection with a source of steam.

2. In a rotary engine, the combination with a casing having a chamber therein, of a piston revolubly mounted in the chamber, piston-heads carried by the piston and lying in engagement with the walls of the chamber, slides movable into and out of the paths of movement of the piston-heads, said slides having openings formed therethrough and opening through their side and outer faces, said casing having a steam-chest therein and having passages communicating with the steam-chest and arranged for communication with the openings of the slides when the latter are in the paths of movement of the piston-heads, throttle-disks disposed in the passages of the casing and resting against the slides, said throttle-disks having passages therethrough arranged for registration with the openings of the slides interchangeably for the passage of steam from the steam-chest to the chamber, means for moving the slides out of the paths of movement of the piston-heads, said throttle-disks having exhaust-grooves formed therein and arranged for registration with the openings of the slides with which the passages of the throttle-disks are out of registration, said casing having exhaust-ports therein arranged for registration with the exhaust-grooves, and connections between the throttle-disks for movement thereof simultaneously.

3. In a rotary engine, the combination with a casing having a chamber therein and a piston revolubly mounted in the chamber, of packing-disks disposed between the piston and the walls of the chamber, said packing-disks being secured to the piston inwardly from their edges, the inner corners of said packing-disks being beveled to permit of the passage of steam between the rings and the piston to force the former against the walls of the chamber.

4. In a rotary engine, the combination with a casing having a chamber therein and a piston revolubly mounted in the chamber, of packing-disks disposed between the piston and the walls of the chamber, said disks being secured to the piston and arranged for the passage of steam between themselves and the piston to hold the disks against the walls of the chamber.

In testimony whereof I affix my signature in presence of two witnesses.

FINLEY C. KEITH.

Witnesses:

ROBT. T. SCOTT,
A. R. McCULLOCH.