No. 680,478. Patented Aug. 13, 1901.

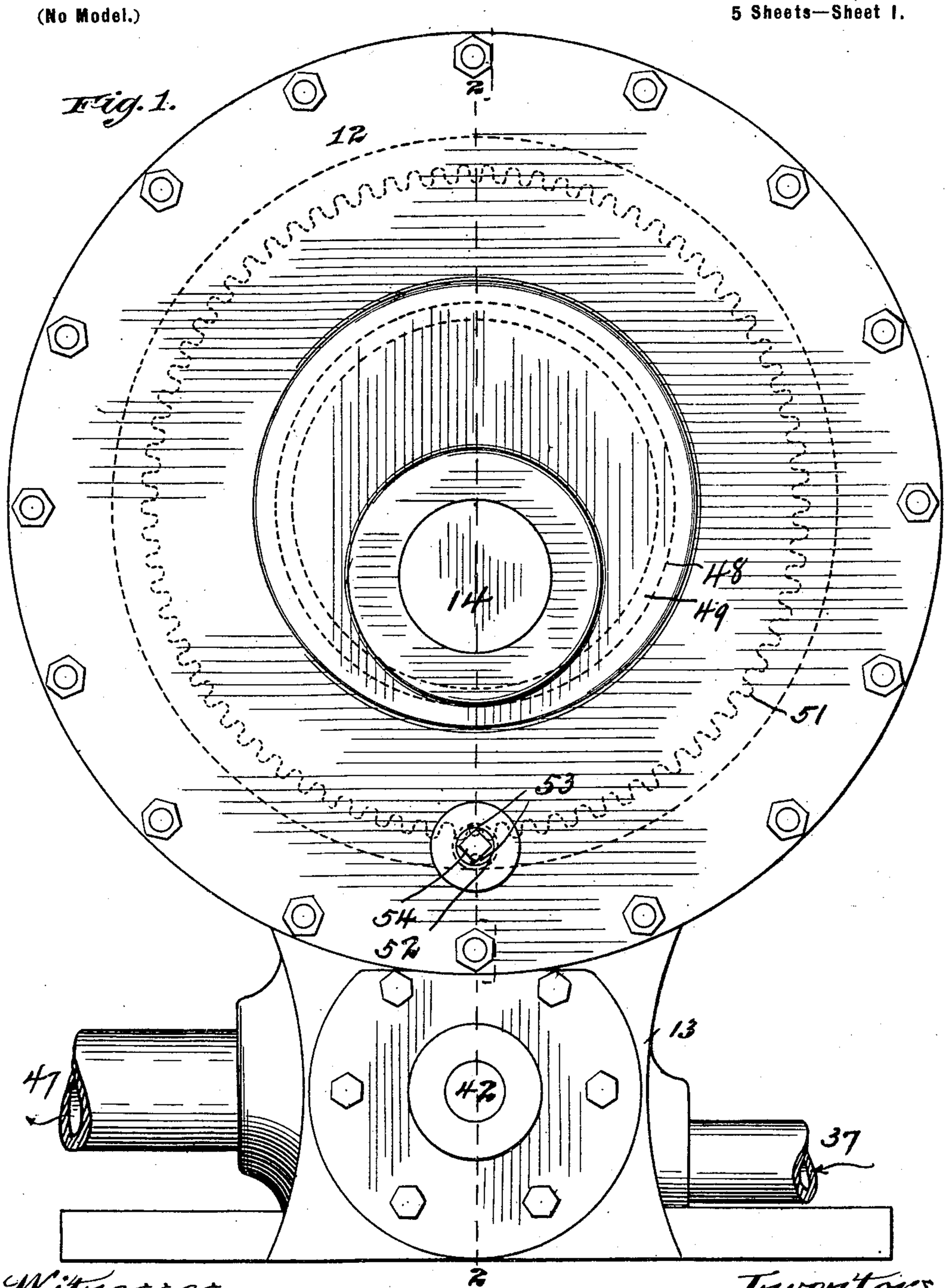
P. ENGLISH & L. COONEY, JR.

ROTARY ENGINE.

(Application filed Jan. 23, 1899.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.



Witnesses,
D. D. Mann,
Frederick L. Goodwin.

Inventors,
Peter English,
Luke Cooney Jr.,
By Offield, Towler & Linthicum,
Attys.

No. 680,478. Patented Aug. 13, 1901.

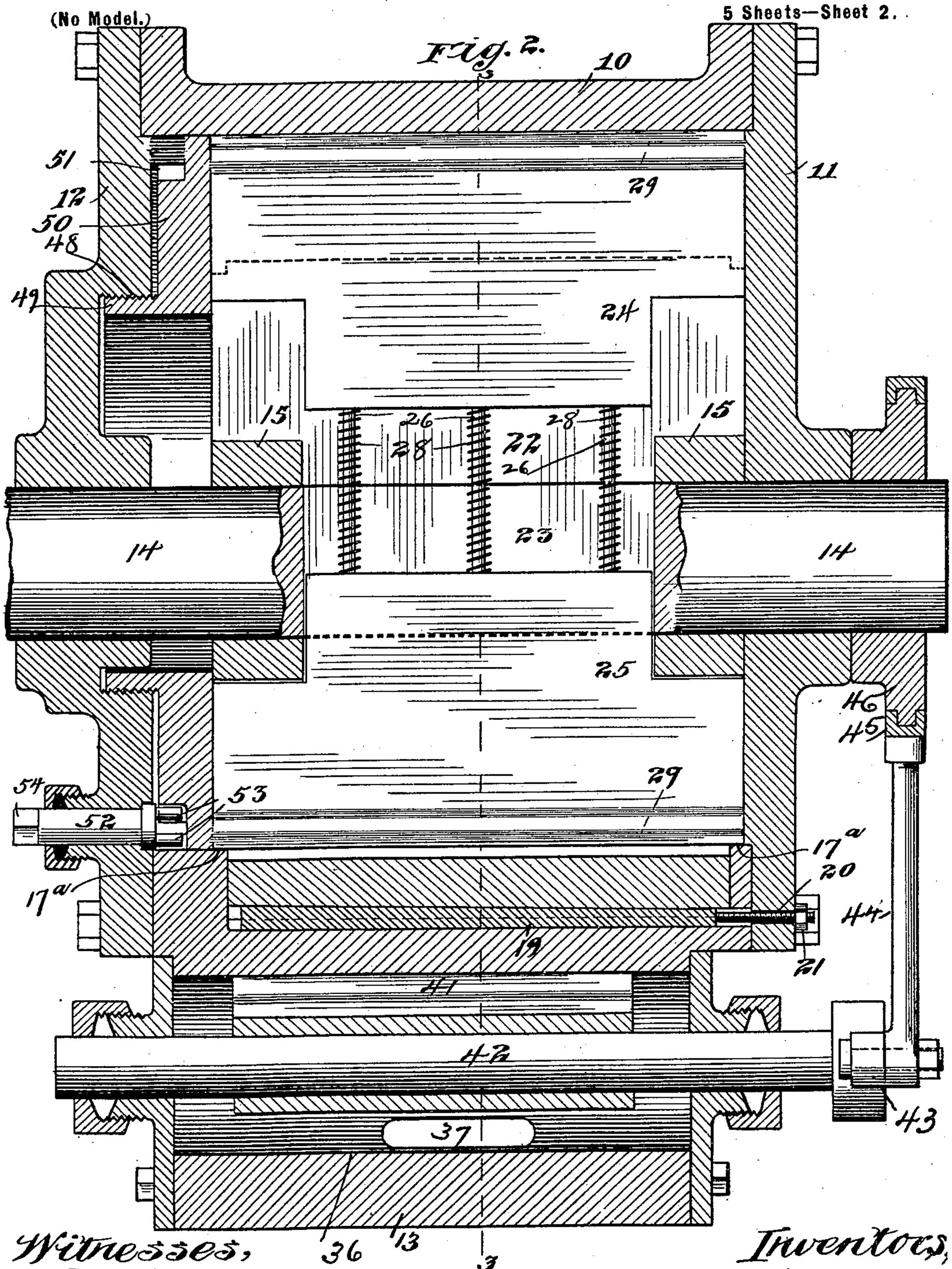
P. ENGLISH & L. COONEY, JR.

ROTARY ENGINE.

(Application filed Jan. 23, 1899.)

(No Model.) 5 Sheets—Sheet 2.

Fig. 2.



Witnesses,
F. S. Mann,
Frederick f. Gordwin

Inventors,
Peter English,
Luke Cooney Jr.,
By Offield, Towler & Lauttmann,
Attys.

No. 680,478. Patented Aug. 13, 1901.

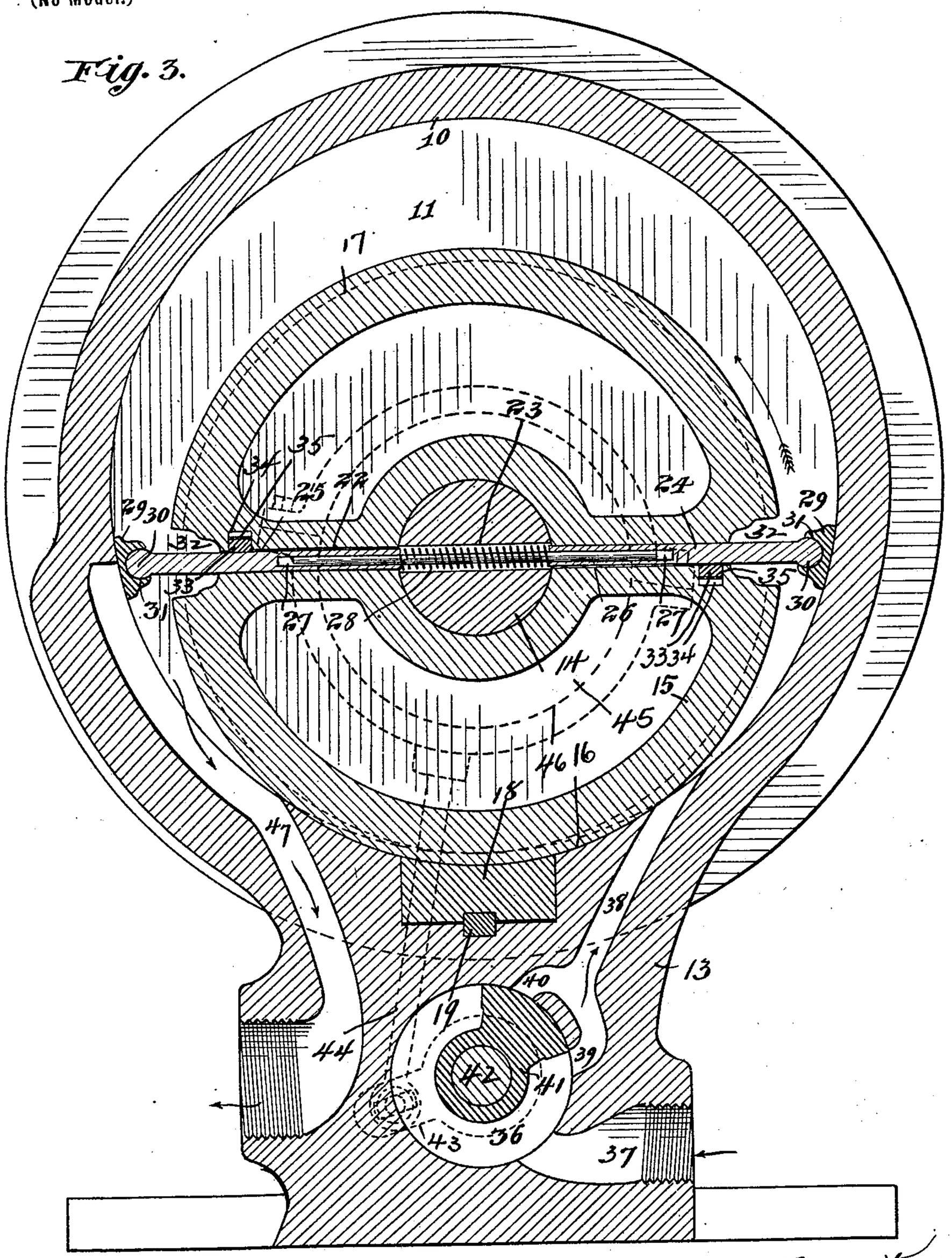
P. ENGLISH & L. COONEY, JR.

ROTARY ENGINE.

(Application filed Jan. 23, 1899.)

(No Model.) 5 Sheets—Sheet 3.

Fig. 3.



Witnesses,
D. S. Mann,
Frederick L. Goodwin

Inventors.
Peter English,
Luke Cooney Jr.,
By Offield, Towler & Linthicum,
Atty's.

No. 680,478. Patented Aug. 13, 1901.

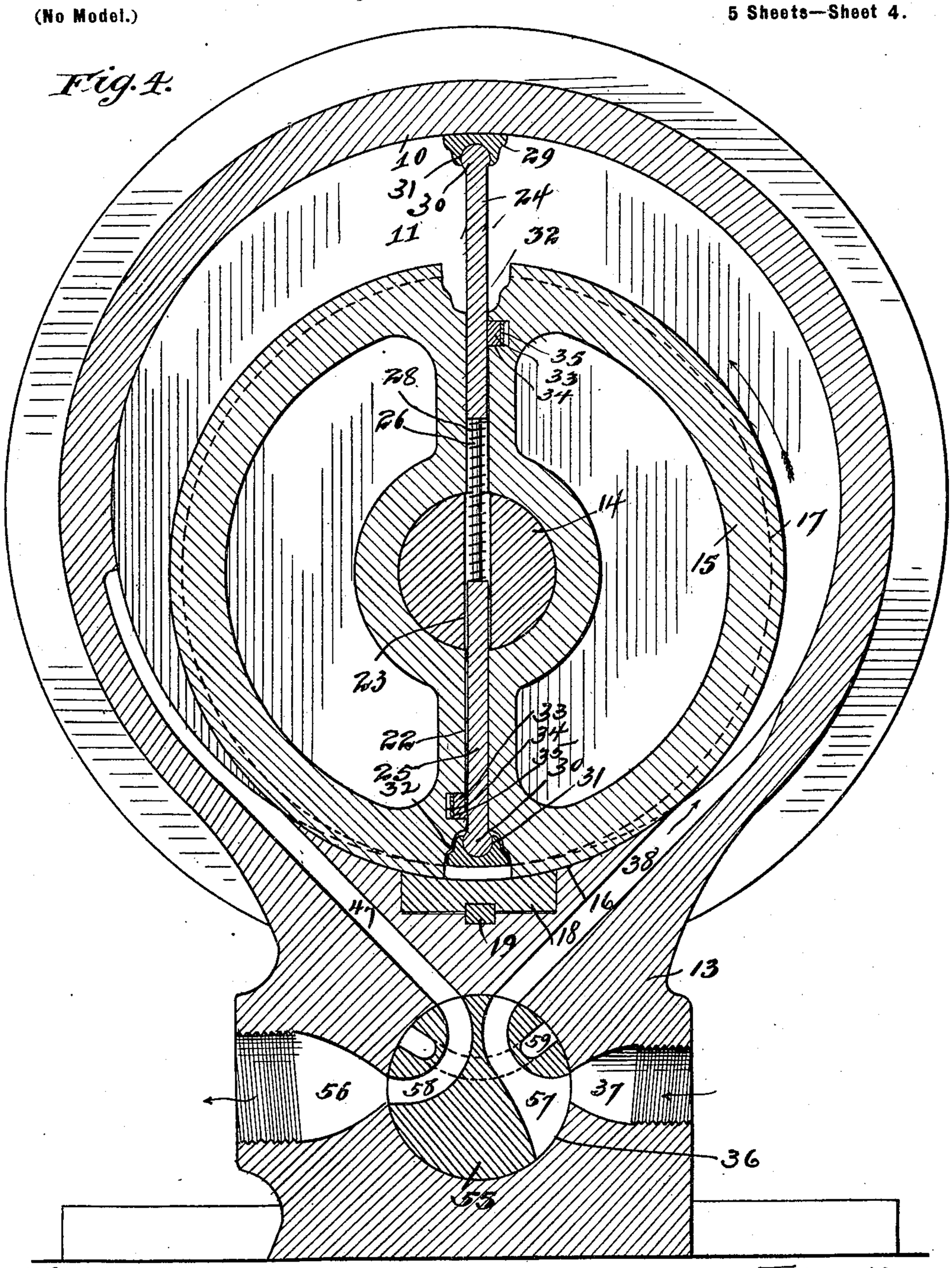
P. ENGLISH & L. COONEY, JR.

ROTARY ENGINE.

(Application filed Jan. 23, 1899.)

(No Model.) 5 Sheets—Sheet 4.

Fig. 4.



Witnesses,
F. D. Mann,
Frederick f. Goodwin

Inventors,
Peter English,
Luke Cooney Jr.,
By Offield, Towler & Linthicum,
Att'ys.

No. 680,478. Patented Aug. 13, 1901.

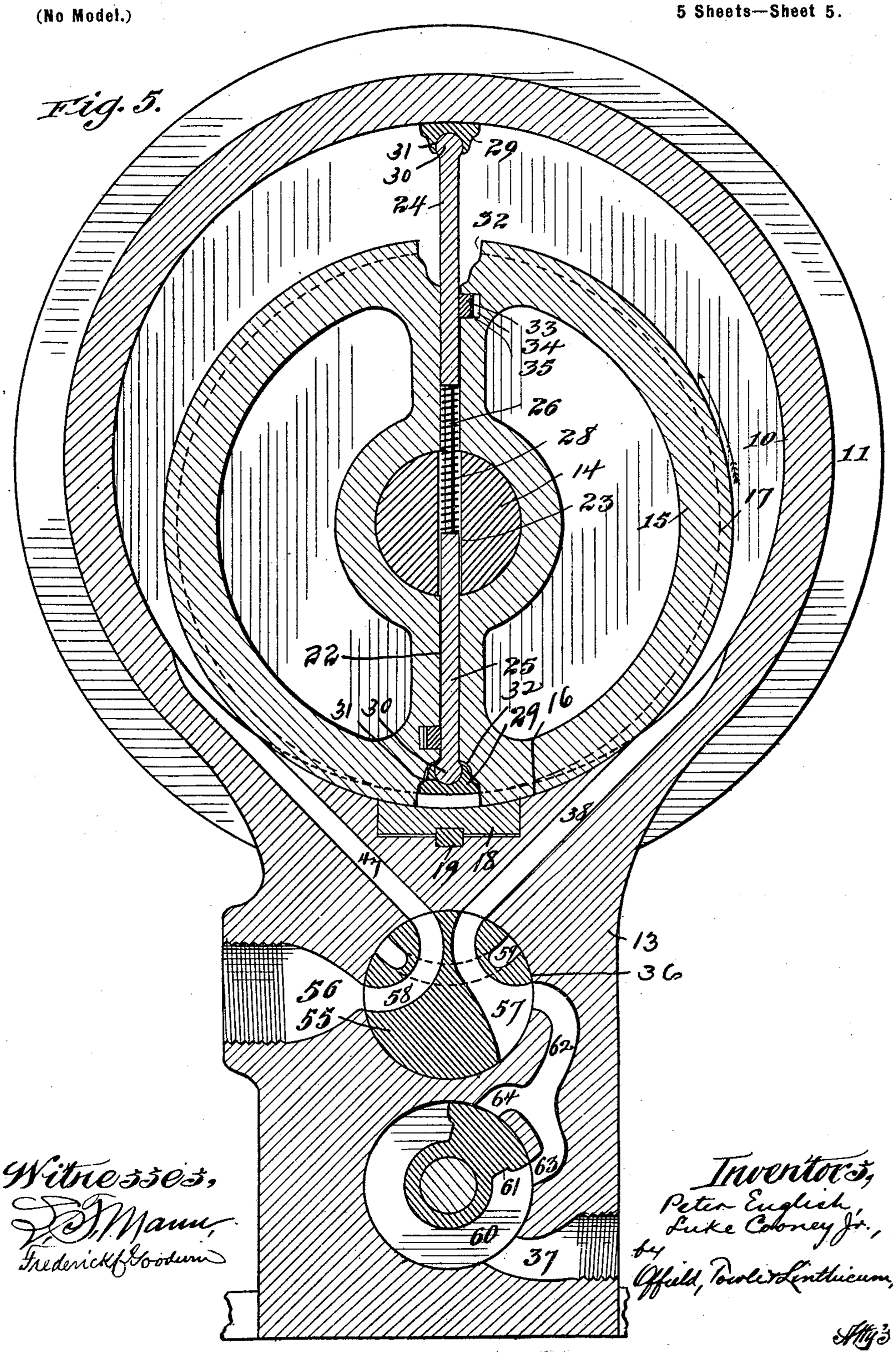
P. ENGLISH & L. COONEY, JR.

ROTARY ENGINE.

(Application filed Jan. 23, 1899.)

(No Model.) 5 Sheets—Sheet 5.

Fig. 5.



Witnesses,
F. S. Mann,
Frederick F. Goodwin

Inventors,
Peter English,
Luke Cooney Jr.,
by
Offield, Towler & Lenthicum,
Attys

UNITED STATES PATENT OFFICE.

PETER ENGLISH, OF BENTON HARBOR, MICHIGAN, AND LUKE COONEY, JR., OF CHICAGO, ILLINOIS, ASSIGNORS OF THREE-FOURTHS TO PAUL E. BERGER, OF CHICAGO, ILLINOIS, AND FRANCIS W. GRIDLEY, OF SYRACUSE, NEW YORK.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 680,478, dated August 13, 1901.

Application filed January 23, 1899. Serial No. 703,049. (No model.)

To all whom it may concern:

Be it known that we, PETER ENGLISH, of Benton Harbor, in the county of Berrien and State of Michigan, and LUKE COONEY, Jr., of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to rotary engines, and has for its object to provide a construction whereby a simple and efficient engine of this type may be produced having ample provision for taking up any wear of the parts which may occur.

To these ends the invention consists in certain novel features, which we will now proceed to describe and will then particularly point out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of an engine embodying our invention in one form. Fig. 2 is a vertical central sectional view thereof, taken on the line 2 2 of Fig. 1. Fig. 3 is a view similar to Fig. 2, but taken in a central plan at right angles thereto or upon the line 3 3 of Fig. 2, the parts being shown in a different position, however. Fig. 4 is a view similar to Fig. 3, but with the rotating parts in the same position as in Fig. 2 and illustrating a modified form of construction whereby the engine is adapted to be run in either direction; and Fig. 5 is a view similar to Fig. 3, illustrating yet another modification.

In the said drawings, 10 indicates a suitable cylindrical casing, provided at each end with heads 11 and 12 and resting upon a suitable base 13.

14 indicates a shaft rotating in suitable bearings in the heads 11 and 12, said shaft being located eccentrically relatively to the cylinder.

Upon the shaft 14 is concentrically mounted a rotating drum or piston 15. This drum or piston is of such a diameter that its main or body portion cuts or intersects the inner surface of the cylinder 10, and this latter is therefore not truly cylindrical upon its inner face, but is provided at the point where said drum or piston intersects its inner surface with a cylindrical portion 16 of smaller radius, said radius being identical with that of the body of the drum or piston 15. The drum or piston 15 is reduced in diameter at each end, as indicated at 17, so that said reduced portions bear upon the truly-cylindrical inner portions 17^a of the cylinder 10 at each side of the depression 16 thereof, as clearly shown in Fig. 2. Located within the depression 16 and extending longitudinally of the same is a bearing-block or abutment 18, whose exposed face corresponds in curvature with the depression 16 and with the face of the drum or piston 15. This block is preferably constructed of steel, and there is provided suitable means for feeding the blocks toward the piston in case of wear. In the present instance we have shown for this purpose a wedge 19, lying partly in the block and partly in the casing and having a threaded extension 20, provided on the outer side of the casing with a nut 21, by means of which the wedge may be moved to adjust the bearing-block or abutment 18.

The drum or piston 15 is provided with a diametrical slot 22, and the shaft 14 is provided with a similar slot 23, forming a continuation of the slot 22. In these slots there are mounted two radial vanes or wings 24 and 25. These vanes or wings are connected by a plurality of rods or bars 26, which are adapted to slide in apertures 27 in the said wings or vanes, and there are mounted on said rods or bars 26 springs 28, preferably coiled around said rods and bearing upon the inner ends of the vanes or wings and forcing the same outward into contact with the inner wall of the cylinder. In order to provide a steam-tight fit between the ends of the vanes or wings and the inner wall of the cylinder, we provide shoes 29, which have a pivotal or rocking connection with the ends of said wings or vanes. To this end we prefer to provide at the outer edge of each wing or vane a cylindrical enlargement 30, each shoe being provided with a correspondingly-shaped socket 31, which fits over the enlargement 30 and permits the shoe to rock freely thereon, the two parts being engaged by sliding them

together endwise and maintaining their engagement while in position in the cylinder. The outer portions of the wings or vanes 24 and 25 are of the full width of the drum or piston 15, and consequently of greater width than the projecting central body portion thereof and the depression 16 in the inner face of the cylinder 10, so that as the drum or piston rotates the shoes ride upon the marginal portions 17^a of the cylinder and are held clear of and above the abutment-block 18. The drum or piston 15 is provided with peripheral recesses 32, within which the shoes 29 may recede when the parts are in the position just referred to, as indicated in Fig. 4 of the drawings. In order to take up any wear which may occur, there is provided back of each wing or vane a bearing-strip 33, mounted in a recess 34, communicating with the slot 22 and backed by a spring 35, which holds said strip against the wing or vane.

A valve-chamber 36 is formed, preferably, in the base 13, and steam is admitted to said valve-chamber through a supply-port 37, connected with a suitable source of steam-supply. An inlet-passage 38 extends from said valve-chamber to a point within the cylinder 10 immediately adjacent to the point where the periphery of the drum or piston 15 intersects the true cylindrical surface of said cylinder, as clearly shown in Fig. 3. This inlet-passage 38 communicates with the interior of the valve-chamber 36 through two ports or branches 39 and 40, and there is mounted in the valve-chamber 36 a valve 41, the face of which is adapted to alternately close and cover the ports 39 and 40 as the said valve is oscillated. For the purpose of operating said valve it is mounted upon a rock-shaft 42, which is provided with a crank-arm 43, to which is connected a rod 44, provided with a strap 45, embracing an eccentric 46 on the shaft 14. The exhaust-passage 47 communicates with the interior of the cylinder at a suitable point and is extended thence to any suitable point of discharge.

In order to provide means for taking up lateral wear of the drum or piston, we provide within one of the cylinder-heads—as, for instance, the head 12—a threaded recess 48, within which fits the correspondingly-threaded hub 49 of a disk or annulus 50, which corresponds in diameter with the internal diameter of the cylinder 10, while its inner face bears against one end of the drum or piston 15. This annulus or disk is rabbeted or cut away for a portion of its thickness at its periphery, and there is formed upon this rabbeted edge a series of gear-teeth 51. A shaft 52, extending through the head 12, is provided on its inner end with pins 53, which when said shaft is rotated engage the gear-teeth 51 and rotate the annulus 50, and the shaft 52 may be provided externally with any suitable means by which it may be rotated—as, for example, a wrench-grasp 54 formed thereon.

The engine just described operates in the following manner: The parts being in the position shown in Fig. 3, steam being admitted through the supply-passage 37 into the valve-chamber 36 passes through the ports 39 and passage 38 into the interior of the cylinder, between the wing or vane 24 and the point of contact of the piston 15 and cylinder 10. The action of this steam upon the wing or vane causes the piston and shaft 14 to rotate, and when such rotation has continued for a sufficient length of time the valve 41 is shifted so as to close the port 39, after which the steam acts expansively. This action continues until the vane 24 passes the outlet or exhaust port 47, whereupon the steam thus taken in is discharged. In the meantime the valve 41 has been so moved as to open the port 40, and a fresh supply of steam is admitted between the wing or vane 25 and the point of contact between the piston and cylinder. The operation proceeds as before, and a continuous rotary motion is thus imparted to the shaft 14.

The wings or vanes 24 and 25 are free to move in and out independently of each other and to adjust themselves to the varying distances between the shaft 14 and the cylinder 10. The rocking shoes 29 facilitate this adjustment, insure a steam-tight fit at these points of contact, and prevent excessive wear. Efficient provision is also made in the manner already set forth for taking up the wear upon the sides of the wings or vanes, while the wear between the drum or piston and cylinder may be taken up by the block or abutment 18, and owing to the fact that the shoes are withdrawn entirely within the outer face of the drum or piston at this point there is no danger of their coming into contact with said block or abutment, and thereby damaging the engine. Any lateral wear upon the drum or piston may be taken up by rotating the annulus 50 through the medium of the shaft 52, whereupon the screw-threaded engagement of its hub 49 with the correspondingly-threaded recess 48 of the head will cause said annulus to bear firmly against the drum or piston, and thus take up any wear. This adjustment may be effected from the outside of the engine at any time without even arresting its motion.

The engine just described and shown in Figs. 1, 2, and 3 of the drawings is adapted to run in one direction only; but in Fig. 4 we have shown an engine the direction of motion of which may be reversed, there being provided for this purpose a valve 55, with the valve-chamber of which the supply-port 37 communicates, as well as a separate outlet-port 56. The inlet-passage 38 communicates directly with the valve-chamber, as does the exhaust-passage 47. The valve 55 is provided with a passage 57, one end of which is enlarged, so as to be in constant communication with the supply-passage 37, while the valve may be so moved as to place its other

end either in communication with the inlet-passage 38 or the exhaust-passage 47. The valve 55 is provided with a second passage 58, which when the valve is in one position connects the passage 47 with the outlet 56, and said valve also has a passage 59, which when the valve is in its other position connects the passage 38 with the outlet 56. When the parts are in the position shown, the steam is admitted to the cylinder through the passage 38 and the piston revolves in the direction of the arrow 1, the exhaust-steam passing through the passages 47 and 58 to the outlet 56. When the valve 55 is turned into its other position, steam is admitted through the passages 57 and 47 into the cylinder and the exhaust-steam escapes through the passages 38 and 59, the piston revolving in the opposite direction.

The cut-off valve (shown in Figs. 1, 2, and 3) may be employed in conjunction with the reversing-valve, (shown in Fig. 4,) and in Fig. 5 of the drawings we have shown a construction in which these two valves are jointly used. In this construction the steam-supply 37 communicates with a valve-chamber 60, in which is located a cut-off valve 61, corresponding in construction and operation with the cut-off valve 41. (Shown in Fig. 3 of the drawings.) A passage 62 leads from the valve-chamber 60 to the reversing-valve, and said passage 62 is provided with ports or branches 63 and 64, corresponding with the ports or branches 39 and 40 of the construction shown in Fig. 3. The reversing-valve 55 is constructed in the manner hereinbefore described, having passages 57, 58, and 59 and communicating with the exhaust 56 and with the passages 38 and 47, leading to the interior of the cylinder. It will be understood that with this construction the engine may be not only run in either direction, but may be made to employ the steam expansively by the use of the cut-off valve.

It is obvious that various modifications in the details of construction may be made without departing from the principle of our invention, and we therefore do not wish to be understood as limiting ourselves strictly to the precise details of construction hereinbefore described and shown in the drawings.

We claim—

1. A rotary engine, comprising a cylinder having in its inner face a depression or recess of smaller radius and less length than the cylinder proper, an eccentric cylindrical piston inclosed in said cylinder and having a body portion of a radius conforming to the depression or recess and reduced ends to bear upon the true cylindrical face of the cylinder, an abutment-block located in said depression or recess, and radially-movable wings or vanes mounted in the drum or piston and having a width at their outer extremities greater than the length of the depression or recess, substantially as described.

2. A rotary engine, comprising a cylinder having in its inner face a depression or recess of smaller radius and less length than the cylinder proper, an eccentric cylindrical piston inclosed in said cylinder and having a body portion of a radius conforming to the depression or recess and reduced ends to bear upon the true cylindrical face of the cylinder, an abutment-block located in said depression or recess, means for adjusting said abutment-block toward the piston, and radially-movable wings or vanes mounted in the drum or piston and having a width at their outer extremities greater than the length of the depression or recess, substantially as described.

3. A rotary engine, comprising a cylinder and a rotating piston mounted therein, one of the cylinder-heads being provided with a threaded recess, an annulus located and fitting within the cylinder, bearing upon one end of the piston and provided with a threaded hub to engage the recess of the head and with peripheral gear-teeth, and a shaft extending through the head, provided at its inner end with pins to engage the gear-teeth of the annulus and having its outer end provided with means whereby it may be rotated, substantially as described.

4. A rotary engine comprising a cylinder having in its inner face a depression or recess of smaller radius and less length than the cylinder proper, an eccentric cylindrical piston inclosed in said cylinder and having a body portion of a radius conforming to the depression or recess and reduced ends to bear upon the true cylindrical face of the cylinder, an abutment-block located in said depression or recess and wings or vanes mounted in the drum or piston and having a width at their outer extremities greater than the length of the depression or recess, substantially as described.

PETER ENGLISH.
LUKE COONEY, JR.

Witnesses:
L. F. MCCREA,
IRVINE MILLER.