W. D. TUTT.

ROTARY ENGINE.

APPLICATION FILED FEB. 3, 1908.

911,852.

Patented Feb. 9, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

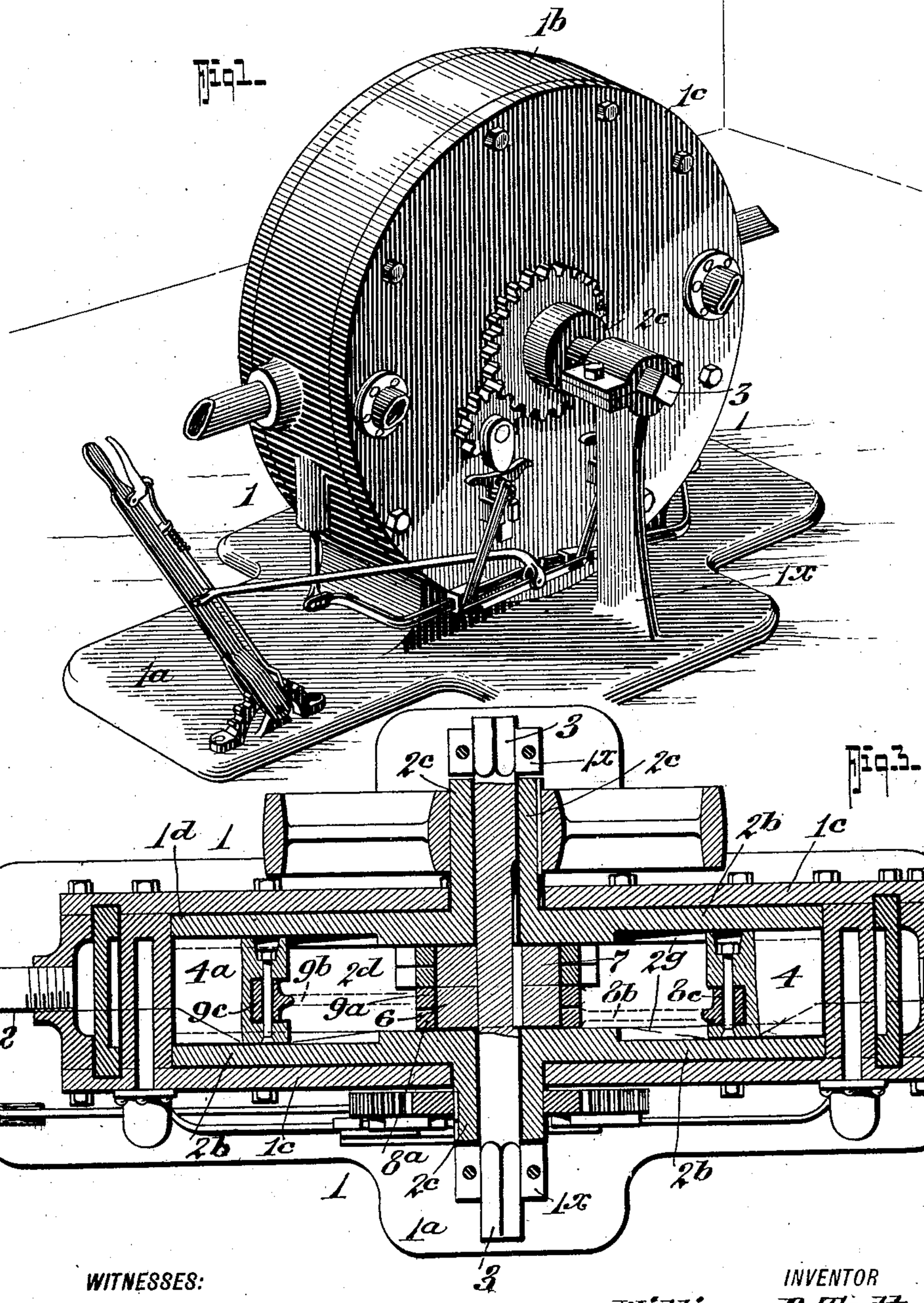

Fig. 3.

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2 SHEETS—SHEET 2.

Fig. 2.

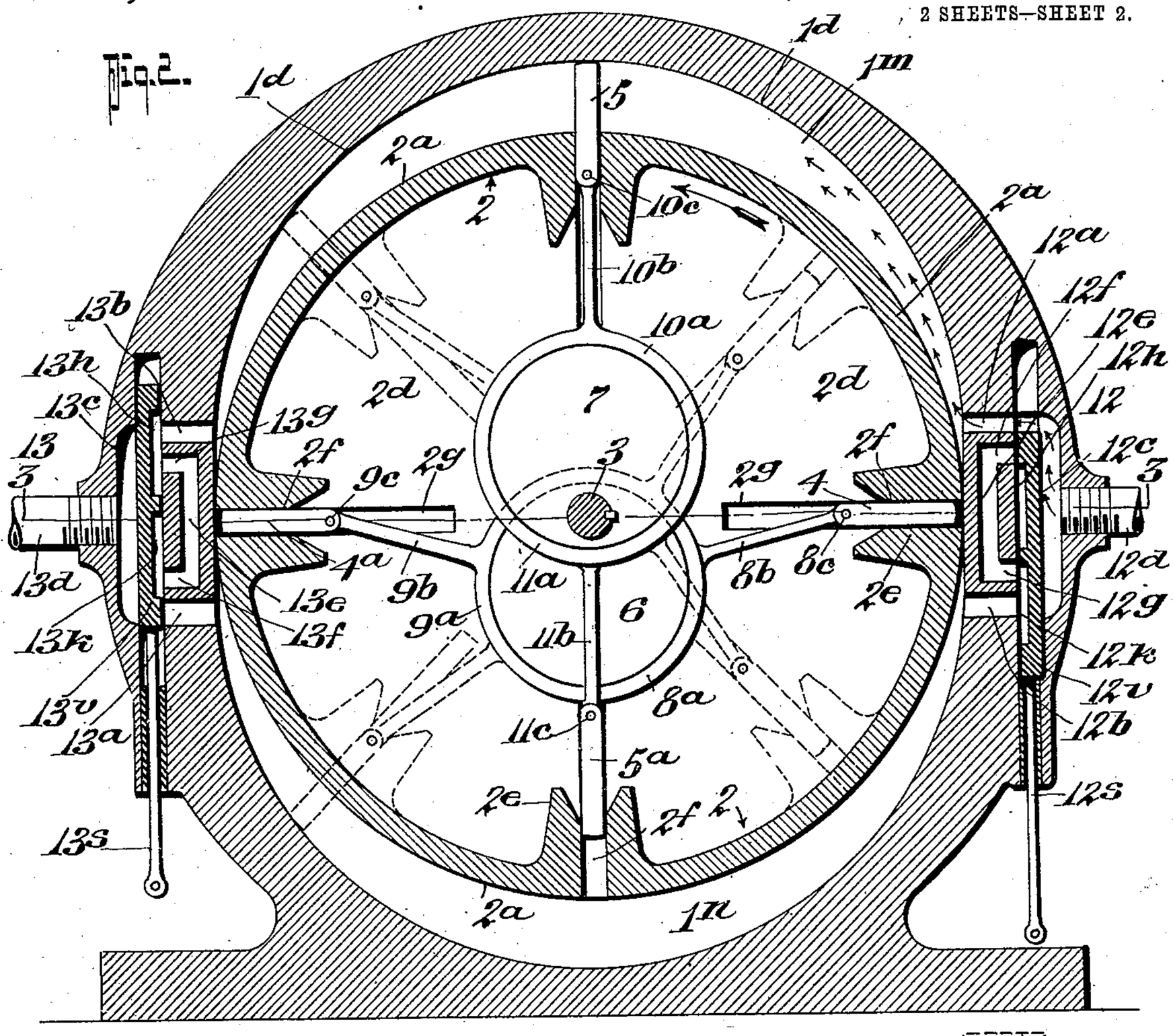
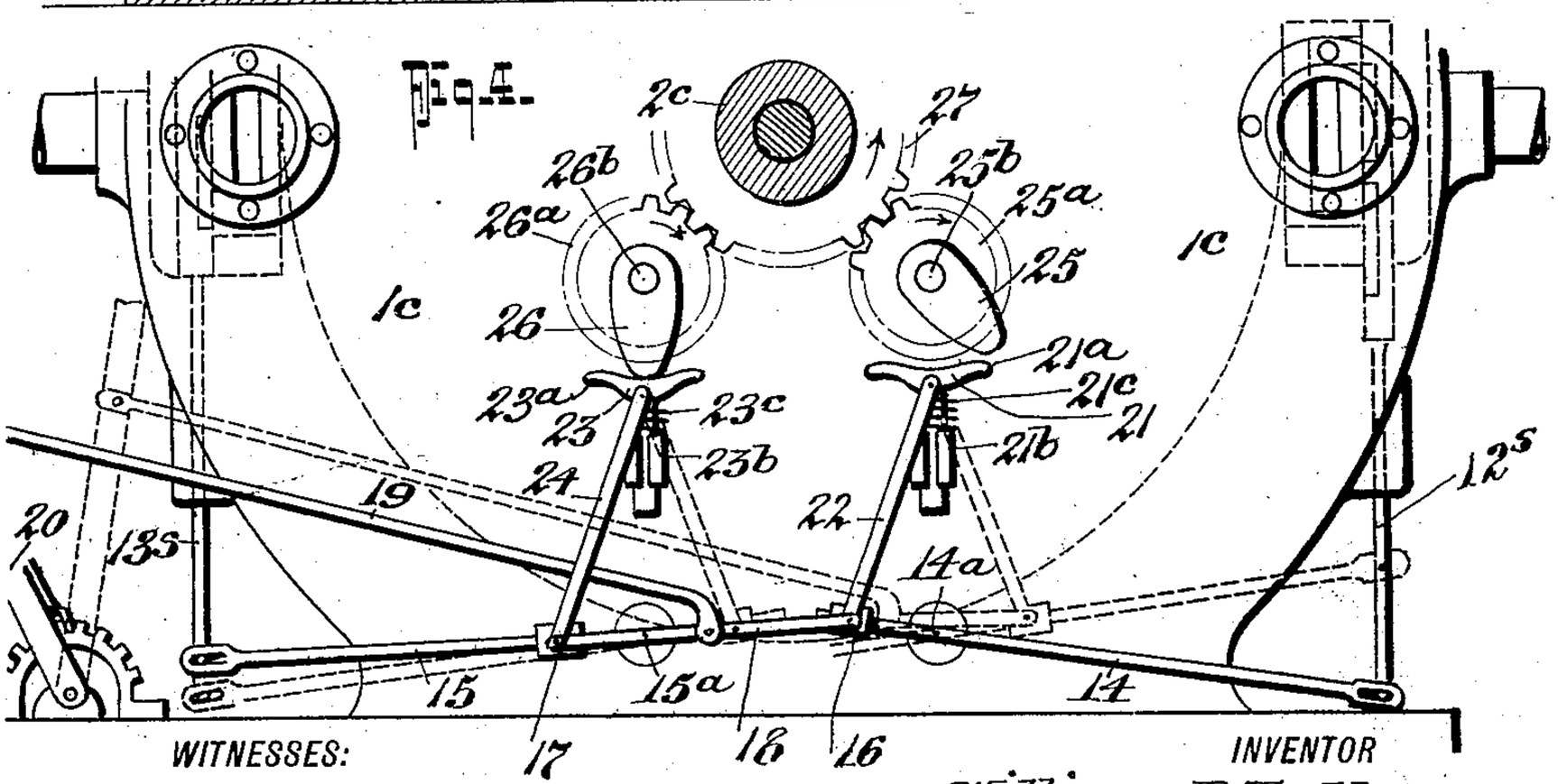


Fig. 4.



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UNITED STATES PATENT OFFICE.

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ROTARY ENGINE.

No. 911,852. Specification of Letters Patent. Patented Feb. 9, 1909.

Application filed February 3, 1908. Serial No. 414,010.

To all whom it may concern:

Be it known that I, WILLIAM D. TUTT, residing at Elberton, in the county of Elbert and State of Georgia, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention relates to certain new and useful improvements in rotary engines of the sliding piston type wherein a rotator carries sliding pistons to coöperate with the steam passages of a casing in which the rotator is mounted.

The invention comprises certain novel details of construction, combination and arrangement of parts all of which will be first described in detail, then specifically pointed out in the appended claim, and illustrated in the accompanying drawings, in which—

Figure 1, is a perspective view of my invention. Fig. 2, is a longitudinal section taken substantially on the line 2—2 of Fig. 3. Fig. 3, is a horizontal section thereof on the line 3—3 of Fig. 2. Fig. 4, is a detail elevation of a part of my invention showing the valve controlling gear and the reverse gear mechanism.

Referring now to the accompanying drawings, in which like letters and numerals of reference indicate like parts in all of the figures, 1 represents the main frame of my engine which forms the casing and consists of the base 1^a, the main frame portion 1^b and the closure plates 1^c, the main frame 1^b and the plates 1^c inclosing an elliptical piston chamber 1^d, as indicated, and the casing 1 is stationary and receives the rotator 2. The rotator 2, shown most clearly in Figs. 2 and 3 of the drawings comprises the annular or ring portion 2^a and the side plates 2^b which are formed with apertured hubs or sleeves 2^c—2^c respectively, the sleeves 2^c being mounted on a shaft 3 that is non-rotatably held in bearings 1^x supported from the base 1^a of the main frame. The shaft 3 projects through the casing 1 and through the hubs or sleeves 2^c of the rotator, as clearly indicated in Fig 2 of the drawings. The rotator 2 is formed with an internal chamber 2^d and is provided with a series of internally projecting lugs 2^e formed with the annular portion 2^a of the casing and provided with passages 2^f for the pistons 4—4^a and 5—5^a respectively. The disks 2^b of the casing have guideways 2^g for the sliding pistons 4—4^a and 5—5^a respectively.

Mounted on the non-rotatable shaft or spindle 3 and within the piston chamber 2^d is a pair of cams 6 and 7, whose centers lie in the longitudinal axis of the elliptical piston chamber 1^d, as clearly indicated in Fig. 2 of the drawings. The piston 4 is connected with the cam 6 through a strap 8^a, and link arm 8^b that is pivoted at 8^c to the piston 4, while the piston 4^a is similarly connected with the cam 6 through a strap 9^a, link arm 9^b and pivotal connection 9^c, as will be readily understood by reference to Figs. 2 and 3 of the drawings. The cam 7 which controls the pistons 5—5^a is coöperatively connected with the pistons 5 and 5^a in a manner similar to the connection between the pistons 4—4^a and the cam 6, *i. e.*, the piston 5 is connected with the cam 7 through a strap 10^a, link arm 10^b which is pivoted at 10^c to the piston 5 while the piston 5^a is connected to the cam 7 through the strap 11^a, link arm 11^b and pivotal connection 11^c. Thus it will be seen as the rotator rotates in the direction of the arrow in Fig. 2, the cams 6 and 7 being stationary, the pistons 5—5^a and 4—4^a will operate in separate sets, each set 5—5^a and 4—4^a being operated by their respective cams 7 and 6 in a manner which will be presently more fully explained.

12 and 13 designate the valve mechanisms which control the operation of the engine. The casing 1 is provided with a pair of ports 12^a—12^b, one of which communicates with the steam passage 1^m and the other communicates with the steam passage 1^n, it being understood that the rotator 2 divides the elliptical steam chamber 1^d of the casing into two steam passages, 1^m—1^n respectively. The ports 12^a—12^b communicate with a steam inlet chamber 12^c to which steam is led from the steam pipe 12^d, a slide valve 12^v being interposed to control the communication between the ports 12^a—12^b and the steam inlet chamber 12^c of the valve.

12^e designates an exhaust which has a pair of ports 12^f—12^g respectively, the exhaust ports 12^f and 12^g being arranged to communicate, at times, with the by-passes 12^h—12^k respectively of the slide valve 12^v, thus when the slide valve 12^v is positioned as indicated in Fig. 2, the port 12^a will be in

communication with the steam inlet 12^c while the port 12^b will be in communication with the exhaust 12^e through the ports 12^g and the by-pass 12^k. The valve 12^v has a stem 12^s which will hereinafter be again referred to.

The construction of the valve mechanism 13 is substantially identical with that of the valve mechanism 12, it including the ports 13^a—13^b, steam chamber 13^c, steam inlet 13^d and exhaust 13^e, exhaust ports 13^f and 13^g, slide valve 13^v having the by-passes 13^h and 13^k and provided with the stem 13^s, as clearly indicated in Fig. 2 of the drawings. The slide valves 12^v and 13^v are operated through a valve gear mechanism which is clearly shown in Fig. 4 of the drawings, by reference to which it will be seen that the valve stem 12^s is connected with a lever 14 that is fulcrumed at 14^a on a suitably projecting lug formed on the plate 1^c of the casing. The valve stem 13^s is similarly connected with a lever 15 similarly fulcrumed at 15^a to the casing wall.

Mounted on each of the levers 14 and 15 are sliding carriages 16 and 17 respectively that are linked together through a link 18 and connected with the reversing rod 19 that is controlled by the reverse lever 20, as clearly shown in Figs. 1 and 4 of the drawings. The sliding carriage 16 is connected with a cam operated plunger 21 through a pitman 22, the plunger 21 having a cam engaging face 21^a and mounted in a bearing 21^b. A coil spring 21^c is interposed to normally hold the plunger 21 in a given position. A second plunger 23 is provided to coöperate with the carriage 17 to which it is connected through a pitman 24. The plunger 23 has a cam engaging face 23^a and is slidable in a bearing 23^b and is spring pressed by a spring 23^c to its normal position.

25 and 26 designate cams carried by gears 25^a—26^a respectively that are mounted on the stub shafts 25^b—26^b respectively formed on the casing wall 1^c. The gears 25^a—26^a mesh with a master gear 27 keyed to the sleeve 2^c of the rotator so as to rotate therewith and impart the rotary motion of the rotator to the cams 25 and 26 respectively. The cams 25 and 26 are so arranged as to operate the plungers 21 and 23 at certain definite intervals to move the valves 12^b—13^b to close off the ports 12—13^a at proper times.

So far as described, the manner in which my invention operates can be best explained by reference to Fig. 2 of the drawings. Assume the rotator 2 to be rotating in the direction of the arrow, the piston 5 being in its position of greatest extension the port 12^a being in communication with the source of steam supply from the chamber 12^c, as indicated, while the port 13^a of the valve mechanism 13 is closed. As the rotator rotates and as the piston 4^a passes the port 13^a the cam 26 will become disengaged from the plunger 23 to allow it to return to its normal position and rock the lever 15 to move the slide valve 13^v to open the port 13^a into communication with the steam chamber 13^c so as to allow a charge of live steam to enter the steam passage 1^n between the piston 4^a and the port 13^a. As the piston 5 reaches the port 13^b and just prior to passing the same, the cam 25 engages the plunger 21 and shifts the valve 12^v to close the port 12^a from communication with the steam chamber 12^c, thus cutting off the steam supply in the passage 1^m. The valve 12^v is so timed as to leave the port 12^a cut off until the piston 5^a passes the same, after which the cam 25 releases the plunger 21 to permit the valve 12^b to return to the position shown in Fig. 2 of the drawings. As the piston 4^a on its travel about reaches the port 12^b the valve 13^v will again cut off the port 13^a until the piston 4 has passed the port 13^a, when a new charge of steam will be admitted therethrough to the piston 4.

From the foregoing it will be seen that live steam is admitted to one passage 1^m until the piston in such passage has reached the limit of its stroke in such passage and the steam therein has become more or less expanded and as soon as this condition in the first passage is reached the steam will be supplied to the other passage, 1^n, to coöperate with its piston at the beginning of its active stroke, thus always keeping a full head of steam operating on a piston, causing a very steady and effective running of the engine.

Of course, the cams 25 and 26 may be so set and arranged that the valves 12^v and 13^v will be operated to close the ports 12^a and 13^a respectively at any desired time, such for instance as when the piston 5 is in the position shown in Fig. 2, the valve 12^v may be made to close and remain closed until the piston 5^a passes the port 12^a by simply changing the position of the cam 12, as will be readily apparent to those skilled in the art; similarly the valve 13^v may be arranged and operated, as I do not confine myself to any specific valve gear or valve controlling mechanism.

In order to reverse the engine the lever 20 is simply thrown over from the position shown in Figs. 1 and 4 to the position shown in dotted lines in Fig. 4 to bring the sliding carriages 17 and 16 to the right of the pivot centers 15^a and 14^a of the respective levers 15 and 14.

From the foregoing description taken in connection with the accompanying drawings it is thought the complete construction operation and numerous advantages of my invention will be readily understood by those

skilled in the art to which the invention appertains.

What I claim is:

In a rotary engine, a casing inclosing a substantially elliptical chamber, a rotator mounted centrally in said chamber and dividing the chamber into a pair of steam passages of equal area, said rotator consisting of a closed hollow drum formed of side walls and a peripheral wall, a series of inwardly projecting portions carried by the peripheral wall and provided with radial piston passages, said side walls of the rotator also provided with radial grooves on their inner surfaces to coöperate with their respective piston passages, two sets of diametrically opposite pistons mounted to slide in said passages and said radial grooves and form a closure for said passages, one set of slide pistons coöperating with one steam passage of the casing and the other set coöperating with the other steam passage of the casing, said rotator having laterally projected apertured hubs passing through apertures in the side walls of the casing, a shaft passing through said hubs and said rotator, means for holding said shaft from rotation, a pair of stationary cams carried by said shaft within the rotator, one cam for each set of pistons, straps passing around said cams and having arms pivotally connected with the respective pistons and valve devices for admitting steam to the steam passages and exhausting steam therefrom and means for operating said valve devices.

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Witnesses:
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