No. 803,599. PATENTED NOV. 7, 1905.

W. F. JUNGERSEN & J. J. FOGH.

ROTARY ENGINE.

APPLICATION FILED JAN. 5, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

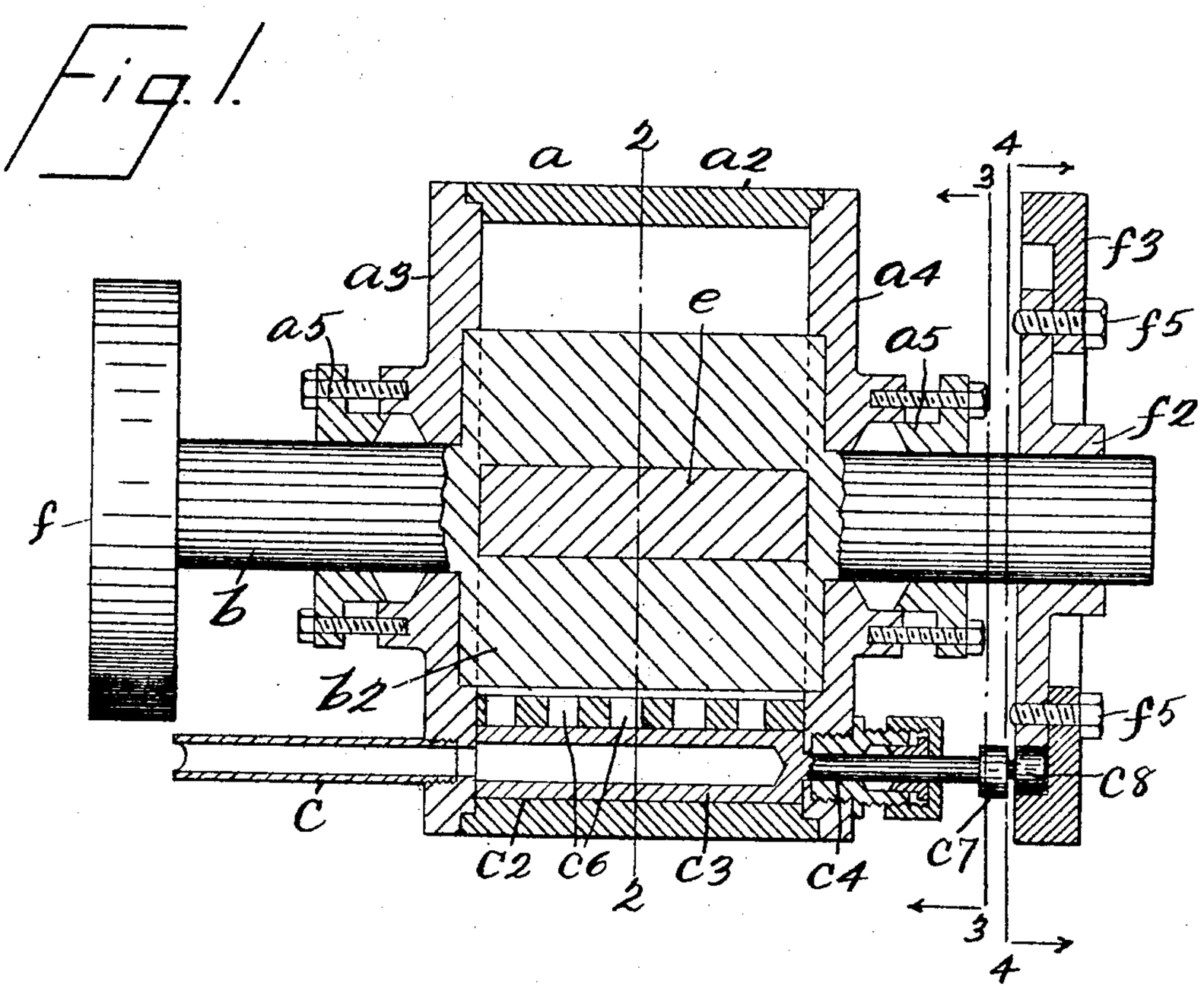
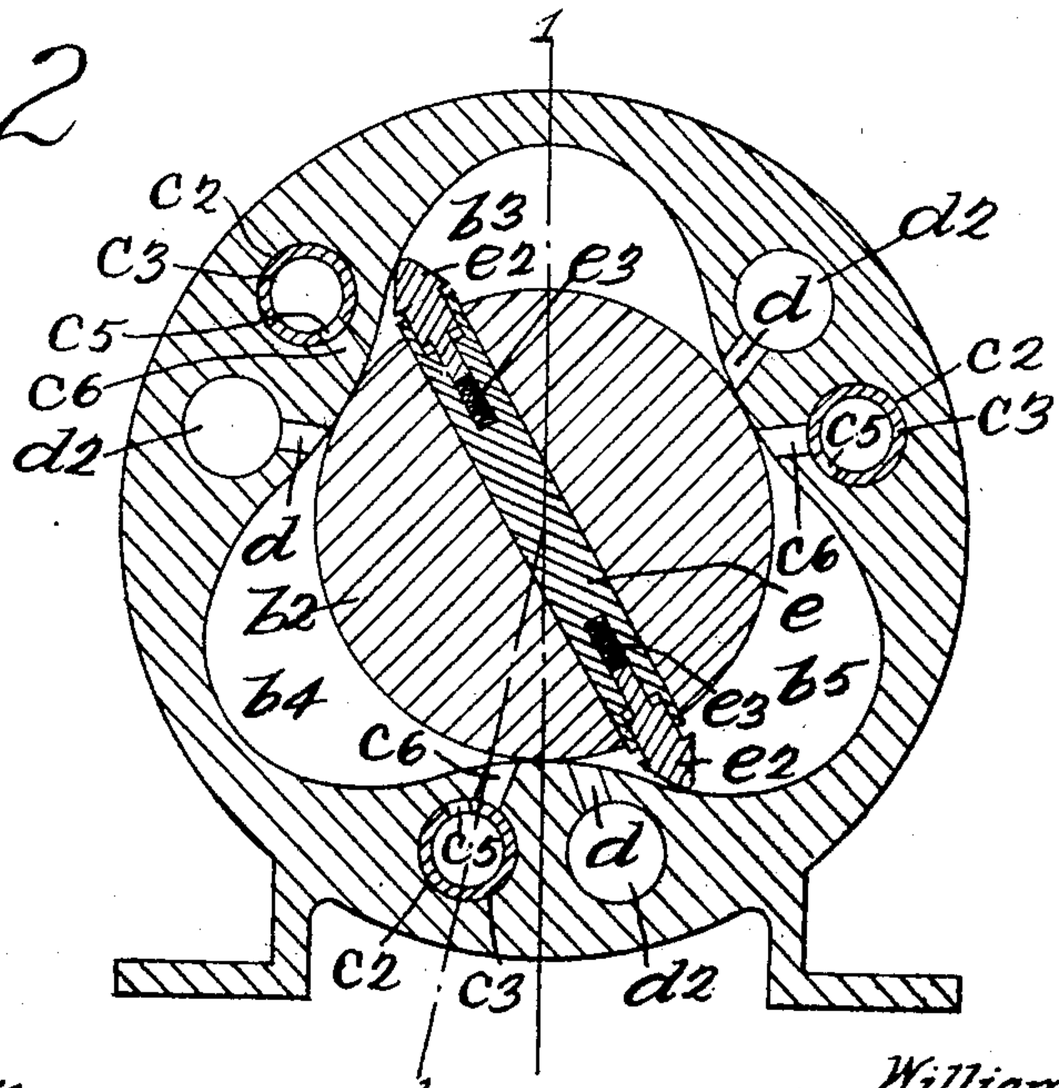


Fig. 2



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2 SHEETS—SHEET 2.

Fig. 3

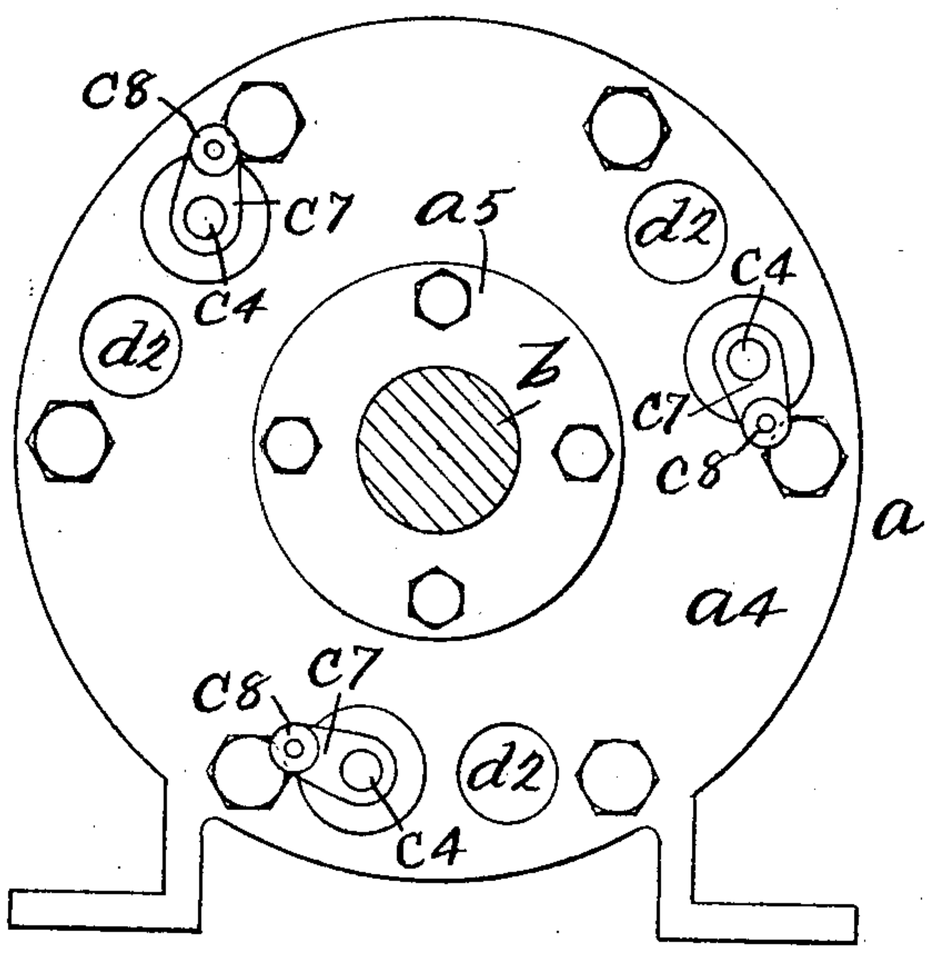


Fig. 4

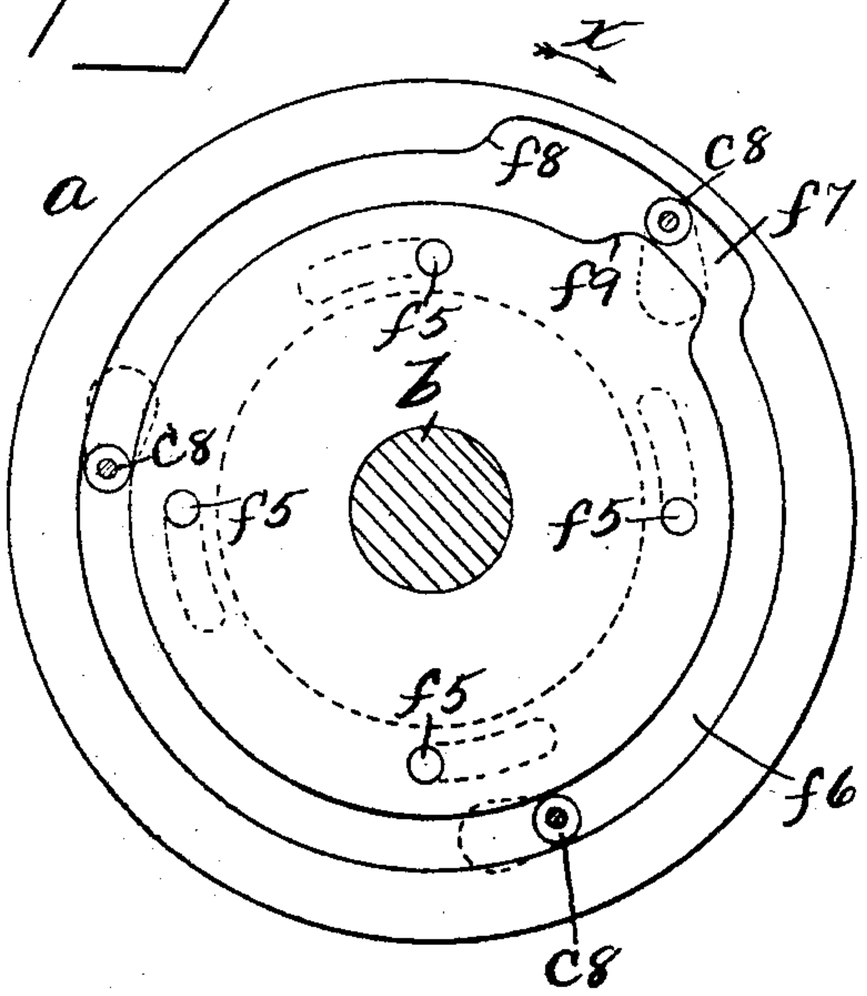
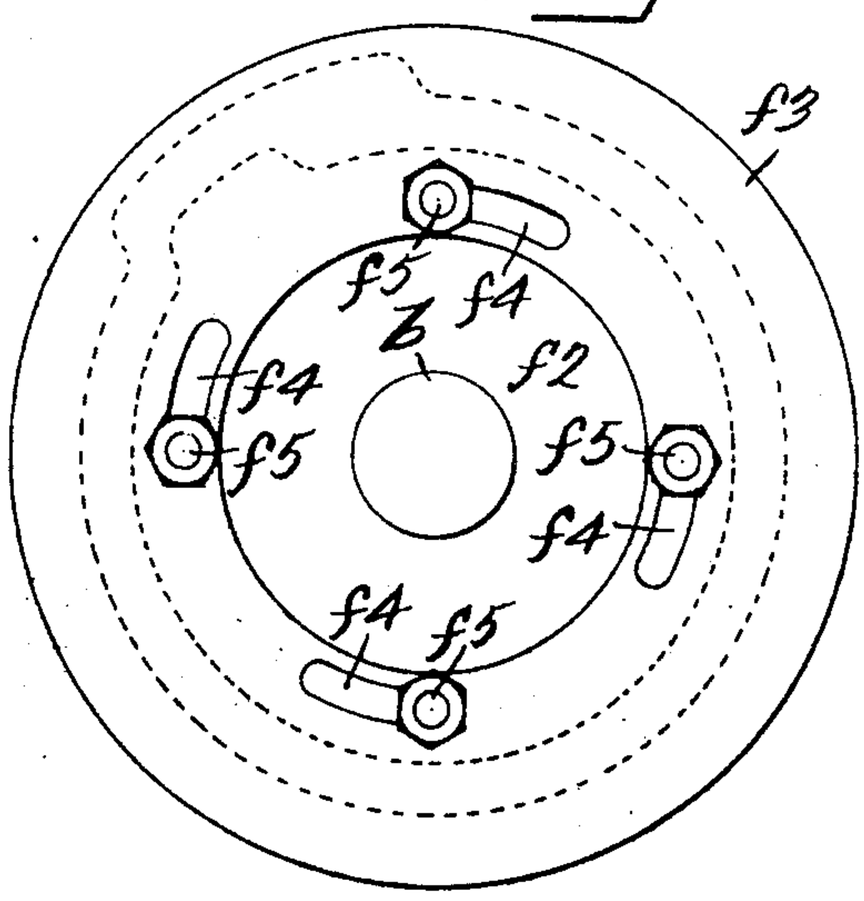


Fig. 5



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ROTARY ENGINE.

No. 803,599. Specification of Letters Patent. Patented Nov. 7, 1905.

Application filed January 5, 1905. Serial No. 239,693.

To all whom it may concern:

Be it known that we, WILLIAM F. JUNGERSEN and JOHN J. FOGH, citizens of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

The object of this invention is to provide a rotary engine wherein the full expansive force of steam is utilized, a further object being to provide a rotary engine of this type which employs a rotary abutment and a piston slidably mounted therein, said piston bearing always against the inner surface of the piston-chambers, a still further object being to provide an engine of this class wherein the steam is adapted to be admitted at a plurality of points successively and also to provide means whereby the inlet of steam at these inlet-ports may be accurately regulated and also to provide an engine of this type which is simple in construction and operation, composed of few parts, very inexpensive, and which will not readily get out of order.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which the separate parts of our improvement are designated by suitable reference characters in each of the views, and in which—

Figure 1 is a longitudinal vertical section through an engine constructed according to our invention and taken on the line 1 1 of Fig. 2; Fig. 2, a section on the line 2 2 of Fig. 1; Fig. 3, a section on the line 3 3 of Fig. 1; Fig. 4, a section on the line 4 4 of Fig. 1, and Fig. 5 a view of the end of our engine adjacent to the line 4 4.

In the drawings forming part of this specification we have shown a casing a, comprising a body portion a^2 and two end members a^3 and a^4, said end members being provided with stuffing-boxes a^5, through which passes and is adapted to rotate therein a shaft b, and said shaft b carries at the center thereof a circular abutment b^2, said abutment preferably being made integral with the shaft b.

The end member a^3 of the casing a is provided, as shown in Fig. 1, with an inlet-port c, which communicates with an annular chamber c^2 within the body portion a^2, and rotatably mounted in the annular chamber c^2 is a tube c^3, one end of which is closed and provided with an extending shaft c^4, and the tube c^3 is provided with a port c^5, which is adapted to register with openings c^6 in the body portion a^2, said openings c^6 being in communication with the interior of the body portion a^2, the said interior being, as shown in the drawings, of a triangular form and in which the abutment b^2 is adapted to rotate, the abutment b^2 separating the interior of the body portion a^2 into three distinct chambers b^3, b^4, and b^5, and each of the chambers b^3, b^4, and b^5 is provided with the inlet c, the annular chamber c^2, and the rotatable tube c^3, and these tubes c^3 act as the valves of our engine. Each of the chambers b^3, b^4, and b^5 is also provided with a port d, communicating with a passage d^2 in the casing a, and the passages d^2 serve as the exhaust-ports for the corresponding chambers, as will be understood, and each of the shafts c^4 of the valves c^3 is provided with a crank-arm c^7, which carries a roller c^8 on its outer end.

Slidably mounted in the abutment b^2 and of a length greater than the diameter of said abutment is a piston e, which carries on either end a slidable head e^2, which is normally forced outwardly by means of a spring e^3, and the piston e and heads e^2 thereof extend the full transverse width of the piston-chambers b^3, b^4, and b^5, and, as will be seen with reference to Fig. 2, when the abutment b^2 is rotated the piston e slides therein over the grooved surface of the chambers b^3, b^4, and b^5, and because of the springs e^3 the heads e^2 of the piston e always bear against the inner surface of the said chambers.

Secured to one end of the main shaft b is a pulley or fly-wheel f, and at the other end of the shaft b is secured a disk f^2, as clearly shown in Figs. 4 and 5, and adjustably secured to the disk f^2 is an annular plate f^3, provided with concentric slots f^4, through which pass bolts f^5, secured in the disk f^2, and if the bolts f^5 be loosened the annular plate f^3 may be rotated within the limits of the slots f^4, as will be readily understood, and, as shown in Figs. 1 and 4, the annular plate f^3 extends inwardly over the disk f^2, thereby forming a concentric groove f^6, and the groove f^6 is interrupted for a portion of its length to form a concentric groove f^7 of a radius greater than that of the groove f^6, and the rollers c^8 on the crank-arms c^7 move in the grooves f^6 and f^7, said grooves being adapted to impart a cam movement to each of said rollers successively, and thereby to the corresponding valve c^3, with which they are connected, and this

cam movement of the rollers c^8 opens and closes the valve c^3 successively, as will be understood, and, as will be seen in Fig. 4, the concentric indentation in the annular plate f^3 forming the groove f^7 is of greater length than the projection on the disk f^2 forming the groove f^7, and the reason for which will be explained in the operation of our engine.

It will be understood in the operation that the steam is always free to pass into the valves c^3, and if none of the valves c^3 be in communication with a corresponding piston-chamber the fly-wheel f may be operated manually, thereby rotating the abutment b^2, as well as the disk f^2 and annular plate f^3, until the roller c^8 of one of the crank-arms c^7 enters the groove f^7, at which time that valve c^3 is placed in communication with the corresponding piston-chamber, and the steam passes thereinto and expanding therein forces the abutment b^2 around, and the piston e is forced into the abutment b^2, while the other end of said piston extends a correspondingly greater distance beyond the abutment b^2, and when the piston e has rotated the abutment b^2 a sufficient distance the roller c^8 passes out of the groove f^7 and into the groove f^6, and the steam of this port is at this time cut off, and in the continued rotation of the abutment b^2 the next valve c^3 is operated and steam is admitted into the piston-chamber in communication therewith, and in the further rotation of the abutment b^2 the third and last valve c^3 is placed in communication with its piston-chamber, and in the successive opening and closing of the valve c^3 the abutment b^2 attains a high rate of speed, and it will be understood that when the piston e passes the ports d the steam in the corresponding piston-chamber is free to exhaust, and the amount of steam necessary to produce this result and continue the operation of our engine is regulated by means of the rotation of the annular plate f^3 in the direction of the arrow x, thereby bringing the shoulder f^8 closer to the shoulder f^9, and in this way the steam is cut off sooner than if the shoulder f^8 is in the position shown in Fig. 4, and it will be understood that the rotation of the annular plate f^3 on the disk f^2 is within the limits of the slot f^4, and when secured in position all of the valves c^3 are operated alike but at desired intervals and said intervals being of a desired duration, and in this way the amount of steam admitted to the piston-chambers is regulated so as to produce the greatest amount of power with the least amount of steam and take advantage thereby of the full expansive power of steam, and it will be evident from this construction that a very slight exhaust from our engine results.

Although we have shown three piston-chambers in the casing a, it will be evident that any odd number of piston-chambers may be employed, the greater the number thereof the more constant the pressure of steam on the piston e; but no fewer than three piston-chambers can be employed, and the concentric grooves f^6 and f^7, which operate the valves of our engine, may be made of greater or less length or of greater or less radii, and the said concentric grooves may be duplicated, if desired, or a greater or less number thereof be employed according to the number of piston-chambers employed, the object of duplication in the construction as shown in the drawings being for the purpose of equalizing the pressure on both ends of the piston, and thereby balancing the abutment in which said piston operates, and various other changes in and modifications of the construction herein shown and described may be made without departing from the spirit of our invention or sacrificing its advantages.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A rotary engine, comprising a casing, an irregularly-shaped chamber therein, an abutment rotatably mounted in the center of said chamber and bearing against the sides thereof and thereby dividing said chamber into a plurality of supplemental chambers, a piston slidably mounted in said chamber and extending on either or both sides thereof and bearing against the opposite surface of said first-named chamber and said supplemental chambers, a valve in communication with each of said supplemental chambers, an exhaust in communication with each of said supplemental chambers, and means for operating said valves, substantially as shown and described.

2. A rotary engine, comprising a casing, an abutment rotatably mounted therein, a plurality of piston-chambers around said abutment, an inlet-port and an outlet-port for each of said piston-chambers, a valve controlling each of said inlet-ports, a piston slidably mounted in said abutment and extending entirely therethrough, and means for operating said valves, substantially as shown and described.

3. A rotary engine, comprising a casing, an abutment rotatably mounted therein, a plurality of piston-chambers around said abutment, the central plane of each of said piston-chambers being directly opposite the plane of division of two other of said piston-chambers and said abutment bearing against said points of division, a piston in said abutment extending therethrough and adapted to operate in each of said piston-chambers, an inlet and an outlet port for each of said chambers, a valve controlling each of said inlet-ports, and means for operating each of said valves successively, substantially as shown and described.

4. A rotary engine, comprising a casing, an abutment rotatable therein, a piston slidable in said abutment, a plurality of said piston-chambers about said abutment, an inlet-port and an exhaust-port for each of said piston-chambers, a valve controlling each of said in-

let-ports, a shaft secured to each of said valves, a crank-arm on each of said shafts, a disk in operative connection with said abutment, an annular plate adjustably connected to said disk and forming concentric grooves between the same and said disk, and said crank-arms being provided with a projecting member operating in said grooves, substantially as shown and described.

5. In a rotary engine, comprising a casing, a rotatable abutment, a slidable piston therein, piston-chambers in which said piston operates and valves for said piston-chambers; devices for operating each of said valves successively comprising a disk in operative connection with said abutment, a cam-groove formed therein, a crank-arm secured to each of said valves and operating in said cam-groove, and means for regulating the lengths of said grooves, substantially as shown and described.

6. A rotary engine, comprising a casing, an abutment rotatable therein, a piston extending through said abutment, a plurality of piston-chambers about said abutment and in which said piston is adapted to operate, the central plane of each of said piston-chambers being opposite the line of division of two others of said piston-chambers, substantially as shown and described.

7. In a rotary engine, a casing provided with an irregularly-shaped chamber therein and the diameter of which through the center thereof is the same in any direction, and an abutment rotatable in said casing and dividing said chamber into a plurality of piston-chambers, substantially as shown and described.

8. In a rotary engine, a casing provided with an irregularly-shaped chamber, an abutment rotatable in said casing and dividing said chamber into a plurality of piston-chambers, and a piston slidable through the center of said abutment and bearing against the opposite walls of said piston-chambers, substantially as shown and described.

In testimony that we claim the foregoing as our invention we have signed our names, in presence of the subscribing witnesses, this 4th day of January, 1905.

WILLIAM F. JUNGERSEN.
JOHN J. FOGH.

Witnesses:
F. A. STEWART,
C. E. MULREANY.