No. 883,955. PATENTED APR. 7, 1908.

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ROTARY ENGINE.

APPLICATION FILED AUG. 19, 1907.

2 SHEETS—SHEET 1.

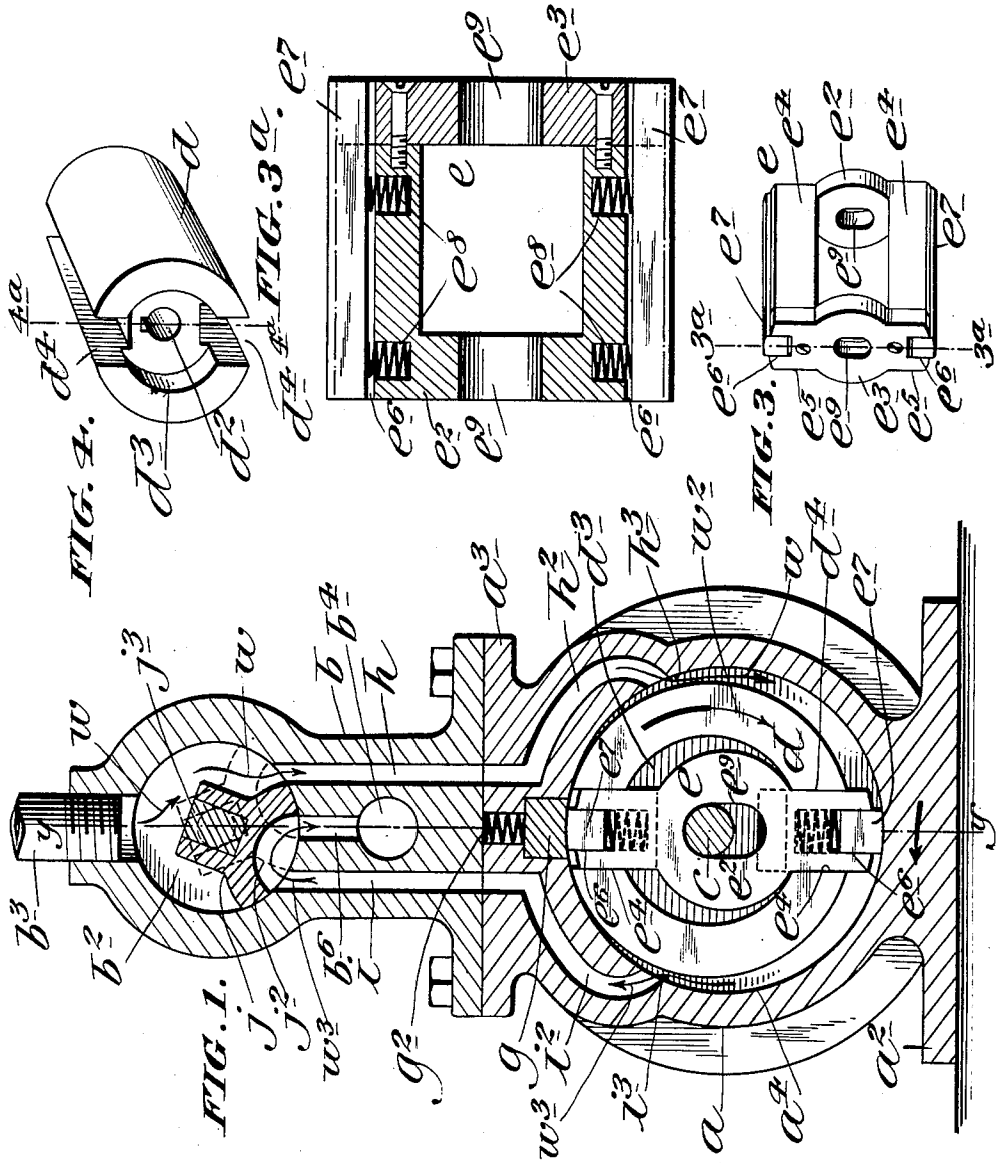


FIG. 1.

FIG. 3a.

FIG. 4.

FIG. 3.

WITNESSES

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2 SHEETS—SHEET 2.

FIG. 4a.

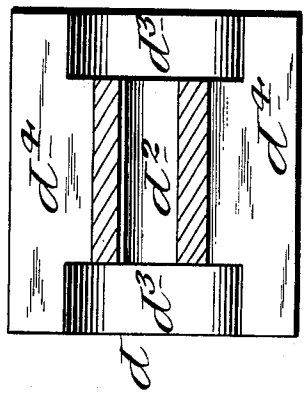


FIG. 5.

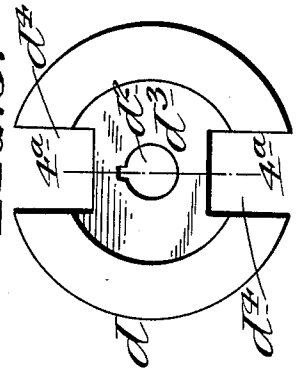
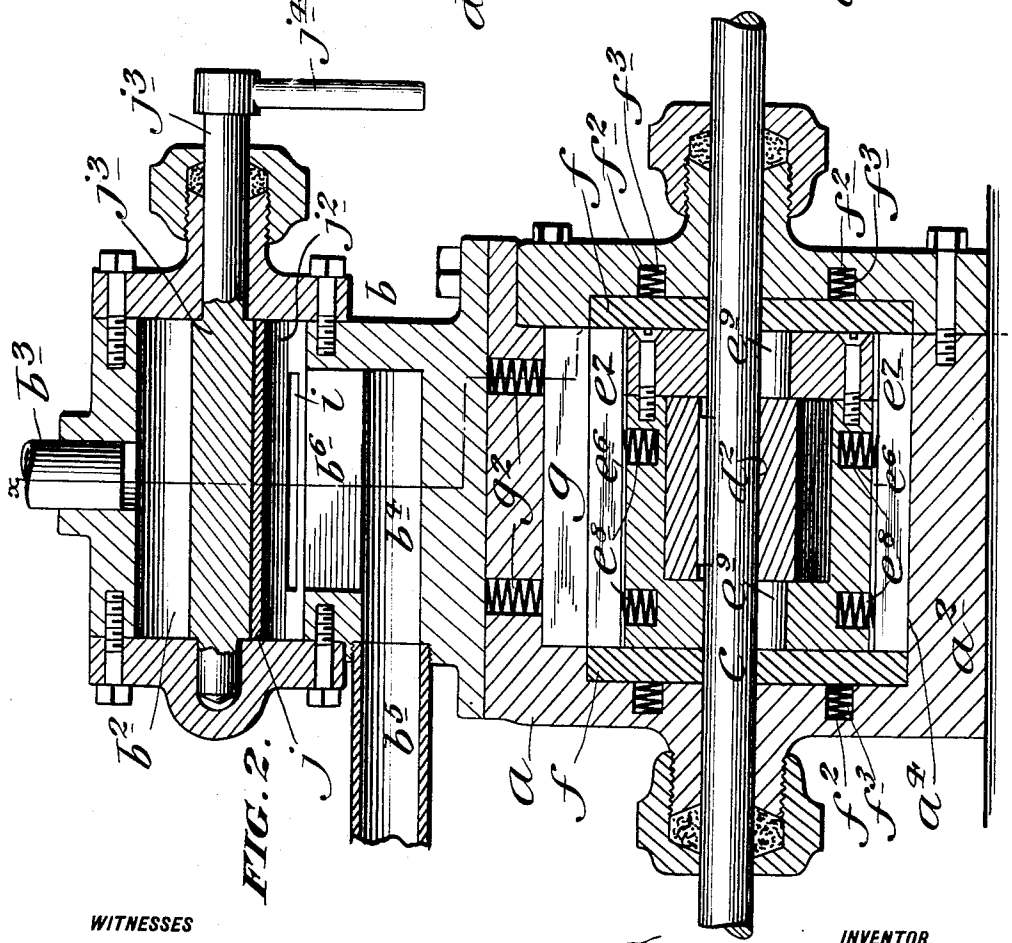


FIG. 2.



WITNESSES

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UNITED STATES PATENT OFFICE.

GEORGE W. HOPKINS, OF BROOKLYN, NEW YORK; MARTHA HOPKINS ADMINISTRATRIX OF SAID GEORGE W. HOPKINS, DECEASED.

ROTARY ENGINE.

No. 883,955. Specification of Letters Patent. Patented April 7, 1908.

Application filed August 19, 1907. Serial No. 389,105.

To all whom it may concern:

Be it known that I, GEORGE W. HOPKINS, a citizen of the United States, and 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.

This invention relates to rotary engines, and the object thereof is to provide an improved device of this class which is simple in construction and operation and comparatively inexpensive and which may be easily reversed whenever desired; and with this and other objects in view the invention consists in a rotary engine constructed as hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawing forms a part, in which the separate parts of my inprovement are designated by suitable reference characters in each of the views, and in which;—

Figure 1 is a vertical transverse sectional view of my improved rotary engine on the line x—x of Fig. 2; Fig. 2 a vertical longitudinal section on the line y—y of Fig. 1; Fig. 3 a perspective view of one part of the piston of my improved rotary engine, on an enlarged scale; Fig. 3^a a longitudinal section on the line 3^a—3^a of Fig. 3; Fig. 4 a perspective view of another part of the piston of my improved rotary engine; Fig. 4^a a section on the line 4^a—4^a of Fig. 4 and on an enlarged scale; and Fig. 5 an end view of that part of the piston shown in Fig. 4 and Fig. 4^a.

In the practice of my invention, I provide a main casing a having a substantial and flat base portion a^2 and a flat top portion a^3 to which is secured a supplemental top casing b, and the main casing a is provided longitudinally thereof with a cylindrical chamber a^4 through which is eccentrically passed a shaft c.

In connection with the shaft c I employ a piston rotatable with said shaft in the chamber a^4, and said piston comprises a main cylindrical part d rigidly connected with the shaft c and shown in perspective in Fig. 4. The part d of the piston is provided with a central longitudinal bore d^2 through which the shaft c passes, and each end thereof is provided with a circular recess d^3 and the opposite sides thereof with deep longitudinal recesses d^4. The piston also comprises a supplemental radially movable part e, a perspective view of which is given in Fig. 3, and said part e of the piston comprises two end plates e^2 and e^3 with one of which, the end plate e^2, as shown in the drawing, is integrally connected opposite parallel side members e^4 and the other end part e^3 of which is provided with oppositely directed side members e^5 which are bolted, screwed or otherwise secured to the parallel side members e^4 and form an extension thereof, and in the outer sides of the parallel members e^4, and the extension e^5 of the end plate or part e^3 of the movable piston member, are deep longitudinal grooves e^6 in which are placed radially movable packings or packing members e^7 between which and the framework of the part e of the piston are placed spiral springs e^8 as clearly shown in Fig. 3^a and which serve to force the packing members e^7 outwardly.

The central portions of the end parts or members e^2 and e^3 of the supplemental part of the piston are circular in form, and when the parts are assembled they fit in the circular recesses d^3 in the opposite ends of the main part d of the piston, and said end portions e^2 and e^3 of the supplemental part of the piston are provided with oblong central openings e^9 through which the shaft c passes, and when the separate parts d and e of the piston are assembled, the parallel side portions e^4 of the part e fit in the recesses d^4 of the part d and the part e is movable radially on the shaft c.

In the opposite ends of the chamber a^4 in the casing a are placed metallic packing plates f and the end portions of said casing are provided with recesses f^2 in which are placed spiral springs f^3 which bear on said packing plates and force them into close contact or connection with the opposite end portions of the piston as shown in Fig. 2.

In the top portion of the casing a, or in the top wall of the chamber a^4 is a longitudinal chamber in which is placed a packing g, and in the top part of said casing are placed springs g^2 which bear on said packing and force it inwardly.

In the top portion of the supplemental top casing b is a horizontal steam supply chamber b^2 with which communicates a steam supply pipe b^3 and under the steam supply cham-

ber b^2 is a horizontal steam discharge chamber b^4 with one end portion of which a steam exhaust pipe b^5 communicates.

A vertically and centrally arranged port b^6 connects the steam exhaust chamber b^4 with the steam supply chamber b^2, and at one side thereof is a steam port h which communicates with the bottom part of the steam supply chamber b^2 at one side thereof and extends downwardly through the supplemental top casing b and into the main casing a where it is curved outwardly and downwardly and inwardly as shown at h^2 and communicates with one side portion of the chamber a^4 at h^3. On the opposite side of the steam exhaust chamber b^4 is another steam port i which also communicates with the bottom part of the steam supply chamber b^2 at one side thereof, and extends downwardly through the base portion of the top casing b and into the bottom casing a, where it is curved outwardly and downwardly and inwardly as shown at i^2 and communicates with the chamber a^4 at i^3 opposite the point where the port h communicates therewith.

Within the steam supply chamber b^2 is a reverse valve j which extends longitudinally therethrough and the bottom portion of which is segmental in cross section and forms a longitudinal port or passage j^2, and said reverse valve j is provided with a shaft j^3 which passes out through one end wall of the steam supply chamber b^2 and is provided with a handle j^4 by which it may be operated. The central part of the shaft j^3 of the reverse valve j is made rectangular in cross section and fits in the corresponding recess in the body portion of said valve as clearly shown in Fig. 1, the object of this construction being to be able to make the main part of the valve and the shaft thereof of different material.

The operation will be readily understood from the foregoing description when taken in connection with the accompanying drawing and the following statement thereof. Suppose the valve j to be in the position shown in Fig. 1. In this case steam will enter the chamber b^2 through the pipe b^3 and pass through the port h into the piston or cylindrical chamber a^4 as shown by the arrows w, and the piston will be turned in the direction of the arrow w^2, and the steam will be exhausted as shown by the arrows w^3 through the port i, the port or passage j^2 in the bottom of the valve j into the exhaust chamber b^4 from which it will be discharged through the pipe b^4. This will result, as will be understood, in a continuous rotation of the piston and shaft c and the power produced may be transmitted from said shaft for any desired purpose and in the usual way. If it is desired to reverse the engine, the valve j is turned into the position shown in dotted lines in Fig. 1, in which case steam will enter the piston through the port i and will be exhausted through the port h.

It will be understood by reason of the eccentric position of the shaft c in the chamber a^4 and the radial movement of the part e of the piston, the packing members e^7 are continually forced against the walls of the chamber a^4 and form a perfectly steam tight connection therewith, and no steam is able to pass around said packing, and the full force of the steam is thus employed to rotate the piston and the shaft c.

In the construction shown, the central portions of the end members e^2 and e^3 of the supplemental part of the piston are made circular in form, and the chambers or recesses d^3 in the opposite end portions of the part d of the piston are also made circular in form, and with this construction it is necessary for the chambers or recesses d^3 to be larger than the central circular portions of the end portions e^2 and e^3 of the part e of the piston, all as clearly shown in Fig. 1, and with all the parts of the relative size shown in the drawing, this construction is probably necessary in order to provide room for the shaft c in the end portions of the part e of the piston and for the openings e^9 through which said shaft passes, but it will be apparent that the shape of these parts is not an essential feature, and the recesses d^3 in the ends of the part d of the piston may be of other forms as may also the end portions e^2 and e^3 of the part e of the piston, and other changes in and modifications of the construction described may be made, within the scope of the appended claims, without departing from the spirit of my invention or sacrificing its advantages.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

In a rotary engine, a casing provided with a cylindrical chamber, a shaft passing eccentrically and longitudinally therethrough, steam ports communicating with the opposite side portions of said chamber, one of which is adapted to serve as a supply and the other as an exhaust, and a piston connected with said shaft and composed of two parts, one of said parts being cylindrical in form and being keyed to said shaft and being provided in its opposite ends with diametrical recesses and in its opposite sides with longitudinal recesses, the other portion of said piston consisting of end parts adapted to fit in and movable in said diametrical recesses, and provided with elongated openings through which the shaft passes, and parallel side parts adapted to fit in and movable in said longitudinal recesses, said parallel side parts being provided in their outer surfaces with spring operated packings which extend longitudinally thereof, and the top wall of said chamber being also provided with a

spring operated packing, the end walls of said chamber being also provided with counter-sunk spring operated packing plates of the same diametrical dimensions as said chamber and adapted to bear on the ends of the parts of the piston.

In testimony that I claim the foregoing as my invention I have signed my name in presence of the subscribing witnesses this 17th day of August, 1907.

GEORGE W. HOPKINS.

Witnesses:

C. E. MULREANY,

LAWRENCE QUINN.