No. 681,537. Patented Aug. 27, 1901.

F. FUCHS.

ROTARY ENGINE.

(Application filed Dec. 29, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 2.

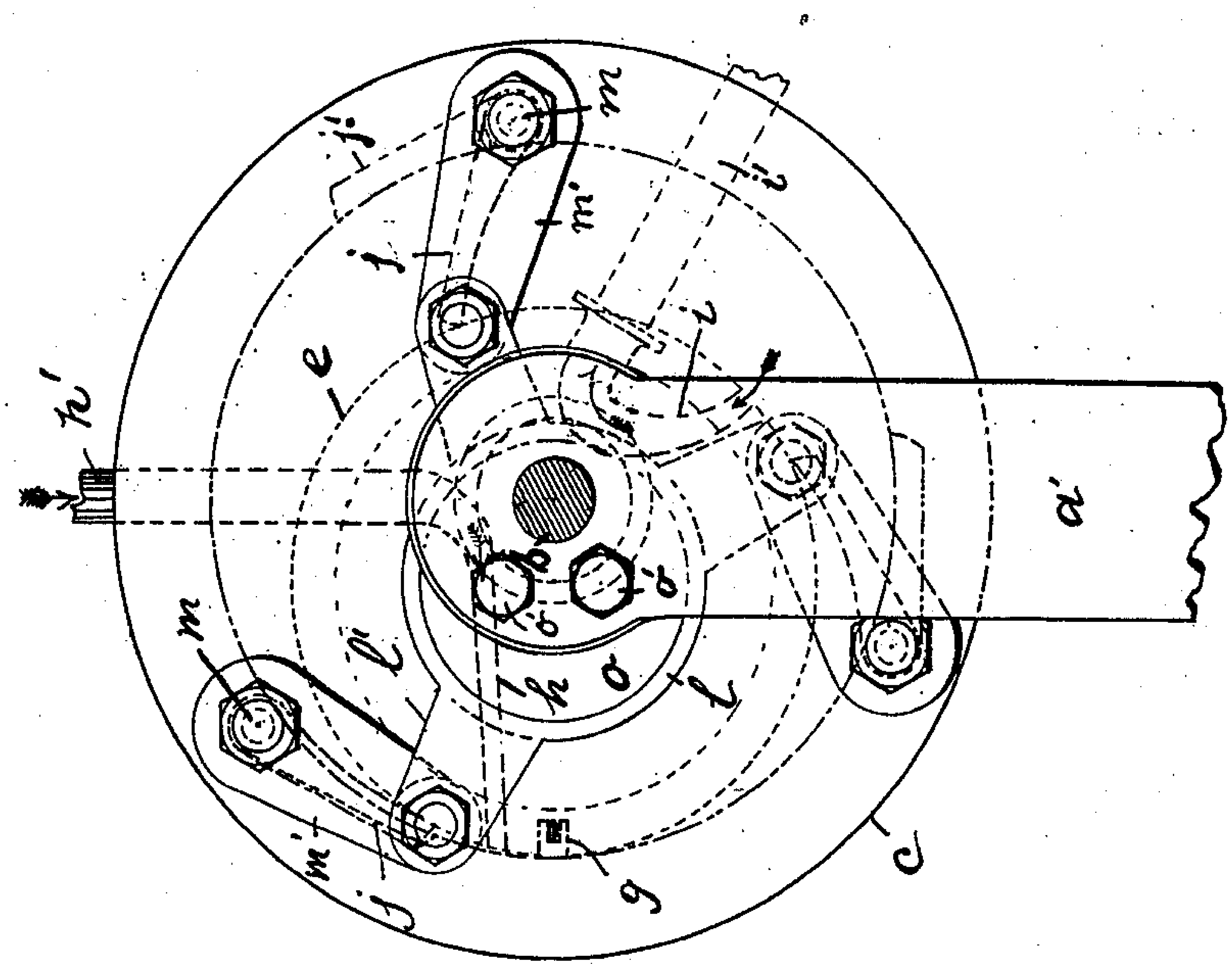
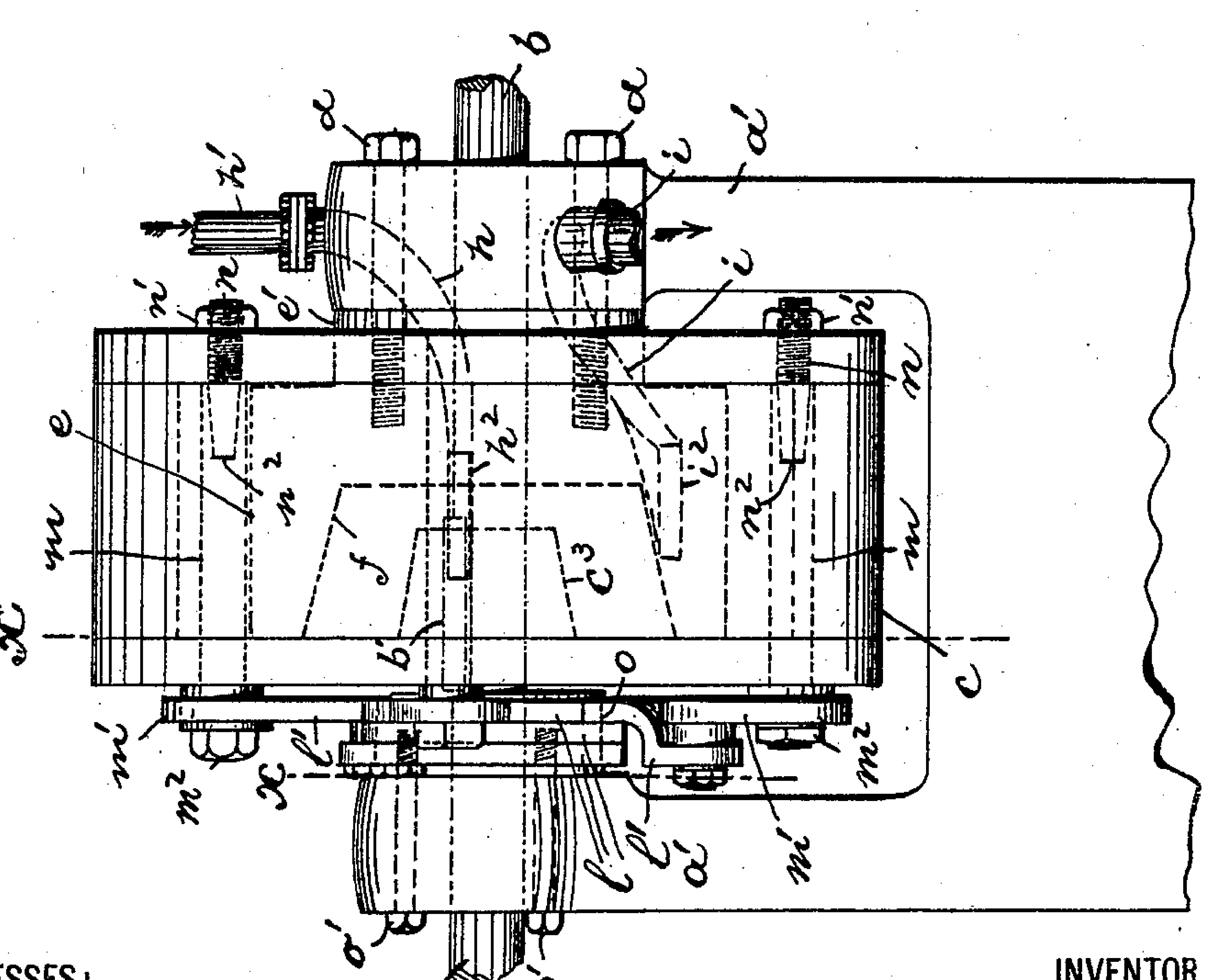


Fig. 1.



WITNESSES:

Henry King

Russell M. Everett

INVENTOR

Fredrich Fuchs

BY

Drake & Co.

ATTORNEYS.

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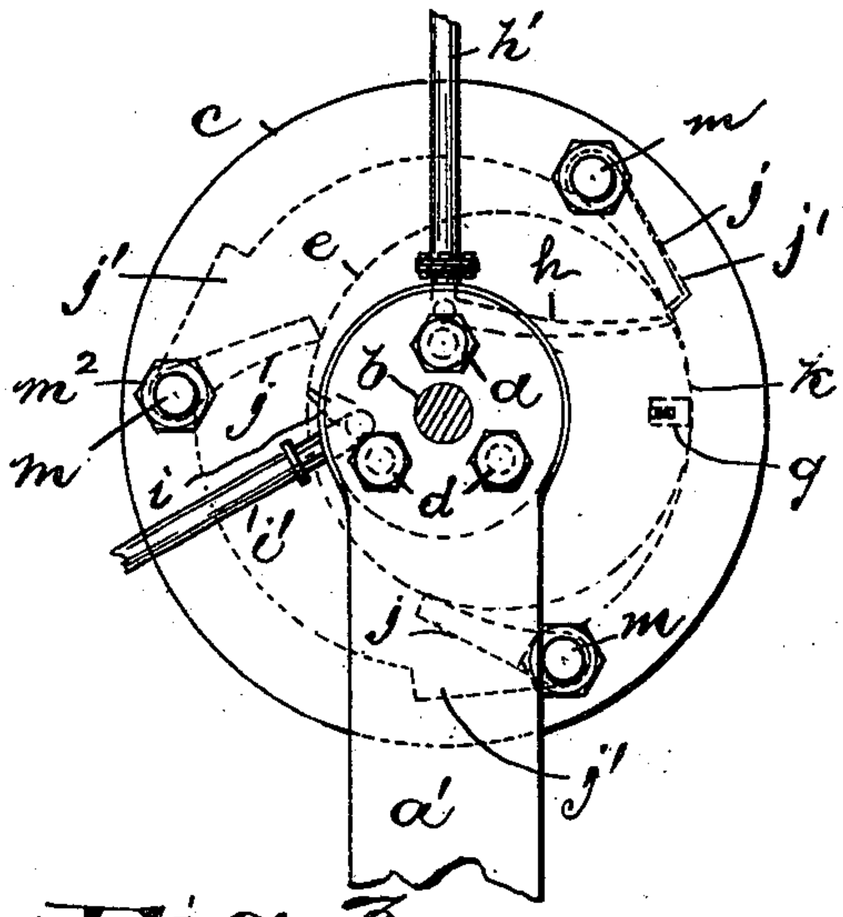

Fig. 3.

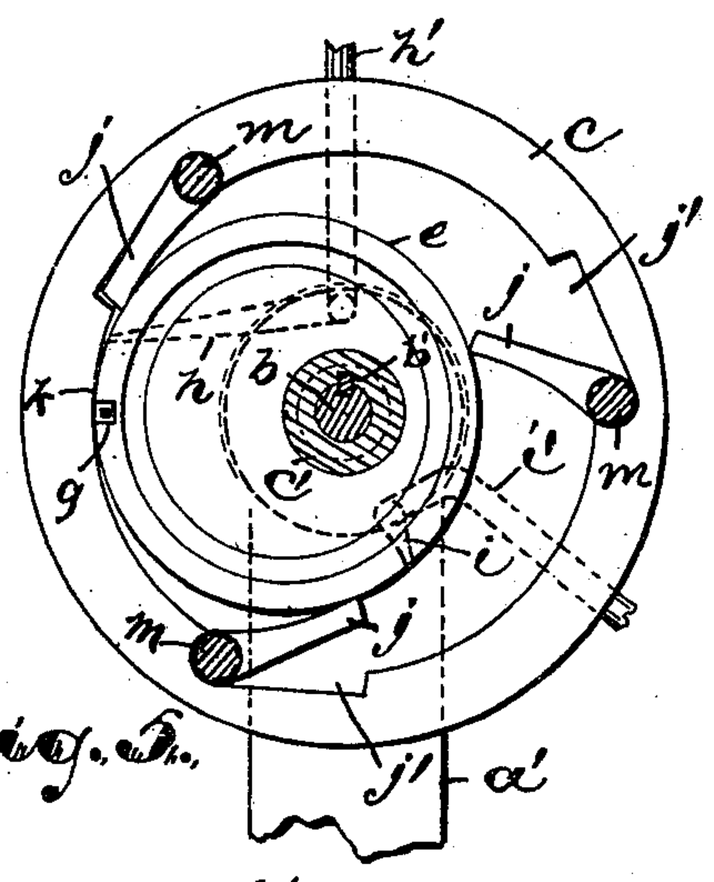

Fig. 5.

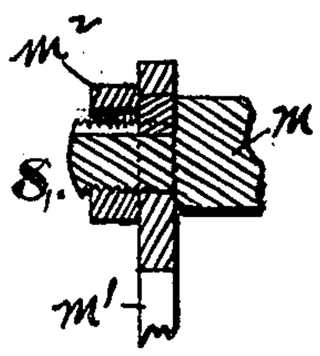

Fig. 8.

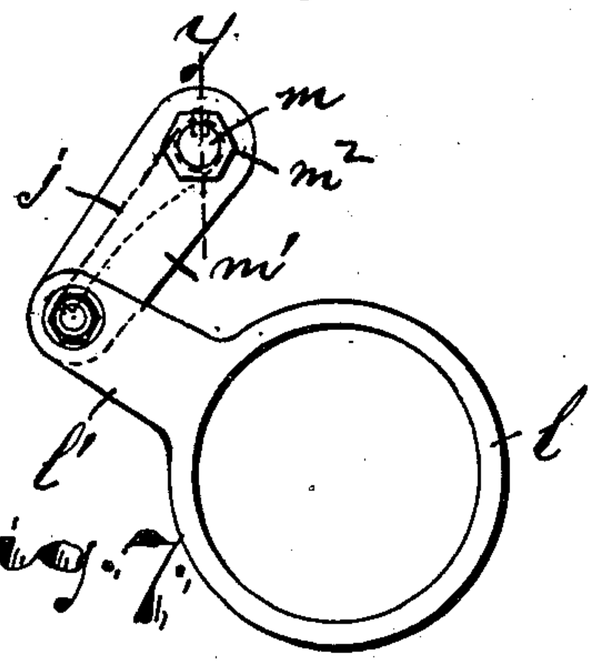

Fig. 7.

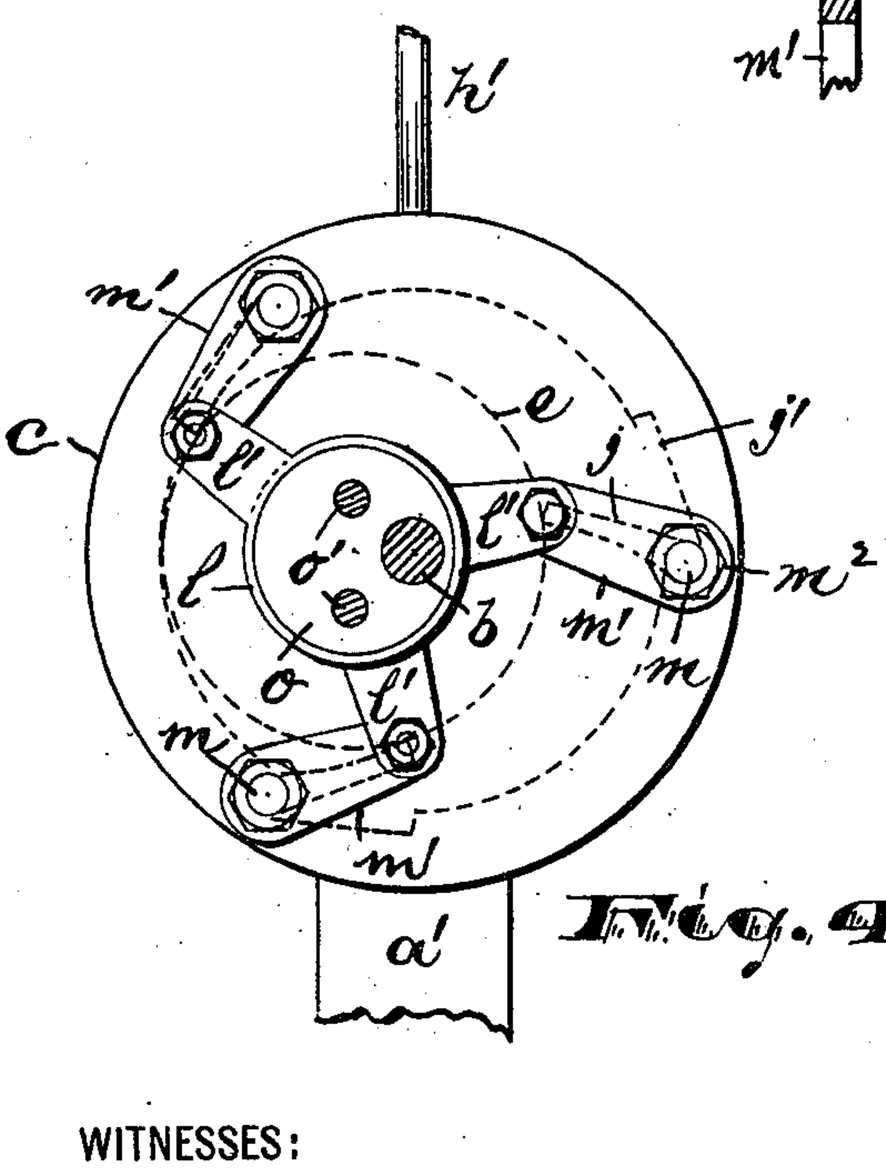

Fig. 4.

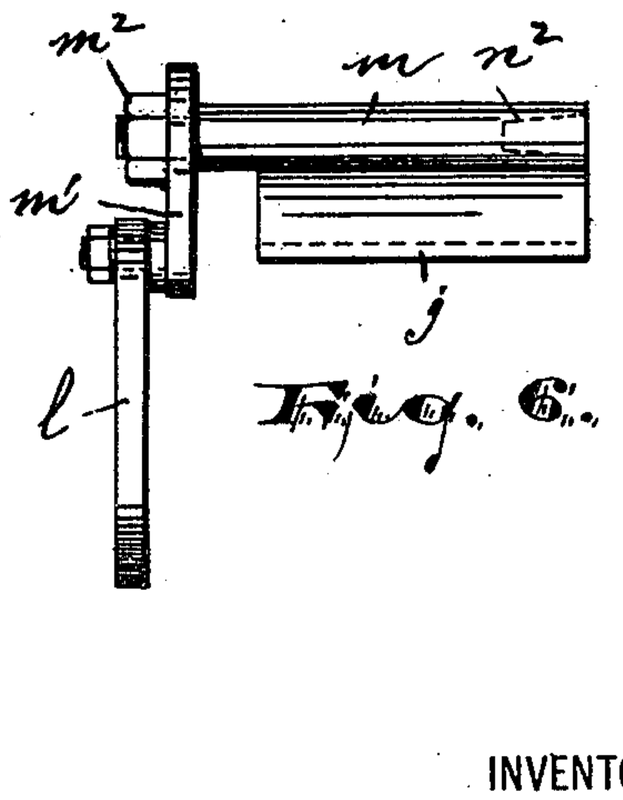

Fig. 6.

WITNESSES:

Henry Prug

Russell M. Everett.

INVENTOR:

Friedrich Fuchs.,

BY

Drake & Co.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

FREDRICH FUCHS, OF ELIZABETH, NEW JERSEY.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 681,537, dated August 27, 1901.

Application filed December 29, 1900. Serial No. 41,441. (No model.)

To all whom it may concern:

Be it known that I, FREDRICH FUCHS, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have 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 others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The objects of this invention are to provide a rotary steam-engine of a novel and improved construction, to secure a simple and inexpensive construction and one which at the same time will utilize to a high degree the expansive power of the steam, and to secure other advantages and results, some of which may be referred to hereinafter in connection with the description of the working parts.

The invention consists in the improved rotary engine and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth, and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like letters of reference indicate corresponding parts in each of the several views, Figure 1 is a side elevation of my improved engine looking at right angles to the shaft or axis of rotation. Fig. 2 is an end view of the same, showing certain valve-operating connections. Fig. 3 is a view, on a smaller scale, of the opposite end of the engine from that shown in Fig. 2. Fig. 4 is a view taken on a plane passing between one of the end supports or bearings of the engine and an eccentric block affixed thereto on which certain valve-operating rings turn, as on line x, Fig. 1. Fig. 5 is a sectional view on line x', Fig. 1. Fig. 6 shows a side view of one of the valves with its operating ring and link. Fig. 7 is an end view of the same, and Fig. 8 is a detail section on line y, Fig. 7.

In said drawings, a indicates a suitable bed or foundation for the engine, having upright standards or arms a' a', providing at their upper ends bearings for the shaft b of the engine and between which standards the engine rotates. The engine comprises, first, a drum c, having its cylindrical walls and one end preferably cast integral, and said end having an inward central boss c^3 to afford a more staple bearing on the shaft b, on which shaft the drum is centrally disposed and keyed by the spline b'. The removable end of the drum is secured in place by any well-known means adapted to that purpose and is centrally apertured to permit the second principal member of the engine to extend into the cavity of the drum. This second member is bolted fast to one of the supports a', as by bolts d, and consists of a neck e', lying in the aperture of the removable end of the drum, and a cylindrical head e within the cylindrical drum-chamber, said head being of a length adapted to fill the drum lengthwise and forming at its ends impervious joints with the end walls of the drum and yet not so as to prevent rotation of the drum with respect to the inner member e. The inner end of the member e is recessed, as at f, to provide space for the boss c^3, above described, on the drum. The inner member thus described is centrally perforated to form a passage for the shaft b to extend through to its bearings in the support a', and the neck e' of the member is of course concentrically disposed with reference to the shaft, so as to permit a free turning of the drum; but the circular head e of the inner member is eccentrically disposed with reference to the shaft, and therefore with reference to the drum, being so placed that at one point, as k, it is tangent at its outer surface to the inner surface of the drum. Along the line of tangency is arranged an elastic packing-strip g, which insures a steam-tight contact of the parts. A crescent-shaped (in cross-section) chamber is thus formed between the stationary inner member and the inclosing drum to be rotated, and into this chamber the live steam enters by the steam-pipe h' and passage h through the support a' and inner member, and from which the exhausted steam is led by the passage i through the inner member and support a' and the exhaust-pipe i'. Said passages h and i are formed through the solid

metal of the support a' and the inner member, preferably in casting, and at their inner ends they open through the cylindrical surface of the head e of the inner member in the form of longitudinally-disposed slots or mouths h^2 i^2, respectively.

The space between the drum and its eccentric inner member is divided into steam-chambers, each of which receives steam in turn from the inlet h^2 by valves j, extending longitudinally of the drum and at its ends making tight joints with the end walls of the drum. One longitudinal edge of each valve is hinged at the inner surface of the drum, while the other edge lies against the outer surface of the head e of the inner member. Thus as each valve passes the steam-inlet h^2, referring more especially to Fig. 5, it forms between itself and the line of tangency k a closed chamber, into which the steam entering pushes against the valve j by expansion, and so rotates the drum to which said valve is attached. As the valve is carried farther around another valve comes between it and the steam-inlet, and presently the continued rotation brings the now closed steam-chamber over the exhaust-opening i^2, and the spent steam escapes.

There may be any desired number of the valves j, and as the drum rotates it will be noted said valves change their angular position on their hinge-pins, assuming most nearly a radial position at the widest part of the crescent-shaped space and at the point of tangency k, being laid back against the drum-wall into recesses j', provided for them. For holding the valves always with their free edges against the member e I have provided each one with a controlling-ring l. These rings are free to turn on a cylindrical block o, securely bolted by bolts o' to the support a', between said support and the end of the drum opposite that at which the inner member e enters. This block is arranged eccentric to the shaft b and drum, but concentric with the head e of the inner member. Each ring has a radial arm l', pivoted at its end to the meeting end of a fixed arm m', projecting from the hinge-shaft m of a valve. The point of said pivoting is on the line of the circumference of the inner member e, as will be seen from Figs. 2 and 4, and the arm m' occupies a radial relation to the shaft m identical with that of the valve-blade j. This insures that as the drum c rotates the valves will be held close against the inner member at all times. The shaft m of each valve is preferably integral with the blade, and at one end it projects through the drum-head to receive the arm m', keyed thereto, and a retaining-nut m^2. The other end is recessed, as at n^2, to oscillate upon the taper end of a screw-bolt n, inserted from the outside and locked by a nut n', Fig. 1.

It will be understood from the foregoing description that by my improved construction the steam entering the engine acts not alone by its mere velocity, but is also permitted to expand in the closed space between two valves j j, so as to exert an expansive pressure on the leading valve. It will also be obvious that compressed air or other gases confined under pressure may be used to drive my engine instead of steam.

Various modifications may be made in the detail construction of the engine, and I do not wish to be understood as limiting myself by the positive descriptive terms employed, except as the state of the art may require.

Having thus described the invention, what I claim as new is—

1. In a rotary engine, the combination with fixed bearings a', a', and a shaft b, rotatable therein, of a hollow drum fast on said shaft, an inner member made fast to one of said bearings and extending through the adjacent end of the drum into its interior and providing an annular chamber between itself and the drum, the said bearing and inner member having passages formed therein leading to the annular chamber independent of the shaft, substantially as set forth.

2. In a rotary engine, the combination with a rotatable shaft journaled in suitable bearings, of a hollow drum fast on said shaft, and a stationary member loosely surrounding said shaft and extending into the drum and forming between itself and the drum a chamber and having passages leading through itself to said chamber, substantially as set forth.

3. In a rotary engine, the combination with a hollow drum, a solid shaft having the drum fast thereon and having suitable bearings at opposite sides of said drum, and a second member loose on the shaft and extending into the drum, and having inlet and outlet passages in itself, means for holding said second member stationary, and valves or pistons, substantially as set forth.

4. In a rotary engine, the combination with opposite bearings a', a', of a shaft journaled to rotate in said bearings, a hollow drum fast on said shaft between said bearings, a second member bolted to one of the bearings and having a neck entering the end of the drum centrally and an interior head eccentric to the drum, said second member being perforated to provide free passage for the shaft, and the said member and bearing to which it is bolted being perforated to provide inlet and outlet passages to the interior of the drum, and valves on the inner walls of the drum, substantially as set forth.

5. In a rotary engine, the combination with opposite bearings a', a', the shaft b, and a drum c, keyed thereon, and an eccentric inner member e, fixed to one of said bearings, of a valve j, longitudinally disposed between said drum and inner member and having an outer arm m', fixed in the same plane with the valve-blade, a pivotal block o, fixed to the opposite bearing a', from the one having

the inner member *e*, and being concentric with said inner member, and a ring *l*, adapted to turn on said block *o*, and having an extension *l'*, pivotally joined to the valve-arm *m'*, at a distance from the center of the pivotal block, substantially equal to the radius of the said inner member, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 22d day of November, 1900.

FREDRICH FUCHS.

Witnesses:
C. B. PITNEY,
CHARLES H. PELL.