(No Model.)

G. H. WESTON.

ROTARY ENGINE.

No. 516,385. Patented Mar. 13, 1894.

Fig: 1.

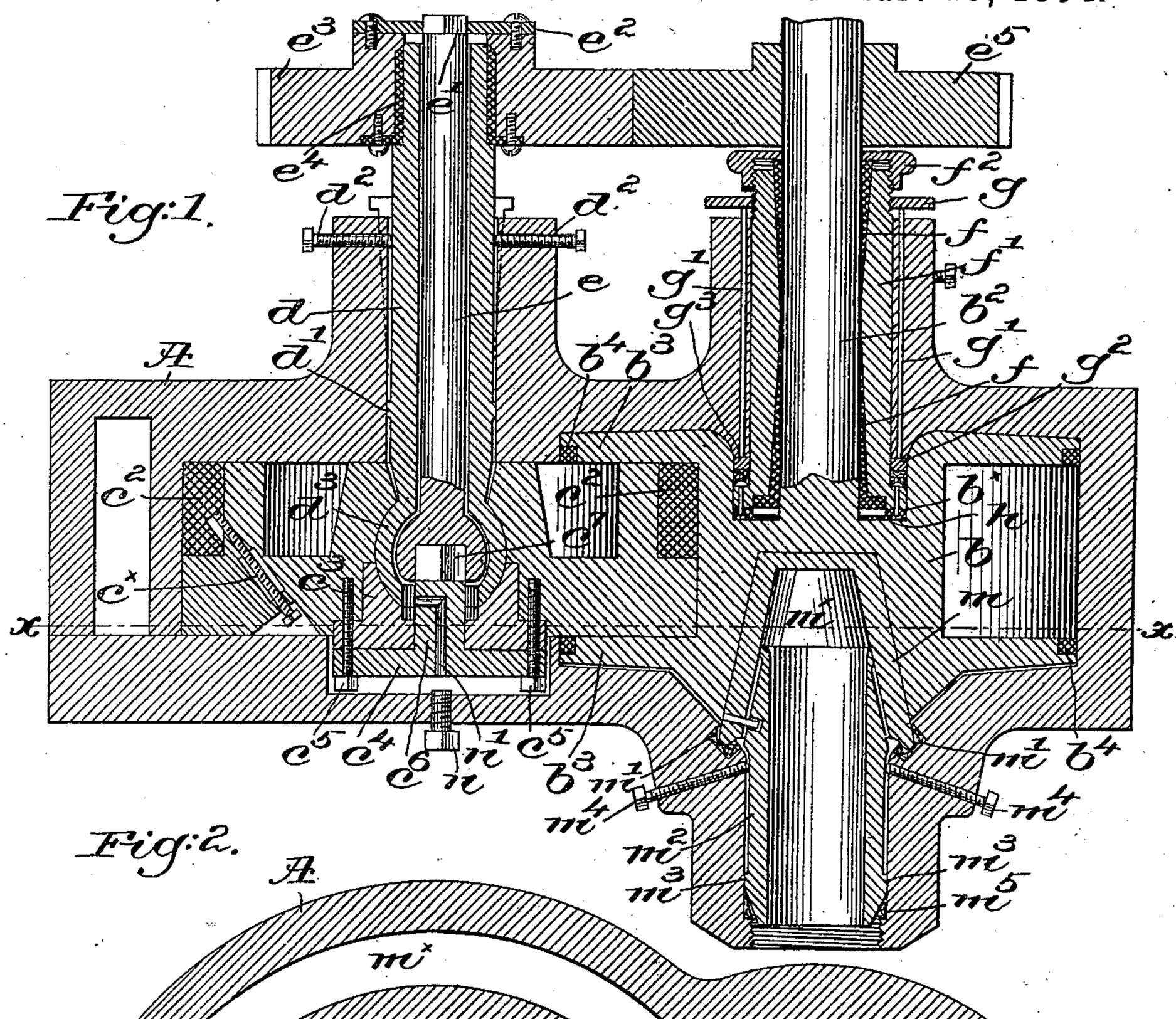
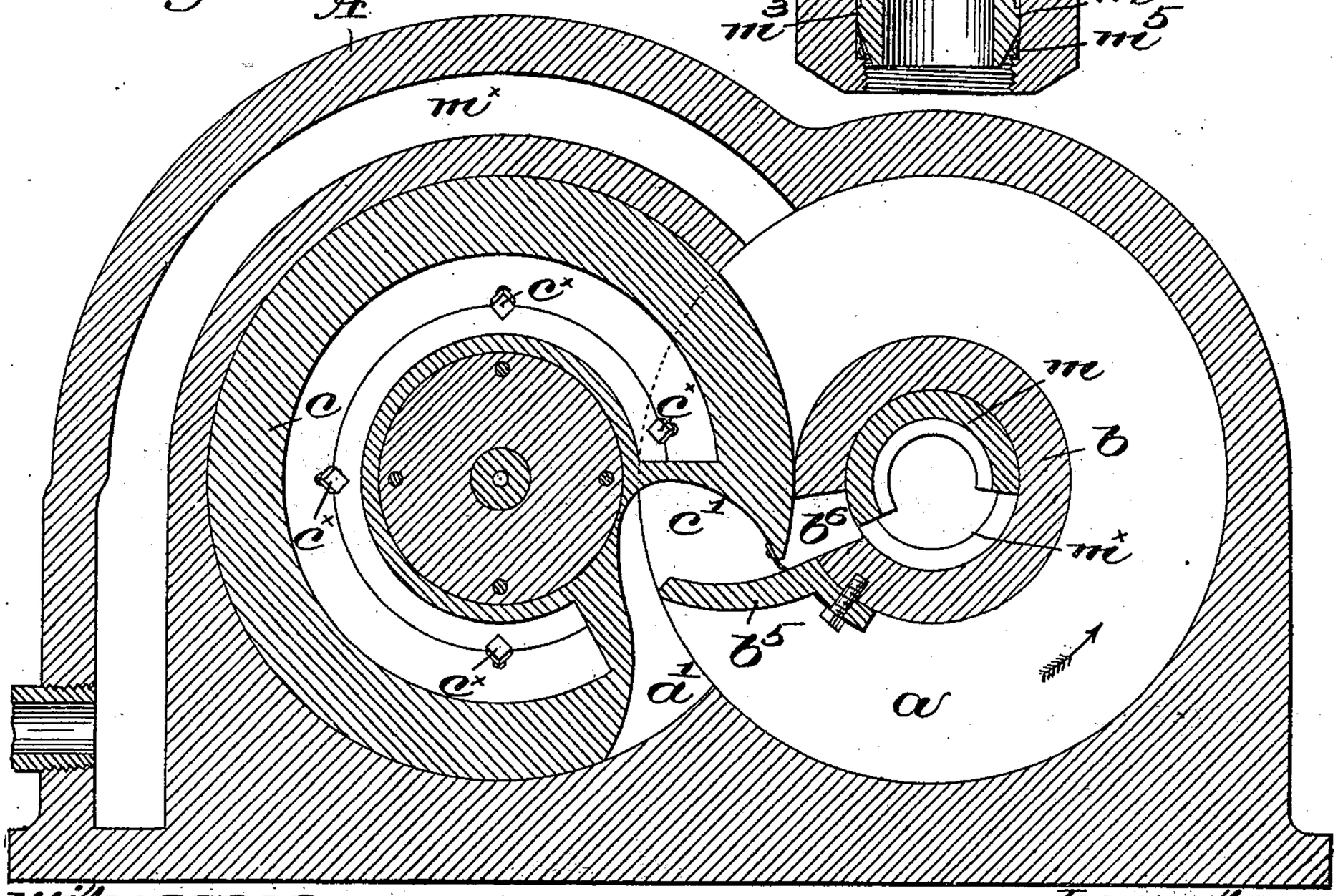


Fig: 2.



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ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 516,385, dated March 13, 1894.

Application filed May 13, 1893. Serial No. 474,069. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. WESTON, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Rotary Engines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to rotary engines of the class shown and described in United States Letters Patent No. 449,148, granted to me March 31, 1891, the object of this present invention being to improve the construction of an engine of this class whereby the parts may be more easily and thoroughly packed and adjusted.

The various features of this invention will be hereinafter described and pointed out in the claims.

Figure 1 is a horizontal section of an engine embodying this invention, and Fig. 2, a vertical section taken on the dotted line *x*—*x*, Fig. 1.

Referring to the drawings, A represents the inclosing-case which may be of any suitable or desired construction, it having formed within it the two like cylindrical chambers *a*, *a'*, which contain respectively the steam piston *b* and abutment *c*. The piston *b*, as herein shown, consists of a central portion or hub *b'*, Fig. 1, mounted upon or forming a part of the shaft b^2 journaled in suitable bearings in the inclosing case, to be hereinafter described in detail, said hub having at its opposite ends flanges b^3, fitting the outer annular wall of the cylindrical chamber *a* and provided with suitable packing as the rings b^4 running in contact with said annular wall to form at all times a steam-tight joint between the piston and its cylinder. Between the flanges b^3 and extending outwardly from the hub *b'* is bolted or otherwise secured the piston arm or wing b^5, shown best in Fig. 2. The abutment *c* in the cylindrical chamber or cylinder *a'*, has at one side a recess *c'*, which as the abutment rotates in connection with the piston, receives the wing b^5 of the piston and permits the latter to pass it, as will be readily understood from Fig. 2. The abutment *c* enters between the flanges b^3 of the piston, as shown in Fig. 1, and at its periphery is provided with a suitable packing as the ring c^2, which runs in contact with the peripheral surface of the hub *b'* of the piston. In the present instance, and preferably, the abutment *c*, runs upon a universal or ball bearing to permit it to adjust itself to any inaccurate alignment of the piston, such bearing in the present instance being constructed as follows:

Referring to Fig. 1, *d* represents a long non-rotatable sleeve mounted in the inclosing case A, it being supported in said case near its inner end upon its flange *d'*, and at its outer end by and between the adjusting screws d^2 and wedges $d^\times$ by means of which said sleeve may be moved in one or the other direction about the flange *d'* as a fulcrum to change the alignment or position of its axis. The inner end of this sleeve *d* is made spherical as at d^3 to constitute a ball bearing for the abutment *c*, the latter having a semi-spherical bushing c^3, upon which is placed a plate c^4 both being bolted to the base of the abutment by screws c^5. The plate c^4 has an inwardly projecting teat c^6 squared at its inner end as at c^7 to enter a squared socket in the inner end of the shaft *e* arranged in the sleeve *d*, said shaft at its rear or outer end projecting beyond the end of the sleeve *d* and squared at *e'* to enter a square opening in a plate e^2, fast on the face of a toothed wheel e^3, having a bushing e^4, journaled upon the shouldered end of the sleeve *d*, said toothed wheel e^3 being in mesh with a toothed wheel e^5 fast on the piston shaft b^2, so that rotation of the latter causes like but opposite rotation of the shaft *e*.

While any form of journal-bearing may be provided for the piston shaft b^2, yet I prefer the bearing similar to that herein shown, which consists of the two oppositely facing conical bushings *f*, *f*, fixed on the shaft b^2 and which run in a suitable sleeve *f'*, flanged outwardly at its inner end to fit the outer annular surface of the annular recess $b^\times$ in the face of the piston surrounding its shaft b^2, said sleeve *f'* at its outer end being threaded to receive the cap f^2 by means of which the conical bushings may be drawn together to take up wear between them and the sleeve *f'* and to form an oil pocket to receive and prevent escape of lubricating oil. A collar *g*, also threaded upon the outer end of the sleeve *f'*, acts upon the outer ends of two or more rods

g', which pass inwardly through the boss on the inclosing case, and at their inner ends act against a packing ring g^2, between which and the flange on the inner end of said sleeve f' is interposed a packing g^3 to prevent steam blowing out around the sleeve f' and to form a tight oil space to hold oil for lubrication. I have herein shown a cap h bolted to the face of the inner end of the sleeve f', and surrounding the piston shaft b^2 to serve as an oil trap to prevent escape of oil. The piston b at its front side has a cone-shaped recess to receive the conical cup shaped cut-off shell m held from rotation by a pin $m^\times$ entering the sleeve m^2, and packed against leakage by a soft packing ring m' in the inclosing case. A sleeve m^2 provided with a flange m^3 at its outer end and at its inner end made tapering or conical to fit the interior of the conical shell m constitutes the steam inlet, steam passing from the interior of the shell through an opening $m^\times$ in the side thereof, through an opening b^6 in the hub b' of the piston into the steam cylinder between the wing b^5 and the abutment. Adjusting screws m^4 act upon the sleeve m^2 and furnish means by which to adjust its alignment. A packing m^5 may be placed between the flanged end of the sleeve m^2 and the inclosing case to prevent leakage and keep the sleeve in position. Adjusting screws $c^\times$ are also provided to set or adjust the packing ring c^2 on the abutment. The ball bearing d^3 is oiled through a hole normally closed by a screw n, the oil introduced through this hole being conducted through passage n' to the bearing.

The operation of the engine is as follows:—Assuming the parts to be in the position Fig. 2, steam admitted to the sleeve m^2 enters the cylinder a between the piston wing b^5 and the abutment, expands, and thereby forces the wing and its piston around its axis in the direction of the arrow Fig. 2, the abutment also rotating in an opposite direction, the steam being cut off by the shell m and finally escapes through the exhaust passage $m^\times$, all as in engines of this class now well understood and patented by me.

The advantages of this present construction over any other construction known to me consist chiefly in the improved manner of packing the parts to prevent leakage and in the ready adjustability of the parts to permit working of the same without friction. For example, assuming the piston shaft b^2 to be somewhat out of line by reason of poor adjustment or workmanship, the shell m accommodates itself to the position of the piston, the sleeve m^2 in turn accommodating itself to the new position of the shell. The abutment c is also free to turn about its ball bearings to accommodate itself to the piston in whatever position the latter may be. The abutment being packed to the piston, and free to adjust itself thereto insures a tight joint or fit at all times and consequently insures perfect working of the engine. By providing the piston with two flanges b^3 and packing the same at their peripheries, a much more simple and effective packing is provided, and it will be noticed that both the piston and abutment are packed at their peripheries, thus avoiding side or surface packing.

This invention is not restricted to the particular construction of parts herein shown, for it is evident that the same may be varied in many respects without departing from the invention.

I claim—

1. A rotary engine containing the following instrumentalities, viz:—a rotary piston having a fixed axis and provided at its opposite sides with flanges, a rotary abutment fitted between said flanges, a packing for said piston and abutment, and a universal supporting bearing for said abutment whereby the latter may adjust itself to the alignment of and to always fit the flanges of its co-operating piston, to operate, substantially as described.

2. A rotary engine, containing the following instrumentalities, viz:—a rotary piston, a co-operating rotary abutment, and a universal or ball-bearing for the latter, whereby it is adjustable to accommodate itself to the alignment of the piston, substantially as described.

3. A rotary engine, containing the following instrumentalities, viz:—a rotary piston, a co-operating rotary abutment, a cut-off shell, as m, and an independent sleeve leading therefrom to the steam inlet, substantially as described.

4. A rotary engine, containing the following instrumentalities, viz:—a rotary piston, and a co-operating rotary abutment, a cut-off shell, and a sleeve m^2 flanged at its outer end and adjusting devices for its inner end, whereby it may be adjusted to various positions of the said shell, substantially as described.

5. A rotary engine, containing the following instrumentalities, viz:—a rotary piston, a co-operating abutment, a cut-off shell, an independent sleeve leading thereto, and packing for both shell and sleeve, substantially as described.

6. A rotary engine, containing the following instrumentalities, viz:—a rotary piston, a co-operating rotary abutment, a fixed non-rotatable sleeve having a ball bearing for said abutment, a shaft within said sleeve connected and rotatable with said abutment, a toothed wheel connected with said shaft, and a meshing wheel connected with and rotated by the piston, substantially as described.

7. A rotary engine, containing the following instrumentalities, viz:—a rotary piston, a co-operating rotary abutment, the sleeve d having the flange d' at one end, and adjusting devices at its opposite end, to operate, substantially as described.

8. A rotary engine, containing the following instrumentalities, viz:—the piston b, its shaft b^2, bushings f, sleeve f', caps f^2 and h, the

abutment *c*, and gears e^3, e^5, all to operate, substantially as described.

9. A rotary engine, containing the following instrumentalities, viz:—a rotary piston, a co-operating abutment, a fixed sleeve having bearings for said abutment, a shaft within the said sleeve, and connected at one end with said abutment, a toothed wheel surrounding and journaled upon said sleeve, and connected with and rotated by said shaft and a meshing wheel connected with and rotated by said piston, substantially as described.

10. A rotary engine, containing the following instrumentalities, viz:—a rotary piston, the abutment *c*, the bushing c^3 and plate c^4, having the teat c^7, the sleeve *d*, shaft *e*, and wheels e^3, e^5, all to operate, substantially as described.

11. A rotary engine containing the following instrumentalities, viz:—a rotary piston, a co-operating rotary abutment, a sleeve having at one end a bearing for said abutment, and adjusting devices to vary the position of the axis of said sleeve, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE H. WESTON.

Witnesses:
FREDERICK L. EMERY,
EMMA J. BENNETT.