(No Model.)

2 Sheets—Sheet 1.

H. B. DIERDORFF.

ROTARY ENGINE.

No. 350,354. Patented Oct. 5, 1886.

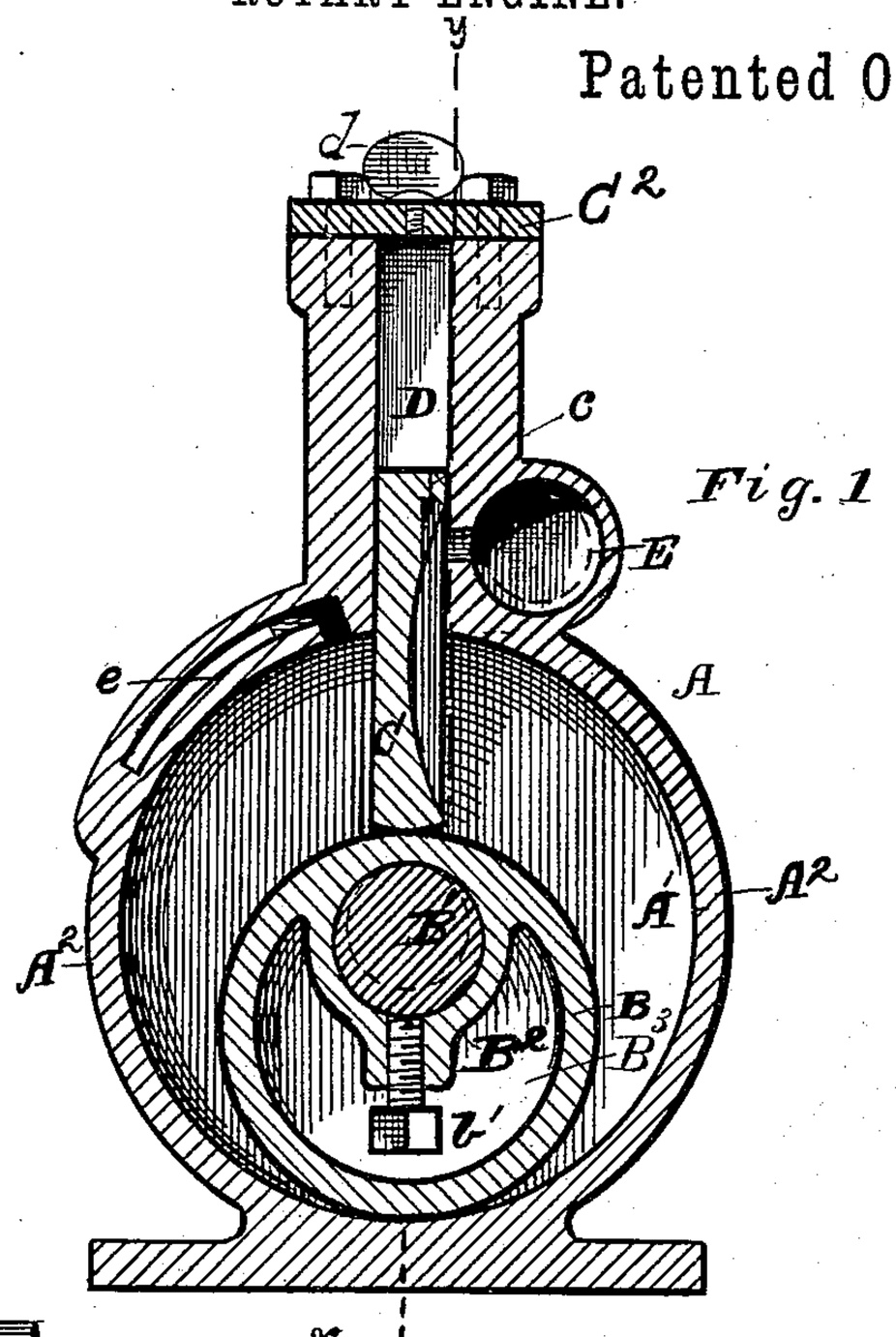


Fig. 1

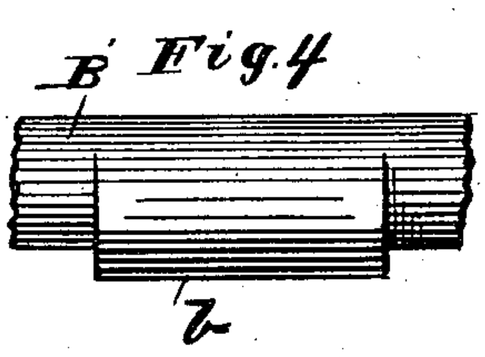
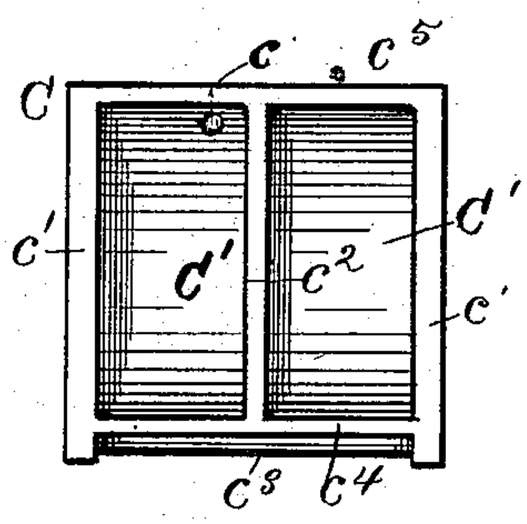


Fig. 4

Fig. 2

Fig. 3



Witnesses:

J. C. Turner

J. S. Barker.

Inventor:

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by Dodbeday & Bliss attys.

(No Model.) 2 Sheets—Sheet 2.

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ROTARY ENGINE.

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Fig. 5

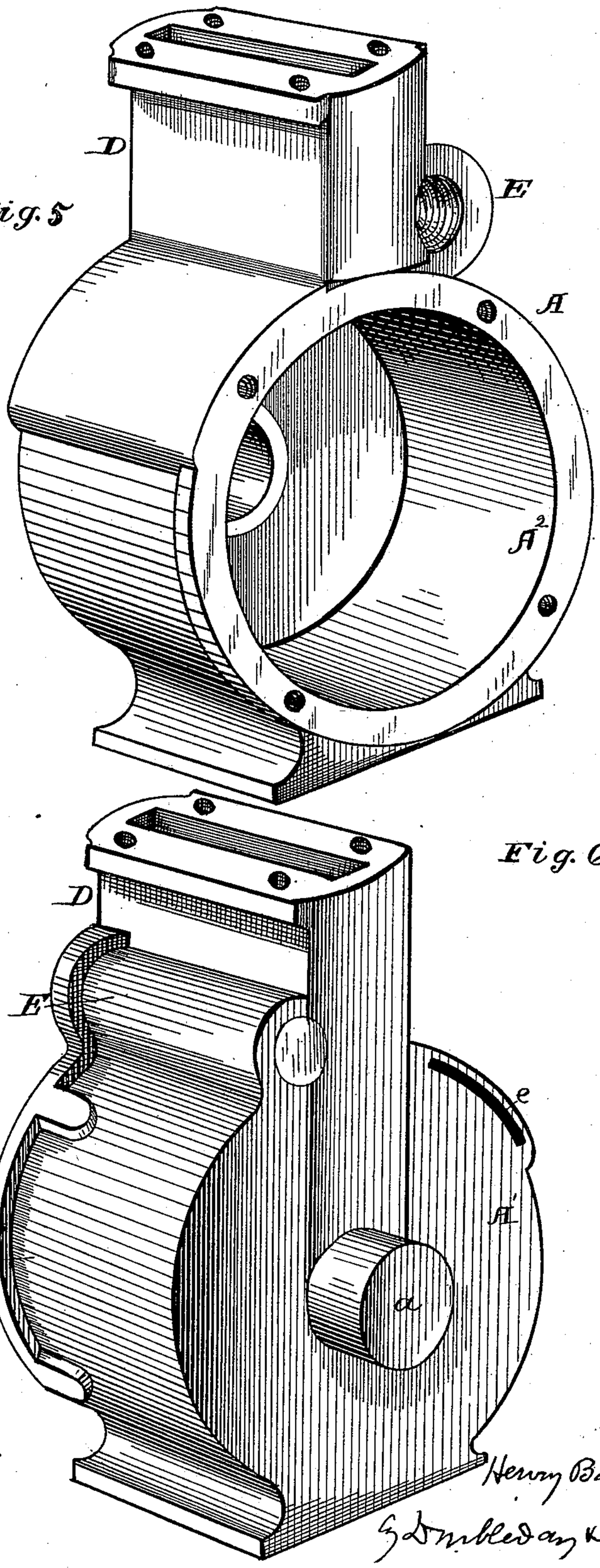

Fig. 6

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UNITED STATES PATENT OFFICE.

HENRY B. DIERDORFF, OF COLUMBUS, OHIO, ASSIGNOR TO JOSEPH A. JEFFREY, OF SAME PLACE.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 350,354, dated October 5, 1886.

Application filed December 14, 1885. Serial No. 185,629. (No model.)

To all whom it may concern:

Be it known that I, HENRY B. DIERDORFF, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a vertical transverse section of an engine containing my invention, taken on line *x x*, Fig. 2. Fig. 2 is a section on line *y y*, Fig. 1. Fig. 3 is a face view of the valve. Fig. 4 is a side view of a portion of the shaft which carries the piston. Figs. 5 and 6 are perspectives of the main casting taken from opposite sides.

In the drawings, A represents the cylinder.

One of the objects of my invention is to simplify the construction of engines of this character, so that they can be cheaply made of a very few pieces, which can be readily taken apart and put together. Heretofore it has been customary to make the cylinder of several pieces, separately from each other, and separately from the steam-chest or initial receptacle and from the valve-support. I have succeeded in so arranging and constructing the parts that I can cast the back wall, A′, and the peripheral wall A^2 of the cylinder, the steam-chest or initial steam-receptacle E, and the valve-holder D all integral—that is, all in one piece of metal except the top plate, C^2, of the valve-holder D, which I prefer to have detachable. When thus formed, these parts of the engine are not only much stronger, but also require but little labor in the construction of the engine, the careful fitting of the numerous parts heretofore necessitated being obviated. The cylinder proper, A, has an interior chamber which is circular in cross-section. With this chamber communicates the chamber in the valve-holder D, and also the exhaust-port *e*.

B′ represents the shaft which carries the piston, this shaft being mounted on the central line of the cylinder. One bearing is provided for the shaft by casting a cylindrical projection, *a*, with the rear wall, A′, the interior socket of which receives the inner end of the shaft. The other end of the shaft has a bearing in the gland or cap-pieces forming the stuffing-box, said pieces consisting of an interior flanged cylinder, F, and an external threaded cap, G. The front wall of the cylinder consists of a detachable plate, A^3, comprising a disk, a^2, which fits tightly into the aperture, and a flange, a^3, which is bolted to the peripheral wall A^2. *a′* is a cylindrical projection having an external screw-thread, with which the aforesaid cap G can engage. The piston B has a cylindrical surface of a width equal to the length of the chamber in the cylinder A. This piston may be rigid with the shaft B′—that is, permanently secured thereto; but to attain another end of my invention I prefer to have it detachable from the shaft, or at least adjustable relatively thereto, so that it can be shifted or adjusted after the occurrence of any wear upon its surface, in order to preserve a tight joint between said surface and the interior surface of the cylinder. This adjustment can be provided for in any of several ways. I have shown in the drawings and will describe that form and construction of the parts which I prefer for accomplishing this purpose. That portion of the shaft B′ around which fits the cylinder B is provided with an enlargement, *b*, which is cylindrical, but which is eccentric to the other portions of the shaft B′, as will be readily understood from Figs. 1 and 4. The piston B has an aperture large enough to allow it to be fitted snugly to this enlarged part *b* of the shaft. It will be seen that if the cylinder be turned around its supporting-part *b* the operative or contact portion of its surface will be moved toward or from the interior wall of the cylinder, and in this way it can be adjusted so as to provide as close a contact as is required. The cylinder, after adjustment, can be fastened to the shaft in any preferred way. In the construction shown it is at one end recessed, as shown at B^3, there being a tubular part, B^2, around the shaft, and a set-screw, *b′*, mounted in the part B^2, and adapted to bear against the part *b*, to clamp the piston. The valve C is formed with recesses C′, the bottom or inner walls of which are preferably curvilinear in section; but they may be of other forms. These recesses are bounded by flanges *c′* at the ends and a web, c^2, at the center. The lower edge is rounded, as shown at c^3, except

that at the ends the flanges c', project downward, as clearly shown in Figs. 3 and 2. In the upper part of the valve there is formed a fine or small needle-aperture, c, for a purpose to be set forth. The thickness of the parts c' is equal to the width of the chamber in the valve-holder D, and the valve is fitted as tightly as possible therein, so that there shall be no passages for steam to escape around it. This chamber in the valve-holder is closed at the top by a plate, C^2, which latter is firmly bolted in place, and is at the center provided with an aperture which receives the thumb-screw d. The aperture in plate C^2 may be opened by removing screw d whenever it is found necessary or desirable to oil the valve, or to relieve the pressure upon the upper surface of the valve.

The steam-receptacle E, which, as above stated, is cast integrally with the cylinder and the valve-holder, is threaded at the open end to receive the feed-pipe. The duct which leads from this part E to the interior communicates at all times with the cavity or recess in the face of the valve C. The front and rear walls are provided with grooves, in which the valve is situated, the total width of the latter being somewhat greater than that of the piston B. The parts c' overlap somewhat the vertical faces of the piston. As above stated, the lower part of the valve is rounded, and this rounded portion fits upon the surface of the piston.

Of the above-described small apertures c' in the valve C as many may be used as are required to admit sufficient steam to provide a cushion in the upper part of the chamber of the valve-holder—that is, between the upper face of the valve itself and the cap-plate C^2—though for most purposes I have found that a single aperture, and that, as said, a very fine one, is sufficient. I have found in practice that I can in this way cushion in a superior manner, and that such cushioning materially facilitates the operation of the engine without materially increasing the wear, and without interfering with a proper balancing of the valve when steam is being admitted upon its recessed face.

Although I have herein spoken particularly of steam as a motive agent, it will of course be understood that my invention is as applicable in mechanisms operated by compressed air, water, &c. The recesses in the valve C above described terminate at points above the bottom of the valve, there being a wall or flange, c^4, at the end adjacent to the piston of the same thickness as the side flanges, c'.

I have above referred to the part C as the valve; but it will be seen that it also serves the purpose of that part of rotary engines commonly spoken of as the abutment. That which I have described as the valve-holder may be considered as composing part of the steam-chest, as it serves more or less the purpose of such chest. The chamber wherein is confined the steam which is utilized to cushion the abutment or valve is during at least a part of the movement of said abutment or valve practically cut off from the live steam. This cutting off I prefer to accomplish in the way shown—that is, by employing an inlet-duct so small that the steam cannot pass very freely therethrough, thereby obviating the necessity of a positively-acting cut-off device, the aperture being so constructed as to be equivalent to such a cut-off for pressure purposes, and by having in connection therewith a chamber which is tight at points other than that of the said inlet duct or port. It will be seen that without this—that is, a contracted passage or cut-off—a free communication for the steam in both directions would be allowed, so that there would be (as is the case with earlier engines of this kind) no variation of steam-pressure in the cushioning-chamber.

I am aware of the fact that heretofore abutments in rotary engines have been forced down against the piston by steam-pressure, as is illustrated in Patent No. 310,531, to Melville and Brown, January 6, 1885, and I do not claim as of my invention devices constructed and arranged as are those shown in said patent. The steam which thus acts in the earlier engines is at all times of substantially the pressure of the boiler, there being no cut-off to permit cushioning; nor do I claim as of my invention devices constructed and arranged as are those in the German Patent No. 1,241 and in the United States Patent No. 156,998, November 17, 1874, Hardy and West. In my case there is a capability of adjustment of the piston relatively to the cylinder-wall which I have not found incident to previous engines of this sort.

What I claim is—

1. In a rotary engine, the combination of the cylinder, a rotary piston therein, a sliding abutment or valve, a chamber wherein steam is introduced to cushion the abutment or valve, and means, substantially as described, for admitting steam to and retaining it in said chamber, whereby the abutment or valve is permitted to vary the steam-pressure in said chamber, substantially as set forth.

2. In a rotary engine, the combination of the cylinder, the piston therein, the valve-holder, the valve or abutment fitting steam-tight therein, and a duct or passage separate from the inlet-passage and communicating with the live steam, and also with the chamber in the valve-holder above the abutment or valve, substantially as set forth.

3. In a rotary engine, the combination of the cylinder, the piston therein, a sliding abutment or valve, a chamber wherein steam is introduced to cushion the abutment or valve, and a reduced port or steam-passage connecting said chamber with the live steam, whereby steam is admitted to said chamber for cushioning the abutment or valve, said chamber being tight at points other than that of said port, substantially as set forth.

4. The herein-described sliding valve, recessed upon the steam-receiving side, and having the webs or flanges c' and c^2, substantially as and for the purposes set forth.

5. The combination of the cylinder, the piston therein, the valve-holder, and the valve C, recessed upon the steam-receiving face and formed with the flanges c', and the top flange or wall, c^5, fitted tightly to the chamber of the valve-holder and provided with an aperture, c', substantially as set forth.

6. The combination of the cylinder, the piston, the sliding valve, the valve-holder open at the upper end, the closing-cap C^2, provided with an aperture, and the screw d, substantially as set forth.

7. In a rotary engine, the herein-described valve provided with an aperture, c', to admit steam to the upper part of the valve holder or chest to cushion said valve, substantially as set forth.

8. In a rotary engine, the combination, with the valve holder or chest having the steam-pipe E communicating with one side, of the valve C, recessed and provided with one or more holes to admit steam to the valve holder or chest above the valve to cushion the valve, substantially as set forth.

9. In a rotary engine, the combination, with the cylinder and the piston-shaft, of a piston adjustable around the shaft and relative to the wall of the cylinder, substantially as set forth.

10. The combination of the cylinder, the sliding valve, the piston provided with an aperture, and the rotating shaft to which the piston is fastened and with which it rotates, passing through said aperture and having its axis of rotation eccentric to the aperture in the piston, substantially as set forth.

11. The combination of the cylinder, the valve, and the rotating shaft provided with an eccentric enlargement, to which the piston is rigidly fastened, substantially as set forth.

12. The combination of the cylinder, the valve, the piston-shaft rotating in the cylinder, the eccentrically-arranged piston rotating with the shaft, and means, substantially as described, for adjusting the point of contact of the piston with the cylinder nearer to or farther from the axis of rotation of the shaft, whereby the degree of eccentricity of the piston may be varied, substantially as set forth.

13. The combination of the cylinder, the sliding valve, the piston-shaft provided with an eccentric enlargement, the piston provided with an eccentrically-arranged aperture, in which is arranged the eccentric enlargement upon the shaft to which the piston is secured, and means, substantially as described, for adjusting the piston upon the eccentric portion of the shaft, substantially as set forth.

14. In a rotary engine, the herein-described casting having the rear wall, A′, the peripheral wall A^2 of the cylinder, the steam-receptacle E, and the four vertical walls of the valve-holder, all formed integrally, substantially as set forth.

15. In a rotary engine, the herein-described casting, consisting of the rear wall, A′, the inwardly-opening box a for the end of a shaft, and the peripheral wall A^2, all formed integrally, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY B. DIERDORFF.

Witnesses:
W. T. McCLURE,
T. M. LIVESAY.