D. N. GREEN.

ROTARY ENGINE.

APPLICATION FILED AUG. 6, 1910.

985,584.

Patented Feb. 28, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

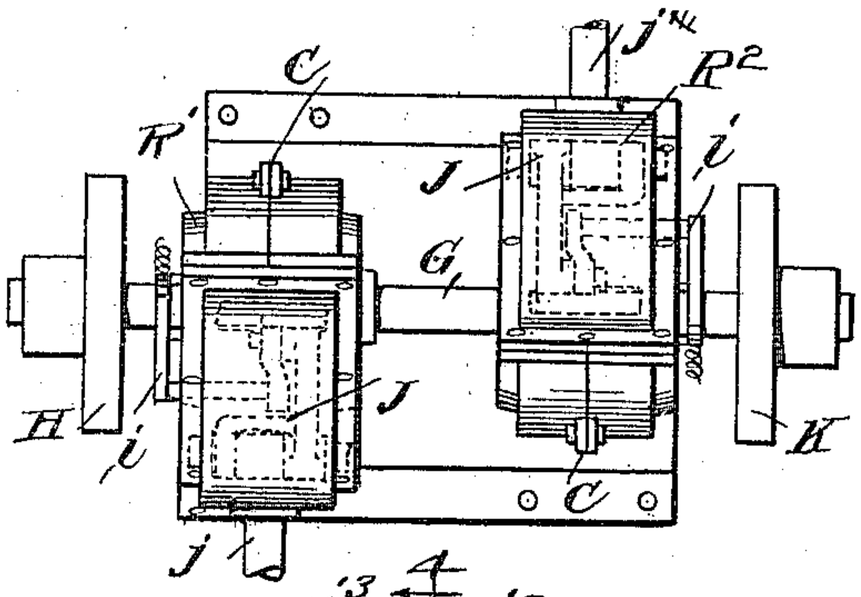


Fig. 2.

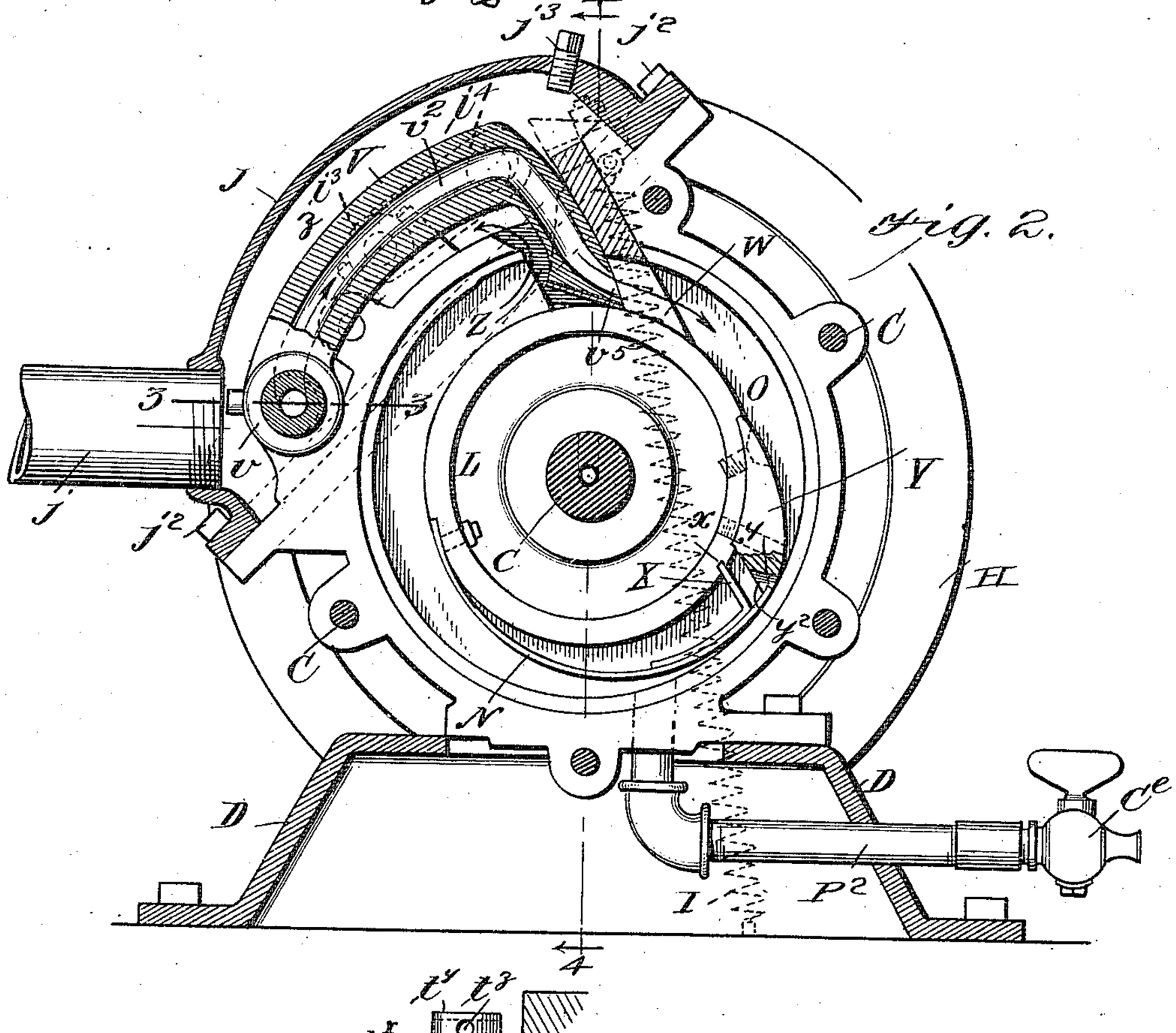
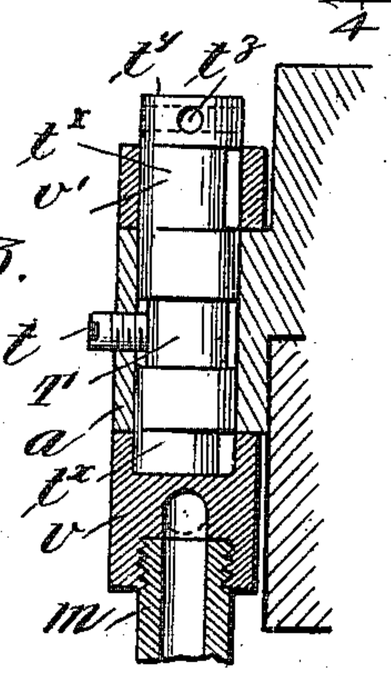


Fig. 3.



WITNESSES:

F. C. Barry

L. A. Stanley

INVENTOR

DAVID N. GREEN

BY Munn & Co.

ATTORNEYS

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2 SHEETS—SHEET 2.

Fig. 4.

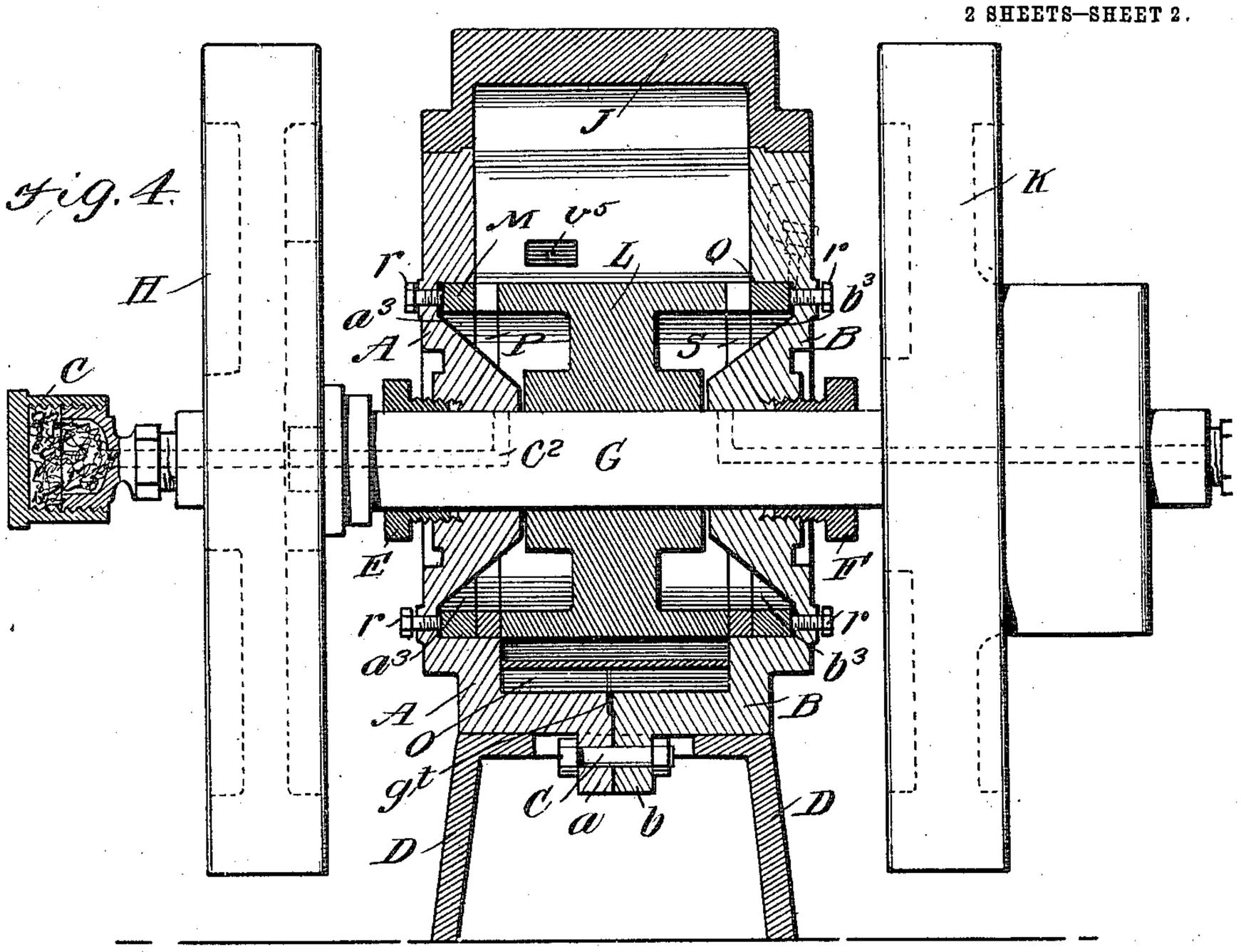


Fig. 5.

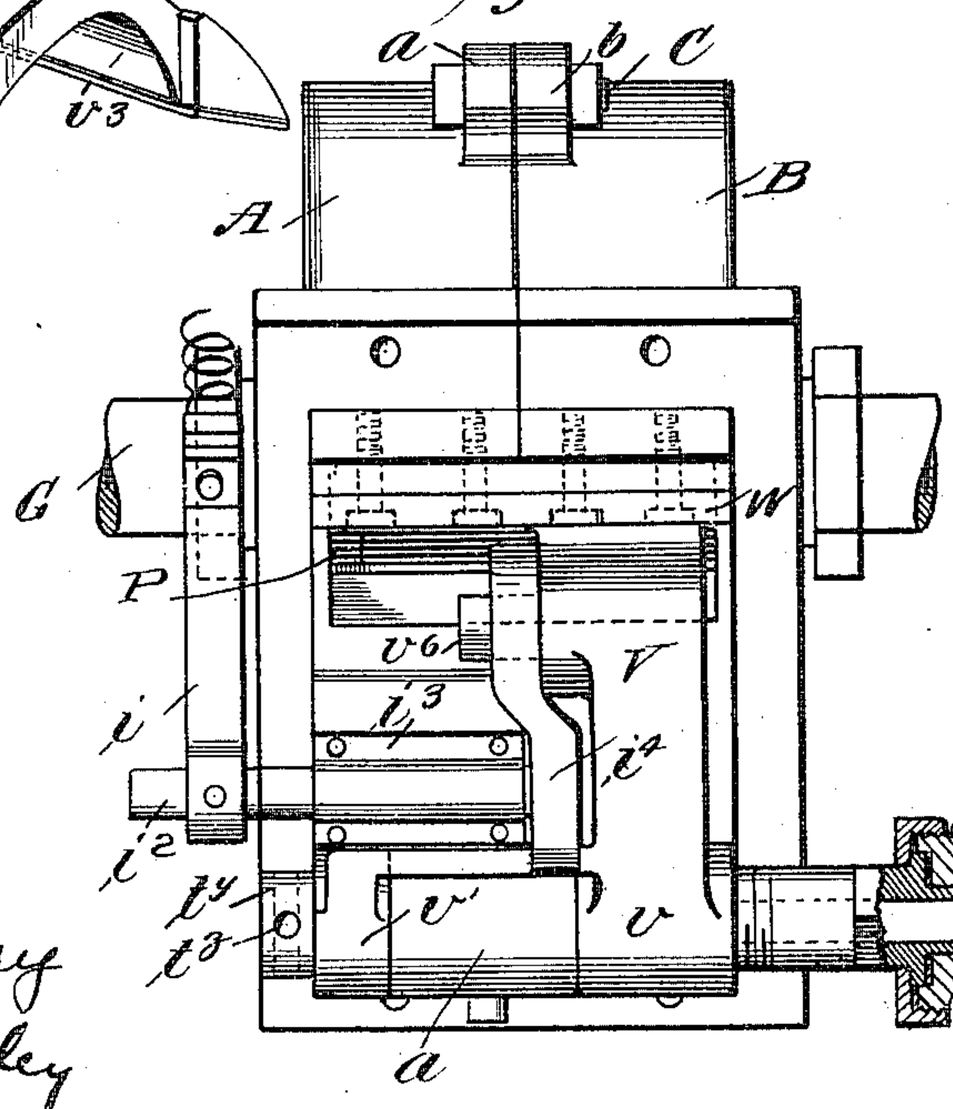


Fig. 6.

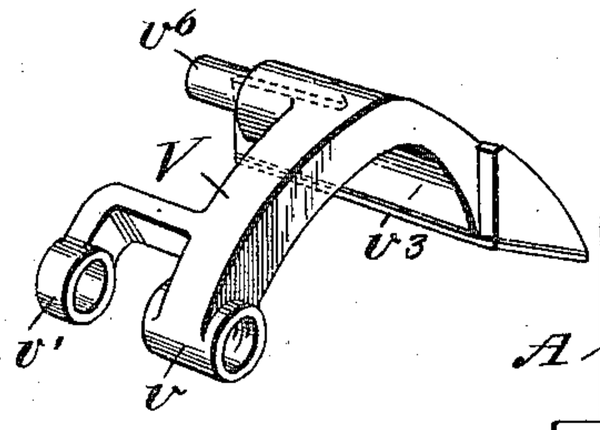
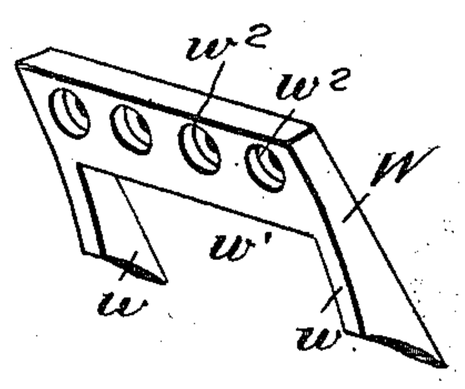


Fig. 7.



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BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

DAVID N. GREEN, OF SUNBURY, OHIO.

ROTARY ENGINE.

985,584. Specification of Letters Patent. Patented Feb. 28, 1911.

Application filed August 6, 1910. Serial No. 575,892.

To all whom it may concern:

Be it known that I, DAVID N. GREEN, a citizen of the United States, and a resident of Sunbury, county of Delaware, and State of Ohio, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention relates to improvements in rotary engines, and it consists in the combinations, constructions and arrangements herein described and claimed.

An object of my invention is to provide certain improvements in an engine, the main features of which are disclosed in a prior application, Serial Number 515,043.

In said prior application I disclosed a rotary engine provided with a power wheel bearing a resilient shoe at the end of a spring, adapted to press against the interior of the chamber.

The present invention contemplates means for preventing the sudden descent of the abutment valve after the shoe has passed it. This means consists in a curved member secured to the power wheel, whose outer surface acts as a slide for bringing the abutment valve into position gradually, thereby preventing jars.

A further object of my invention is to provide a new arrangement by which the abutment valve may be mounted. In the former application, the abutment valve was shown straddling the contiguous flanges of two halves of the casing, so that the casing could not be taken apart without removing the valve. In the present instance, the valve straddles a flange on one-half of the casing, but not the other half, thereby permitting the other half to be removed. The purpose of this arrangement will be more clearly explained in the following specification.

A further object of my invention is to provide a novel form of bearing plate which can be cast in the position in which it is to occupy in the engine.

A further object of my invention is to provide a rotary engine which may be turned backward, so that where two of the rotary engines are connected with the common shaft, one engine may turn the shaft in one direction and the other engine may turn it in the reverse direction.

Other objects and advantages will appear in the following specification and the novel features of the device will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings forming part of this specification in which similar reference characters indicate like parts in the several views and in which—

Figure 1 is a plan view showing two rotary engines coupled up to a common shaft in such a manner as to rotate the latter in either direction. Fig. 2 is a section through the device showing one embodiment of my invention. Fig. 3 is a sectional view along the line 3—3, of Fig. 2. Fig. 4 is a sectional view along the line 4—4 of Fig. 2. Fig. 5 is a plan view showing the abutment valve in position, the upper casing being removed, and certain parts being shown in section. Fig. 6 is a perspective view of the abutment valve, and, Fig. 7 is a perspective view of the bearing plate.

In describing the engine, I shall mention briefly the parts that have already been disclosed in my prior application above referred to, and emphasize those parts that form the improvements over the same.

In carrying out my invention I provide a casing composed of the opposed parts A and B. These parts are provided with the peripheral flanges *a* and *b*, which are placed together, (a suitable gasket g^t being interposed between their faces) and are secured in place by means of bolts or screws C. Each of the parts A and B has an annular recess a^3 and b^3. The casing thus formed is supported upon a suitable base D. The central portions of the members A and B are provided with packing glands E and F, respectively. A central shaft G bears on one end a fly-wheel H, and on the other end a similar fly-wheel K, while at the center of the shaft is located the main power wheel L, which is secured to the shaft in any convenient manner.

Referring now to Fig. 4, it will be seen that in the annular recess a^3 is a ring M. This ring is continuous, while inside of the ring M is a split ring P (Fig. 4 is a section taken between the ends of the split ring.) The member B is provided with a similar set of rings Q and S, the latter being a split ring similar to the split ring P. The power wheel L is in close contact with the rings P and S on either side thereof. The rings are adjustable in a lateral direction by means of the adjusting screws *r* which bear on the larger rings M and Q, as clearly shown in the figure. By this arrangement,

packing need not be used, because the split rings P and S tend to fit closely against the casing sections A and B, thereby effectually preventing the leakage of steam.

The oscillating abutment valve is illustrated in Figs. 2, 3 and 6. It consists of an L-shaped member V, (see Fig. 1), having at its rear end two projections v and v', respectively. The extension v is threaded to receive the end of a pipe m, through which the motive fluid is conveyed. A pivot pin T passes through one of the flanges a (see Fig. 3), and is securely held by means of the set screw t. One end of this pivot pin forms a bearing for the extension v', while the other end forms a bearing for the extension v (as shown in Fig. 3).

A channel v^2 communicates with the hollow extension v, leading to the pipe m (as shown in Fig. 2). This channel passes forwardly and down through the opposite end of the valve. This end of the valve forms the abutment, against which the steam, or other motive fluid, presses in forcing the wheel, or other piston, around. On the bottom of the valve is a wear-resisting shoe v^3 (see Fig. 6), which may be replaced when worn, and which is designed to protect the valve itself.

The oscillating abutment valve is arranged to project into an opening in the top of the casing A and B, so as to deliver the motive fluid to the inner chamber O. The free end of the oscillating valve V is arranged to swing down into contact with a bearing plate W.

From an inspection of Fig. 3, it will be seen that the pivot pin T is provided with eccentric portions t^x, upon which the extensions v and v' of the valve are mounted. One end of the pivot pin has a head t^y, which is provided with openings t^z for the reception of a tool, such as a nail, by means of which, when the set screw t is withdrawn, the pin may be rotated so as to move the abutment valve toward or away from the bearing plate W, in order to take up any wear. The arrangement of the machine by which this bearing plate may be cast in the position in which it will be used in the engine, constitutes, as stated before, one of the improvements in this engine, which makes it superior to the form disclosed in the prior application, above referred to. The shape of the bearing member is clearly shown in Fig. 7. The extensions w of the bearing plate W fit closely to the periphery of the wheel L, as shown in Fig. 2. The space w' between the extensions w is for the passage of the shoe, as will be explained later.

The power wheel, or rotating piston L has secured to it a spring N, which bears on its free end an L-shaped plate X. One arm of this plate extends into a recess x in the power wheel L, as shown in Fig. 2. The end of the spring N fits against a shoulder y of a lug Y, which is screwed to the power wheel, as shown in Fig. 2. The outer surface of this lug is curved, and the purpose of the lug is to provide a member which will support the bottom of the valve after it has passed the shoe X until it reaches the surface of the power wheel on its inward movement. In other words, it is to prevent a sudden jar which the valve would have in passing the shoe X.

It will be observed that the lug Y is perforated at y^2 to permit the motive fluid to act on the shoe X. It will also be observed that in Fig. 1 I have cut away a portion of the inner surface of the casing against which the spring N bears (as shown at q in Fig. 2). The purpose of this cut-away portion will be explained in the operation of the device.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood.

The steam, compressed air or other motive fluid is supplied through the pipe m, and is carried down through the channels v^2 and out at the opening v^5. The fluid fills the space O, and presses on the shoe X, being admitted thereto by the opening y^2 in the lug Y. The wheel L is therefore driven around in the direction indicated by the arrows. The exhaust gases are driven by the shoe X up through the opening Z, underneath the oscillating valve into the space z, underneath the housing J, whence it finally escapes through the exhaust pipe j, (see Fig. 2). As the spring end passes underneath the valve v, it raises the latter. After the valve has passed the shoe X, it slides down the curved surface of the lug Y, being brought into contact with the surface of the rotating wheel again by the spring I. The means by which this spring causes the return of the valve is shown in Fig. 5. In this figure, it will be seen that the spring I is attached to a rock arm i, which is pivoted on a shaft i^2. The latter is supported in a bearing i^3 on top of the casing A, and has an integral arm i^4, which is pivotally connected with a cylindrical lug v^6 on the valve v. It will be seen, therefore, that the spring S will bring the valve back into position in contact with the rotating wheel whenever it is elevated therefrom by the shoe. I find that a long spring is less apt to be stretched beyond its elastic limit, than a shorter one. When the valve is in its inner position, it serves as an abutment against which the pressure of the motive fluid is exerted in driving the wheel around.

The pivoting of the abutment valve on the flange a of the casing member A will permit the casing member B to be separated from the casing member A before the valve

is removed. An important advantage is gained by this construction. In making the bearing plate W, the valve may be lowered into its position and the plate may be cast of Babbitt metal in the precise position it is to occupy in the engine. The bolts C may then be withdrawn, and the casing portion B may be taken away laterally, thereby permitting the ready removal of the bearing member W. The latter then may be provided with the openings w^2 for holding the screws, which secure the plates in place. It will be seen that these openings are countersunk, so as to permit the heads of the screws to lie within the plate. The housing J is secured to the casing members A and B by means of the bolts j^2 (see Fig. 2), and is for the purpose of protecting the valve from injury, and also for directing the exhaust fluid into the exhaust pipe j. The screw plug j^3 is for the purpose of oiling the device. I may also supply oil by means of the oil cup c (see Fig. 4). This is secured at one end of the shaft G, and communicates with the bearing on the latter by means of the channel c^2. At the bottom of the engine, I arrange a drain pipe P^e, which is provided with a drain-cock C^e, by which the device may be drained when needed.

The gasket g^t plays an important part in the construction of this engine. Naturally there is some wear on the sides of the spring N and the shoe X, and this wear is taken up by the use of a thinner gasket, which permits the two sections of the casing to come closer together.

It will be noticed that there is a cut-away portion q (see Fig. 2) adjacent to the exhaust opening Z. This is for the purpose of permitting the reversal of the shaft G, so as to turn the wheel L in a backward direction. If this cut-away portion were not present, the spring N might strike the edge of the opening, but, as it is, while it raises slightly, it does not come beyond the edge of the opening, and is cammed down into position by the curved end of the opening q when the wheel is rotated in a backward direction. The purpose of permitting the engine to run backwardly is shown in Fig. 1. I have shown two rotary engines like that already described. The engine R^1 is connected with the shaft G, so as to rotate it in one direction, while the engine R^2 is connected to rotate it in the other direction. I may use one of these engines when the shaft is to be turned in one direction, and the other when it is to be turned in the reverse direction, and as far as I am aware, mine is the only rotary engine which is so constructed as to enable the device to be turned in a reverse direction.

I claim:

1. In a rotary engine, a casing, an exhaust opening in said casing, a pivoted abutment valve having a portion adapted to extend into said casing, a passage in said abutment valve to deliver motive fluid into the interior of said casing, the interior of said casing being cut away at a point adjacent said exhaust opening underneath the abutment valve, a power wheel disposed centrally within said casing and provided with a recess in its periphery, a spring secured to said power wheel at one end, an L-shaped shoe secured to said spring near its free end, one end of said L-shaped shoe being adapted to enter the recess in said power wheel, and a lug secured to said power wheel near said shoe, said lug being provided with a shoulder adapted to hold the free end of said spring, and being provided with perforations for permitting the access of motive fluid to said shoes and having a curved surface extending from said shoulder inwardly to the outer surface of said power wheel.

2. In a rotary engine, a casing, means for delivering motive fluid to the interior of said casing, a power wheel, a pivoted abutment valve arranged to contact with said power wheel, a spring secured to said power wheel, a shoe carried by said spring and adapted to receive the pressure of the motive fluid for driving the wheel, and a lug secured to said power wheel near said shoe and provided with openings for permitting the entrance of motive fluid to said shoe, said lug having a shoulder arranged to retain the end of said spring in position and being provided with a curved surface extending from said shoulder to the surface of the power wheel.

3. In a rotary engine, a casing comprising two members, each of said members being provided with contiguous flanges, means for securing said flanges together, an abutment valve provided with a pair of extensions adapted to straddle a flange on one of said casings, means for pivotally securing said extensions to said flange, said casing members both being cut away to provide an opening to permit the end of the valve to be moved into and out of the interior of said casing, a bearing plate adapted to be engaged by the end of said abutment valve, means for moving the abutment valve toward and away from said bearing plate, a rock shaft pivotally mounted on one of said casing members, an integral arm secured to said rock shaft at one end, and having a pivotal connection with said abutment valve, an arm secured to the other end of said rock shaft, and a tension spring secured to the second-named arm.

4. In a rotary engine, a casing comprising two parts each of said parts being provided with contiguous flanges, means for securing said flanges together, an abutment valve provided with a pair of extensions adapted to straddle a flange on one of said casings,

means for pivotally securing said extensions to said flanges, said casing members both being cut away to provide an opening to permit the end of the valve to be moved into and out of the interior of said casing, a bearing plate adapted to be engaged by the end of said abutment valve, and means for moving the abutment valve toward and away from said bearing plate.

5. In a rotary engine, a casing comprising two parts, each of said parts being provided with contiguous flanges, means for securing said flanges together, an abutment valve provided with a pair of extensions adapted to straddle a single flange on one of said casing members, the last mentioned flange serving as the pivotal bearing for said abutment valve, and said casing members both being cut away to provide an opening to permit the end of the valve to be moved into and out of the interior of said casing, and a bearing plate adapted to be engaged by the end of said abutment valve.

DAVID N. GREEN.

Witnesses:
FRED D. BAKER,
DON D. CRANFORD.