No. 615,834. Patented Dec. 13, 1898.

C. V. FITE.

ROTARY ENGINE.

(Application filed Oct. 19, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

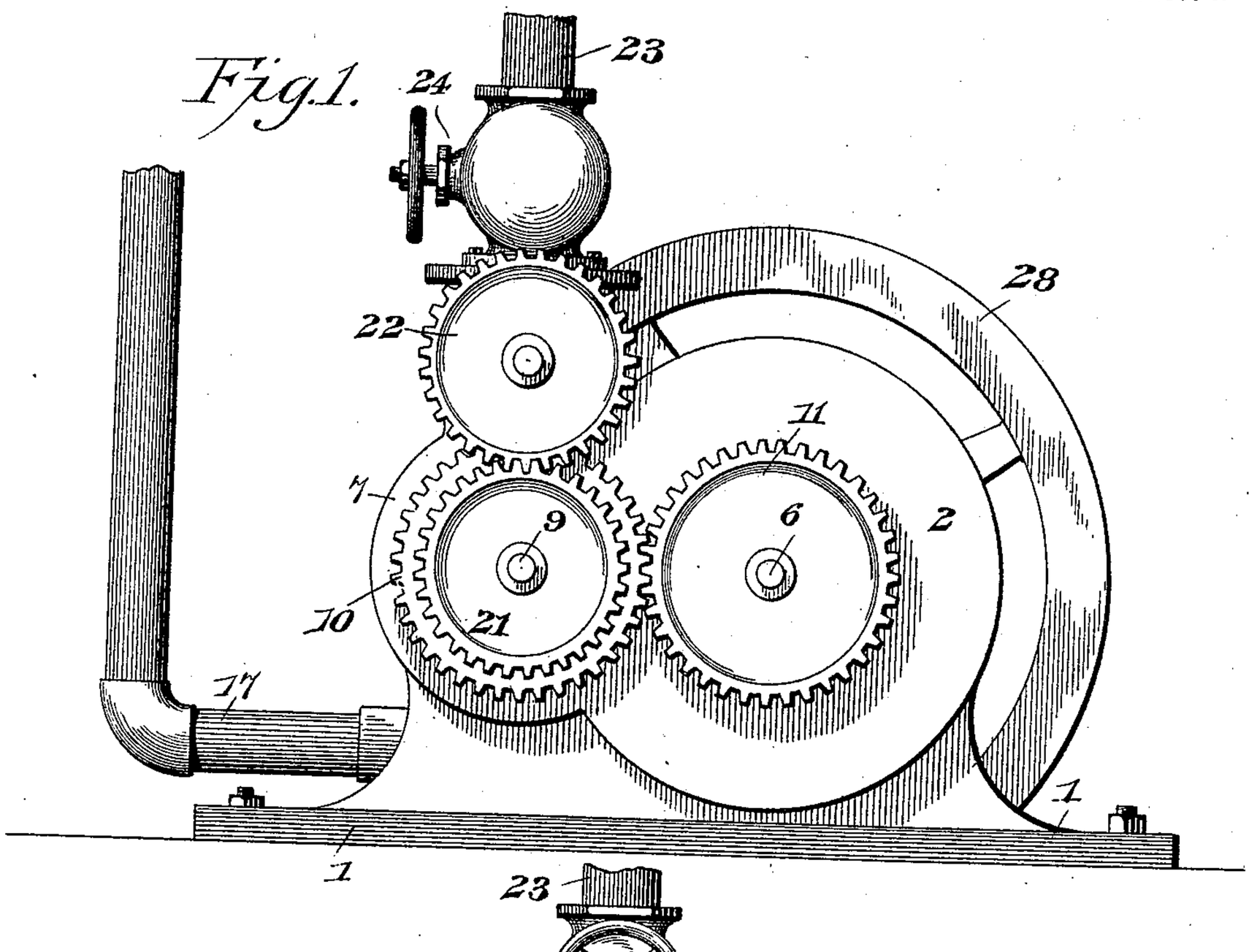
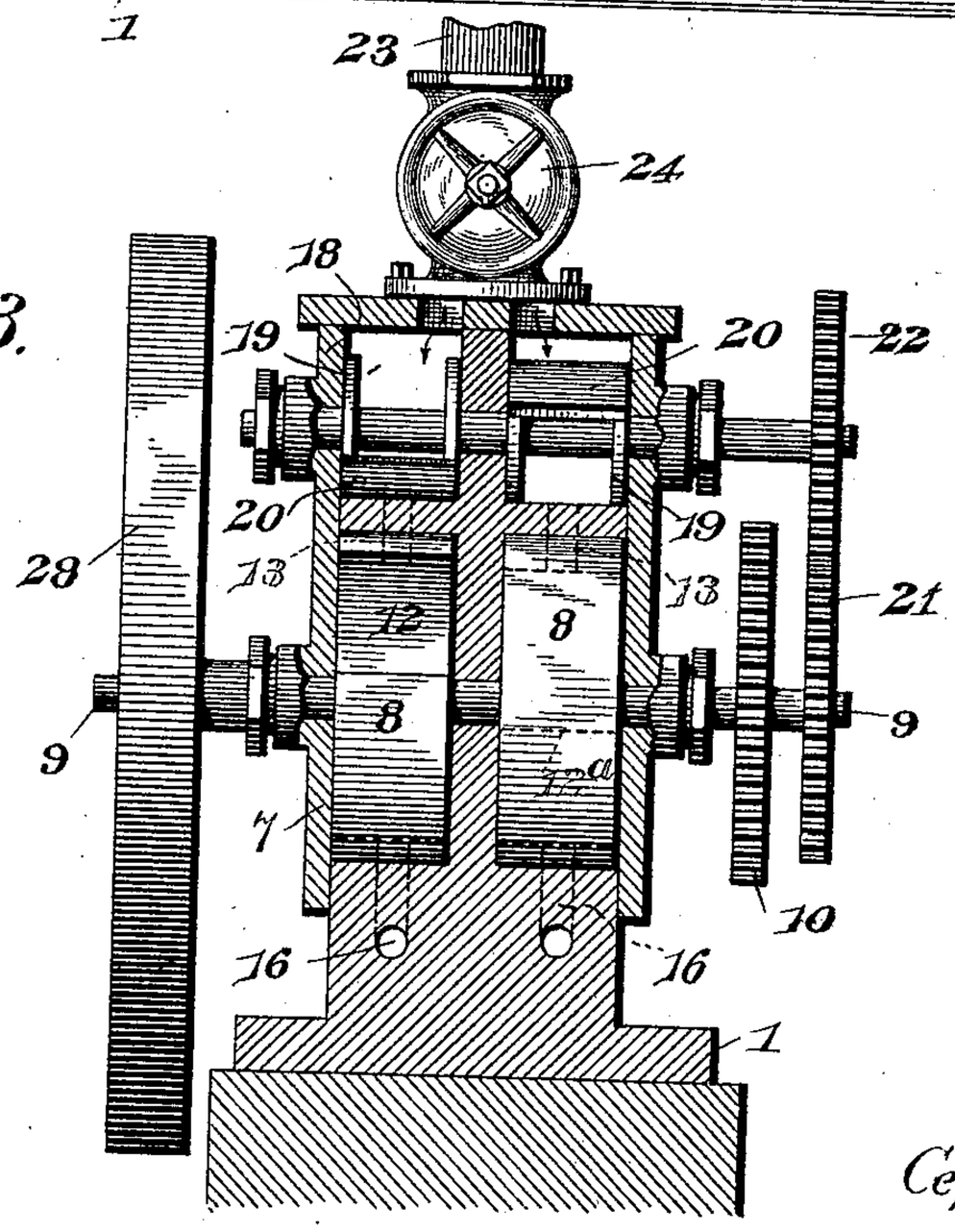


Fig. 3.



Witnesses
Jas. F. McCathran
D. E. Boyle

Inventor
Cephas V. Fite

By his Attorneys,
Cushman & Co.

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2 Sheets—Sheet 2.

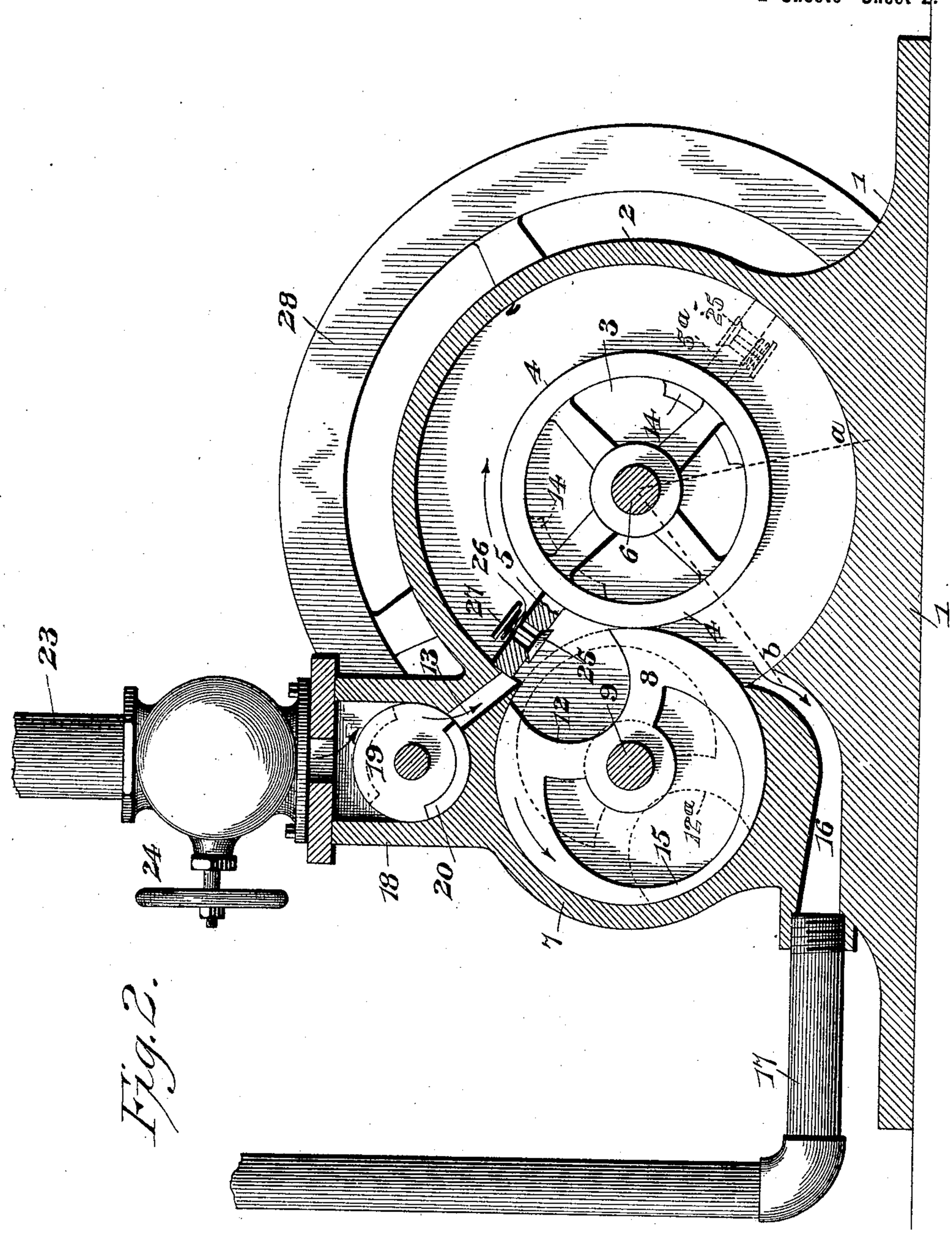

Fig. 2.

Witnesses
Jas. K. McCathran
[illegible]

Inventor
Cephas V. Fite
By his Attorneys,
Church & Co.

UNITED STATES PATENT OFFICE.

CEPHAS V. FITE, OF MOUNT HOLLY, NORTH CAROLINA, ASSIGNOR OF ONE-HALF TO ROBERT H. STOWE, OF SAME PLACE.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 615,834, dated December 13, 1898.

Application filed October 19, 1897. Serial No. 655,697. (No model.)

To all whom it may concern:

Be it known that I, CEPHAS V. FITE, a citizen of the United States, residing at Mount Holly, in the county of Gaston and State of North Carolina, have invented a new and useful Rotary Engine, of which the following is a specification.

My invention relates to rotary engines, and has for its object to provide an improved safety or equalizing valve device whereby back pressure due to a vacuum in rear of the piston-wing or moving abutment, due to the premature cutting off of the motive agent or due to the fact that by reason of a reduction of load the piston is moved at a more rapid rate than it is actuated by the motive agent, is prevented, whereby an approximately uniform speed of rotation is attained.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claim.

In the drawings, Figure 1 is a side view of a rotary engine constructed in accordance with my invention. Fig. 2 is a sectional view of the same, taken through one of the cylinders perpendicular to the plane of the axis of the piston. Fig. 3 is a vertical section taken parallel with and in the plane of the axes of the rolling fixed abutment and the cut-off valve.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

Supported by a base 1 is a cylinder 2 of annular construction, in which is mounted a piston 3, preferably of centrally-open construction, with a rim 4, which forms the inner concentric wall of the cylinder and carries the piston-wing or moving abutment 5. In practice the cylinder and piston, as just described, are duplicated, and the piston-wings or abutments are arranged at diametrically opposite points (see dotted lines 5^a in Fig. 2) for the purpose, as will be readily understood, of maintaining a constant actuating pressure upon the rotary member of the machine, both pistons being carried by a common shaft 6.

Revolubly mounted in an extension 7 of the casing is a fixed abutment 8, having a spindle 9, carrying a gear 10, which meshes with a corresponding gear 11, fixed to the piston-shaft. This fixed abutment, which is of the rolling type and rotates with the piston, is provided with a peripheral recess 12 to allow the passage of the piston-wing 5, and as the piston and rolling abutment are geared together for simultaneous rotation it is obvious that said parts will operate synchronously, the periphery of the abutment being normally in contact with the rim 4 of the piston to prevent back pressure of motive pressure admitted through an inlet-port 13 in the casing. Obviously the feature of the fixed abutment 8 is also duplicated, with the recess 12^a (see dotted lines, Fig. 2) of the coöperating abutment arranged in a position diametrically opposite to the recess 12. In order that the piston may be balanced to avoid jar during rotation and insure a uniform motion, I provide it at a point 14 opposite to the piston-wing 5 with a counterbalancing block or enlargement, and in the same way the abutment 8 is cut away, as shown at 15, for a similar purpose. An exhaust-port 16 communicates with the interior of the cylinder at a point on the opposite side of the extension 7 from the inlet-port 13, and communicating with said exhaust is a suitable conductor 17.

In connection with the above-described construction and also located in an extension 18 of the casing, forming a valve-chamber, is a rotary cut-off valve 19, designed for controlling the inlet-port 13 and provided with a segmental closing face 20 of an extent approximately equal to one hundred and thirty degrees, the function of this closing cut-off face being to exclude motive agent from the cylinder during a portion of the rotation of the piston to allow the expansion of said motive agent to be utilized—as, for instance, while the piston-wing is moving from *a* to *b* (see Fig. 2) or through an arc of sixty or seventy degrees. At *b* the space in rear of the piston-wing communicates with the exhaust-port, and from this point until the piston-wing reaches the position indicated in full lines in Fig. 2 said wing is passing through the recess 12 of the fixed abutment. Motive agent therefore is not admitted to the cylinder until the piston-wing approaches said

position indicated in full lines in Fig. 2. In order to secure a synchronous operation of the piston and cut-off valve, a second gear 21 on the spindle of the fixed abutment 8 is arranged to mesh with a gear 22 on the spindle of the valve 19, a second or duplicate cut-off valve being used in connection with the duplicate cylinder hereinbefore mentioned. Motive agent is admitted to the cut-off-valve casing through a supply-pipe or equivalent conductor 23 and may be controlled by any suitable means, such as the throttle-valve mechanism 24.

From the above description it will be understood that in operation the motive agent, as steam, is admitted through the inlet-port 13 in rear of the piston-wing when the latter is in the position indicated in full lines in Fig. 2, and this admission of motive agent continues approximately until the piston-wing reaches the point *a*, when by means of the cut-off segment 20 of the valve 19 further admission is checked, and the piston-wing is driven by the expansion of the motive agent until it reaches the point *b*, where the exhaust takes place. Obviously the piston in the twin cylinder receives the direct application of the motive agent during the time that the piston-wing 5 is moving from the point *a* to the position indicated in full lines in Fig. 2, where it again receives pressure, as above described. I have found in practice, however, that particularly when there is a sudden reduction of load the cut-off of the motive agent is liable to cause a vacuum in rear of the piston-wing, due to the speed of the piston being in excess of that which it would receive by a continued pressure of the motive agent. Obviously the creation of such a vacuum has the effect of producing an opposite or backward impulse, and in order to counteract this effect I have found it desirable to place in the piston-wing a safety or equalizing valve 25, normally held seated by the pressure of the motive agent against the rear surface of the piston-wing, from the fact that said valve opens rearwardly or in the opposite direction to the application of direct pressure to the piston-wing and also held when normally seated by an actuating-spring 26 employed for this purpose. This valve, however, is provided at the front end of its stem, and hence exposed at the front side of the piston-wing, with a pressure-plate 27, and therefore an unequal pressure applied to the opposite face of the piston-wing or an excessive pressure applied to the front surface thereof by reason of an induced vacuum in rear of the wing has the effect of repressing the safety or equalizing valve, and thus permitting an immediate equalization of pressure to avoid the above-mentioned restraining or backward impulse. By the use, therefore, of a safety or equalizing valve constructed substantially as indicated I am enabled to check the introduction of the motive agent by means of a cut-off such as described without the risk of causing back pressure upon the piston due to the creation of a vacuum in rear of the piston-wing. The immediate response of the safety or equalizing valve to any induced vacuum will accomplish an equalization which permits the piston to continue uninterruptedly in its course, whereby a uniform speed of rotation is maintained. In the drawings I have shown a balance or fly wheel 28 carried by the piston-shaft, for the purpose well known in the art.

In practice various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having described my invention, what I claim is—

In a rotary engine, the combination of the cylinder having inlet and exhaust ports, a rotating piston carrying a piston-wing having a relief-port therein, a rearwardly-opening safety or equalizing valve 25 seated at the rear side of the wing within one end of the port and having a stem extended through said port and carrying at the front side of the wing a pressure-plate, a spring interposed between the pressure-plate and the adjacent side of the piston-wing, and the revoluble fixed abutment 8 arranged in a plane between the inlet and exhaust ports, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CEPHAS V. FITE.

Witnesses:
E. C. BOYTE,
E. M. ASBURY.