No. 867,172. PATENTED SEPT. 24, 1907.

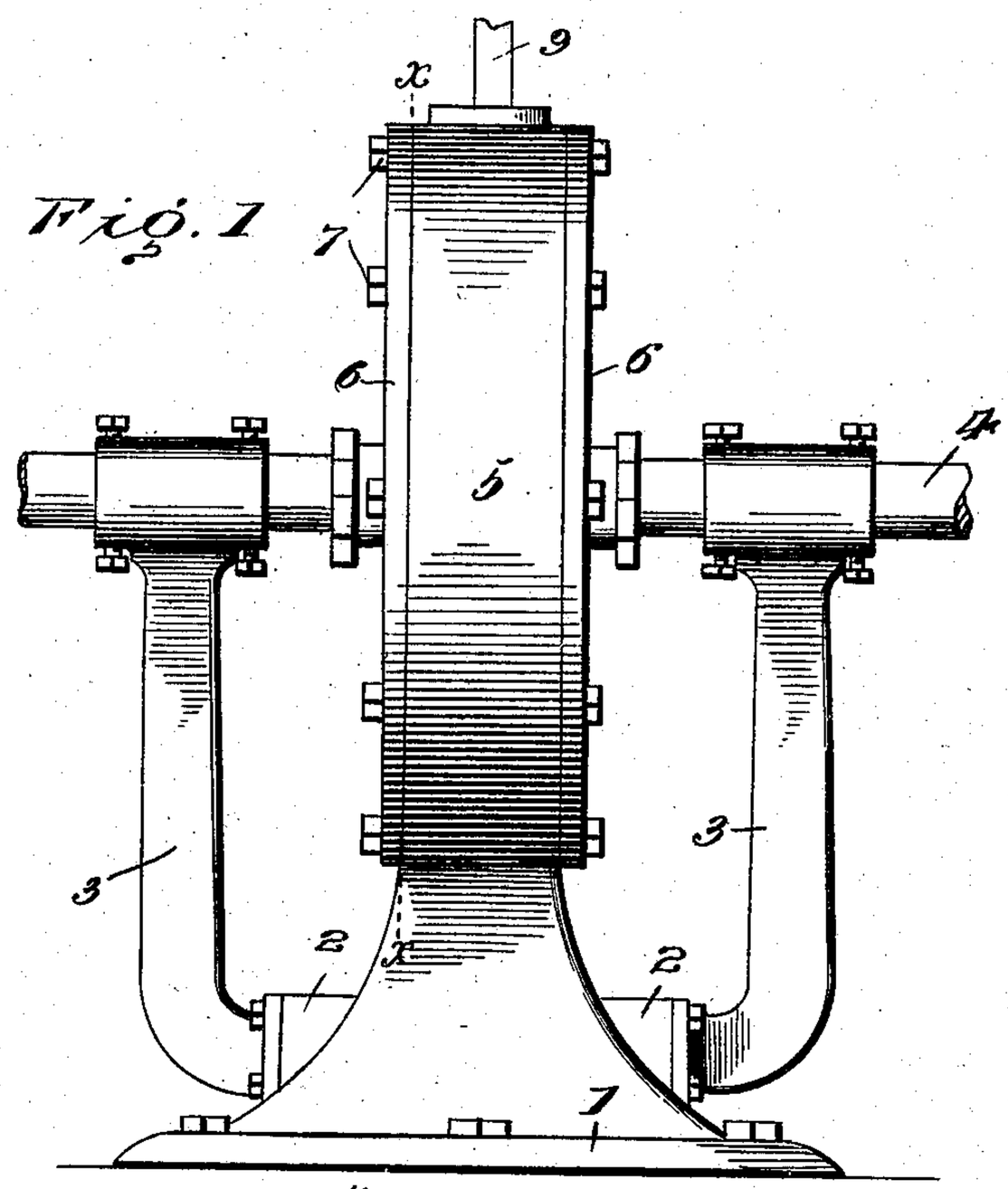
J. B. & W. C. TROUP.

ROTARY ENGINE.

APPLICATION FILED NOV. 30, 1906.

2 SHEETS—SHEET 1.

Fig. 1



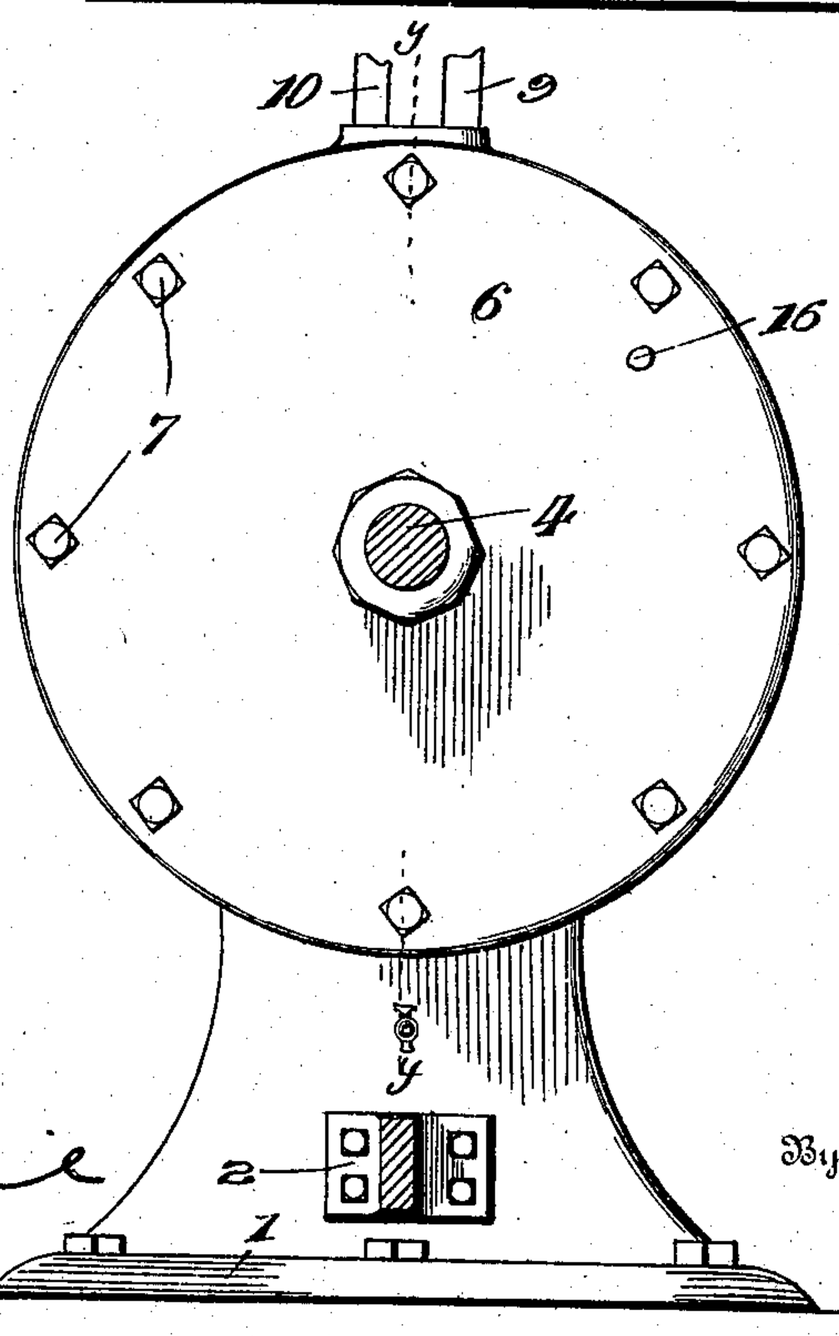


Fig. 2.

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2 SHEETS—SHEET 2.

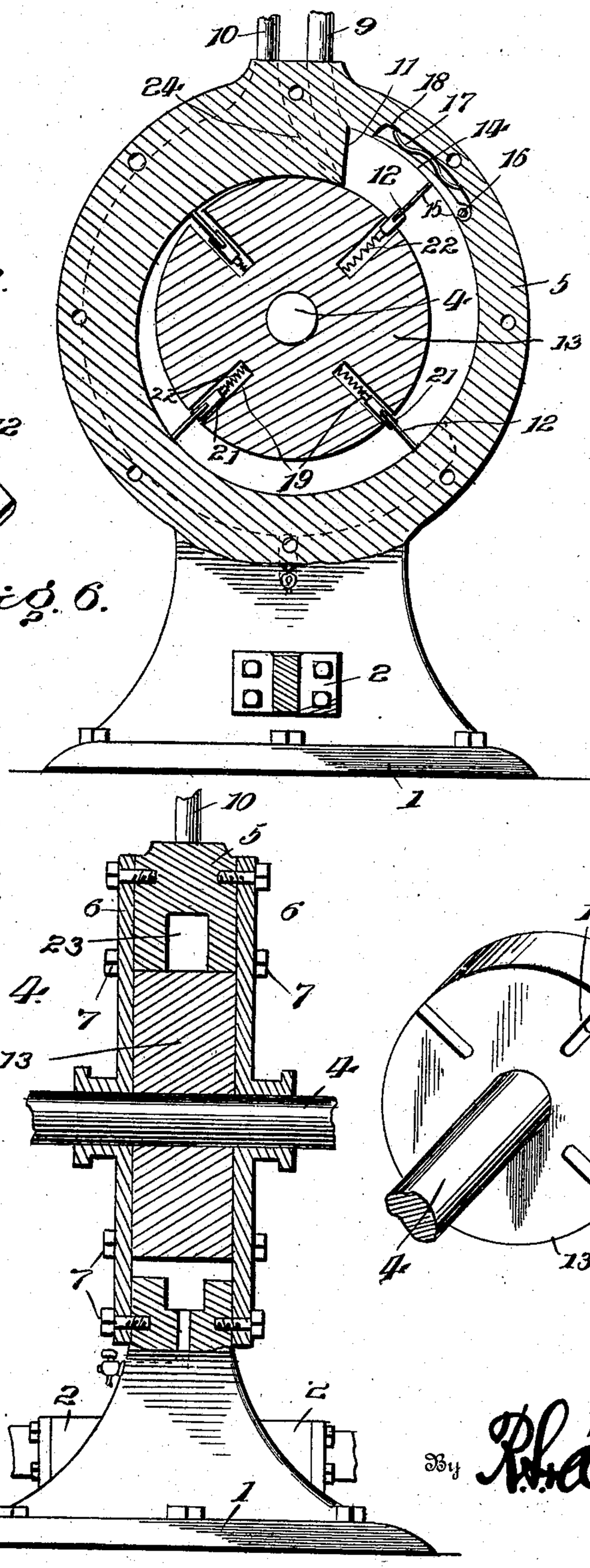

Fig. 3.

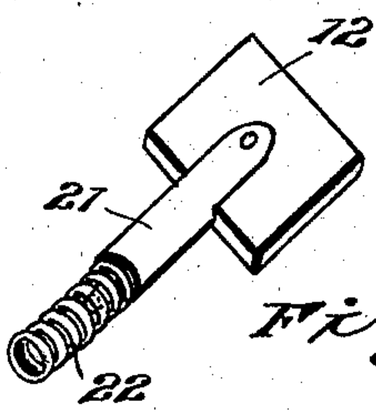

Fig. 6.

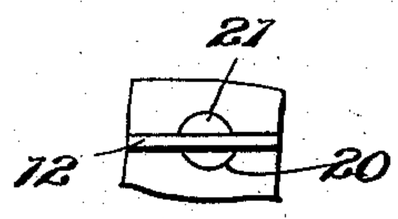

Fig. 7.

Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE.

JAMES B. TROUP AND WALTER C. TROUP, OF MIDLAND, INDIANA.

ROTARY ENGINE.

No. 867,172. Specification of Letters Patent. Patented Sept. 24, 1907.

Application filed November 30, 1906. Serial No. 345,716.

To all whom it may concern:

Be it known that we, JAMES B. TROUP and WALTER C. TROUP, citizens of the United States, residing at Midland, in the county of Greene and State of Indiana, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

Motors, and particularly engines, operated by means of motive power, such as compressed air and steam, and of the rotary type, are preferable since they are continuous and are free from the dead point incident to engines of the reciprocating type. Such engines have not come into general use because of the difficulty experienced in preventing leakage and because the parts quickly wear.

This invention provides an engine of the rotary type involving a novel construction which admits of the motive medium being applied and utilized to the best possible advantage and which will obviate a rapid wear of the working parts and be free from the back lash incident to escape of steam past the pistons.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result, reference is to be had to the following description and accompanying drawings.

While the invention may be adapted to different forms and conditions by changes in the structure and minor details without departing from the spirit or essential features thereof, still the preferred embodiment is shown in the accompanying drawings, in which:

Figure 1 is a front view of a rotary engine embodying the invention. Fig. 2 is a side view of the engine having the bracket and the head on the near side omitted. Fig. 3 is a section on the line *x*—*x* of Fig. 1. Fig. 4 is a transverse section on the line *y*—*y* of Fig. 2. Fig. 5 is a detail perspective view of the hub and a portion of the engine shaft. Fig. 6 is a detail perspective view of a piston, its stem and coöperating spring. Fig. 7 is an edge view of a portion of the hub showing the relation between the slot and opening thereof and the piston and stem.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The engine is provided with a base 1 which is adapted to be anchored, or otherwise secured to a bed of masonry, or other material, so as to secure the same firmly when in operation. Projections 2 extend from opposite sides of the base 1 and brackets 3 are bolted thereto, said brackets being provided at their upper ends with bearings in which is mounted the engine shaft 4 to which the band pulleys, fly-wheel and hub are attached in any manner.

The cylinder 5 is closed at opposite sides by means of heads 6 which are bolted thereto, the bolts 7 passing through corresponding openings in the heads and in the body of the cylinder. An enlargement 8 is provided at the upper end of the cylinder and receives pipes 9 and 10, the former having connection with a suitable source of supply of motive medium, such as compressed air, or steam, and the latter adapted to carry off the exhaust, or spent medium. A shoulder 11 is provided in the inner wall of the cylinder and the steam port with which the pipe 9 communicates, opens therethrough so as to direct the jet against a side of the pistons 12 applied to the hub 13. Adjacent to the shoulder, or off-set 11, is located a buffer 14 which receives the impact of the pistons as the latter fly outward after clearing the shoulder 11. The buffer 14 is preferably a wing, or plate, curved in its length to correspond to the inner circumference of the cylinder and of a width corresponding to the width of the cylinder so as to make a close fit with the heads 6 and yet not be clamped thereby. The buffer 14 tapers throughout its length being thickest at its pivotal end which is arranged remote from the shoulder 11. The buffer 14 has a limited movement, a shoulder 15 at its pivotal end adapted to engage with a corresponding shoulder of the cylinder to limit the inward movement of the buffer at its free end. The buffer, or wing, 14 may be pivotally connected to the cylinder in any manner, but it is preferred to have an opening formed transversely through the thickened end portion to receive a pivot pin 16 which is supported at its ends in the heads 6 of the cylinder. The recess formed in the wall of the cylinder to receive the wing 14, corresponds in depth to the shape of said wing in edge view with the result that said wing has its inner side corresponding to the inner wall of the cylinder.

A spring 17 is interposed between the wing, or buffer, 14 and the cylinder, and normally exerts an inward pressure upon said wing to hold its free end at the limit of its inward movement so that the impact of the pistons when striking the wing, after clearing the shoulder 11, is neutralized by said spring. The spring 17 is preferably constructed of a strip of spring metal and is seated in a recess 18 formed in the wall of the cylinder and opening into the recess receiving the said buffer, or wing.

The hub 13 is eccentrically mounted with reference to the space of the cylinder and touches the same adjacent to the shoulder 11 and from the point of contact extending circumferentially around to the shoulder 11. The space between the opposing walls of the hub and cylinder gradually increases, being *nil* at the point of contact and of a maximum depth at the shoulder. The hub 13 is of a width corresponding to the transverse extent of the cylinder so as to fit snugly between the heads 6 without being bound thereby. Radial slots 19 extend inward from the edge of the hub a distance to receive the pistons 12 and admit of their having a radial

reciprocating movement, the amplitude of which is determined by the depth of the shoulder 11. The slots 19 intersect radial openings 20 which are bored into the hub to receive the stems 21 of the pistons and coil springs 22 which press the pistons outward and hold them in contact with the inner wall of the cylinder. The hub 13 is fast to the shaft 4 so as to rotate therewith. The stems 21 are of rounded form and snugly fit within the openings 20 and their outer ends are spilt so as to receive the pistons 12 which are inserted and secured by means of rivets, or like fastenings.

A channel 23 is in communication at one end with the exhaust 10 and is formed in the inner wall of the cylinder and terminates at 24 a short distance from the shoulder 11. When the engine is in operation, the steam, or fluid medium, admitted through the supply pipe 9 strikes the piston immediately in advance of the shoulder 11 and drives the same forward carrying with it the head 13 and the shaft 4. When said piston reaches the point 24 in its travel, the next succeeding piston clears the shoulder 11 and receives the impact of the escaping jet. About this instant, the piston, previously acted upon, clears the point 24 and the steam, or fluid medium, confined between it and the succeeding piston, escapes by way of the channel 23 to the exhaust 10 and is discharged at the predetermined point. As the pistons 12 clear the shoulder 11, they fly outward by the action of the springs 22 and the impact incident to the quick movement is received upon the buffer, or wing 14, and is neutralized by the spring 17. It will thus be seen that the part 14 sustains the force of the blow, receives the wear and neutralizes the shock. Inasmuch as the space gradually decreases from right to left from the shoulder 11 to the exhaust 10, the pistons are gradually moved inward against the tension of the springs 22 which are slowly compressed and the instant the pistons clear the shoulder 11, they fly outward and are instantly acted upon by the motive medium whether the same be liquid or fluid.

Having thus described the invention, what is claimed as new is:

1. In a rotary engine, the combination of a cylinder having an inner shoulder, a hub eccentrically mounted within the cylinder and provided with outwardly movable pistons and a wing arranged within the cylinder adjacent to the shoulder thereof and in front of said shoulder to receive the impact of the pistons as the same fly outward after clearing the aforementioned shoulder.

2. In a rotary engine, the combination of a cylinder having a shoulder upon its inner wall and having a recess in front of said shoulder, a wing located in said recess and having a limited play at one end towards and from the axis of the engine, a spring interposed between said wing and the cylinder to normally press the free end of the wing inward, and a hub mounted eccentrically within the cylinder and provided with pistons adapted to have an inward and outward movement and normally acted upon by an outward force to fly outward after clearing the aforementioned shoulder of the cylinder, the outward shock and wear of the piston being taken up by the said spring actuated wing.

3. In a rotary engine, the combination of a cylinder having an inner shoulder to form an abutment and provided with an inlet port opening through the face of said shoulder and having an exhaust and provided with a channel in communication at one end with the exhaust and extending around the inner wall of the cylinder to within a short distance of the aforementioned shoulder, and a hub eccentrically mounted within the cylinder and provided with radially movable pistons adapted to fly outward upon clearing the aforementioned shoulder.

4. In a rotary engine, the combination of a cylinder provided with inlet and exhaust ports and having an inner shoulder and a channel in its inner wall, said channel being in communication with the exhaust port and terminating a short distance from the aforementioned shoulder, a wing fitted in a recess in the inner wall of the cylinder adjacent to and in front of the said shoulder and having a limited movement at the end adjacent to the shoulder and pivoted at its opposite end to the cylinder, a spring interposed between said wing and the cylinder and located in a recess formed in the latter, a hub eccentrically mounted within the cylinder and provided with radial openings and intersecting slots, pistons slidably mounted in the slots, stems attached to the pistons and arranged to operate in the said openings, and springs mounted in the openings and normally exerting an outward pressure upon the pistons.

In testimony whereof we, affix our signatures in presence of two witnesses.

JAMES B. TROUP. [L. S.]
WALTER C. TROUP. [L. S.]

Witnesses:
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WILLIAM CAMPBELL.