No. 805,513. PATENTED NOV. 28, 1905.

T. R. ALMOND.

REACTION ENGINE.

APPLICATION FILED FEB. 9, 1905.

Fig. 1.

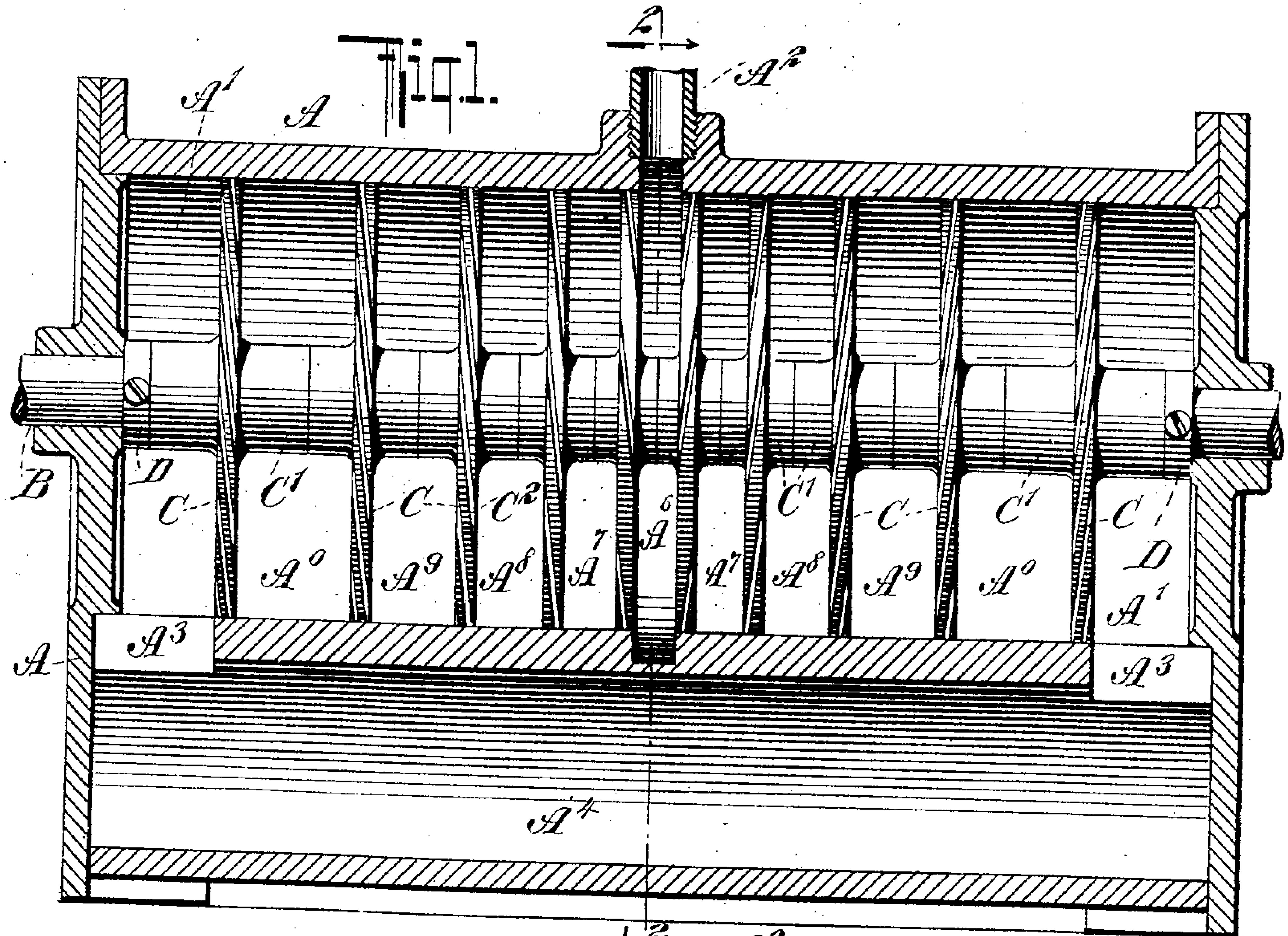
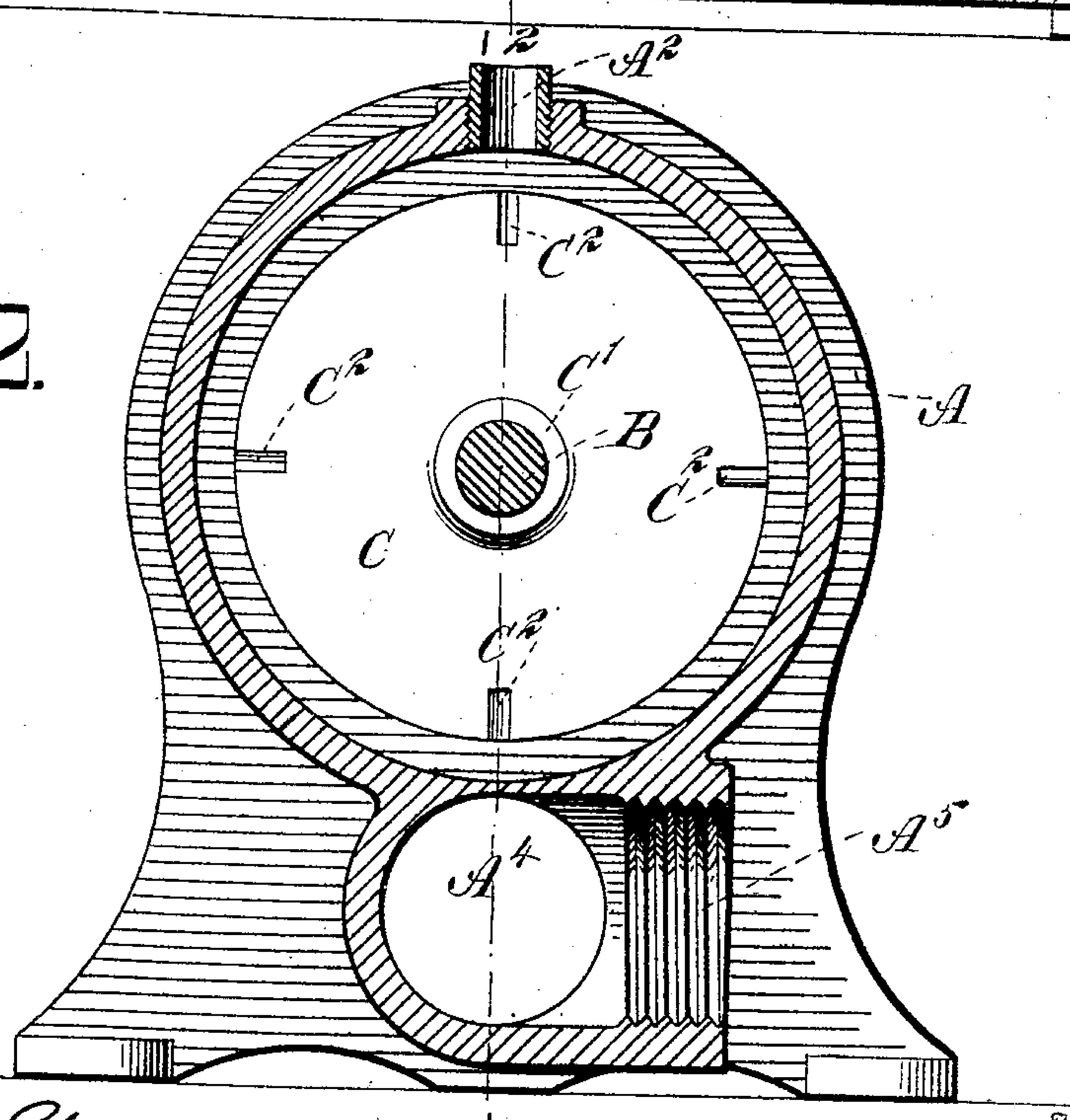


Fig. 2.



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REACTION-ENGINE.

No. 805,513. Specification of Letters Patent. Patented Nov. 28, 1905.

Application filed February 9, 1905. Serial No. 244,892.

To all whom it may concern:

Be it known that I, THOMAS R. ALMOND, a citizen of the United States, and a resident of Dunwoodie, Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Reaction-Engines, of which the following is a specification.

My invention relates to reaction-engines, and particularly to such as are worked by expansive fluids.

The object of my present invention is to simplify considerably the construction of such engines and to secure an efficient and noiseless operation.

I will now proceed to describe in detail a typical example of a reaction-engine embodying my present improvements and will then point out the novel features of my invention in the appended claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a longitudinal section of the engine on line 1 1 of Fig. 2, and Fig. 2 is a cross-section on line 2 2 of Fig. 1.

The engine shown in the drawings is a double engine, the casing A of which forms a cylindrical chamber A', with a middle port A^2, located at the periphery, and two end ports A^3. The port A^2 is generally used for the admission of the driving medium, such as steam, while the ports A^3 are exhaust-ports, leading either directly to the air or into a chamber A^4, having an outlet A^5; but it is possible to reverse the engine by interchanging the functions of the ports A^2 A^3 and making certain other changes, to be presently indicated, if the port A^2 be of sufficient cross-section. This port A^2 leads to a central chamber A^6, forming an admission-chamber in the ordinary operation of the engine.

Through the chamber A' runs a shaft B, on which are mounted a series of plates C, forming reaction members and all rigidly connected with the shaft to rotate therewith, as by means of clamping-collars D, secured to the shaft. These plates form reaction members of a peculiar novel construction. Their two end faces are practically devoid of projections, so that they will rotate in the atmosphere of air or steam with no resistance beyond the unavoidable skin friction, and, further, the humming noise commonly observed in engines of the rotary type will be avoided, owing to the disturbance of the air and steam by the plates being relatively slight.

Various constructions may be employed for mounting the disks or plates C on the shaft B. As shown, each of the disks has an axially-projected central boss C' on each side, the two bosses of one plate being preferably of equal length, but differing in length from those of the other plates. As the exhaust-ports are approached the length of the bosses increases progressively, so that a series of chambers A^6 A^7 A^8 A^9 A^0 are formed, which increase in size by degrees toward the outlet.

The peripheral edges of the plates or disks C run quite close to the inner wall of the casing A, but of course should not rub against it in operation. In these edges I provide channels which afford the steam-passages from one chamber to the next and also cause the plates to rotate by a reaction effect. For this purpose the channel C^2 extends obliquely from one face of a disk to the other—that is, lengthwise of the casing—at an angle other than a right angle to the plane of rotation. The total area of the passages through the respective plates may, as shown, vary gradually toward the exhaust. This may be obtained either by increasing the size of the individual passages or by increasing only the number of the passages, or both expedients may be combined. I consider it preferable when such increase is employed to have all channels C^2 of the same size for all disks C, but to increase their number progressively. The innermost disks might, for instance, have only four passages, the next six, and the others eight, ten, and twelve, respectively. I do not mean, however, that this particular proportion of increase should be used always. It will be understood that the gradual widening of the total steam-passage from one chamber to the next (together with the increase in the size of the chambers themselves when such increase is employed, as shown) will bring about an expansive action of the steam, so that it will pass to the exhaust under a greatly-reduced pressure and after a very efficient utilization of the energy contained in the steam.

It will be obvious that as the steam travels in opposite directions from the central chamber A^6 the channels C^2 should slant in opposite directions at opposite sides of said chamber—that is, if the said channels be likened to portions of a spiral path the channels on one set of the plates should be left-handed and those on the other set right-handed.

The oblique reaction-channels C^2 provide reaction-surfaces for the steam to drive the members C and the shaft B.

When the reaction-disks C are made with hubs or bosses C′ of equal length on both sides, it is immaterial which of these bosses is placed inward—that is, toward the central chamber A^6. Thus the amount of care necessary in assembling the parts is reduced.

Should it be desired to use the ports A^3 as inlets and the port A^2, or at least a center port, as outlet, the order of assembling the plates or disks C will be reversed, so that in each case the disk having the largest area of reaction-passages, or in the particular structure shown the largest chamber or compartment, (such as A^6,) will be nearest to the outlet. The arrangement shown, in which the steam-outlets are near the ends of the casing, and therefore near the bearings of the shaft B, is of especial advantage in that the shaft-bearings are kept relatively cool, since the steam has lost a considerable portion of its heat by the time it reaches the bearings.

The double arrangement shown in the drawings is thought particularly advantageous on account of its compactness; but a single set of disks C, all having the passages C^2 in the same direction, may be employed, the steam in such case entering at one end of the series and passing out at the other end.

It will be understood that the number of disks C may be increased or diminished, and, in fact, the engine will work with only one disk or a single pair of them corresponding to the two disks which bound the chamber A^6. In that case the engine would rotate at a much higher speed, and the addition of further disks, so as to secure a gradual expansion, offers the advantage of reducing the speed of the shaft B considerably, which is a desideratum for many practical purposes, while at the same time the energy of the steam is utilized more completely.

While I have described the disks C as separate members individually mounted on the shaft B, it will be understood that this is only a matter of mechanical detail and that, if preferred, all the disks may be cast together to form a single structure.

Various modifications may be made without departing from the nature of my invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. A reaction-engine composed of a casing having a chamber, and a rotary member mounted to turn in said chamber and comprising a series of disks subdividing said chamber into a series of compartments and provided with peripheral oblique passages extending from one compartment to the other.

2. A reaction-engine composed of a casing having a chamber, and a rotary member mounted to turn in said chamber and comprising a plurality of disks spaced from each other to subdivide said chamber into compartments and having their outer edges close to the inner surface of the casing, said disks being provided with oblique passages extending from one compartment to the other.

3. A reaction-engine composed of a casing having a chamber, and a rotary member mounted to turn in said chamber, and comprising a shaft and a series of reaction members mounted on said shaft and provided with hubs projecting in opposite directions, the two hubs of each reaction member being of equal length, but differing in length from those of the other reaction members so as to subdivide the chamber of the casing into a series of compartments of different sizes.

4. A reaction-engine composed of a casing having a chamber, and a rotary member mounted to turn in said chamber and comprising a plurality of disks having their peripheries close to the inner surface of the casing and spaced to subdivide said chamber into compartments, the said disks having smooth end faces devoid of projections near their peripheries, and being provided with oblique passages extending from one compartment to the other.

5. A reaction-engine composed of a casing having a chamber, and a rotary member comprising a series of progressively-spaced reaction-disks held to rotate in unison within said chamber and subdividing it into a series of compartments of gradually-increasing sizes, each of said disks being provided with reaction-passages leading from one of its end faces to the other and terminating within the planes of said end faces, and the total area of the passages through which the compartments communicate with each other, increasing from compartment to compartment.

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

THOMAS R. ALMOND.

Witnesses:
JOHN LOTKA,
JOHN A. KEHLENBECK.