M. L. HARRIS.

ROTARY GAS ENGINE.

APPLICATION FILED AUG. 15, 1908.

963,436.

Patented July 5, 1910.

2 SHEETS—SHEET 1.

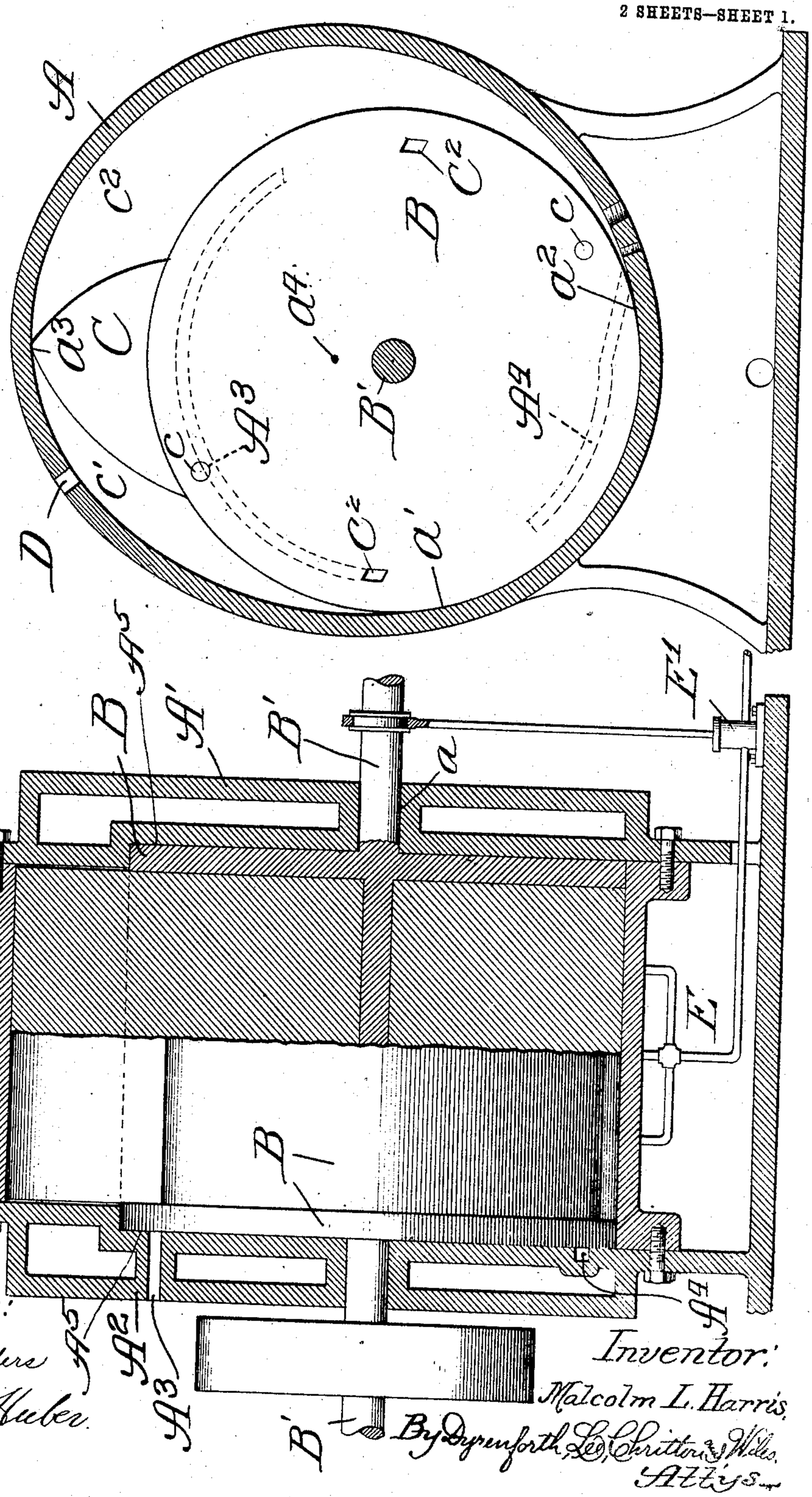

Fig. 2.

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 4.

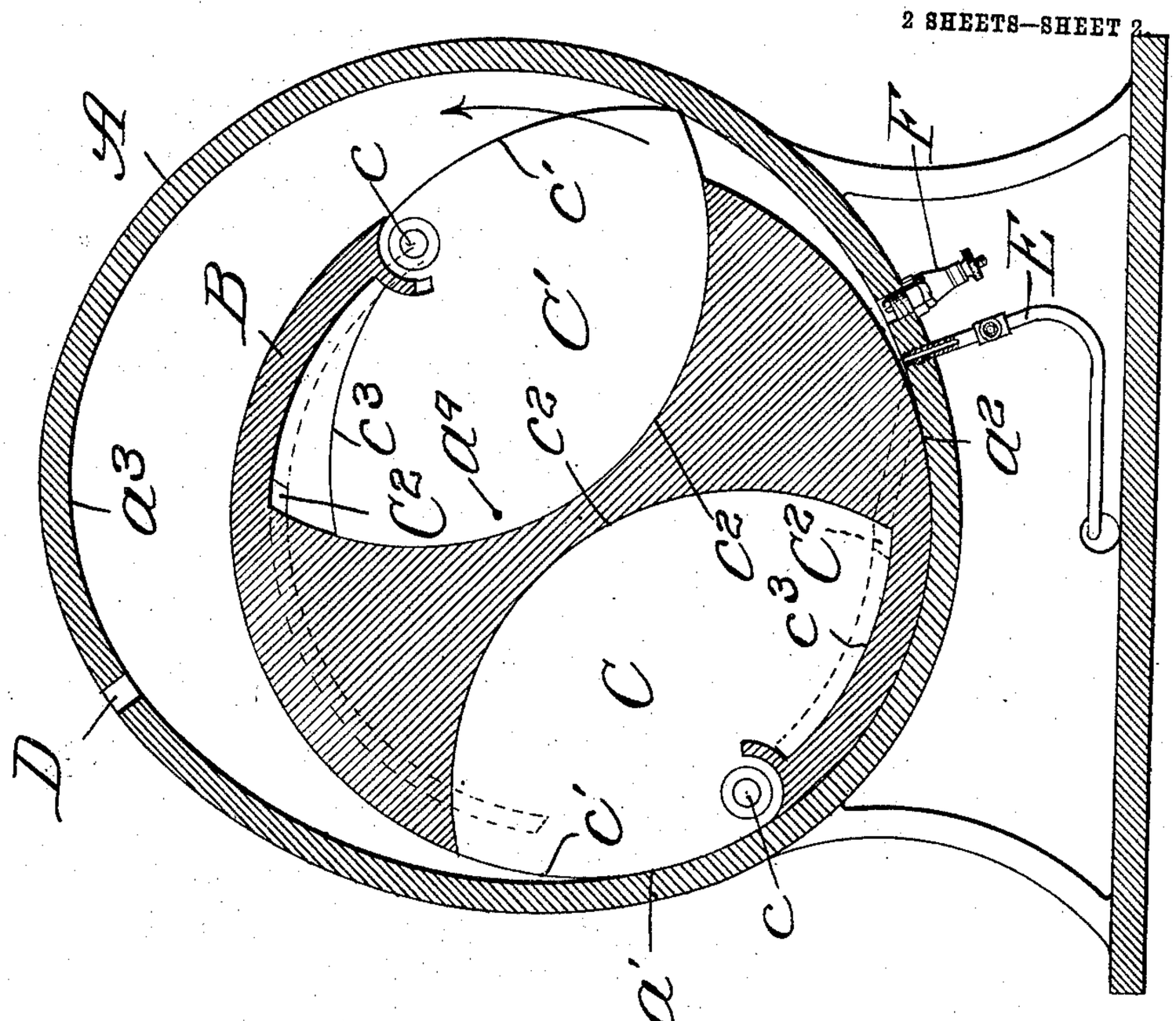
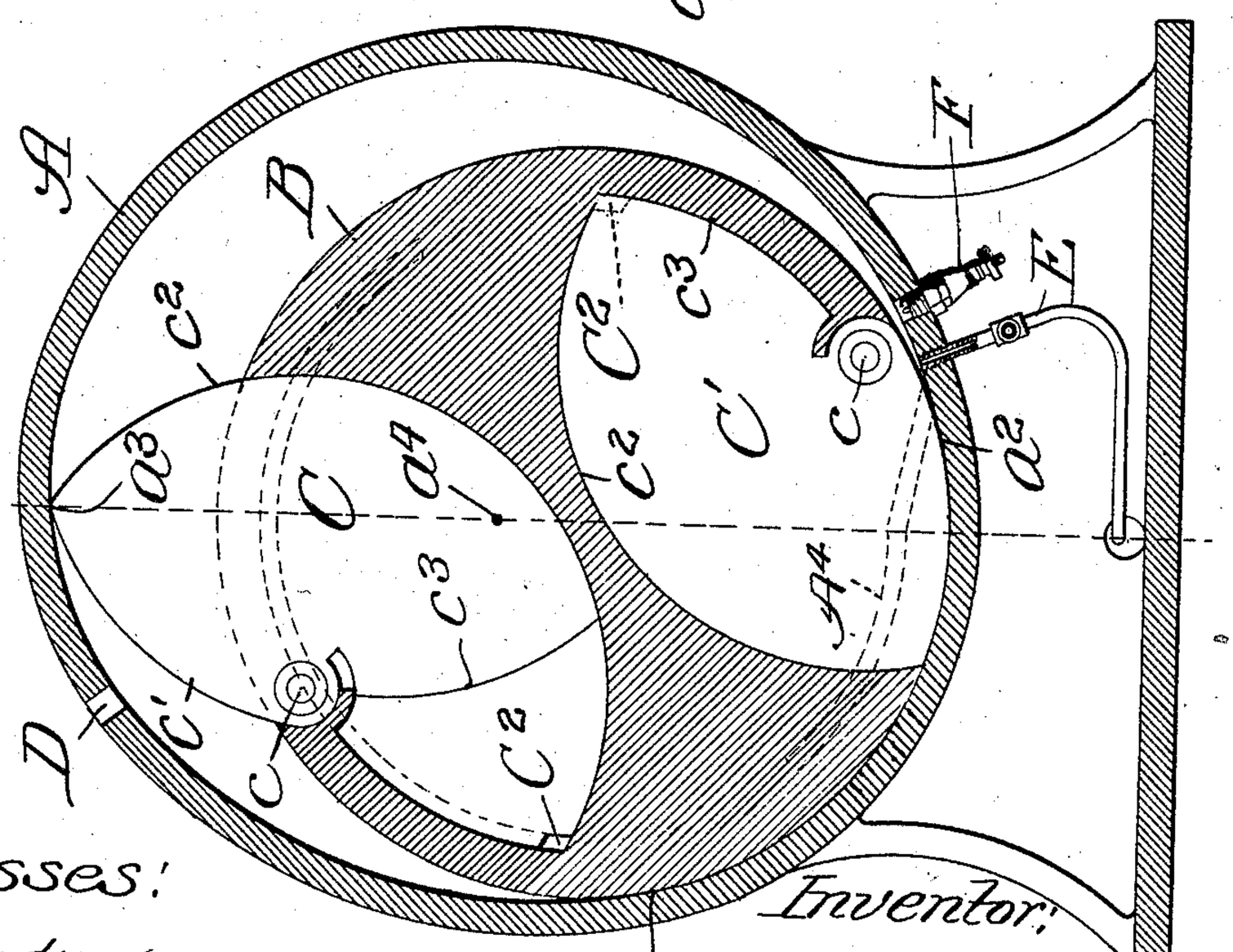


Fig. 3.



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UNITED STATES PATENT OFFICE.

MALCOLM L. HARRIS, OF CHICAGO, ILLINOIS.

ROTARY GAS-ENGINE.

963,436. Specification of Letters Patent. Patented July 5, 1910.

Application filed August 15, 1908. Serial No. 448,691.

To all whom it may concern:

Be it known that I, MALCOLM L. HARRIS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Rotary Gas-Engines, of which the following is a specification.

My invention relates to certain new and useful improvements in rotary gas engines, and is fully described and explained in the specification and shown in the accompanying drawings, in which:

Figure 1 is a longitudinal section in the line 1 of Fig. 3 through my improved engine the drum being shown one-half in elevation and one-half in section; Fig. 2 is a transverse section with the drum in elevation; Fig. 3 is a transverse section in the line 3 of Fig. 1, showing the blades and drum in position; and Fig. 4 is a similar section showing the parts in a different position.

Referring to the drawings, A is a casing, the wall of which when viewed in cross-section has an irregular, generally oval, curve. The casing is provided with journal-bearings a at its ends to receive journals, and the curve of the wall is struck on the arc of a circle with the center of the journals as its center from the point a^1 to the point a^2 of said wall. From the point a^2 to the point a^3 the curve may be varied as desired, although in the preferred form of construction this portion of the wall is formed on an arc of the circle struck from the point a^4 above the center of the journal-bearings a. From the point a^3 to the point a^1, the curve is irregular but of a general nature so as to form an easy connection between the ends of the two curves already formed. The casing A is closed at its ends by heads A^1, A^2, in which said journal-bearings are formed, as shown, and having circular recesses A^5 to receive the ends of a cylindrical drum B, which may be solid and provided with journals B^1 passing through journal-bearings a. The cross-section of the drum B is best illustrated in Figs. 3 and 4, from which it will be seen that the drum although closed at its ends, is chambered medially to form two chambers diametrically to each other. Swinging abutments or vanes C, C^1 are pivoted to the drum on centers c adjacent to the periphery of the drum, and the abutments are of the following form: Each has a curved face c^1 of the same curvature as the periphery of the drum; each has a cross-surface c^2 intersecting the surface c^1, the surfaces c^2 being struck on arcs of circles about the pivots of the abutments as centers. Each abutment has a third curved surface c^3 which may be varied considerably, but is preferably struck on a curve, which when the abutment is swung into its chamber in the drum will be substantially parallel to the concentric inner and outer faces of the drum. The chambers in the drum are made to receive the abutments and fit them exactly, so as to permit the swinging motion of the abutments illustrated in the drawing; and each chamber has at one end an intake-port C^2, which during a portion of the rotation of the drum registers with a slot A^3 through the corresponding end of the casing or head A^2. During another portion of the revolution of the drum the port C^2 registers with a grooved port or channel A^4 cut in the wall of the casing, but not extending therethrough, as illustrated in Fig. 1.

The operation of the device will be readily apparent from the foregoing description. Starting with the parts in the position shown in Fig. 4, let it be assumed that there is a charge behind the projecting end of the abutment C^1 driving the same in the direction of rotation indicated by the arrow in said section. The pressure behind the said abutment and the centrifugal force will, of course, hold the same constantly in contact with the wall of the casing and the gas will gradually expand forcing the drum forward until the abutment C^1 takes the position occupied by the abutment C in Fig. 3. Immediately after passing this position, the abutment will uncover an exhaust-port D, and the burned gases will be free to pass out. In the meanwhile, the chamber within the drum occupied by the abutment C^1 will have been in communication with the outside air, or with a source of explosive gas, through the slot A^3 being in registration with the port C^2. This registration will begin when the rear end of the abutment reaches the point a^2 and will continue until it reaches the position of the abutment C in Fig. 3, when it will cease. From that point on, the abutment will be forced inward compressing the air or gas thus sucked in; the

compression will continue until the port C^2 comes into registration with the groove A^4 whereupon the gas will pass through said groove around the end of the drum to a position just behind the opposite abutment. The length of the groove is so adjusted that the gas will reach the space behind the abutment, just as it begins to move out, that is just after it passes the point a^2 in the casing-wall. Immediately after the gas reaches the point behind the abutment it will be fired in the usual way.

It will be obvious from the foregoing description that it is a matter of indifference whether atmospheric air be drawn in through the slot A^3 and supplied with its fuel-component after it enters, or whether carbureted air be brought in through the said slot after the ordinary manner. In the form of construction herein illustrated specifically, the first alternative is shown and atmospheric air is taken in as described and supplied with its fuel-component just as it enters the space behind a given abutment. E indicates a fuel supply-pipe for this purpose, the same being operated by a small pump E^1 or other means of ordinary construction. It is also evident that the sparker F, or any ordinary igniting means, may be used, or if desired, compression may be carried to such a point, that artificial ignition can be dispensed with, particularly in case the fuel be introduced within the engine.

Other variations will at once occur to those skilled in the gas engine practice, the principal feature of my present construction being the general form and manner of operation.

In the operation the abutments may be held out in any ordinary manner, but when the engine is running at any speed the centrifugal force will be enough to accomplish the desired result. The abutments it will be seen are unbalanced so that the proper end will be forced outward by centrifugal force to accomplish the result described.

I realize that considerable variation is possible in the details of construction of my improved device, without departing from the spirit of my invention, and I do not intend therefore, to limit myself to the specific form herein shown and described.

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

1. The combination with a casing and a rotatable drum eccentrically journaled therein, and provided with chambers, of pivoted abutments adapted to swing into and out of the chambers to follow the wall of the casing during rotation of the drum, an intake port in each chamber, an inlet opening and a transfer port in the wall of the casing, the parts being so positioned relative to each other as to cause each port in the drum to first register with said inlet opening and then with said transfer port in the rotation of the drum.

2. The combination with a casing, and a drum eccentrically journaled therein and provided with chambers, of pivoted abutments adapted to swing into and out of said chambers to follow the wall of the casing, ports in the chambers, a slot in the casing adapted to register with said ports during the outward movement of the abutments to receive charges within the chambers, and a passage in the casing adapted to register with said ports in the chambers for the transference of the compressed charges to positions behind the preceding abutments.

3. The combination with a casing, of an eccentrically journaled drum rotatable therein, chambers in the drum, pivoted abutments adapted to swing into and out of said chambers to follow the wall of the casing, ports in the chambers, a slot in the casing adapted to register with the ports for the inspiration of charges during the outward movement of the abutments and a port in the casing adapted to register with the ports in the chambers for the transference of compressed charges from the chambers to the space within the casing outside the drum, and means for introducing fuel to the charges after leaving the chambers.

MALCOLM L. HARRIS.

In presence of—
L. HEISLAR,
R. A. RAYMOND.