No. 750,336. PATENTED JAN. 26, 1904.

J. F. BENTZ.

COMBUSTION MOTOR.

APPLICATION FILED JUNE 19, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

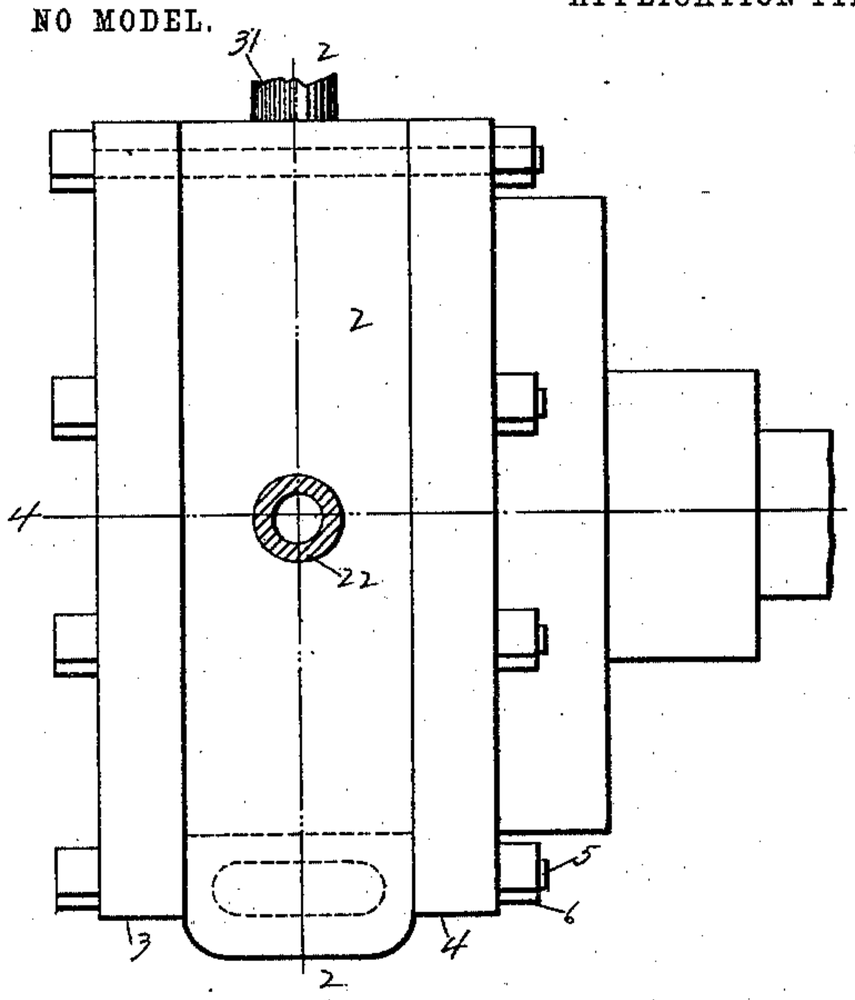

FIG. 1.

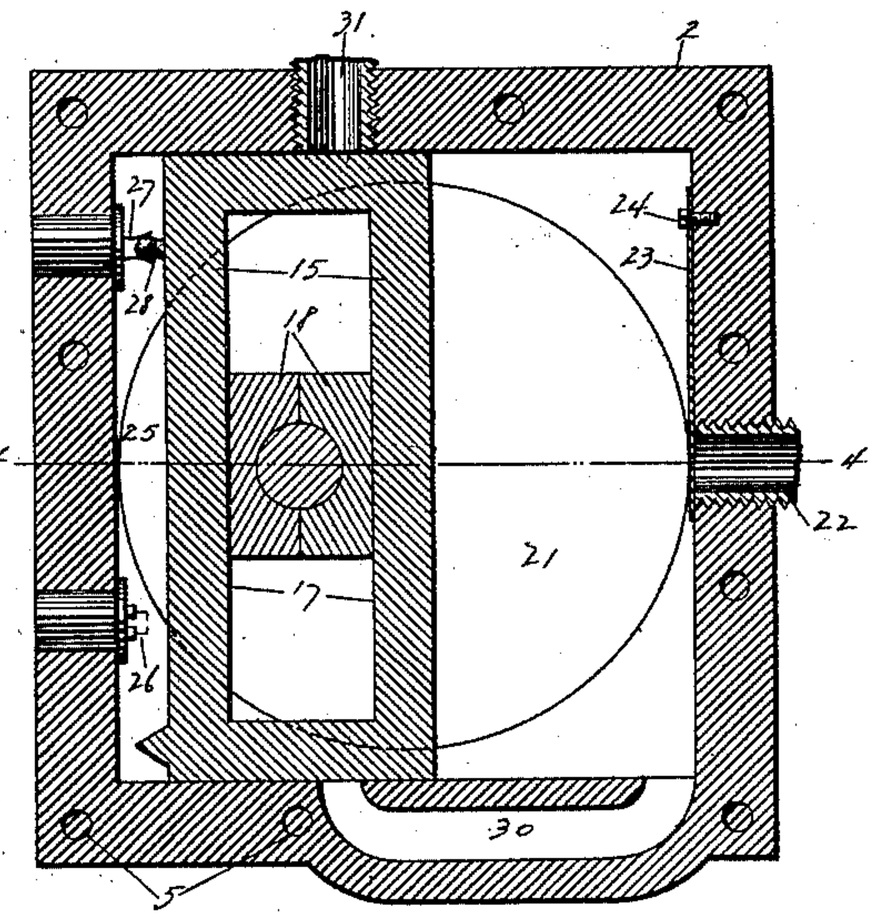

FIG. 2.

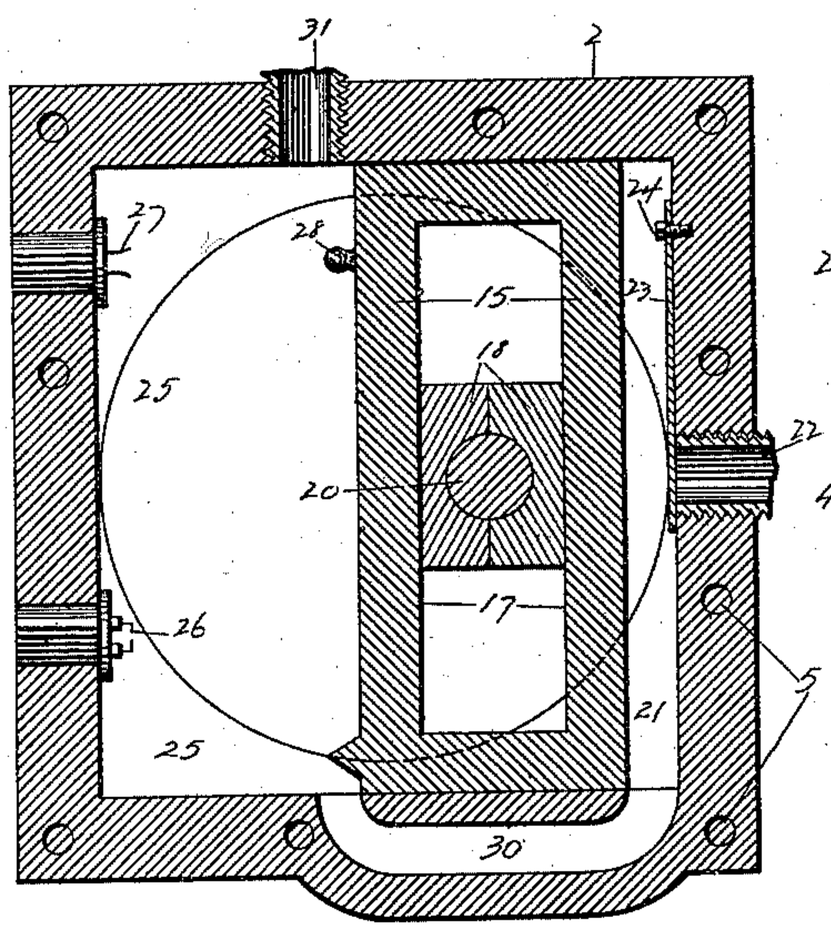

FIG. 3.

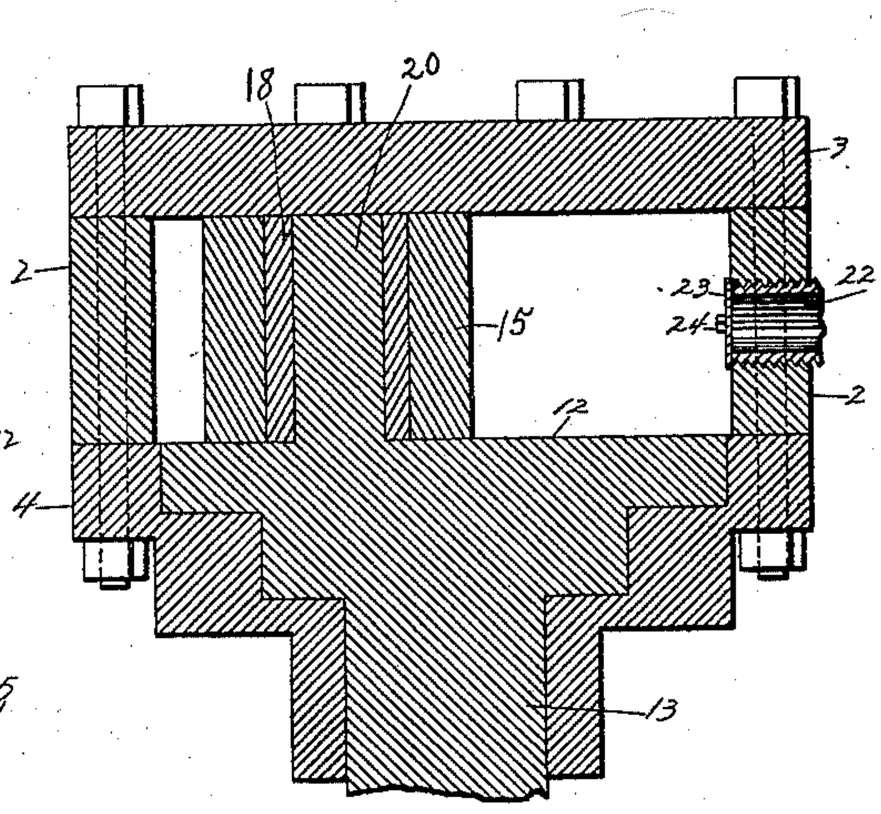

FIG. 4.

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No. 750,336. PATENTED JAN. 26, 1904.

J. F. BENTZ.

COMBUSTION MOTOR.

APPLICATION FILED JUNE 19, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

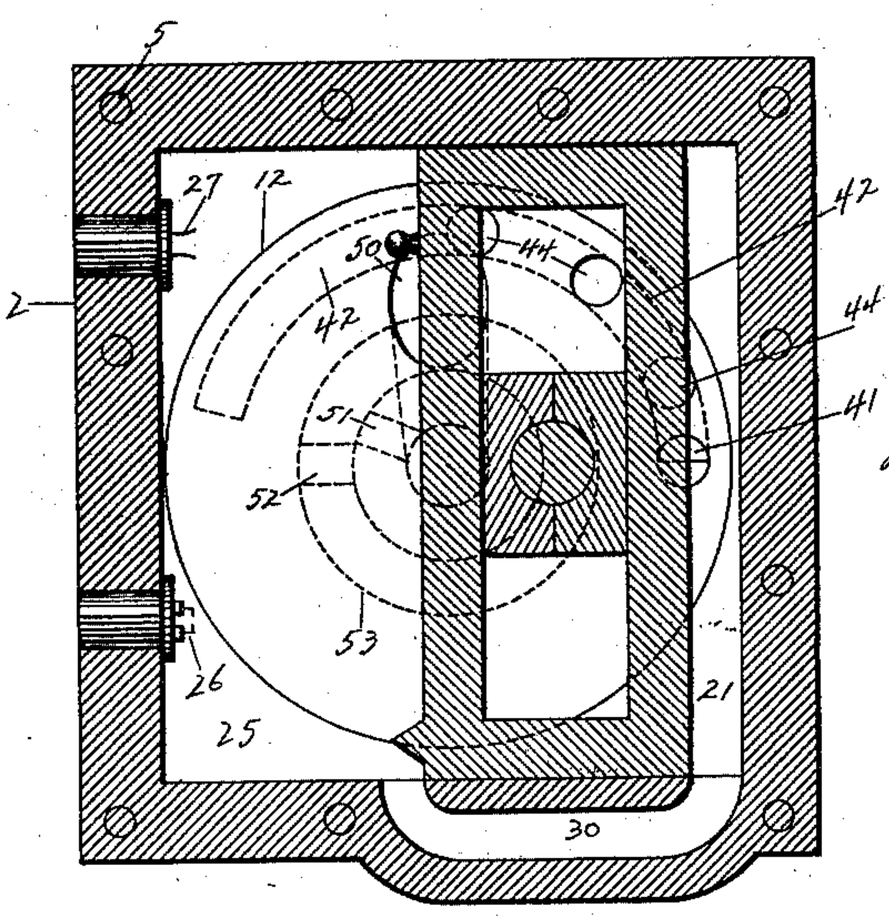

FIG. 5.

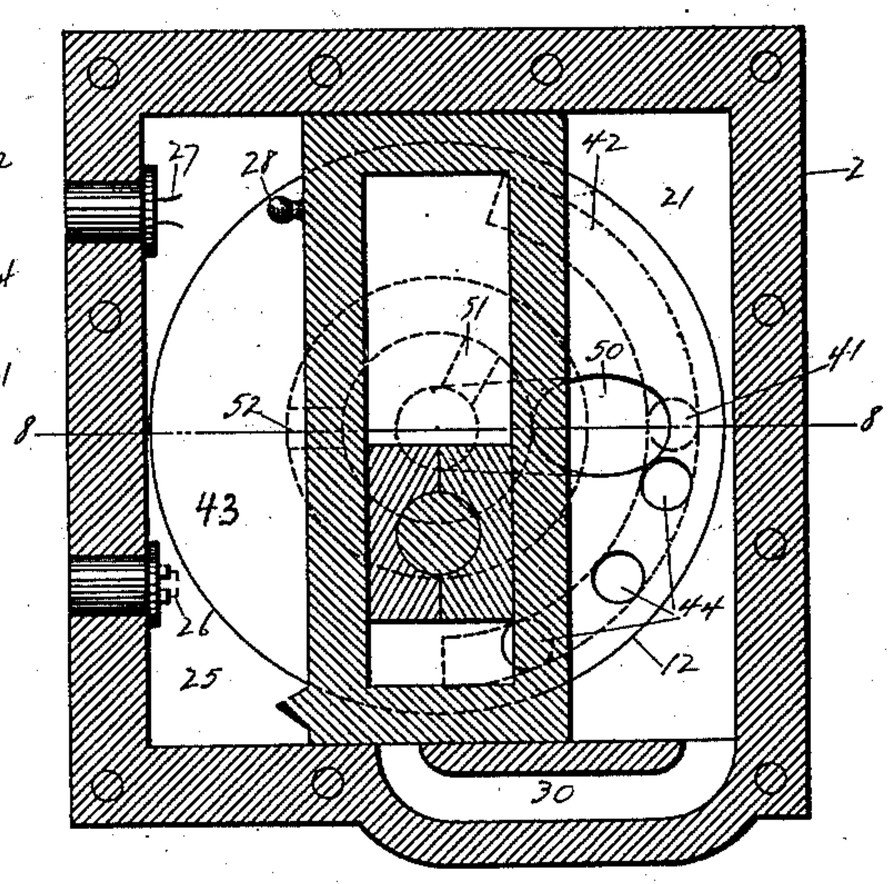

FIG. 6.

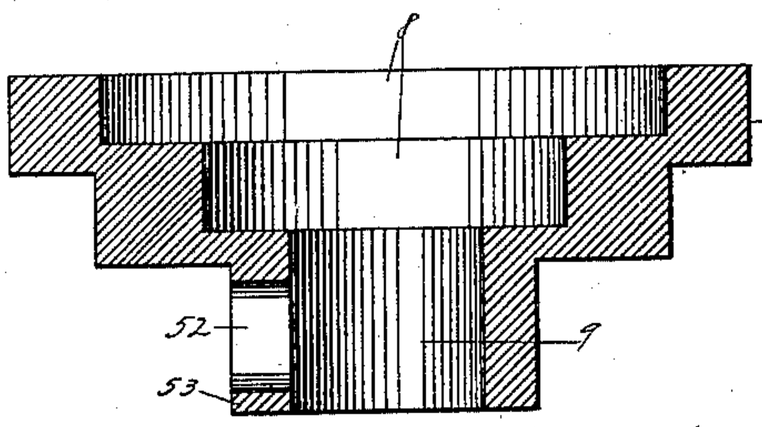

FIG. 7.

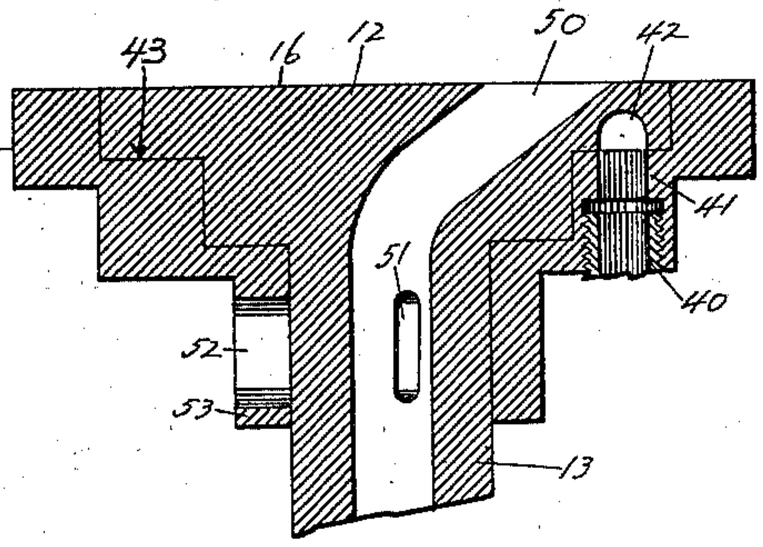

FIG. 8.

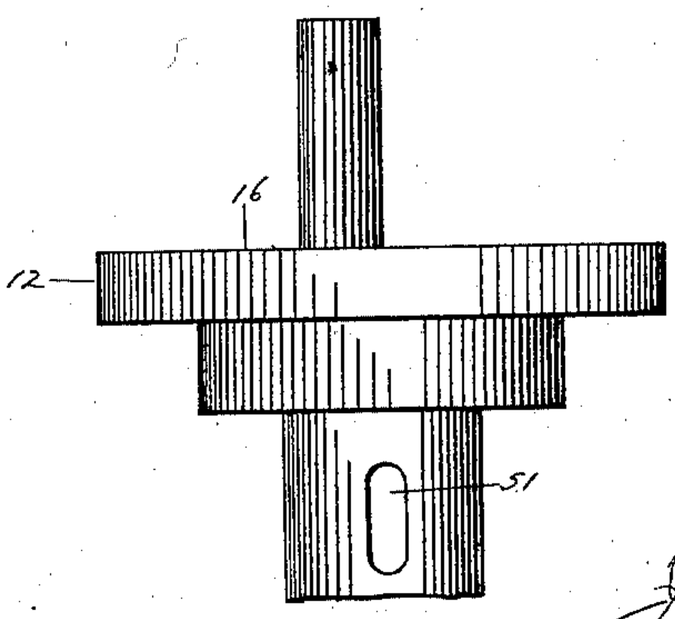

FIG. 9

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No. 750,336. Patented January 26, 1904.

UNITED STATES PATENT OFFICE.

JACOB F. BENTZ, OF SCHENECTADY, NEW YORK.

COMBUSTION-MOTOR.

SPECIFICATION forming part of Letters Patent No. 750,336, dated January 26, 1904.

Application filed June 19, 1903. Serial No. 162,211. (No model.)

To all whom it may concern:

Be it known that I, JACOB F. BENTZ, a citizen of the United States, residing at Schenectady, county of Schenectady, and State of New York, have invented certain new and useful Improvements in Combustion-Motors, of which the following is a specification.

The invention relates to such improvements; and it consists of the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings and the reference characters marked thereon, which form a part of this specification.

Similar characters refer to similar parts in the several figures.

Figure 1 of the drawings is a view in end elevation of the improved combustion-motor. Fig. 2 is a vertical section taken on the broken line 2 2 in Fig. 1. Fig. 3 is a similar section showing a movement of the disk and piston. Fig. 4 is a horizontal central section taken on the broken line 4 4 in Figs. 1 and 2. Fig. 5 is a sectional view similar to that shown in Fig. 3, showing a modified form of construction. Fig. 6 is a similar section showing a movement of the disk and piston. Fig. 7 is central horizontal section of the countersunk wall of the piston-chamber case detached. Fig. 8 is a similar section of the case, wall, and disk, taken on the broken line 8 8 in Fig. 6. Fig. 9 is a plan view of the disk and pin and a part of the crank-shaft detached from the motor-case.

The case 1, which contains the piston-chamber, is composed of a rectangular frame 2 and side plates or walls 3 and 4, clamped upon opposite sides of the frame by means of the screw-threaded bolts 5 and nuts 6, so as to form a closed piston-chamber within the rectangular frame.

The side wall 4 is provided with a countersink 8 and a bearing-aperture 9, extending from the countersink through the wall, as shown in Figs. 4 and 7, adapted to receive the crank-disk 12 and crank-shaft 13. (Shown detached in Fig. 9 and inserted in the countersunk wall in Fig. 8.)

The piston 15 is composed of a rectangular frame which is adapted to reciprocate in the piston-chamber 7, forming practically a gas-tight connection with the end walls 3 and 4 and two opposite sides of the frame 2, also with the inner face 16 of the disk, which is flush with the inner surface of the wall 4, as shown. The inner surface 17 of the sides of the piston form a slideway for the bearing-blocks 18 inclosing the crank-pin 20.

The foregoing description does not differ from that of similar parts contained in my improved fluid-motor for which I have filed an application for a patent concurrently herewith.

In my improved combustion-motor that part of the piston-chamber located on one side of the piston into which the ingredients of the explosive mixture are introduced may be termed the "mixing-compartment" and that upon the opposite side of the piston in which the igniting mechanism acts upon the mixture the "combustion-compartment."

The mixing-compartment 21 is provided with an induction-port, which may be through a supply-tube 22, leading from a source of supply. (Not shown.) As shown in the first four figures of the drawings, the supply-tube is screw-threaded and inserted in a similar-threaded aperture in the frame 2. Its port-aperture is controlled by the check-valve 23, secured to the frame by screw 24.

The combustion-chamber 25 may be provided with any known means for igniting an explosive mixture, as the electrodes 26, separated a short distance from each other and connected, respectively, with the ends of an induction-coil and the contact 27, adapted to be electrically connected by a metallic plug 28 and form an electric circuit containing a battery and primary coil (not shown) in the usual well-known manner. The mixing and combustion compartments are adapted to be connected at certain times by the by-pass port 30, contained in the frame 2 and leading around the piston. The combustion-compartment is provided with an eduction-port for exhausting the same, which may be tube 31, leading from such compartment to the atmosphere.

When the parts are in the position shown in Fig. 2, the electric circuit is completed by

contact of plug 28 with the contact 27, and an electric spark passes from one of the electrodes 26 to the other, and if the combustion-chamber has been charged with an explosive material an explosion occurs, which acts upon the piston and causes it and the crank-pin to move from the position shown in Fig. 2 to that shown in Fig. 3, provided, of course, that the parts had sufficient momentum or other application of force to carry the crank-pin beyond the "dead-center" line. The mixing-compartment having been filled with an explosive-gas mixture through the induction-port and closed by the check-valve, the mixture will be compressed continually by the movement of the piston until the piston opens the by-pass port to the combustion-compartment, after which the compressed gas will expand and rush into the combustion-compartment, the products of combustion therein exhausting through the eduction-port, which has been opened by the piston before the by-pass port was opened. As the momentum of the parts, which may be assisted by a fly-wheel, (not shown,) carries the piston and pin from the position shown in Fig. 3 to that shown in Fig. 2 the eduction and by-pass ports are closed by the piston and a new supply of explosive material drawn into the mixing-compartment, the check-valve readily yielding for that purpose, and the operation will be repeated and continued as long as the supply of explosive material continues.

When desired, a disk-controlled induction-port may be substituted for the port controlled by the check-valve by inserting the supply-pipe 40 in the countersunk wall, as seen in Fig. 8, and providing a port-aperture 41, leading therefrom into the countersink, and providing the outer side of the disk with a segmental annular groove 42, adapted to register a part of the time during each rotation of the disk with the port-aperture 41 and with a segmental annular plane surface 43, extending from one end of the groove to the other end and adapted to close such aperture between the intervals of registering with the groove. The disk is also provided with one or more port-holes 44, leading from such groove into the piston-chamber. The plane surface serves to close the induction-port during the action of the explosive force upon the piston, and by arranging the port-holes near the forward end of the groove as shown in Fig. 5 there can be no communication through the groove from one side of the piston to the opposite side, yet the induction-port will remain open to the mixing-compartment practically all the time such compartment is being increased in size by the movement of the piston toward the combustion-compartment. The eduction-port may also be controlled by the rotary disk when desired. This may be accomplished by providing the disk and shaft with an exhaust-passage 50, leading to the atmosphere at the time of exhaust through a lateral slot 51 in the shaft and a port-hole 52 in the bearing 53. The relative position of the parts is shown partly by dotted lines in Fig. 5. At the proper time for exhausting the combustion-compartment the two slots 51 and 52 register with each other, and at all other times the slot 51 is closed. The exhaust preferably commences just before the by pass-port is opened to the combustion-compartment.

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

1. In a combustion-motor having induction and eduction ports, the combination with the case having a piston-chamber; of a crank-disk rotary within such chamber and in engagement with the piston; a crank-shaft fixed to the disk and projecting exteriorly of the case; a piston reciprocatory in the piston-chamber; an operative connection in the piston-chamber between the disk and piston; and means for igniting an explosive mixture in the piston-chamber, substantially as described.

2. In a combustion-motor, the combination with the case having a piston-chamber; of a crank-disk rotary within such chamber and in engagement with the piston; a crank-shaft fixed to the disk and projecting exteriorly of the case; a piston reciprocatory in the piston-chamber; an operative connection in such chamber between the disk and piston; means for igniting an explosive mixture in the piston-chamber; a valve-controlled induction-port; and a disk-controlled eduction-port, substantially as described.

3. In a combustion-motor having induction and eduction ports, the combination with the case having a piston-chamber; of a crank-disk rotary within such chamber and in engagement with the piston; a crank-shaft fixed to the disk and projecting exteriorly of the case; a piston reciprocatory in the case, and dividing the piston-chamber into mixing and combustion compartments; a piston-controlled by-pass port leading from the mixing-compartment to the combustion-compartment; means for igniting an explosive mixture in the combustion-compartment; and an operative connection in the piston-chamber between the disk and piston, substantially as described.

4. In a combustion-motor, the combination with the case having a piston-chamber; of a crank-disk rotary within such chamber and in engagement with the piston; a crank-shaft fixed to the disk and projecting exteriorly of the case; a piston reciprocatory in the piston-chamber; an operative connection between the disk and piston in such chamber; means for igniting an explosive mixture in the piston-chamber; a valve-controlled induction-port; a piston-controlled by-pass port; and an eduction-port comprising an aperture in the case leading to the atmosphere and a passage-way in the disk leading from the piston-chamber and adapted to register with the port-aperture

in the case after each explosive combustion and while open to the combustion-chamber, substantially as described.

5. In a combustion-motor, the combination with a piston-chamber case, having a countersink in a wall of the piston-chamber and an induction-aperture opening into such countersink; of a piston; a crank-disk, rotary in such countersink and in engagement with the piston, having a segmental annular plane surface for closing the induction-aperture and provided with a segmental annular groove adapted to register with such aperture, at each rotation of the disk, and one or more port-holes adapted to connect such groove with the piston-chamber alternately on opposite sides of the piston; means for exploding a combustible mixture in the piston-chamber; and operative connections between the disk and piston, substantially as described.

6. In a combustion-motor, the combination with a piston-chamber case, having a countersink in a wall of the piston-chamber and an induction-aperture opening into such countersink; of a piston, dividing the piston-chamber into a mixing-compartment and a combustion-compartment; a crank-disk, rotary in such countersink, and forming a part of the compartment-wall in both the mixing and combustion compartments, having a segmental annular plane surface for closing the induction-aperture and provided with a segmental annular groove adapted to register with such aperture and one or more port-holes adapted to connect such groove with both compartments alternately at each rotation of the disk; a piston-controlled by-pass port leading from the mixing-compartment to the combustion-compartment; means for exploding a combustible mixture in the combustion-compartment; means for exhausting such compartment; and operative connections between the disk and piston, substantially as described.

7. In a combustion-motor having induction and eduction ports the combination with a case having a combustion-chamber; of a crank-disk rotary within such chamber and in engagement with the piston; a crank-shaft fixed to the disk and projecting exteriorly of the case; a piston reciprocatory in the piston-chamber; an operative connection in the piston-chamber between the crank-disk and piston consisting of a crank-pin fixed to the disk and a bearing for the pin movable in a slideway in the piston; and means for igniting an explosive mixture in the piston-chamber.

In testimony whereof I have hereunto set my hand this 15th day of June, 1903.

JACOB F. BENTZ.

Witnesses:

JOHN C. HAMILL,

GEO. A. MOSHER.