L. T. BASSETT.

EXPLOSIVE ENGINE.

APPLICATION FILED JAN. 3, 1908.

916,972.

Patented Apr. 6, 1909.

2 SHEETS—SHEET 1.

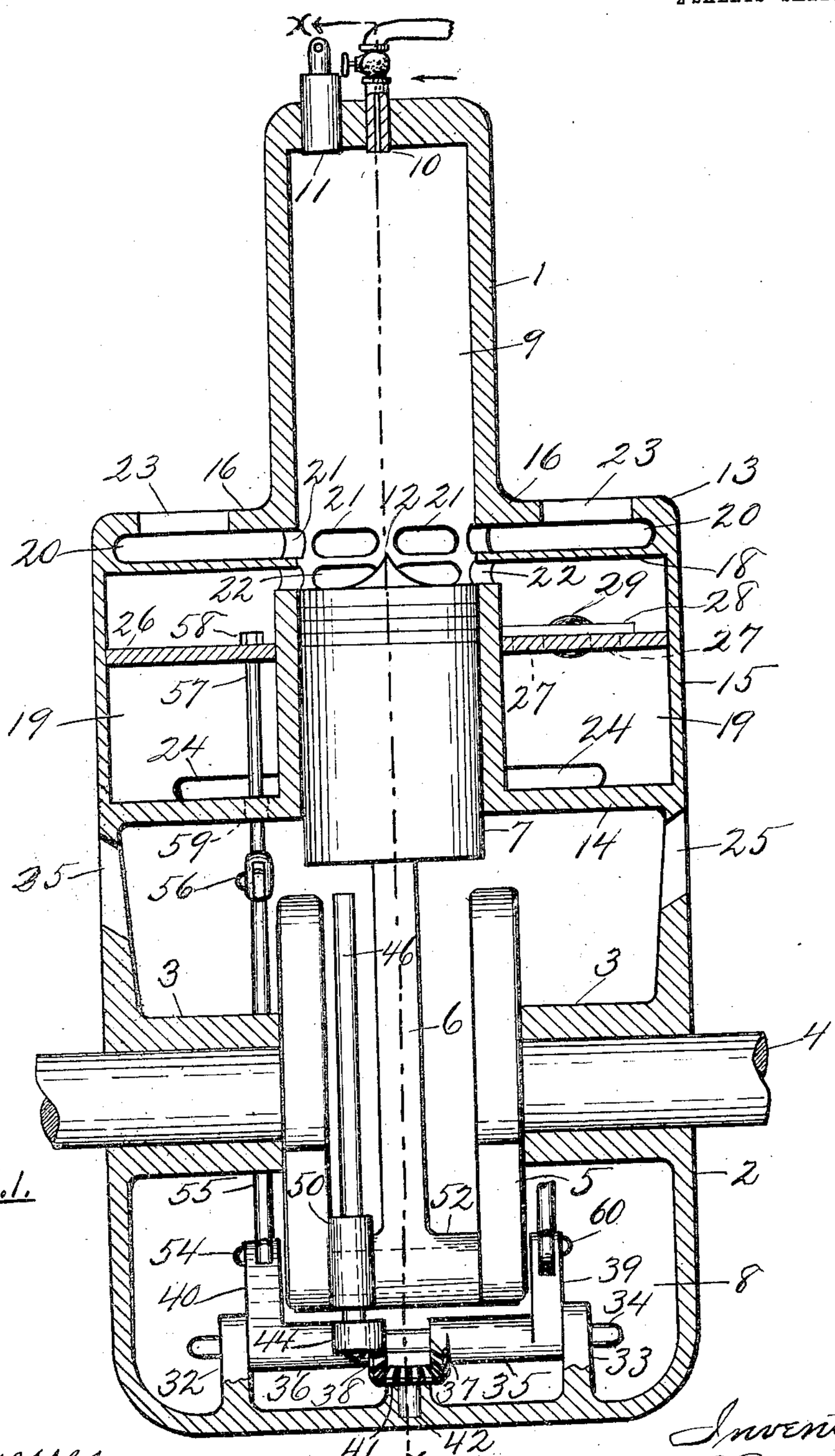

FIG. 1.

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2 SHEETS—SHEET 2.

FIG. 3.

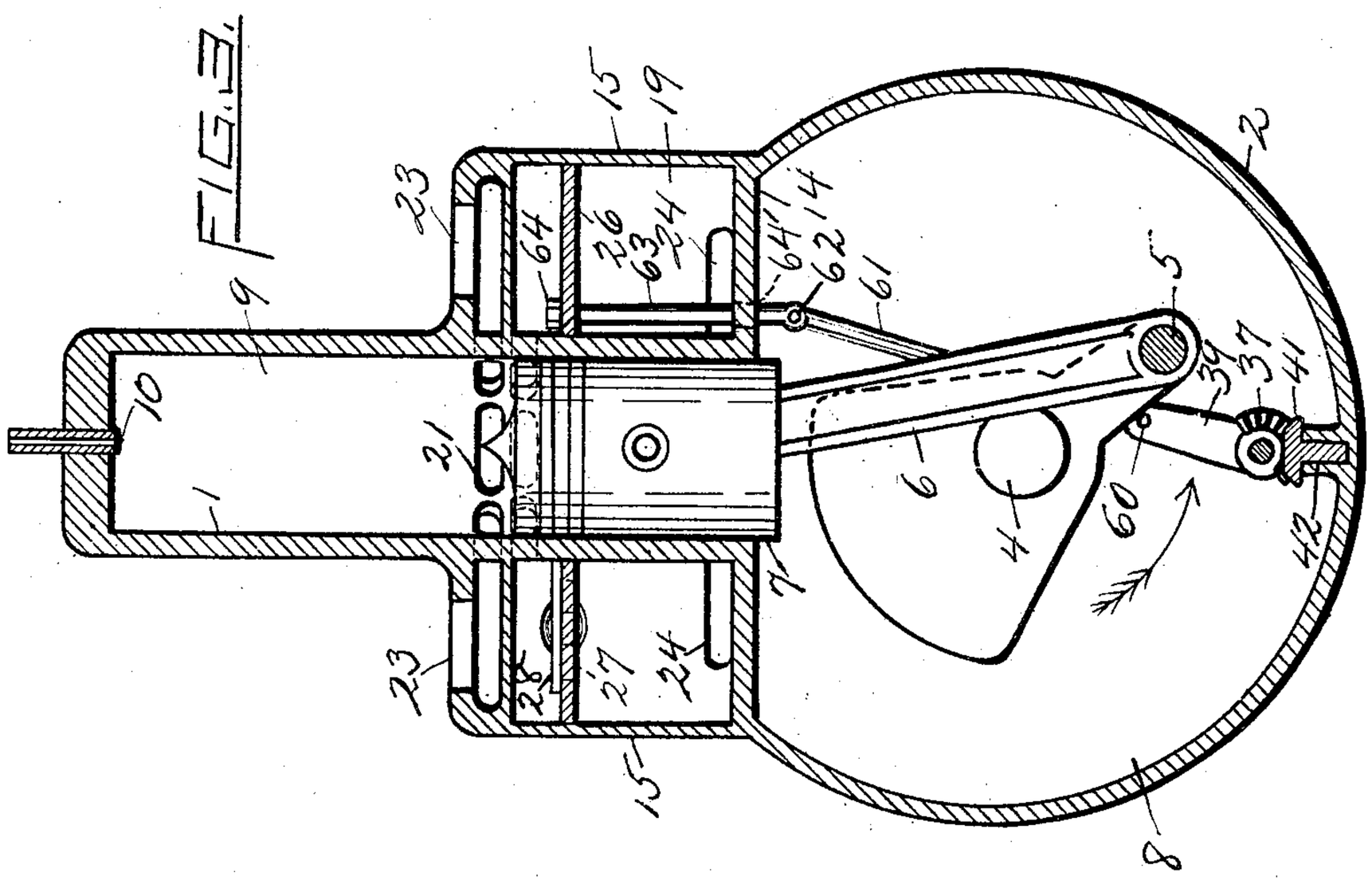

FIG. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

LINTON T. BASSETT, OF SALEM, MASSACHUSETTS.

EXPLOSIVE-ENGINE.

No. 916,972. Specification of Letters Patent. Patented April 6, 1909.

Application filed January 3, 1908. Serial No. 409,143.

To all whom it may concern:

Be it known that I, LINTON T. BASSETT, a citizen of the United States, residing at Salem, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a specification.

My invention relates to explosive engines, and has for its leading objects the absolute scavenging of the cylinder; the avoidance of compression in the crank case and elsewhere except in the working cylinder whereby resistance to the pistons is reduced; the maintenance of the cylinder at comparatively low temperature by the large volume of air therein; the scavenging of the cylinder by means other than by compression; and the attainment of the above and other objects which will hereinafter be pointed out and claimed by means of a simple, inexpensive, compact, and efficient structure.

To the enumerated ends essentially my invention consists in the novel construction and combination of parts hereinafter described, and illustrated in the accompanying drawings, wherein,

Figure 1 is a vertical central section, partially in side elevation, of an explosive engine of the two cycle type embodying my invention, certain parts being broken away. Fig. 2, a section of the same partially in side elevation, taken on line *x x* of Fig. 1 looking in the direction of the arrows, and showing the air piston at the bottom of its stroke, and Fig. 3, a like section of the same, looking in the opposite direction, and showing the air piston at the end of its forward stroke.

Like reference characters indicate like parts throughout the views.

In the present embodiment of my invention, 1 is the cylinder, 2 the crank case, 3 the bearings, 4 the crank shaft, 5 the crank arms, 6 the connecting rod, and 7 the piston of the engine; and 8 and 9, the crank and firing chambers respectively. In the cylinder head are the usual fuel feed, 10, and spark plug, 11; and upon the center of the piston face a conical projection, 12. The engine is provided with an annular casing, 13, around the lower part of the cylinder; and has a base or partition, 14, separating it from the crank chamber, a side wall, 15, and a horizontal top wall, 16, extending to the wall of the cylinder. The interior of the casing is divided near its top by a horizontal partition, 18, forming a large annular chamber, 19, and a small chamber or passage, 20. In the cylinder wall are annularly disposed exhaust ports, 21, opening into the chamber, 20. Similarly disposed air inlet ports, 22, in the cylinder wall immediately below the exhaust ports open into the chamber, 19. Annularly disposed exhaust ports, 23, in the wall, 16, permit egress of the products of combustion. In the casing wall, 15, are annularly disposed air admission ports, 24, leading to the bottom of the chamber, 19. The upper portion of the crank case is provided with openings, 25, to admit air and prevent compression. It will be understood, however, that the crank case need only be closed sufficiently to form a receptacle for lubricants. Mounted in the chamber, 19, is an annular piston, 26, which slides vertically along the wall of the cylinder and of the casing, 15, and whose travel extends from the lower ports, 24, nearly to the upper ports, 22, to pump the air through the latter into the combustion chamber, 9. To facilitate its downward travel this piston is provided with two sets of openings, 27, over each of which rests a bellows flap, 28, fixed by a pin, 29, or otherwise to the upper face of the piston. The number of these flap structures is immaterial.

The mechanism for operating the piston, 26, is as follows: Upon the bottom of the crank case are bearings, 32 and 33, for a shaft, 34, upon which are two sleeves, 35 and 36, provided upon their inner ends respectively with segmental bevel gears, 37 and 38; and, upon their outer ends respectively, with integral arms, 39 and 40. The gear segments, 37 and 38, mesh with a bevel gear, 41, upon a stud, 42, loosely mounted in the crank case intermediate the bearings, 32 and 33. Fixed in lugs, 44 and 45, upon opposite sides of the sleeve, 36, are rods, 46 and 47 respectively. These rods pass loosely through openings, 48 and 49, in lateral extensions, 50 and 51, upon opposite sides of a yoke, 52, loose upon the crank or crank pin, 5. Pivoted to the arm, 40, by pin, 54, is a connecting rod, 55, whose opposite end is pivoted by pin, 56, to the lower end of a piston rod, 57, fixed by a nut, 58, or otherwise to the piston, 26, and which passes through an opening, 59, in the partition, 14. Pivoted to the arm, 39, by a pin, 60, is a connecting rod, 61, whose upper end is pivoted by a pin, 62, to the end of a

piston rod, 63, fixed by a nut, 64, or otherwise to the piston. 26, at a point diametrically opposite to the piston rod, 57. The rod, 63, passes through an opening, 64′, in the partition, 14. Ports 21, 22 and 23 are preferably of larger area than usual.

It will be observed that the rotation of the crank reciprocates the yoke, 52, upon the rods, 46 and 47, thereby imparting a rocking motion to the sleeve, 36, and its arm, 40. This rocking motion is imparted in an opposite direction to the arm, 39, of the sleeve, 35, through the gears, 38, 41 and 37. Thus the piston rods, 57 and 63, are simultaneously raised and lowered by the rotation of the shaft, 4, and crank, 5, whereby the air piston, 26, is reciprocated in the chamber, 19; and the engine piston, 7, which acts as a valve to ports, 21, and inlets, 22, is reciprocated in the combustion chamber, 9. Piston, 26, performs its entire upward stroke while piston, 7, is opening and closing ports, 22.

When piston, 7, in its descent, begins to open ports, 22, as shown in Fig. 2, the piston, 26, is at its lowest point, preparatory to its upward stroke. The piston, 7, however, still continues its descent one-eighth of a revolution of the crank to its lowest point, as shown in Fig. 1, at which time piston, 26, has performed two-thirds of its upward travel. The remaining third of the upward travel of piston, 26, is performed during the next eighth of a revolution of the crank, 5. It will be seen that one-fourth of the crank revolution is required for the upward stroke of the piston, 26, as shown in Figs. 2 and 3, while three-fourths of a revolution is required for the downward stroke of the same.

It will be seen that exhaust ports, 21, by action of piston, 7, are opened shortly before opening the inlet ports, 22, thereby allowing the remaining pressure of the exploded charge to escape before the opening of the inlet ports, thus reducing the pressure in the chamber practically to that of the atmosphere before the opening of ports, 22, and the upward travel of piston, 26. Furthermore, by virtue of the large area of the ports, 21, 22 and 23, the resistance of the inclosed air to the upward travel of piston, 26, is reduced to a minimum. The entire upward movement of the piston, 26, is performed while the ports, 21, 22 and 23, are open, therefore there is no compression involved by either piston in scavenging the chamber, 9. This construction allows entrance into and passage through the chamber, 9, of a volume of air much in excess of the cubical contents of said chamber, and greatly in excess of the volume of air generally introduced into the combustion chamber. Not only does this produce practically perfect scavenging, but a large amount of heat in the products of combustion is expelled instead of passing through the cylinder wall. Thus dispensing largely, if not wholly, with mechanical cooling.

My structure is such as to prevent leakage of the exploded charge from the explosion chamber around the working piston into the crank case to pollute the charge in the crank case when or if the fuel is taken into the engine by way of the crank case.

The described means for introducing the air into the cylinder is not exclusive, as any auxiliary means of pumping or forcing the air into the cylinder in a volume much in excess of the cubical contents of the same is within the spirit of my invention. In other respects my invention is not limited to the exact details of construction herein shown and described, as variations may be made therein without violating the spirit of my invention. Obviously my invention may be embodied in engines provided with two or more cylinders.

What I claim is,

1. In an explosive engine, the combination with the working cylinder and the working piston operating therein, of an air cylinder adjacent the working cylinder, an annular piston guided by the wall of the working cylinder and operating in the air cylinder, and conjoint means for actuating the air piston by connection with the working piston, said annular piston having ports therethrough, and a valve controlling said ports, said air cylinder having ports at its lower end and ports at its upper end controlled by the working piston.

2. In an explosive engine, the combination with the working cylinder and the working piston operating therein, of an air cylinder adjacent the working cylinder, an annular piston guided by the wall of the working cylinder and operating in the air cylinder, conjoint means for actuating the air piston by connection with the working piston, said annular piston having ports therethrough, a valve controlling said ports, said air cylinder having ports at its lower end, ports at its upper end controlled by the working piston, and an annular chamber above said upper ports and having exhaust ports for the working cylinder adjacent said upper ports controlled by the working piston.

3. In an explosive engine, the combination with the working cylinder and the working piston operating therein, of an air cylinder adjacent the working cylinder, an annular piston guided by the wall of the working cylinder and operating in the air cylinder, conjoint means for actuating the air piston by connection with the working piston, said annular piston having ports therethrough, a valve controlling said ports, said air cylinder having ports at its lower end, ports at its upper end controlled by the working piston, an annular chamber above said upper ports and

having exhaust ports for the working cylinder adjacent said upper ports controlled by the working piston, and a crank case having ports open to the atmosphere.

4. In an explosive engine, the combination with the working cylinder provided with a series of air inlet ports and exhaust ports, of a working piston in the cylinder which acts as a valve to the ports, an annular air cylinder surrounding the working cylinder and into which the air inlet ports open, said air cylinder being provided with air admission ports, an annular piston in the air cylinder movable between said air admission and air inlet ports and surrounding the guiding wall of the working piston, and means operated by the working piston for actuating the air piston.

5. In an explosive engine, the combination with a crank case and crank, of a working cylinder and an air cylinder, a piston in each cylinder, operative connections between the power piston and the crank, a yoke upon the crank, a horizontal shaft mounted in the crank case below the path of the crank, two sleeves upon the shaft, an arm upon the outer end of each sleeve, a gear upon the inner end of each sleeve, an idler gear meshing with the sleeve gears, rods in one of the sleeves loosely engaging the yoke, and operative connections between the arms and the air piston.

6. In an explosive engine, the combination with the working cylinder and a piston moving therein, of inlet and exhaust ports arranged in the walls of the cylinder and controlled by the piston, an air cylinder into which the inlet ports open, and provided with air admission ports near its base, an annular piston in the air cylinder intermediate the inlet ports and admission ports and provided with openings, said annular piston surrounding the guiding wall of the working piston a bellows flap upon the top of the air piston over the openings, a crank, operative connections between the power piston and the crank, and means actuated by the crank for operating the air piston.

7. In an explosive engine the combination with the working cylinder and working piston, of an annular casing surrounding the cylinder provided with openings near its base and ports in its top, a horizontal partition in the upper portion of the casing, an annular piston in the casing below the partition, inlet ports in the cylinder wall below the partition, exhaust ports in the cylinder wall above the partition and leading to the ports in the top of the casing, and means actuated by the working piston for reciprocating the annular piston.

In testimony whereof I have affixed my signature in presence of two witnesses.

LINTON T. BASSETT.

Witnesses:
HORATIO E. BELLOWS,
WALTER E. GOODWIN.