J. W. MEAKER.

EXPLOSIVE ENGINE.

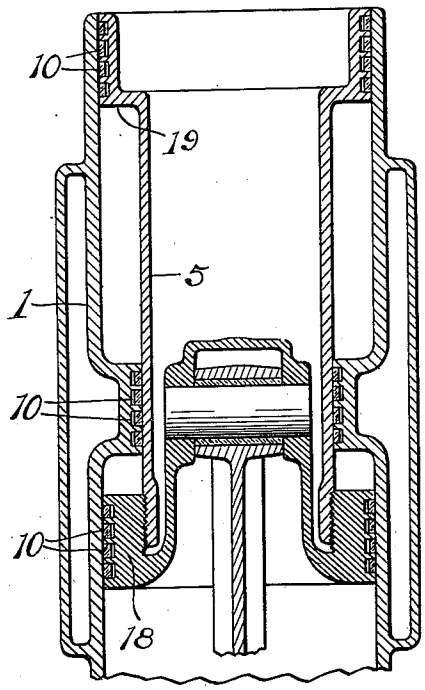
APPLICATION FILED SEPT. 30, 1910.

1,015,502.

Patented Jan. 23, 1912.

4 SHEETS—SHEET 1.

Fig.4



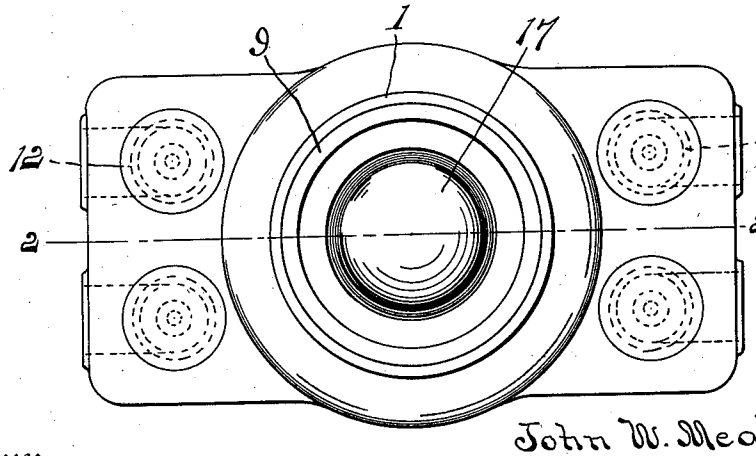


Fig.1

Witnesses

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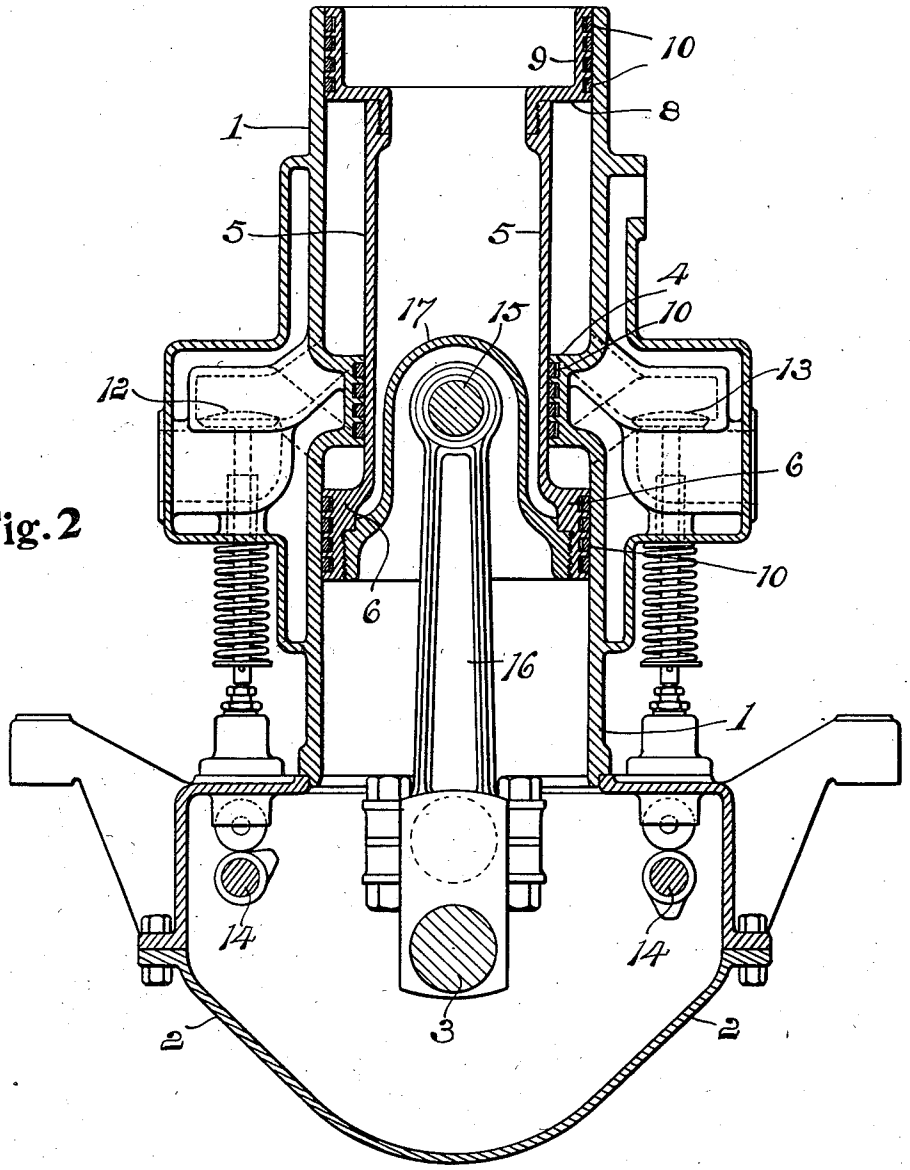
4 SHEETS—SHEET 2.

Fig. 2



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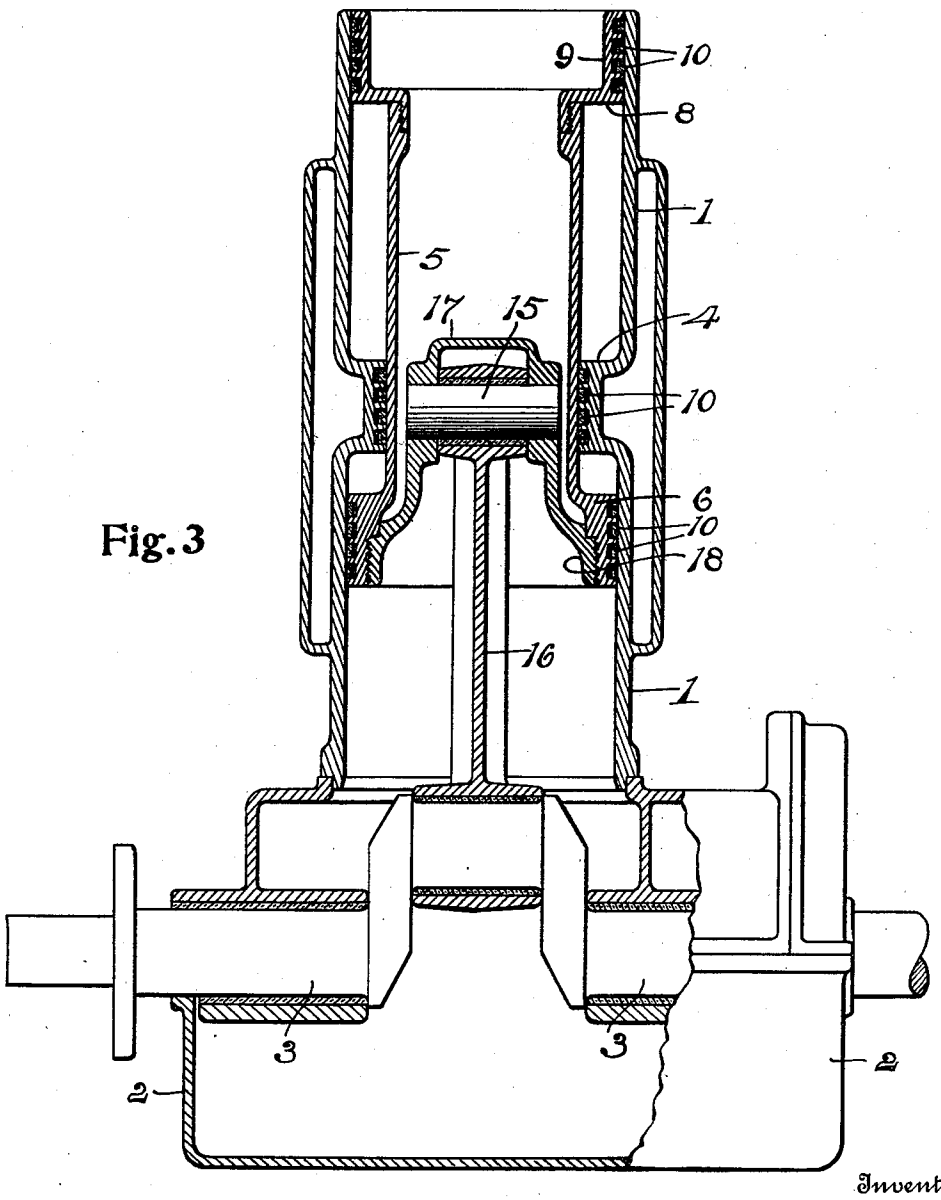
4 SHEETS—SHEET 3.

Fig. 3



Witnesses

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4 SHEETS—SHEET 4.

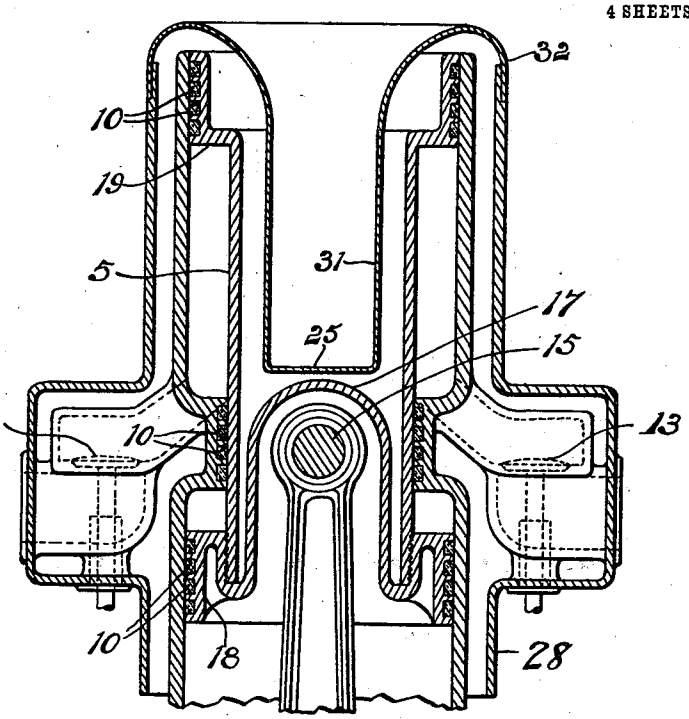

Fig. 5.

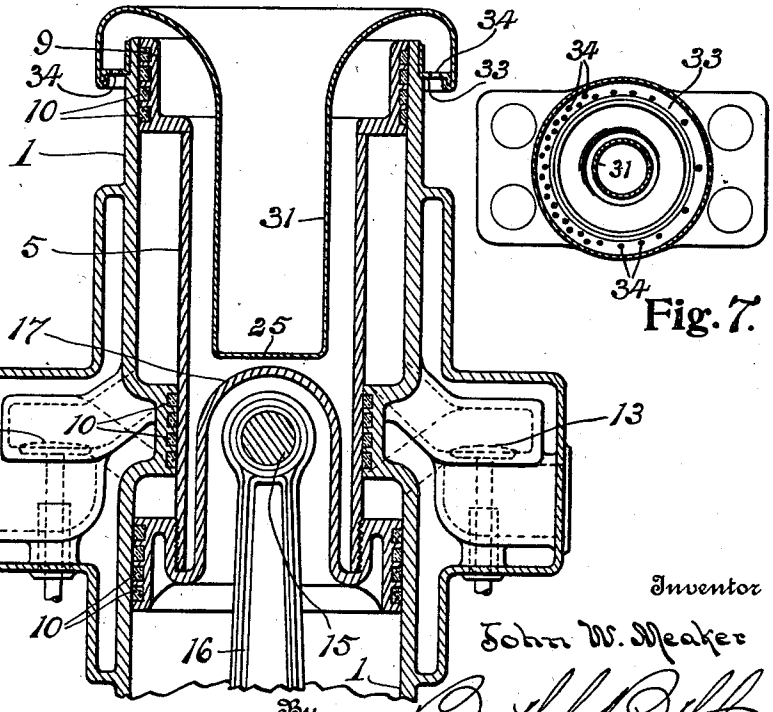

Fig. 6.

Fig. 7.

Witnesses

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UNITED STATES PATENT OFFICE.

JOHN W. MEAKER, OF DETROIT, MICHIGAN.

EXPLOSIVE-ENGINE.

1,015,502. Specification of Letters Patent. Patented Jan. 23, 1912.

Application filed September 30, 1910. Serial No. 584,684.

To all whom it may concern:

Be it known that I, JOHN W. MEAKER, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to internal combustion motors and to an arrangement of the piston and cylinder whereby they are effectively cooled interiorly and exteriorly.

The invention consists in the matters hereinafter set forth, and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a plan view of a motor embodying features of the invention; Fig. 2 is a view in section on or about line 2—2 of Fig. 1; Fig. 3 is a view in section at right angles to that shown in Fig. 2; Fig. 4 is a view in section showing a modification of a piston rod connection; Fig. 5 is a view showing a modification of the air circulator means; Fig. 6 is a view of another arrangement of the air circulator means; and Fig. 7 is a view in section on line 9—9 of Fig. 6 slightly reduced.

As herein illustrated, an open ended cylinder 1 is mounted in upright position on a suitable base 2, in which a main crank shaft 3 is journaled. An annular flange 4 is formed on the inner face of the cylinder. A piston 5 that is open at its outer or outboard end is reciprocable in the flange and has an annular offset 6 or enlargement on its inner or crank end coöperating with the flange to form an annular explosion chamber. In order to obtain a double acting piston, a second annular shoulder 8, or enlargement may be formed on the outboard end of the piston which for convenience of construction and assembling is the inner face of a collar 9 screw-threaded or otherwise detachably secured in the piston end to fit the cylinder. Suitably disposed packing rings 10 in the cylinder flange and on the piston and collar prevent leakage.

Any preferred form of valve mechanism controls the supply and exhaust of the annular explosion chambers. As herein indicated, puppet inlet valves 12 and outlet or exhaust valves 13 operated in timed relation to the piston movements by cam shafts 14, open and close ports or passages into each chamber adjacent the cylinder flange. The shafts are driven through suitable gear or the like, not shown, by the main shaft.

The piston is connected at its closed lower end and is coupled by a wrist-pin 15 and connecting rod 16 to the crank shaft. In the preferred form of construction, a cap 17 that is deeply hollowed, is secured by a flange 18 at its rim in the screwthreaded and counterbored crank end of the cylinder, and is so proportioned that an interval is formed between it and the piston wall to insure an air space for the full length of the adjacent explosion chamber. Or the cap may have an annular enlarged rim 19 as shown in Fig. 4, into which the end of the piston is inserted and suitably secured, the parts being arranged to permit free circulation in the interior of the piston to the lower end thereof. In such instance, the outer shoulder is formed with a permanent or integral outer offset where two chambers are desired.

In Fig. 7, there is shown means for insuring proper cooling of the outer wall of the circular chambers. This consists of an outer jacket 28 spaced from the cylinder wall. On the instroke, cool air is drawn in around the opening at the lower end of the jacket up past the combustion chambers. This effectively cools both walls of the explosion chambers. To further insure the cooling of the outer wall a diaphragm 25 as indicated in Figs. 7 and 8 may be connected by a tubular extension 31 of an outer jacket 32 rounding over the upper margin of the cylinder walls and enveloping the cylinder to at least a point below the lower compression chamber. This outer jacket may be cut off, as indicated in Figs. 8 and 9, and the annular opening closed by a diaphragm 33 having a plurality of apertures 34 which direct the expelled air down the outer surface of the cylinder. By a proper distribution of the apertures of this diaphragm, a maximum cooling effect may be obtained at the hottest zone or point on the cylinder walls.

One feature of this construction is the very light weight of the reciprocating parts as the cylinders coupled as shown give the effect of the conventional type four cylinder motor. Furthermore, the cap closing the inner end of the piston may be of light alloy, such as aluminum or the like, as the cap is not exposed to the high heat of the explosion chambers. Another feature is the mounting of the wrist pin in the cap so

that the integrity of the piston wall is maintained and the leakage inevitable where the pin is journaled in the wall is avoided.

Obviously, changes in the details of construction may be made without departing from the spirit of the invention, and I do not care to limit myself to any particular form or arrangement of parts.

I claim as my invention:—

1. In an explosive engine, an open ended cylinder having an inner annular flange intermediate its ends, a piston open at its outer end and closed at its inner end whose body fits the cylinder flange and whose end portions are enlarged to fit the cylinder body, and a diaphragm of less diameter than the piston bore secured in the cylinder concentrically within the piston near the limit of outward motion of the inner end thereof.

2. In an explosive engine, an open ended cylinder having an inner annular flange between its ends, a piston reciprocable through the flange having an open outer end and a closed inner end both enlarged to fit the cylinder, a jacket forming an air space over the cylinder end with its lower end opening directed toward the lower end of the cylinder, and a diaphragm of less diameter than the piston bore secured in the cylinder concentrically with the piston near the limit of outward motion of the inner end thereof by a tubular extension of the jacket.

3. In an explosive engine, an open ended cylinder having an inner annular flange between its ends, a piston reciprocable through the flange having an open outer end and a closed inner end both enlarged to fit the cylinder, a jacket forming an air space over the cylinder end with its lower end opening directed toward the lower end of the cylinder, a diaphragm of less diameter than the piston bore secured in the cylinder concentrically with the piston near the limit of outward motion of the inner end thereof by a tubular extension of the jacket, and a diaphragm closing the annular opening between the lower end of the jacket and the adjacent cylinder wall provided with a plurality of apertures disposed to direct a maximum quantity of expelled air against the heated portions of the cylinder.

4. In an explosive engine, an open-ended cylinder, an inner, central annular flange therein, an open ended piston and reciprocable in the flange, outer annular enlargements on the piston ends fitting the cylinder and forming annular combustion chambers with the cylinder flange, and a cap closing the inner end of the piston.

5. In an explosive engine, a base, a cylinder open at both ends mounted therein and provided with an inner annular flange between its ends, an open ended piston having a body that fits the cylinder flange and flanged ends that fit the body of the cylinder and form with the cylinder flange annular explosion chambers, a crank shaft in the base, a cap secured at its rim to the inner end of the piston and provided with a concave body extending well into the piston, a wrist pin secured across the recess of the body and a connecting rod coupling the wrist pin and the crank shaft.

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

JOHN W. MEAKER.

Witnesses:
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C. R. STICKNEY.