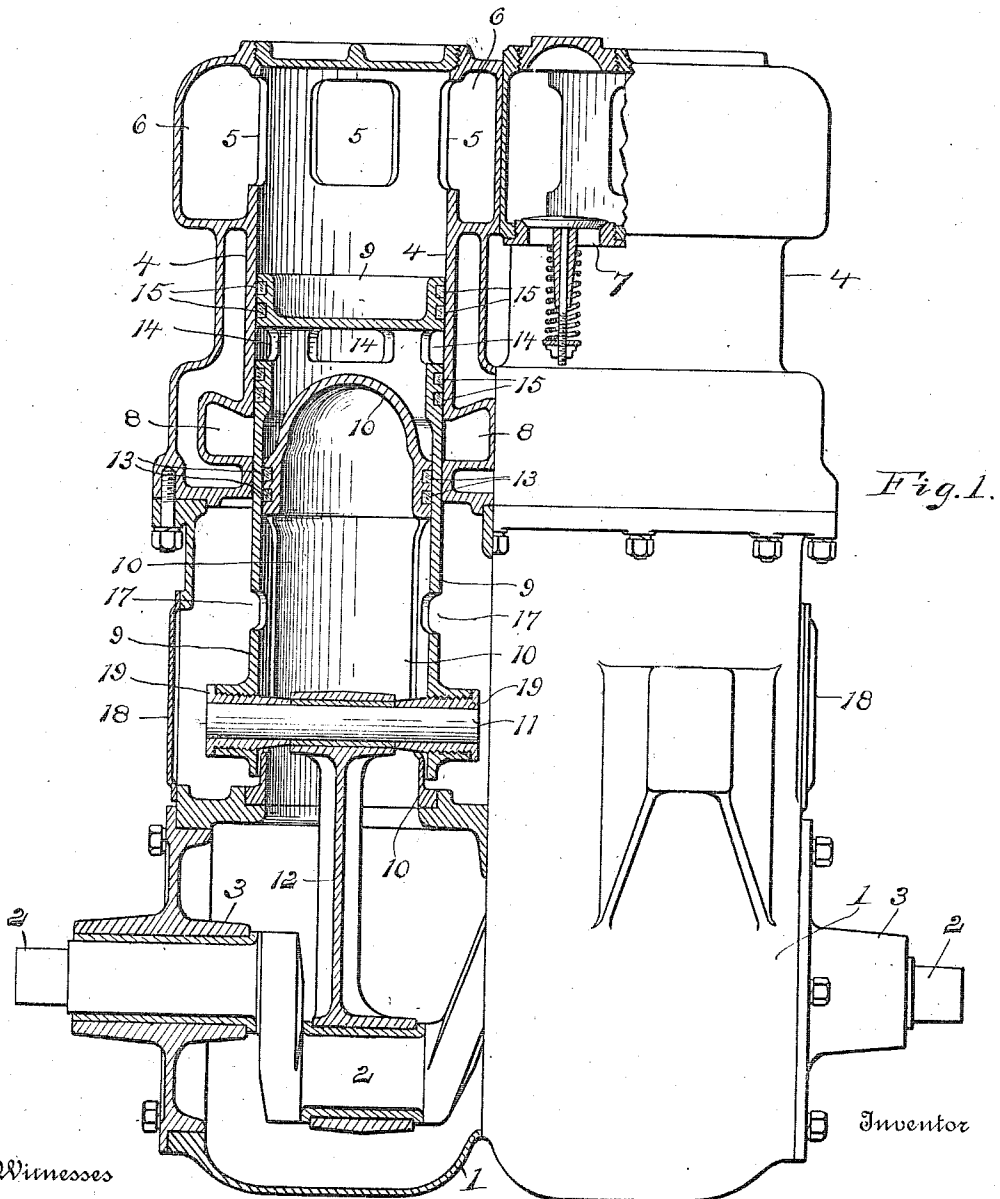


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EXPLOSIVE ENGINE.
APPLICATION FILED JULY 28, 1911.

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Patented Mar. 7, 1911.
2 SHEETS—SHEET 1.



Witnesses

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Fig. 2.

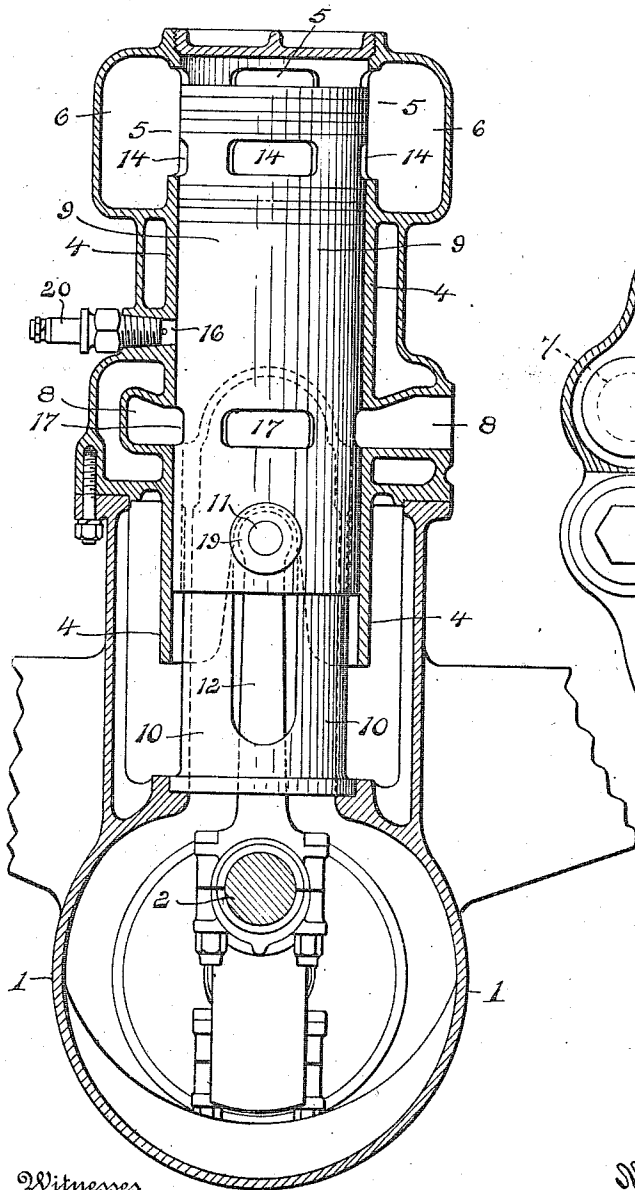
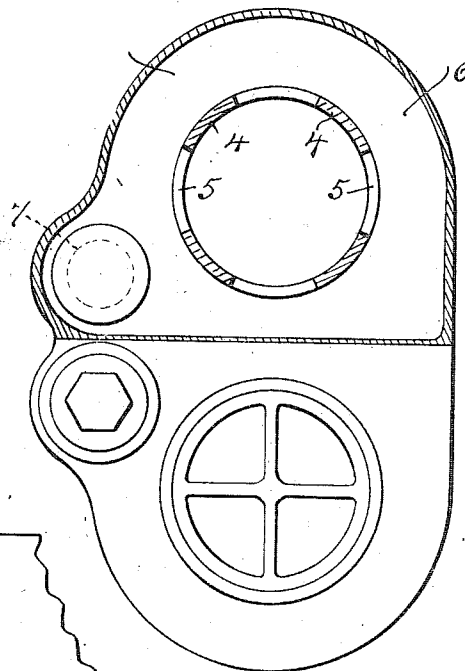


Fig. 3.



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UNITED STATES PATENT OFFICE.

MATHEW B. MORGAN, OF LANSING, MICHIGAN, ASSIGNOR OF ONE-HALF TO OSCAR M. SPRINGER, OF DETROIT, MICHIGAN.

EXPLOSIVE-ENGINE.

985,920.

Specification of Letters Patent. Patented Mar. 7, 1911.

Application filed July 28, 1909. Serial No. 510,052.

To all whom it may concern:

Be it known that I, MATHEW B. MORGAN, a citizen of the United States of America, residing at Lansing, in the county of Ingham 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.

10 This invention relates to internal combustion motors of the two-cycle type and more especially to an arrangement thereof which provides a compression chamber for each cylinder and does not use the crank case for
15 that purpose.

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

20 In the drawings, Figure 1 is a view in side elevation of a motor embodying features of the invention showing a cylinder and adjacent parts in longitudinal section, with a piston approaching the ignition position; Fig. 2 is a view in section at right angles to Fig.
25 1 with a piston at or near the outer limit of its stroke; and Fig. 3 is a view partially in plan and partially in cross section of the motor.

Referring to the drawings, a suitable base
30 1 in which a main crank shaft 2 is journaled in bearings 3, supports cylinders 4 closed at the outer end. Intake ports 5 near the upper end of each cylinder are connected by an annular passage 6 with inlets 7 at the upper
35 ends of the cylinders, which are controlled by inwardly opening valves, either automatic as herein indicated, or positive in action, and of any preferred type. Exhaust ports 8, preferably annular, are found near the lower
40 ends of the cylinder.

A trunk piston 9 in the form of a hollow cylinder closed near its upper end, is reciprocable in each cylinder and is internally bored or machined for sliding engagement
45 with a hollow, cylindrical shell 10 closed at its upper end and secured on the base with its upper portion concentric within the cylinder, its lower end preferably being seated in the counter-bored face of the base 1. Longitudinal openings in the side of the shell
50 allow a wrist pin 11 diametrically secured in the piston 9 to reciprocate freely, a connecting rod 12 coupling the pin to the crank

shaft 2. Packing rings 13 near the upper end of the shell make a closed joint for the
55 cylinder of the piston. Ports 14 in the piston wall near its head, on either side of which are packing rings 15, are adapted to register near the limit of the out-stroke of the piston with the intake ports 5 of the cyl-
60 inder and when the piston approaches the point of greatest compression, uncover an opening 16 in the cylinder wall in which a spark plug 20 or other ignition means is secured. Exhaust openings 17 are likewise
65 formed in the piston wall near the inner end of the piston in such position that they register with the exhaust ports 8 of the cylinder at the same time the intake ports 14 of the piston are alined with the cylinder ports
70 5. A removable plate 18 on the side of the casing permits the insertion and withdrawal of the wrist pin and its bushings 19.

In operation the out-stroke of the piston commences at the instant of explosion due
75 to the uncovering of the spark or ignition terminal by the intake ports of the piston and consequent expansion of the charge compressed between the piston head and the end of the stationary shell. During the out-
80 stroke of the piston, the charge that has entered the outer end of the cylinder is partially compressed so that when the inlet ports of the piston register with the intake ports of the cylinder, the partially com-
85 pressed charge rushes into the piston and forces out ahead of it the exhausted or ignited charge which is free to escape through the exhaust ports of the piston then in register with the exhaust ports of the cylinder.
90 As the piston returns it draws a fresh charge through the inlet valves and intake ports of the cylinder and compresses the other charge between its head and the head of the stationary shell, which is fired when
95 the intake ports uncover the ignition terminal. By this arrangement the crank case may be open, and the crank shaft bearings and connecting rod are not subjected to high temperatures as in the base compression
100 type. Furthermore as each cylinder has its own compression chamber any desired number of cylinders may be coupled on the same shaft.

Obviously, changes in details of construction may be made without departing from

the spirit of the invention, and I do not limit myself to any particular form or arrangement of parts.

What I claim as my invention is:—

1. In a two-cycle internal combustion motor, a cylinder closed at its outer end and provided with an annular inlet passage near its head in communication with the interior of the cylinder through a plurality of intake ports, and with an annular exhaust passage near its inner end in communication with the interior of the cylinder through a plurality of exhaust ports, a cylindrical shell secured with its closed upper end extending concentrically into the cylinder close to the exhaust ports, a trunk piston reciprocable in the cylinder and on the shell, provided with intake and exhaust ports through its wall adapted to simultaneously register respectively with the cylinder intake and exhaust ports when the piston is at the outer limit of its throw, an ignition terminal in the cylinder wall adapted to be uncovered by an intake port of the piston when the latter is near the inner limit of its throw, and a crank shaft operatively connected to the piston.

2. In a two-cycle internal combustion motor, a cylinder closed at its outer end and

provided with an annular inlet passage near its head in communication with the interior of the cylinder through a plurality of intake ports, and with an annular exhaust passage near its inner end in communication with the interior of the cylinder through a plurality of exhaust ports, a cylindrical shell secured with its closed upper end extending concentrically into the cylinder close to the exhaust ports, a trunk piston reciprocable in the cylinder and on the shell, provided with intake and exhaust ports through its wall adapted to simultaneously register respectively with the cylinder intake and exhaust ports when the piston is at the outer limit of its throw, an ignition terminal in the cylinder wall adapted to be uncovered by an intake port of the piston when the latter is near the limit of its throw, a wrist pin diametrically disposed in the piston through longitudinal slots in the shell, a crank shaft and connecting rod coupling the pin and shaft.

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

MATHEW B. MORGAN.

Witnesses:

OTTO F. BARTHEL,
G. E. McGRANN.