S. YBARRA.

EXPLOSIVE ENGINE.

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1,046,704.

Patented Dec. 10, 1912.

Fig. I.

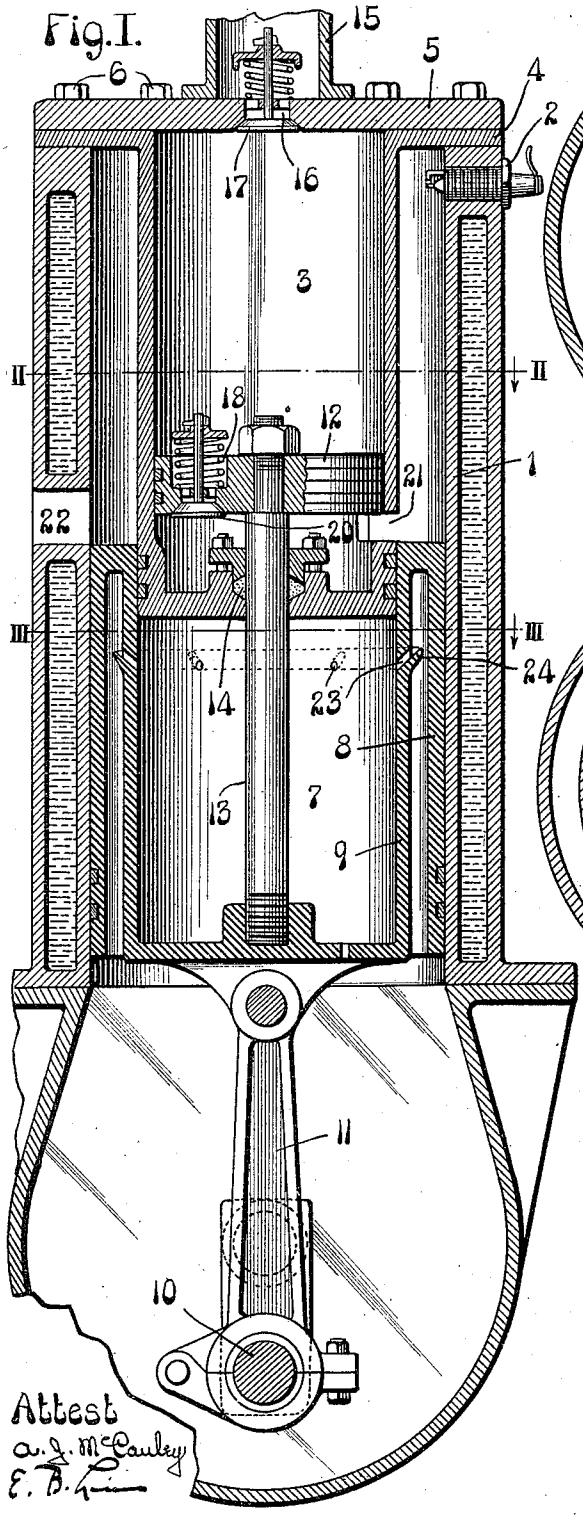
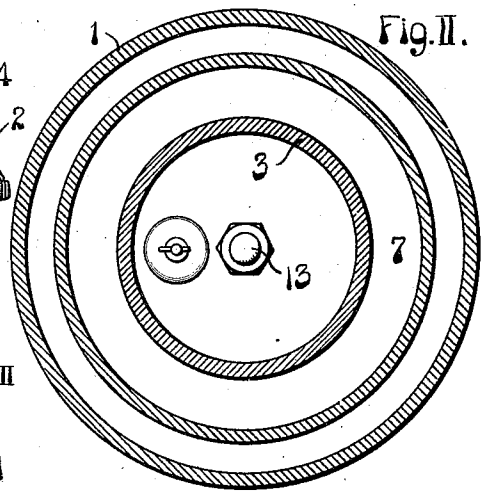


Fig. II.



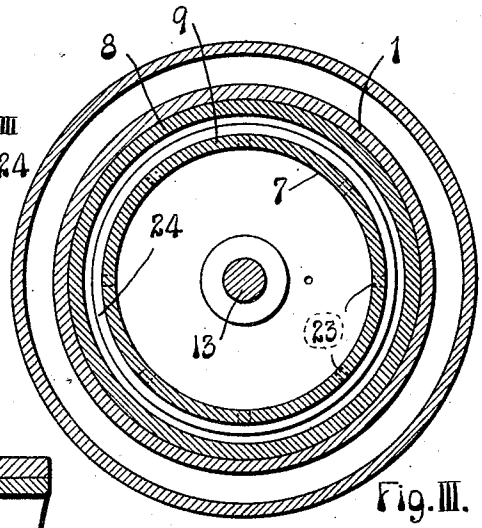


Fig. III.

Attest

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UNITED STATES PATENT OFFICE.

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EXPLOSIVE-ENGINE.

1,046,704. Specification of Letters Patent. Patented Dec. 10, 1912.

Application filed January 26, 1912. Serial No. 673,556.

To all whom it may concern:

Be it known that I, SAMUEL YBARRA, a citizen of the United States, and residing in the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an explosive engine of the two cycle type, and has for its object the production of a two cycle engine wherein all or practically all of the incoming charge will remain in the explosive chamber while it is forcing the products of combustion through the exhaust port.

Another object is the production of explosive engines having parts so constructed that they may be very easily removed for repairs or inspection.

The invention also includes a novel form of oiling device.

Figure I is a vertical section of an explosive engine embodying the features of my invention. Fig. II is a horizontal section taken on line II—II, Fig. I. Fig. III is a horizontal section taken on line III—III, Fig. I.

In the accompanying drawings: 1 designates an explosion chamber provided with a spark plug 2. A pump cylinder 3, arranged within the explosion chamber, has an annular flange 4 at its outer end which lies on and constitutes a closure for the upper end of the explosion chamber. The outer end of the pump cylinder 3 is closed by a removable head 5, seated on the flange 4, and secured to the explosion chamber by screws or bolts 6.

7 designates a power piston having two concentric cylindrical walls, (outer and inner), 8 and 9 which surround the pump cylinder 3, the outer wall 8 being fitted to the explosion chamber 1, and the inner wall 9 being fitted to the pump cylinder. A crank 10 is united to the power piston by a connecting rod 11.

12 designates a pump piston fitted to the cylinder 3 and connected to the power piston 7 by a piston rod 13 passing through a stuffing box 14 in the inner head of the pump cylinder.

Explosive mixture is conducted to the pump cylinder through a pipe 15 and while the pump piston 12 is moving away from the head 5, this mixture is drawn into the pump cylinder through an inlet port 16 in said head. When the pump piston is moving toward the head 5, the port 16 is closed by a check valve 17, and the mixture then passes through a port 18 in the pump piston. During the downward strokes of the pistons, the port 18 is closed by a check valve 20 and the mixture is compressed in the pump cylinder until permitted to escape through a port 21. This port 21 is opened and closed by the power piston 7 in a manner common to two cycle engines, the charge being forced through said port when it is uncovered by the power piston, with the result of forcing the products of combustion through the exhaust port 22. It will be apparent that the operation of this engine is very similar to the ordinary two cycle engine, but it should be noted that the charge is admitted to an annular space around the pump cylinder at a point some distance away from the exhaust port. The incoming charge enters the explosion chamber in the form of a current which flows around the annular space and causes the products of combustion to pass through the exhaust port before any appreciable amount of the charge reaches said port.

To enable the interior of the power piston and exterior of the pump cylinder to be lubricated by oil splashed from the crank case during the operation of the engine, the inner wall 9 of the power piston is preferably provided with ducts 23 and an inclined annular flange 24 below said ducts exterior of said wall. The oil splashed by the crank is thrown upwardly between the cylinder walls 8 and 9 and is caught and delivered through the ducts 23 by the inclined flange 24.

I claim:—

1. In an explosive engine, an explosion chamber, a pump cylinder within said explosion chamber, an annular power piston surrounding said pump cylinder, said pump cylinder having a port which communicates with the explosion chamber, a pump piston in said pump cylinder, a check valve for allowing fluid to pass through said pump piston, and means for conducting an explosive mixture to said pump cylinder.

2. In an explosive engine, an explosion chamber, a pump cylinder within said explosion chamber, a power piston surrounding said pump cylinder, a pump piston in said pump cylinder for forcing an explosive

mixture into the explosion chamber, and a piston rod passing through one end of the pump cylinder and connecting the power piston to the pump piston.

3. In an explosive engine, an explosion chamber, a pump cylinder arranged within said explosion chamber and constituting a closure for one end thereof, a power piston surrounding said pump cylinder, a pump piston arranged within said pump cylinder for forcing an explosive mixture into said combustion chamber, a stuffing box in the inner end of the pump cylinder, and a piston rod passing through said stuffing box and connecting said pump piston to said power piston.

4. In an explosive engine, an explosion chamber, a pump cylinder within said explosion chamber, a pump piston in said pump cylinder for forcing an explosive mixture into said explosion chamber, a power piston surrounding said pump cylinder and connected to the pump piston, said power piston having a pair of cylindrical walls which are spaced apart to form an oil passageway, the inner wall having ducts for conveying oil to the exterior of the pump cylinder, and an inclined flange for delivering oil to said ducts.

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In the presence of—
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E. B. Linn.