J. W. MEAKER.

EXPLOSIVE ENGINE.

APPLICATION FILED DEC. 27, 1910.

**1,002,423.**

Patented Sept. 5, 1911.

2 SHEETS—SHEET 1.

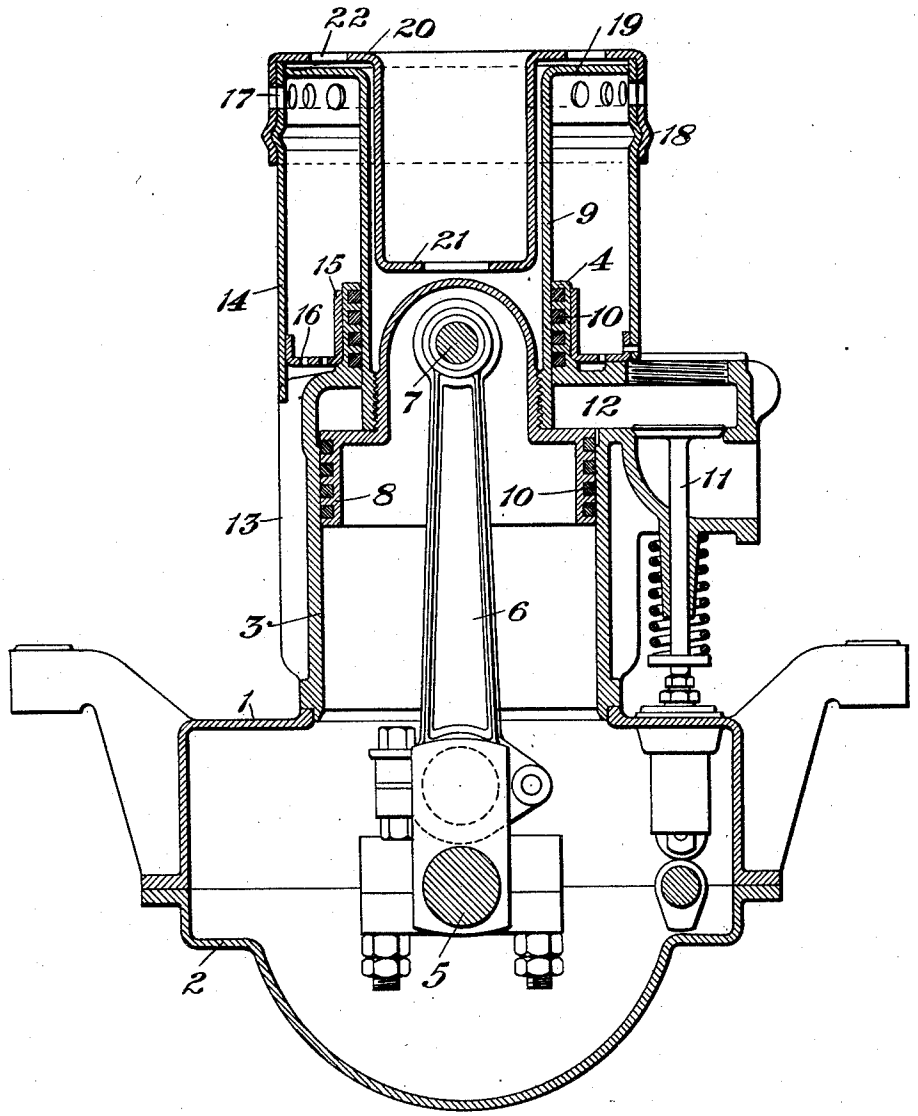


Fig. 1.

Witnesses
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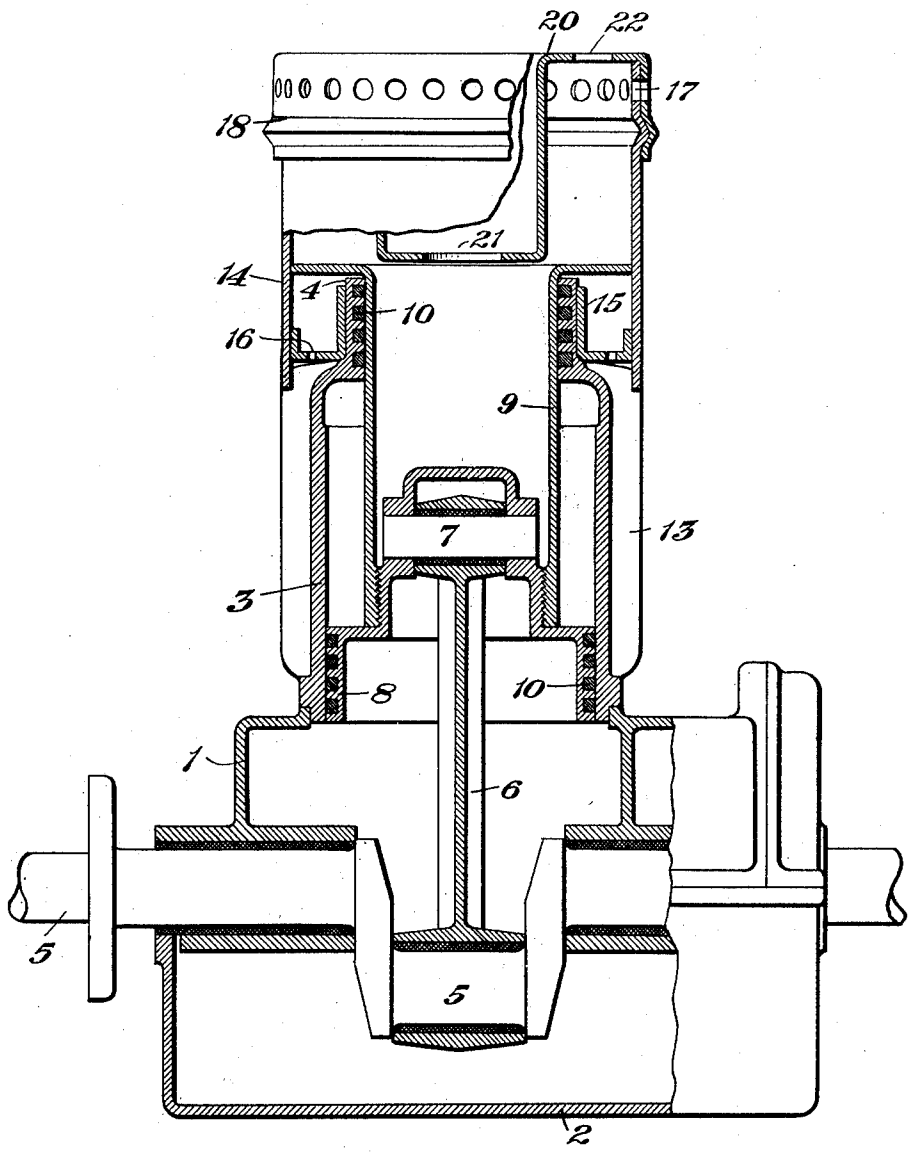


Fig. 2.

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# UNITED STATES PATENT OFFICE.

JOHN W. MEAKER, OF DETROIT, MICHIGAN.

## EXPLOSIVE-ENGINE.

1,002,423. Specification of Letters Patent. Patented Sept. 5, 1911.

Application filed December 27, 1910. Serial No. 599,414.

*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.

In the operation of explosive engines using air cooled cylinders, it is desirable that the portion of the cylinder in which the initial ignition takes place, that is, the explosion end of the cylinder, be positively swept with cold air currents in order that the cylinder be cooled uniformly as the remoter portions of the wall are less highly heated and consequently are readily provided for. It is also advantageous to cool the interior of the piston to further prevent unequal expansion of the parts.

This invention relates to an air cooled explosive engine and more especially to means for positively forcing air against the explosion chamber wall at the point of greatest compression and also into the interior of the piston adjacent the explosion chamber.

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 view in vertical section through the cylinder and piston of an engine embodying features of the invention, showing the piston at the moment of explosion; and Fig. 2 is a view partly in elevation and partly in section at right angles to the view of Fig. 1 showing the piston at the lower end of its stroke.

As herein indicated, a base 1 and crank case 2 support an open ended cylinder having a lower enlarged portion 3 and an upper portion 4 of less diameter. A crank shaft 5 in the base is coupled by a connecting rod 6 and wrist pin 7 to a piston having an enlarged lower end 8 fitting the bore of the cylinder portion 3 and an upper cylindrical extension 9 reciprocable through the smaller portion 4 of the cylinder. Sets of packing rings 10 or like devices insure tight joints between the piston and cylinder. Inlet and outlet valves, one of which is indicated at 11 and which are operated by any preferred form of mechanism in time relation to the piston stroke, control the admission of an explosive mixture into the annular chamber indicated at 12 which forms the compression end of the cylinder.

The lower portion 3 of the cylinder has longitudinally disposed ribs or fins 13 as heat radiating members. An external jacket 14 is supported concentrically over the upper portion 4 of the cylinder as by a perforated flange collar 15 on the cylinder, the latter having perforations indicated at 16 and the lower margins of the jacket 14 entering the intervals between the upper ends of the ribs 13 so as to form air passages arranged to direct air forced out of the jacket directly down the cylinder wall. An annular flange 19 on the upper end of the piston 9 is arranged to have a sliding fit in the jacket 14. A cap 20 is rotatably secured over the upper end of the jacket 14 by a flange 18 and has a depending hollow extension 21 that is arranged to enter the piston when the latter is approaching its outward limit of motion. The space between this extension 21 and the piston is in communication constantly with the open air through apertures 22 in the cap 20. A series of openings 17 are formed near the upper end of the jacket and may be brought into register more or less completely with openings in the flange 18 by turning the cap. As a result of this construction the down stroke of the piston forces all the air between the jacket and the upper portion of the piston, first against the upper portion of the compression chamber of the cylinder and then downwardly between the cylinder radiating ribs. At the same time air has been drawn into the space between the end of the jacket and the interior of the piston and this is expelled on the piston upstroke while at the same time the fresh supply of air is drawn into the jacket. As a result fresh currents of cooled air are projected first against the compression end of the cylinder and then toward the cooler portions while at the same time the interior wall of the piston adjacent the compression end is thoroughly cooled by ingress of air thereto. The motion of the air is positive and as a result the cylinder is kept at an even temperature.

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

What I claim as my invention:

1. In an explosive engine, a cylinder having an open contracted upper end, a piston fitting both the cylinder and the upper end through which it extends, and a jacket over the upper end of the cylinder, in sliding engagement with the upper end of the piston, having openings at its lower end adapted to direct air expelled by the piston movement against and along the outside of the cylinder.

2. In an explosive engine, a cylinder having an open contracted upper end, outer radiating members on the lower portions of the cylinder, a piston fitting both the cylinder and the upper end through which it extends, and a jacket over the upper end of the cylinder in sliding engagement with the upper end of the piston, having openings at its lower end adapted to direct air expelled from the jacket by the piston along the cylinder between the radiating members.

3. In an explosive engine, an open-ended cylinder, a piston reciprocable therein adapted to form with the cylinder an annular explosion chamber near the upper end of the cylinder, and a jacket on the upper end of the cylinder, the upper portion of the piston extending through the upper end of the cylinder into sliding engagement with the jacket and forming therewith an annular chamber with openings adjacent the outer wall of the explosion chamber.

4. In an explosive engine, an open-ended cylinder, a piston reciprocable therein adapted to form with the cylinder an annular explosion chamber near the upper end of the latter, outer radiating members on the cylinder, and a jacket supported over the upper end of the cylinder in sliding engagement with the upper end of the piston, and provided with openings adapted to direct air expelled therethrough by the piston along the radiating members.

5. In an explosive engine, an open-ended cylinder, a piston reciprocable therein adapted to form with the cylinder an annular explosion chamber near the upper end of the latter, the piston having an open, upper enlarged end extending above the upper end of the cylinder, a jacket supported on the upper end of the cylinder in sliding engagement with the upper end of the piston and provided with openings at its lower end directing air expelled from the jacket by the piston against and along the outside of the cylinder and a cap on the upper end of the jacket provided with a depending extension entering the upper end of the piston.

6. In an explosive engine, an open-ended cylinder, a piston reciprocable therethrough adapted to form an annular explosion chamber with the upper portion of the cylinder, and provided with an exteriorly flanged open upper end exterior to the cylinder, a cylindrical jacket supported on the cylinder in sliding engagement with the upper end of the piston, and provided at its lower end with openings and radiating members on the lower portion of the cylinder.

7. In an explosive engine, an open-ended cylinder having a lower enlarged portion and an upper portion of lesser diameter, a piston whose lower portion fits the lower portion of the cylinder and whose open-ended upper portion extends through the open end of the upper portion of the cylinder, a jacket supported concentrically over the upper end of the cylinder, and a flange on the upper end of the piston fitting the jacket, the lower end of the jacket having discharge outlets arranged to direct air expelled from the jacket by the piston along the outside of the cylinder.

8. In an explosive engine, an open-ended cylinder having a lower enlarged portion and an upper portion of lesser inner diameter, radiating members on the outside of the lower portion, a cylindrical jacket supported concentrically over the upper portion of the cylinder and arranged with openings at its lower ends between the radiating members of the cylinder, a piston whose lower portion fits the lower portion of the cylinder and whose open-ended upper portion is reciprocable through the contracted portion of the cylinder, and a flange on the upper end of the piston in sliding engagement with the jacket.

9. In an explosive engine, an open-ended cylinder having a lower enlarged portion and an upper portion of lesser inner diameter, radiating members on the outside of the lower portion, a cylindrical jacket supported concentrically over the upper portion of the cylinder and arranged with openings at its lower end between the radiating members of the cylinder, a piston whose lower portion fits the lower portion of the cylinder and whose open-ended upper portion is reciprocable through the contracted portion of the cylinder, a flange on the upper end of the piston in sliding engagement with the jacket, and a cap closing the upper end of the jacket and having a center portion extending into the top of the piston.

10. In an explosive engine an open-ended cylinder having a lower enlarged portion and an upper portion of lesser inner diameter, radiating members on the outside of the lower portion, a jacket secured concentrically over the upper portion with its lower end contacting with the radiating members and having openings in register with the spaces between the radiating members, a piston whose lower end fits the lower portion of the cylinder and whose upper open end extends through the upper portion and is in sliding engagement with the jacket, a cap closing the upper end of the jacket and

a depending extension on the cap entering the body of the piston and an annular slide on the jacket adapted to control inlet openings near the upper end thereof.

11. In an explosive engine, an open-ended cylinder having a lower enlarged portion and an upper portion of lesser inner diameter, radiating members on the outside of the lower portion of the cylinder, a perforated collar encircling the upper portion of the cylinder adjacent the upper ends of the radiating members, a cylindrical jacket secured by the collar over the upper end of the cylinder with its lower marginal portion contacting with the radiating members, a cap closing the upper end of the jacket and and having a depending central extension and inlet openings around the upper end of the extension, a piston whose lower portion fits the lower portion of the cylinder and whose upper open-ended portion is reciprocable through the upper portion of the cylinder and around the cap extension, a flange on the upper end of the piston fitting the jacket, and an annular flange on the cap having openings adapted to be brought into register with inlet openings through the jacket near the upper end thereof by turning the cap.

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

JOHN W. MEAKER.

Witnesses:
C. R. STICKNEY,
ANNA C. RAVILER.