No. 757,215.

PATENTED APR. 12, 1904.

J. J. MURRAY.

EXPLOSIVE ENGINE.

APPLICATION FILED JULY 8, 1903.

NO MODEL

FIG. 1.

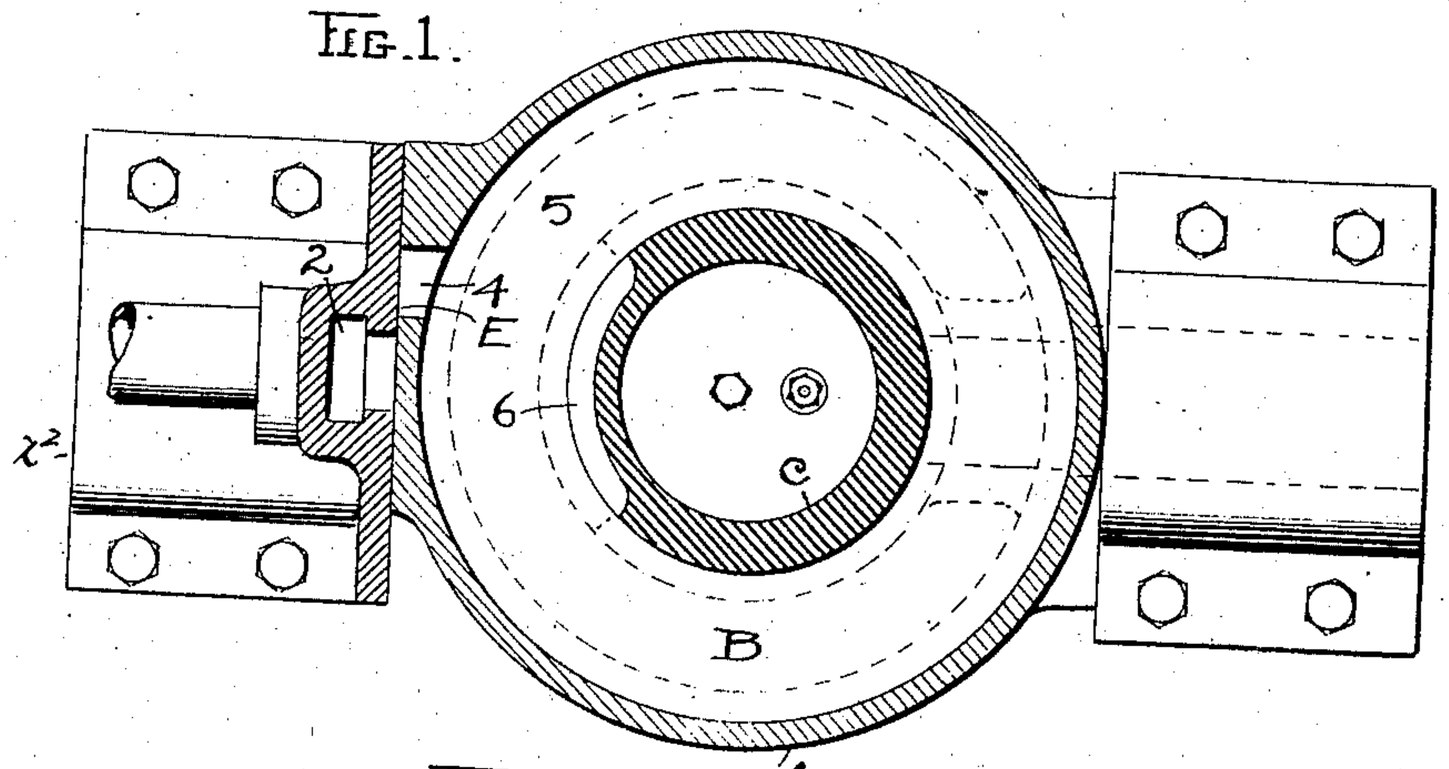
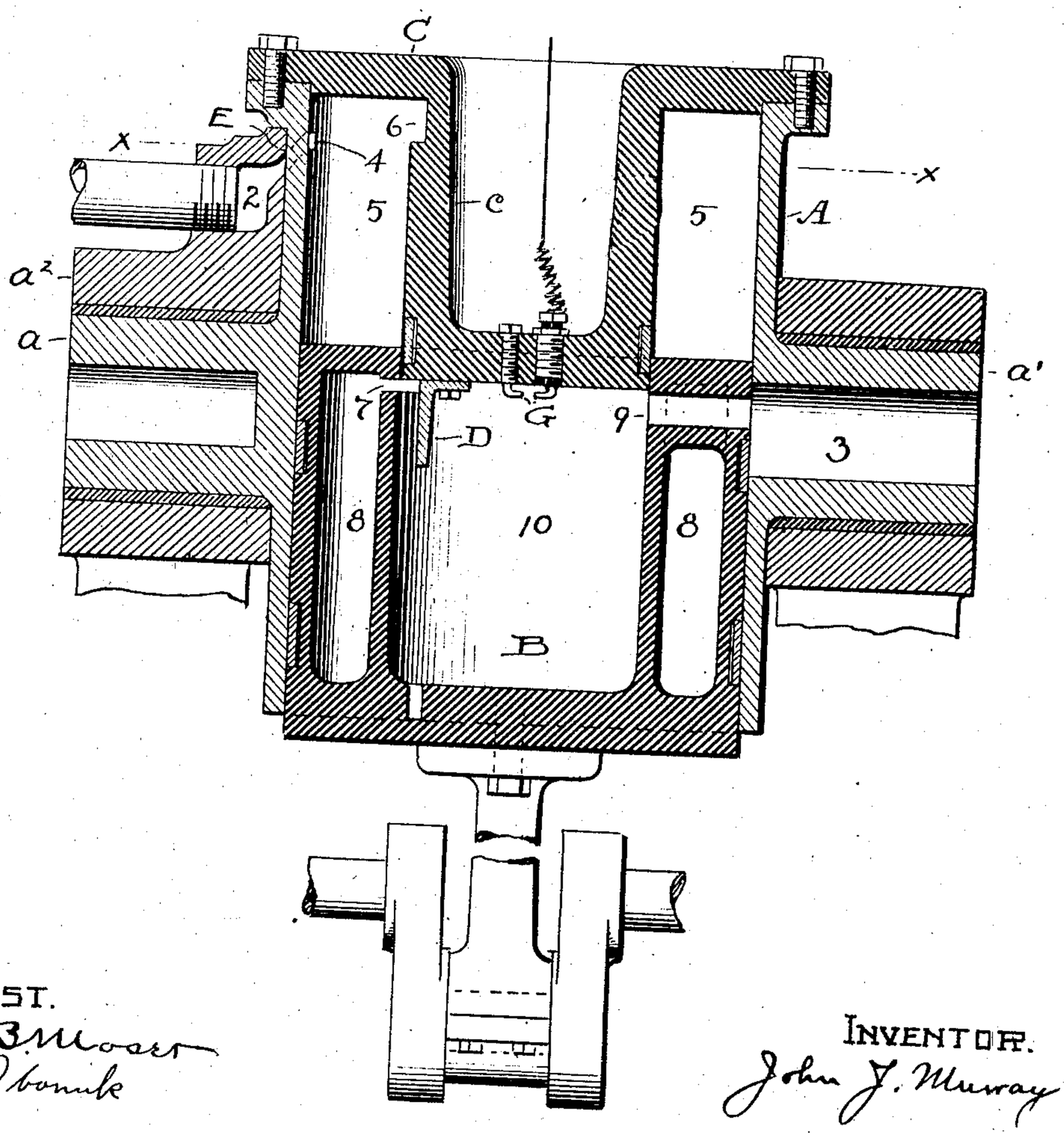


FIG. 2.



ATTEST.

R. B. Moore

R. J. Bonnke

INVENTOR.

John J. Murray

BY H. T. Fisher

ATTY

No. 757,215. Patented April 12, 1904.

UNITED STATES PATENT OFFICE.

JOHN J. MURRAY, OF CLEVELAND, OHIO, ASSIGNOR OF ONE-HALF TO DAVIS D. HOBBS, OF CLEVELAND, OHIO.

EXPLOSIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 757,215, dated April 12, 1904.

Application filed July 8, 1903. Serial No. 164,646. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. MURRAY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Explosive-Engines; and I do declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the use.

My invention relates to explosive-engines; and the invention consists in an explosive-engine of the hydrocarbon type, in which there is an explosion at every stroke of the piston, making, essentially, a two-cycle engine, all as hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a cross-section of the engine on a line corresponding to *x x*, Fig. 2; and Fig. 2 is a longitudinal central sectional elevation of the engine, showing all the ports open.

As thus shown, the engine is comprised practically within two main parts A and B, the part A representing the cylinder and B the piston. The cylinder is provided with trunnions *a* and *a'* centrally at its sides, on which it is adapted to have such slight rocking or vibrating movement as a reciprocating piston may require to work therewith, and the bearing a^2 of trunnion *a* is provided with vapor-induction port or passage 2 and the trunnion *a'* with an eduction or exhaust port or passage 3. This is the preferred style of construction; but these ports might be planned with a different line of entrance and exhaust and still serve my purpose.

C represents the cylinder-head, which has a hollow or cylindrical inward extension *c*, approximately half the depth of the engine-cylinder and having the face thereof nearly in line with the axis of rotation of the cylinder on its trunnions. Between the wall of the cylinder and said extension there is an annular space 5, open to the inlet-port 2 at opening 4 through the wall of the cylinder, and for which any suitable sort of valve or cut-off E or valve mechanism may be provided which is adapted to prevent the gas from being driven back when compression occurs in said annular space 5. The piston itself is provided with an annular walled chamber 8 of its own, having a single inlet and outlet port 7 as its only means of communication, first to receive the gas at the time of compression by way of recess 6 and then to exhaust the fresh supply of gas into compression and explosion chamber of space 10 in the interior of the piston when the piston has about completed its return stroke, as in Fig. 2.

The gas issuing from the chamber 8 through port 7 impinges against the baffle or retarding plate D and is diverted downward, so as to avoid as much as possible flowing to the exhaust-port 9. A slight quantity of gas or vapor will naturally escape through this port when the internal chamber or space 10 of the piston has been filled from its annular chamber 8; but the waste in this way is so comparatively slight as not to be in itself of material consequence, and especially since the ports remain open only momentarily before the piston resumes its forward stroke and closes the said passage.

Suitable packing is provided for the piston at all necessary points, thereby avoiding leakage and utilizing the full volume of gas explosion.

In operation the piston plays back and forth in the annular space 5, as already indicated, and when it travels forward on its so-called "explosion-stroke" it compresses the gas against extension or compression head C, and when this compression has reached its maximum ignition and explosion follow. This drives the piston back with power until it reaches a position substantially as in Fig. 2, when the products of explosion exhaust through ports 9 and 3 and the fresh gas in chamber 8 rushes out through the port 7 and fills the interior 10 of the piston ready for another stroke and explosion. Thus it follows that every stroke of the piston has its new charge and explosion, and a two-cycle engine is formed which is of the highest efficiency and evolves the greatest possible amount of power within the limits of its size and capacity. When the piston retires, as in Fig. 2, a

vacuum is produced, which causes the annular chamber 5 to fill with mixed gases or gas mixture, the proportions of which have been first duly determined; and the valve mechanism which closes port 4 is adapted to close immediately upon the forward movement or stroke of the piston, thus causing gas in chamber 5 to be compressed therein and under such compression to rush in and fill annular chamber 8 of the piston.

It will be noticed as a peculiar feature of this invention that the piston itself is of a dual character, not only serving to take the force of the explosion, as usual, but to carry its own charge of vapor or gas back with it after each explosion, so as to provide a fresh charge immediately and not wait for an intake-stroke and then a compression-stroke before acting, as is so common in explosion-engines generally. Any suitable means of ignition for the gas may be provided, and such means are now shown at G on the face of head *c*.

What I claim is—

1. In an explosion-engine, a piston having an internal explosion-chamber and a gas-carrying chamber about said explosion-chamber and open thereto through a port, substantially as described.

2. In an explosion-engine, a suitable cylinder and a piston therein provided with a central explosion-chamber and an annular chamber about the same, said annular chamber connected by a passage with said explosion-chamber, and an exhaust-port from said explosion-chamber, substantially as described.

3. In an explosion-engine, a cylinder provided with a compression-head extending into the same from one end and an annular space between the wall of the cylinder and said head provided with a gas-inlet, in combination with a piston having an annular chamber adapted to run into the said annular space, and the said parts constructed to fill the said annular chamber with gas on the forward stroke of the piston when the explosion occurs, substantially as described.

4. In an explosion-engine, a cylinder provided with an inwardly-extending explosion-head and an annular space between said head and the walls of the cylinder, in combination with a piston having an annular chamber adapted to run into said annular space, said parts provided with passages to fill the said annular chamber with gas on the compression-stroke of the piston, and the piston having an outlet-port from the said annular chamber into the interior thereof and an exhaust from said interior, substantially as described.

5. The cylinder having an explosion-head extending into one end thereof and a piston in the other end, the said cylinder having an annular space about said head with a gas-inlet and a recess in the wall thereof, and the said piston having a central explosion-chamber and a gas-receiving space outside said chamber provided with a lateral passage opening into said chamber and in position to communicate with the said recess in the cylinder on the forward stroke of the piston, substantially as described.

6. In explosion-engines, a cylinder provided with an inwardly-extending explosion-head, in combination with a piston having an explosion-chamber opposite said head and a walled gas-carrying space having an outlet into the said explosion-chamber, substantially as described.

7. In an explosion-engine, a cylinder having a space at one end with a gas-inlet, in combination with a piston having a gas-carrying chamber arranged to run into said space and provided with an inlet-passage for gas, whereby on the forward stroke of the piston the gas-carrying chamber thereof is filled with gas, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

JOHN J. MURRAY.

Witnesses:
DAVIS D. HOBBS,
JOHN R. MURRAY.