W. L. MARR.

EXPLOSIVE ENGINE.

APPLICATION FILED OCT. 10, 1913.

1,104,059. Patented July 21, 1914.

2 SHEETS—SHEET 1.

Fig. 1.

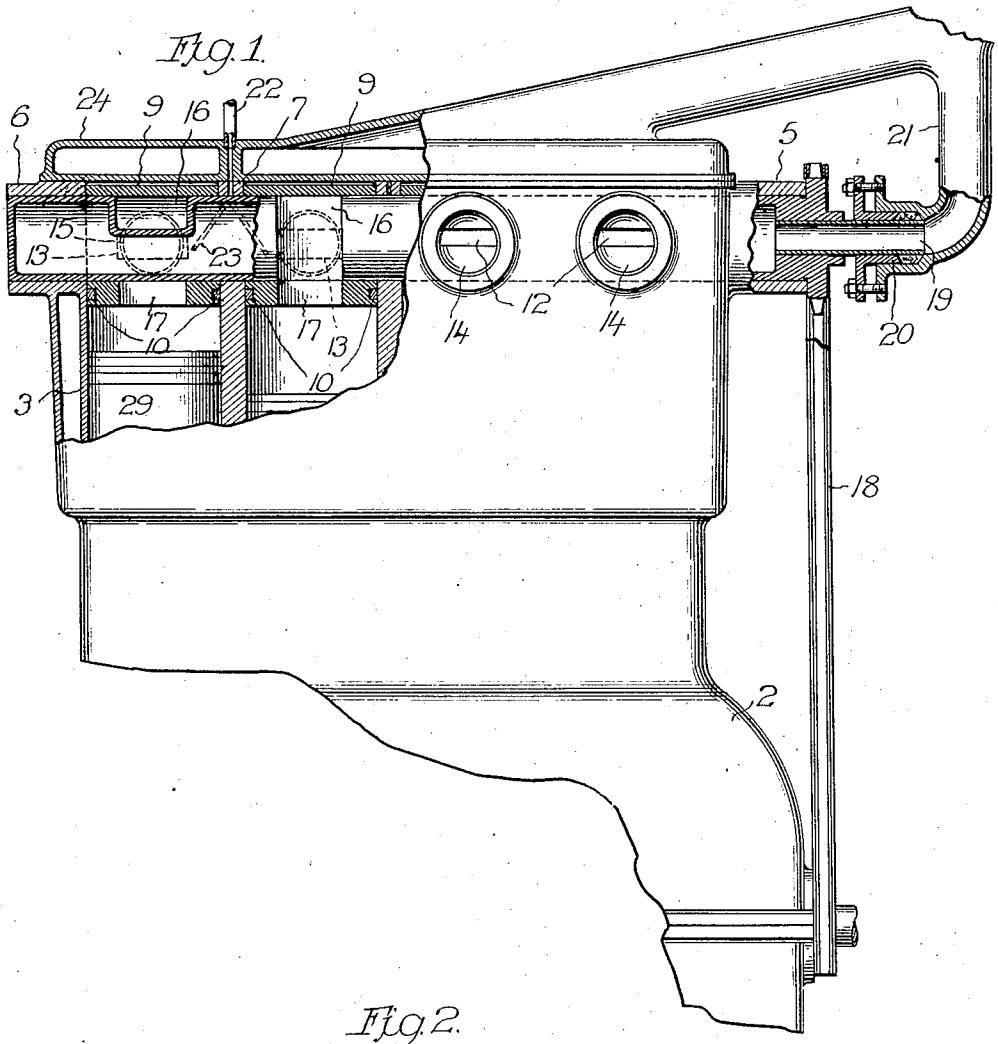
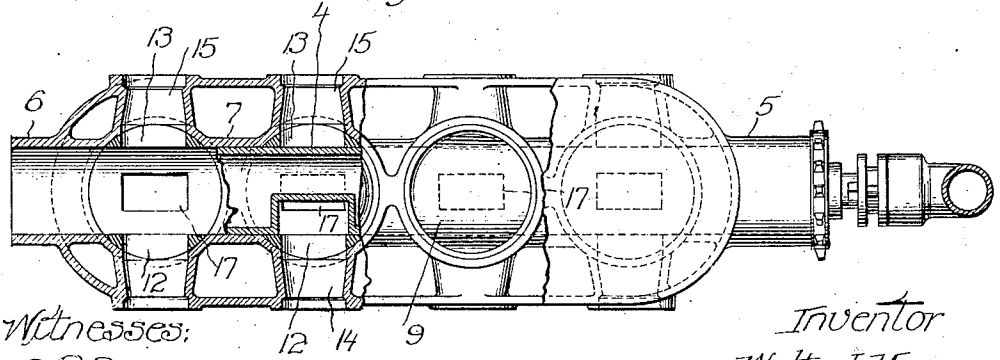


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

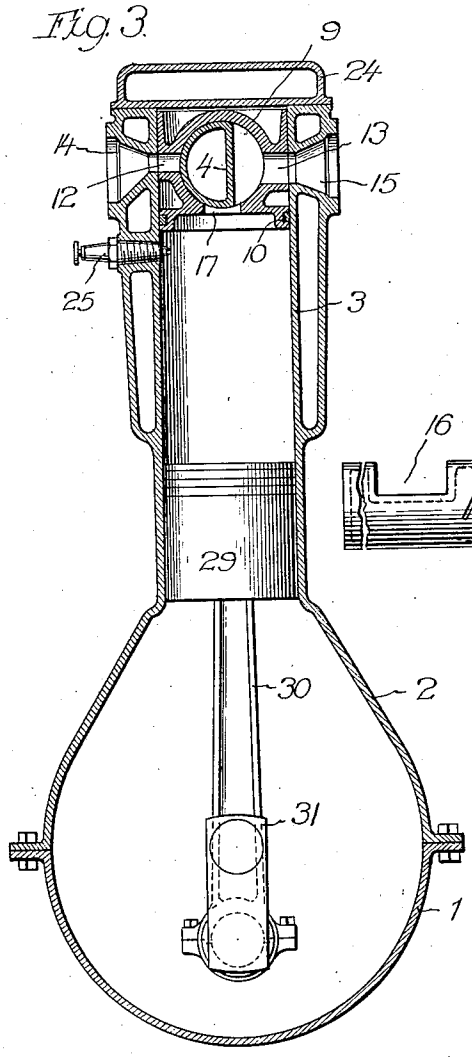


Fig. 5.

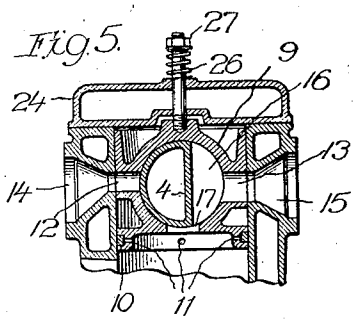


Fig. 6

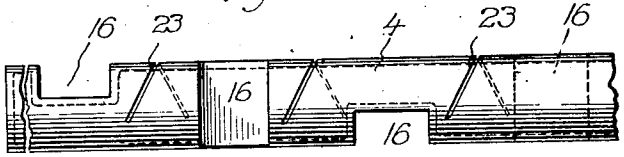


Fig. 7.

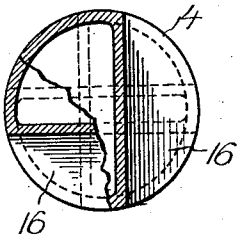
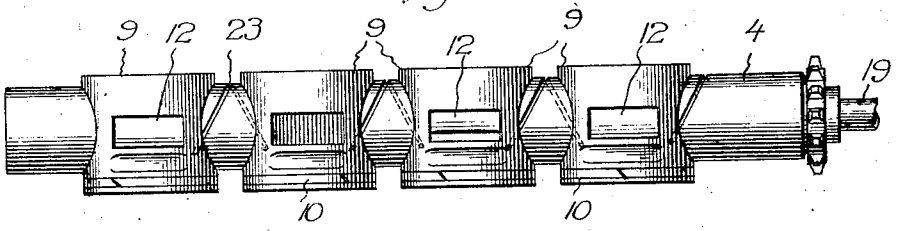


Fig. 4.



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UNITED STATES PATENT OFFICE.

WALTER L. MARR, OF FLINT, MICHIGAN.

EXPLOSIVE-ENGINE.

1,104,059. Specification of Letters Patent. Patented July 21, 1914.

Application filed October 10, 1913. Serial No. 794,394.

To all whom it may concern:

Be it known that I, WALTER L. MARR, a citizen of the United States of America, residing at Flint, in the county of Genesee 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 valve gearing for explosive engines and more particularly of rotary valves it is desirable to avoid the use of a multiplicity of packing rings or like leak stopping devices and it is also advisable to provide compensating means to prevent irregularities in wear on the moving parts.

This invention relates to explosive engines and to an arrangement of the valves therefor whereby the parts when under pressure become self packing, the slight irregularities and differences in action in the different cylinders are compensated for and a valve gearing is obtained that is positive and noiseless in operation.

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, partially in elevation and partially broken away and in section, of a portion of a motor that embodies features of the invention; Fig. 2 is a view, partially in plan and partially broken away and in horizontal section, of the motor; Fig. 3 is a view in vertical section through one of the cylinders of the motor showing the position assumed at the end of the expansion stroke of the motor; Fig. 4 is a view in elevation of a valve and floating cylinder heads thereon; Fig. 5 is a sectional view in detail of a slight modification of the valve; and Figs. 6 and 7 are views in detail of the valve.

Referring to the drawings a motor that has a conventional or standard base 1 and crank case 2 is provided with upright cylinders 3, arranged *en bloc* or as desired. A substantially cylindrical rotatable valve 4 that is common to all the cylinders is journaled horizontally in the upper portion thereof, suitable bearing being afforded by outer bosses 5 and 6 on the end cylinders and by intermediate bosses 7 formed on the adjacent sides of the intermediate cylinders.

A floating head 9 is disposed in each cylinder to close the upper end thereof and is journaled on and supported by the valve. A suitable packing member 10 on the lower end of the floating head prevents leakage around the cylinder wall. As indicated in Fig. 5 the cylinder pressure may be utilized to expand the member 10 by means of apertures indicated at 11 that admit the cylinder gases behind the ring. Each head has an inlet port 12 and an exhaust port 13 that register respectively with the intake opening 14 and the outlet opening 15 of the companion cylinder wall.

By-passes or channels 16 are formed in the valve 4 each to be turned into register by the rotation of the valve with the inlet port or exhaust port 13 and connect them successively with a main port 17 in the floating head opening directly into the cylinder proper. The angular relation of the several by-passes or channels of the valves is such that the intake and exhaust of the cylinders occurs in the usual firing relation, the valve of course being operated in timed relation to the engine crank shaft by suitable connections therefor indicated at 18, such connections being of any preferred type that insure positive interaction between the parts. Preferably the valve is hollow and is water cooled by connection through a hollow stem 19 and suitable packing gland 20 with a pipe 21 leading to the water circulation system of the cylinders. Or both ends of the valve may have such construction provided the conditions warrant it. Lubricant is introduced to the valve through suitable oil pipes 22 that communicate with spirally disposed grooves 23 on the valve face. While the floating head is sufficient to close each cylinder a cap 24 may be secured thereover and included in the water jacket circulation if desired. There is sufficient play allowed between the upper end face of each floating head and the cap to permit movement of the former if necessary. Ignition is supplied by the usual spark plug or terminal 25 inserted at any convenient spot in the cylinder wall.

If desired, the valve may be relieved in part of the weight of the floating head and an upward bearing of the latter against the valve insured by means of a suitably disposed spring 26 that is in compression between the cap and the check nut 27, on a stem 28 that passes through guide openings in the cylinder cap and is screwthreaded into or otherwise attached to the head, suitable provision in the design of the adjacent

faces of the cap and head being made for the necessary clearance and consequent movement of the head. Pistons 29, connecting rods 30 and a crank shaft 31 are also provided.

In operation the timed movement of the valve permits the introduction of the firing charge to each cylinder at the proper moment, cuts off the ports during the compression and explosion strokes and permits escape of the exhausted gases during the scavenging stroke. During the compression and explosion stroke, as the floating head exposes a larger face area than does the valve to the compressed gases of the cylinder, the head of each cylinder is crowded up against the valve and effectively seals the joint between the head and valve around the main port into the cylinder. Thus the valve and head coöperate to prevent leakage at this point. Furthermore as each head of each cylinder is free to accommodate itself to any local wear of the valve, the parts remain in operative position although the valve may not wear evenly throughout its length. Ample bearing may be afforded the valve by a suitable design of the bosses in which it revolves and the action is positive and noiseless while the disposition of the parts is such that efficient lubrication is maintainable. The heads may be designed to combine extreme lightness with the necessary strength and the construction of the valve enables it to be properly water cooled so that it does not expand irregularly under the heat of the explosions.

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

What I claim is:—

1. In an explosive engine, the combination of a cylinder having an inlet and an exhaust port, a valve journaled transversely in the cylinder, and a floating head encircling the valve in the cylinder, the valve and head coöperating to control communication through the ports with the interior of the cylinder.

2. The combination in an explosive engine, of cylinders, a valve journaled transversely thereto in the upper portions of the cylinders, and floating heads each supported in a cylinder by the valve, the cylinders having inlet and exhaust ports that are controlled by the coöperative action of the heads and valve.

3. The combination in an explosive engine, of a cylinder having a lateral inlet and a lateral outlet, with a floating head reciprocable in the upper portion of the cylinder having a main port opening into the cylinder, and an inlet and an exhaust port registering respectively with the corresponding openings of the cylinder, and a valve journaled transversely through the upper portion of the cylinder and the head which it supports, the valve and head coöperating to control communication between the main port and the inlet and exhaust ports.

4. In an explosive engine, a cylinder having an inlet and an outlet, a floating head reciprocable in the cylinder having a main port opening into the cylinder interior and an inlet and an exhaust port in register respectively with the inlet and outlet of the cylinder, and a valve journaled transversely in the cylinder and in the head which it maintains in position, the head and valve coöperating to control communication between the main port and the inlet and exhaust ports.

5. In an explosive engine, cylinders having inlet and outlet openings, a rotatable valve common to all of the cylinders in which it is journaled transversely and a head for each cylinder supported therein by the valve on which it is journaled, the valve and head having by-passes and ports whereby the interior of the cylinder is thrown into communication with the inlet and outlet thereof in proper timed relation.

6. In an explosive engine, a cylinder, a valve journaled transversely in the upper portion thereof, a floating head encircling the valve within the cylinder and reciprocable in the cylinder, and a packing member encircling the head below the valve for sealing the joint around the cylinder wall, the valve and head having ports whereby the intake and exhaust of the firing charge to the cylinder is controlled.

7. In an explosive engine, cylinders each having a lateral inlet and a lateral outlet, floating heads each reciprocable in the upper end portion of the cylinder and having a main port opening into the cylinder, and inlet and exhaust ports substantially in register with the corresponding cylinder openings, and a valve journaled transversely through the cylinders and through the heads which it supports, the valve having by-passes whereby the main ports of the heads are brought into communication with the companion inlet and exhaust ports in timed relation to the engine cycle.

8. In an explosive engine, cylinders each having a lateral inlet and a lateral outlet, floating heads each reciprocable in the upper end portion of the cylinder and having a main port opening into the cylinder and inlet and exhaust ports substantially in register with the corresponding cylinder opening, a valve journaled transversely through the cylinders and through the heads which it supports, the valve having by-passes whereby the main ports of the heads are brought into communication with the companion inlet and exhaust ports in timed re-

lation to the engine cycle, and packing members between the peripheries of the heads and the respective cylinders below the openings thereof.

9. In an explosive engine, cylinders each having a lateral inlet and a lateral outlet, floating heads each reciprocable in the upper end portion of the cylinder and having a main port opening into the cylinder and inlet and exhaust ports substantially in register with the corresponding cylinder opening, a valve journaled transversely through the cylinders and through the heads which it supports, the valve having by-passes whereby the main ports of the heads are brought into communication with the companion inlet and exhaust ports in timed relation to the engine cycle, and packing members between the peripheries of the heads and the respective cylinders below the openings thereof, the areas of the inner faces of the heads exceeding the areas of the main ports therethrough.

10. In an explosive engine, a main shaft, a plurality of cylinders, pistons operatively connected to the main shaft, a floating head longitudinally movable in the upper portion of each cylinder provided with a main port, and an inlet and an exhaust port opening into an inlet and an exhaust of the cylinder, alined bearing bosses on the cylinders, a valve journaled in the bearing bosses transversely of said cylinders and having the portions thereof in said cylinders inclosed by the floating heads which it maintains in position, the valve being adapted to operatively connect the main port of each head successively with the inlet and exhaust ports thereof, means connecting the main shaft and valve to operate the latter in timed relation to the engine cycle, and packing members between the heads and cylinder walls between the pistons and the inlet and exhaust ports, the heads being adapted to be forced by the compressed contents of the cylinders against the valve and to contact therewith around the main ports of each head.

11. In an explosive engine, cylinders each having an inlet and an outlet near the upper end thereof, heads each longitudinally movable in a cylinder provided with a main port and an inlet and an exhaust port that register respectively with the corresponding openings of the companion cylinder, a packing member in the lower portion of each head and the companion cylinder and a single valve common to the cylinders journaled transversely to the upper end thereof and having the portions thereof in said cylinders inclosed by the heads which it maintains in position, the valve having a by-pass in each cylinder that is adapted to connect the main ports successively with the inlet and exhaust port, and means for introducing lubricant to the bearing surface of the valve between the by-passes thereof.

12. In an explosive engine, cylinders having inlet and exhaust openings near the upper ends thereof, floating heads longitudinally movable in the cylinders each provided with a main port and with inlet and exhaust ports in register respectively with the inlet and outlet of the cylinder, a valve extending transversely through the cylinders and the heads and having portions thereof within said cylinders inclosed by said head which it maintains in position and provided with a by-pass for each cylinder adapted to connect the main port of each head with the inlet and exhaust ports thereof respectively and a cap on each cylinder end at an interval above the head.

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

WALTER L. MARR.

Witnesses:
C. W. NASH,
W. L. NELSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."