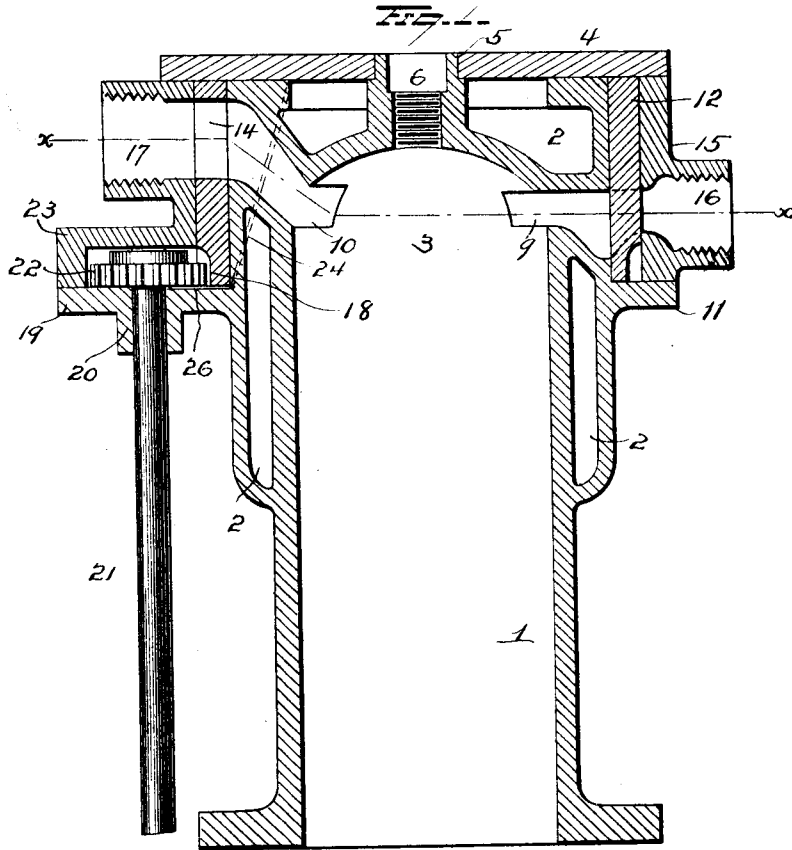
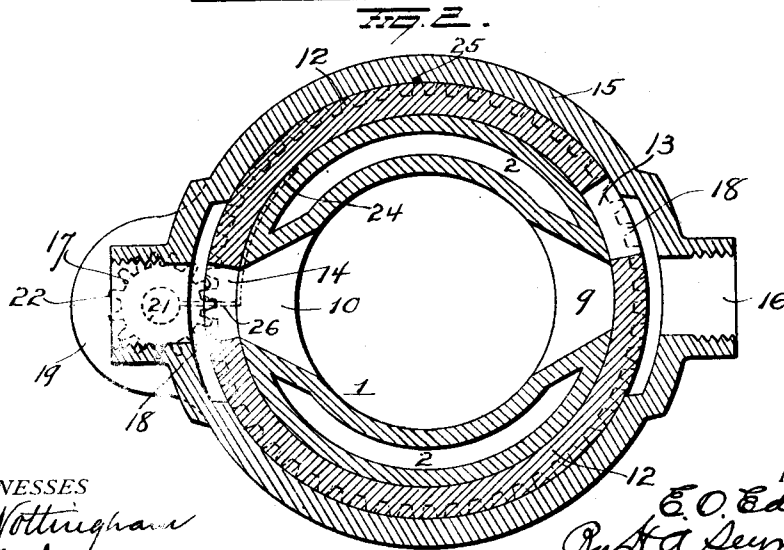


E. O. EDWARDS.
INTERNAL COMBUSTION ENGINE.
APPLICATION FILED MAR. 6, 1911.

1,132,708.

Patented Mar. 23, 1915.

3 SHEETS—SHEET 1.



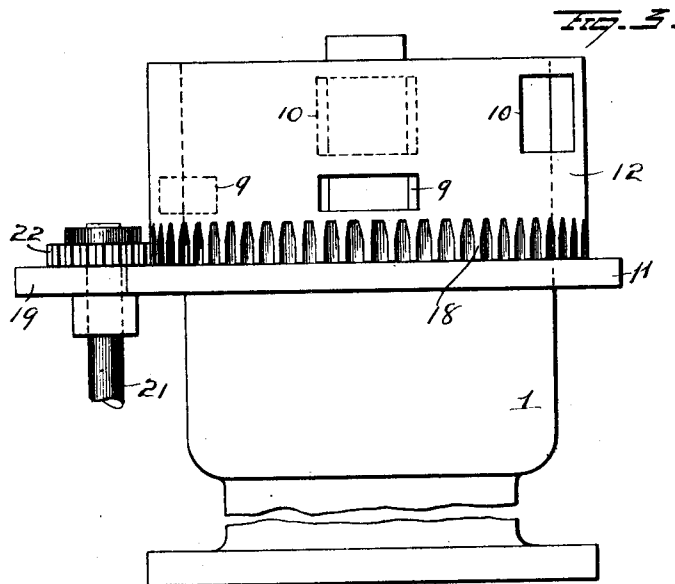
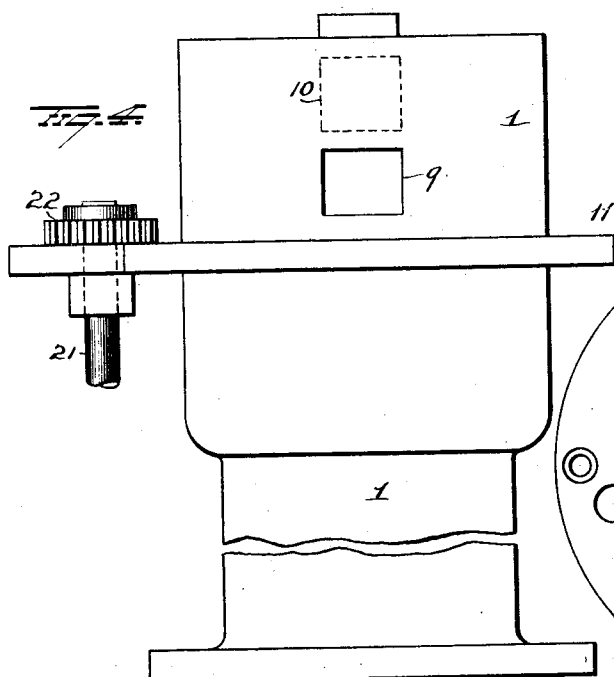
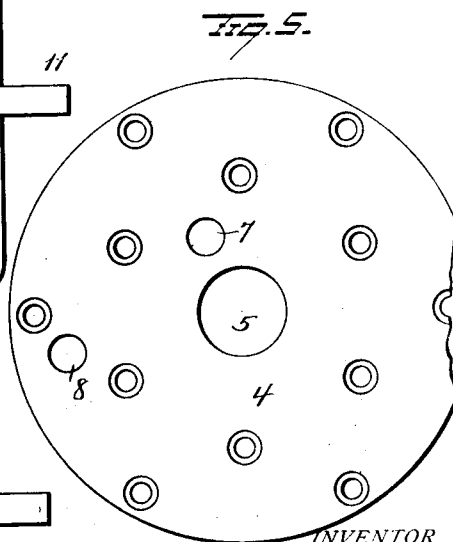
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3 SHEETS—SHEET 2.



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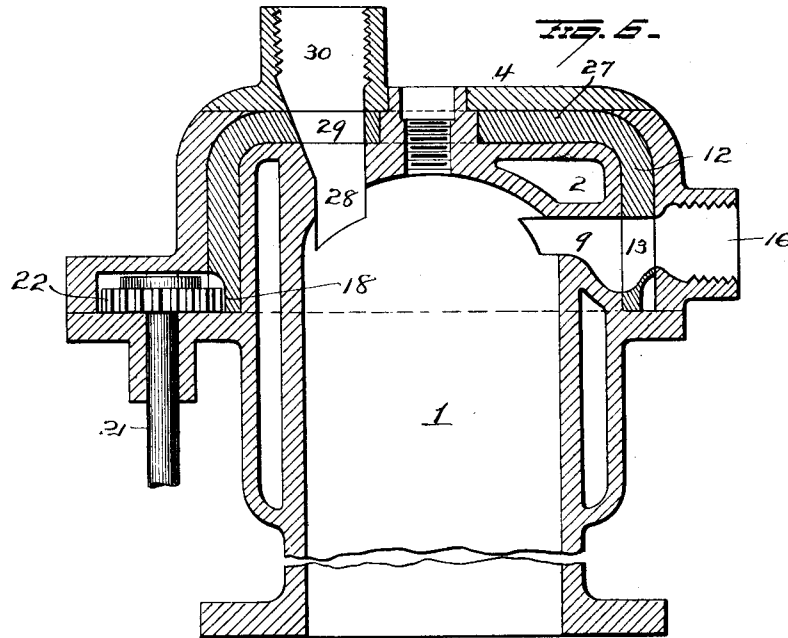
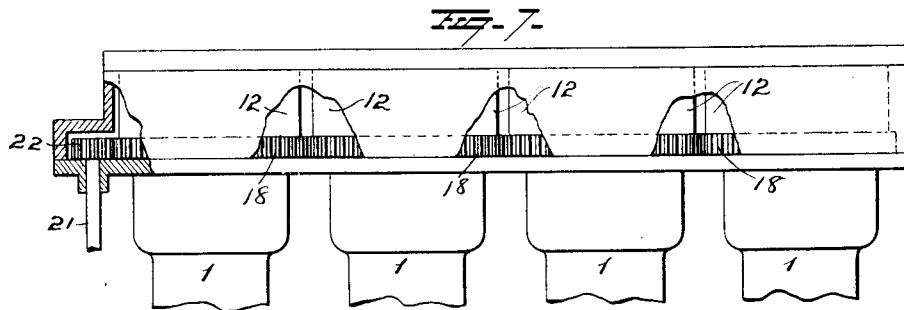
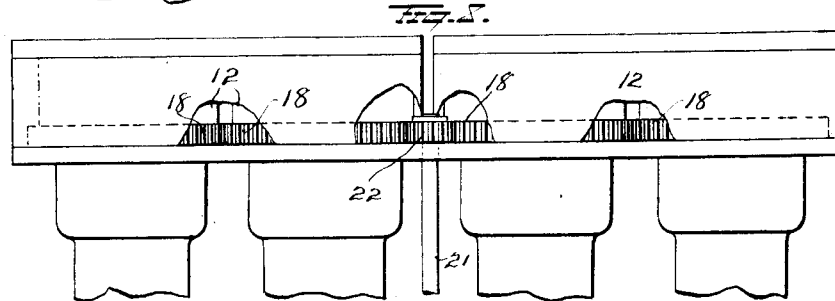
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APPLICATION FILED MAR. 8, 1911.

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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

EUGENE OSBORNE EDWARDS, OF LA CROSSE, WISCONSIN.

INTERNAL-COMBUSTION ENGINE.

1,132,708.

Specification of Letters Patent.

Patented Mar. 23, 1915.

Application filed March 6, 1911. Serial No. 612,575.

To all whom it may concern:

Be it known that I, EUGENE O. EDWARDS, of La Crosse, in the county of La Crosse and State of Wisconsin, have invented certain new and useful Improvements in Internal-Combustion Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in internal combustion engines, and more particularly to a valve construction therefor,—the object of the invention being to construct and arrange a valve for an internal combustion engine in such manner as to avoid complicated mechanism and to obviate the disadvantages encountered with valves which move toward and away from their seats.

A further object is to so construct and arrange a valve for an internal combustion engine as to obviate the necessity for extensive machining and so that it can be made to surround the combustion chamber of the cylinder and operate effectually in controlling the inlet of explosive mixture and the exhaust of products of combustion.

With these and other objects in view the invention consists in certain novel features of construction and combinations of parts as hereinafter set forth and pointed out in the claim.

In the accompanying drawings, Figure 1 is a vertical sectional view of an engine cylinder showing an embodiment of my improvement. Fig. 2 is a view on the line $x-x$ of Fig. 1. Fig. 3 is an elevation showing the valve in place and the valve casing and cylinder head removed. Fig. 4 is an elevation showing one end of the cylinder before the valve and its casing and the cylinder head has been placed in position. Fig. 5 is a plan view of the cylinder head. Fig. 6 is a sectional view illustrating a modification, and Figs. 7 and 8 are views showing the application of my improvement to multi-cylinder engines.

1 represents the cylinder of an engine provided at one end with a water jacket 2 which surrounds and extends over the combustion chamber 3 of the cylinder. A head 4 is secured to the end of the cylinder and is of a diameter somewhat greater than the external diameter of the cylinder and its wa-

ter jacket. This head is provided centrally with an opening 5 which alines with an opening 6 (having a threaded wall) in the cylinder head for the accommodation of a spark-plug of any preferred form of construction. The head 4 also closes the chamber of the water jacket 2 and is provided with an outlet opening 7 for said water jacket,—water being supplied to said jacket by a suitable connection (not shown) with the lower portion thereof. The opening 8 in the cylinder head is intended for the accommodation of a lubricant cup. At opposite sides of the combustion chamber inlet and outlet ducts or ports 9—10 are provided in the wall of the cylinder.

Below the plane of the inlet and outlet ports, the cylinder is provided externally with an annular flange 11 and between this flange and the overhanging portion of the cylinder head 4, a circular or annular valve ring 12 is disposed so as to surround the combustion chamber and be separated therefrom only by the wall of the jacketed portion of the cylinder. The annular valve ring 12 closely embraces the wall of the cylinder and is provided at opposite sides with ports,—an inlet port 13 and an outlet port 14 being provided diametrically opposite similar ports at the opposite portion of the ring valve. The ring valve is surrounded by a closely fitting casing 15 which is disposed between the overhanging portion of the cylinder head 4 and the annular flange 11 on the cylinder and this casing is provided with an inlet port 16 at one side and an outlet port 17 at the opposite side.

The ring valve 12 is provided exteriorly at its lower edge with an annular series of integral gear teeth forming at the lower edge of said valve ring an integral gear wheel 18. An enlargement 19 is made on the flange 11 and is provided with a bearing 20 for the upper end of a shaft 21. To the upper end of this shaft, a pinion 22 is secured and meshes with the gear 18 for rotating the valve ring 12. This pinion is inclosed by a portion 23 of the valve casing 15. Motion will be transmitted to the shaft 21 from the crank-shaft of the engine by means of any suitable gearing not shown.

That portion of the exterior wall of the cylinder against which the valve ring seats, is provided with a diagonal oil groove 24 and the interior wall of the valve casing is similarly provided with an oil groove 25,—

these oil grooves receiving oil from the cup which communicates with the opening 8 in the cylinder head. An oil groove 26 in the upper face of the flange 11 on the cylinder constitutes a continuation of the oil groove 24 and conducts lubricant to the bearing of the shaft 21.

If desired the valve ring may be constructed with a portion 27 (Fig. 6) extending over the closed end of the cylinder and the cylinder head secured to the cylinder over the end portion 27 of the valve ring. In the construction shown in Fig. 6 the inlet port is made in the annular portion of the valve ring as in the construction shown in Fig. 1, but the exhaust ports are made in the end of the cylinder, as at 28; the portion 27 of the valve as at 29, and the head 4 as at 30.

The valves of two or more cylinders can be operated from a single pinion as shown in Fig. 7. In this construction the gears 18 of the several valves mesh with each other and with the gear of the valve on the cylinder at one end of the series, the pinion 22 meshes. It is evident that the cylinders might be arranged in pairs and a pinion 22 might be provided for each pair and connected by shafts such as 21, with gearing cooperating with the crank shaft of the engine.

In the construction shown in Fig. 8 the engine cylinders are arranged in pairs, the gears 18 of the valves of each pair meshing

with each other and a single pinion 22 arranged to mesh with the gears 18 of the valves on the inner cylinders of the respective pairs, so that a single pinion operates to impart motion to the valves of all four cylinders.

Having fully described my invention what I claim as new and desire to secure by Letters-Patent, is,—

In an internal combustion engine, the combination with a cylinder provided with a water jacket, said cylinder having a single inlet port and a single exhaust port located opposite each other, of a rotary valve ring outside of and encircling the water-jacketed cylinder, said valve ring having two oppositely located inlet ports and two oppositely located exhaust ports, the inlet ports being located approximately opposite the exhaust ports but in different planes, said valve provided at its lower edge with gear teeth, a casing inclosing said valve and the gear teeth thereon, a gear housed by said casing and meshing with the gear teeth at the lower edge of the valve ring, and means for driving said gear.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

EUGENE OSBOERNE EDWARDS.

Witnesses:

R. C. WHELPLEY,
JOSEPH BOREHERT.