NOTE.—*The application for a Patent has become void.*
This print shows the Specification as it became open to public inspection.

PATENT SPECIFICATION

Convention Date (New Zealand): Jan. 21, 1920. **158,269**
Application Date (in United Kingdom): Jan. 18, 1921. *No. 2471/21.*
Complete not Accepted.

COMPLETE SPECIFICATION.

Improvements in or relating to Rotary Valves.

I, FREDERICK RIDLEY DENNISON, of 80, Sidey Street, Caversham, Dunedin, New Zealand, British subject. do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The object of this invention is to provide a rotary valve which will efficiently control the admission and exhaust of fuel for power units.

A further object is to provide a rotary valve which may be used for the control and distribution of matter under pressure, and for the admission of pressure and release of exhaust for steam and similar engines.

There are known types of rotary valves which, owing to not being kept in balance in their housing, are liable to lubrication and frictional defects when in operation; and in consequence, wear out very quickly. They are also liable to seize after running for any length of time. My invention overcomes these faults, by the pressure acting upon the valve at two points directly opposite through the valve, and by making the valve a tapered member so that if it should get hot it is not so liable to seize in its casing.

The accompanying drawings illustrate a form of valve which may be used for an internal combustion engine, acting on the four cycle principle.

Figure 1 is a section through the valve casing and top end of engine cylinder, the valve being shown in elevation.

[*Price* 1/-]

Figure 2 is a view in section taken along the line "A—A" in Figure 1.

Figure 3 is a sectional view of the upper end of the engine cylinder and valve casing with the valve in a vertical position.

Figure 4 is a sectional plan taken along line "A—A" in Figure 3, but the valve is shown in its position at time of exhaust.

Figure 5 is a part plan view of Figure 3.

Figure 6 shows a method of gearing which may be used to actuate the valves from the crank shaft of the engine.

The valve in these drawings is shown tapered, but a parallel one may be used without departing from the essential particulars of the invention.

In the case of a multiple cylinder engine fitted with horizontal valves, the valves should be suitably connected to each other so that one drive may actuate the whole, and the valve casing made in one piece, or in the case of vertical valves, may require a separate drive.

Referring to a valve in the horizontal plane, as shown in Figures 1 and 2, the apparatus comprises a valve 1, which is a tapered cylindrical member. Projecting from one end of the said valve is a spindle 2, which may be integral with the valve or suitably secured to it, and on which may be mounted any suitable gearing to drive the valve at the desired speed. Projecting from the opposite end of the valve is another spindle 3, around which is a spring 4, and a washer 5, the end of the spindle is threaded to take a nut 6,

Extending through the valve are two passageways 7 & 7A, which are separated from each other by a partition wall 8; the said passageways being made wide enough to register with two ports at each side of the valve casing at the same time. The valve casing 9 has a tapered bore, inside of which the valve may rotate; oil grooves 10 extend the whole length of the tapered bore; affording communication between the fuel supply, fuel exhaust and the combustion chamber are the following ports or passageways. Each set or pair of ports, such as the fuel admission port 11, fuel exhaust ports 12 & 12A, and combustion chamber ports 13 & 13A, are of equal size and shape, and are approximately equidistant about the centre of the casing. The spaces between the ports may vary in order to give required timing to the engine. There may be another admission port if desired, having its entrance to the combustion chamber directly opposite port 11 about the centre of the valve. The casing surrounding these ports is of box section, and for cooling purposes the interior is supplied with water by any suitable water circulating means through inlet hole 14. In the lower end of valve casing is a hole for the usual ignition plug 15. A facing 16 is left on one end of the valve casing, to which may be secured a housing for a bearing or bearings mounted on spindle 2, which absorb any thrust transmitted to the spindle by the driving medium; these bearings may be of roller, ball or any suitable type.

The valve may be lubricated by means of an oil pump, and the overflow of oil may be led away to lubricate the engine or other gear, or ring oilers may be used with or without an oil pump. The valve casing is suitably secured to the head of the engine cylinder 17. The spring 4 keeps the valve in contact with the bore of the casing, the position of the valve being adjustable by means of nut 6.

Reference should now be made to Figures 3 and 4, where 1 is the valve, which is tapered, projecting from the big end of which is a spindle 2A. There is a wheel 19 mounted on the spindle 2A to rotate the valve, and secured to the said spindle there is a hollow member 20 which forms a bearing in bracket member 21, and the said bracket member is secured to the valve casing 9 at 22.

Mounted on the said spindle at each end of hollow member 20 are two nuts 23 & 23A by means of which the position of the valve 1 in its casing 9 may be adjusted. A suitable cover 24 is provided for the purpose of housing the above described gear, the said cover having a hole 24A therein, by way of which oil may be introduced to lubricate the necessary parts; said cover is extended as at 25, to form a housing for the driving mechanism mounted on spindle 26 which drives the wheel 19 before referred to, said cover being secured to valve casing 9 as at 27. The valve is provided with the two passageways 7 & 7A and partition wall 8. The valve casing 9 is provided with oil grooves 10, and is suitably secured to the head of engine cylinder 17, and has ports similar in form to those described above in connection with the horizontal valve; *viz.*, fuel admission port 11, fuel exhaust ports 12 & 12A, and combustion chamber ports 13 & 13A. The valve casing 9 may be surrounded with a thin hollow cylindrical member 28 and a water-tight joint formed; water for cooling purposes may circulate in the space 29. Provision may also be made for cooling at the upper end of engine cylinder where 28A is the thin hollow cylindrical member and the water space 29A. To ensure that the valve is kept as cool as possible an annular space 30 may be made in the valve itself and a water circulation maintained therein.

Referring to Figure 6, which shows a form of gearing which may be used to actuate the valve in a single or a four cylinder engine in such a manner as to effect a quick opening and closing for the exhaust and admission ports, elliptical or irregular shaped gears 31 & 31A are mounted on crank shaft 32, and by means of suitable chain 33 and two normal shaped gears 34 & 34A, the irregular motion is transmitted to shaft 26, and finally to the valve itself.

In the case of a six cylinder engine where a quick opening and closing for the exhaust and admission ports is desired, it may be better that a separate irregular drive for each pair of valves should be provided.

In operation, the valve may be geared by any suitable means and driven at the desired speed by the engine; by using irregularly shaped gears having a varying ratio, the valve may be rotated so as to ensure a quick opening and closing for the exhaust and admission ports.

Referring to Figures 2 and 4, the valve is here shown in its position when the exhaust ports are full open, at which time the engine piston 18 is on its upward exhaust stroke. The passageway for the exhaust fuel is divided into two branches by means of combustion cham-

ber ports 13 & 13A, and partition wall 8 of the valve, so that one portion of the exhaust is expelled from the combustion chamber by way of combustion chamber port 13, passageway 7A and exhaust port 12A, and the other portion is expelled by way of combustion chamber port 13A, passageway 7, and exhaust port 12; thus the valve will be balanced between the pressure from either sets of ports.

The partition wall 8 prevents the two currents flowing in the reverse direction frictioning with each other. The position of the valve at the admission stroke allows a full charge of fuel to enter the combustion chamber through inlet port 11; during the compression stroke the exhaust ports 12 & 12A, admission port 11, and the combustion chamber ports 13 & 13A are closed by the valve. When explosion of the fuel takes place the upper end of combustion chamber ports 13 & 13A are closed by the valve, and the pressure on one side of the valve is equalized by the pressure on the other; thus the valve is kept in equilibrium in its casing, and is subjected to no violent shock when explosion occurs.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. An improved rotary valve for internal combustion or other engines, or for the control and distribution of matter under pressure, comprising a ported rotary member housed and free to rotate within a casing attached to or forming part of the engine cylinder.

2. An improved rotary valve for internal combustion or other engines, or for the control and distribution of matter under pressure, according to Claim 1; the said rotary member characterised by being tapered.

3. An improved rotary valve for internal combustion or other engines, or for the control and distribution of matter under pressure, partitioned passageways through the valve permitting admission of fuel to the combustion chamber of the engine, and the ejection of exhausted fuel from the combustion chamber.

4. An improved rotary valve for internal combustion or other engines, or for the control and distribution of matter under pressure, according to Claims 1 and 2, means for adjusting the position of the valve inside its casing.

5. An improved rotary valve for internal combustion or other engines, or for the control and distribution of matter under pressure, according to Claims 1 and 2, means for rotating the valve inside its casing.

6. An improved rotary valve for internal combustion or other engines, or for the control and distribution of matter under pressure, according to Claims 1 and 2, a casing member adapted to be water cooled, the said member having a tapered bore and suitable lubricating means; openings in said casing forming inlet and exhaust ports, and forming communication to the combustion chamber of the engine and ports forming communication between the combustion chamber and the head of the engine cylinder.

7. An improved rotary valve for internal combustion or other engines, or for the control and distribution of matter under pressure, according to Claim 1, the upper ends of the said combustion chamber ports being so disposed that the pressure on the rotary member is equalized.

8. An improved rotary valve for internal combustion or other engines, or for the control and distribution of matter under pressure, according to Claims 1, 6 and 7, the upper ends of the said combustion chamber ports being so positioned that they are diametrically opposite each other through the centre of the valve, so that the pressure due to explosion on one side of the valve is equalized by the pressure on the other side.

9. The improved rotary valve for internal combustion or other engines, or for the control and distribution of matter under pressure, according to Claims 1, 5 and 6, exhaust ports, so positioned and connected by passageways and ports that the exhaust fuel from the combustion chamber of the engine is divided into two currents, each making its exit in opposite directions, but being prevented from frictioning by the partitioned wall of the valve.

Dated this 18th day of January, 1921.

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Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1922.

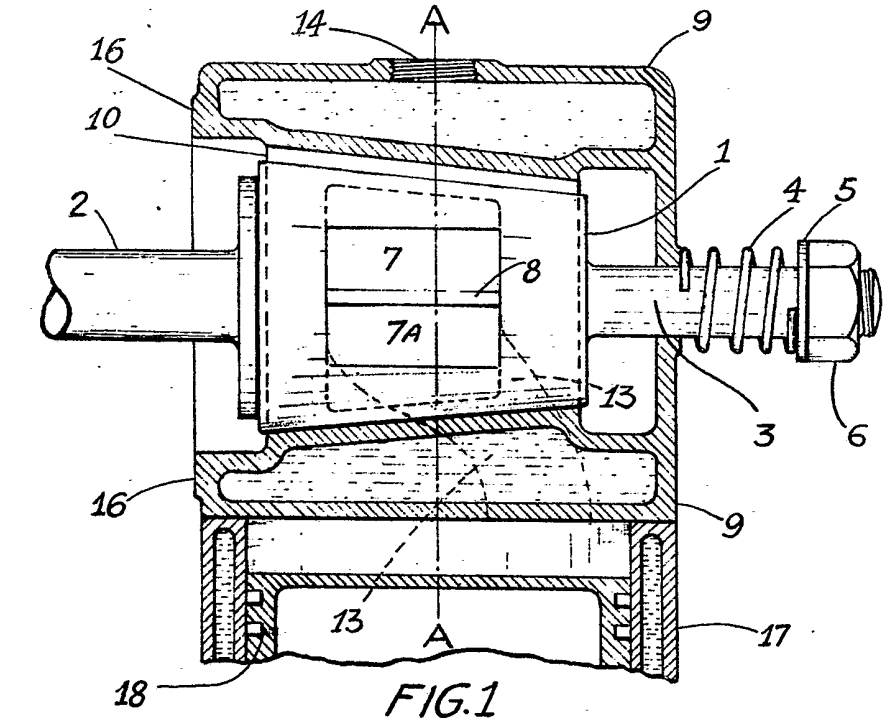

FIG.1

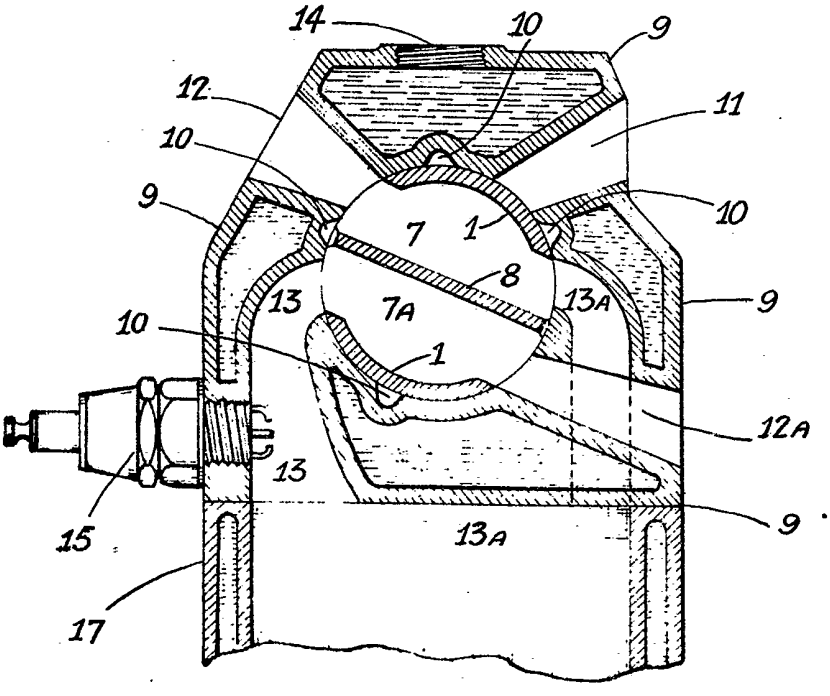

FIG.2

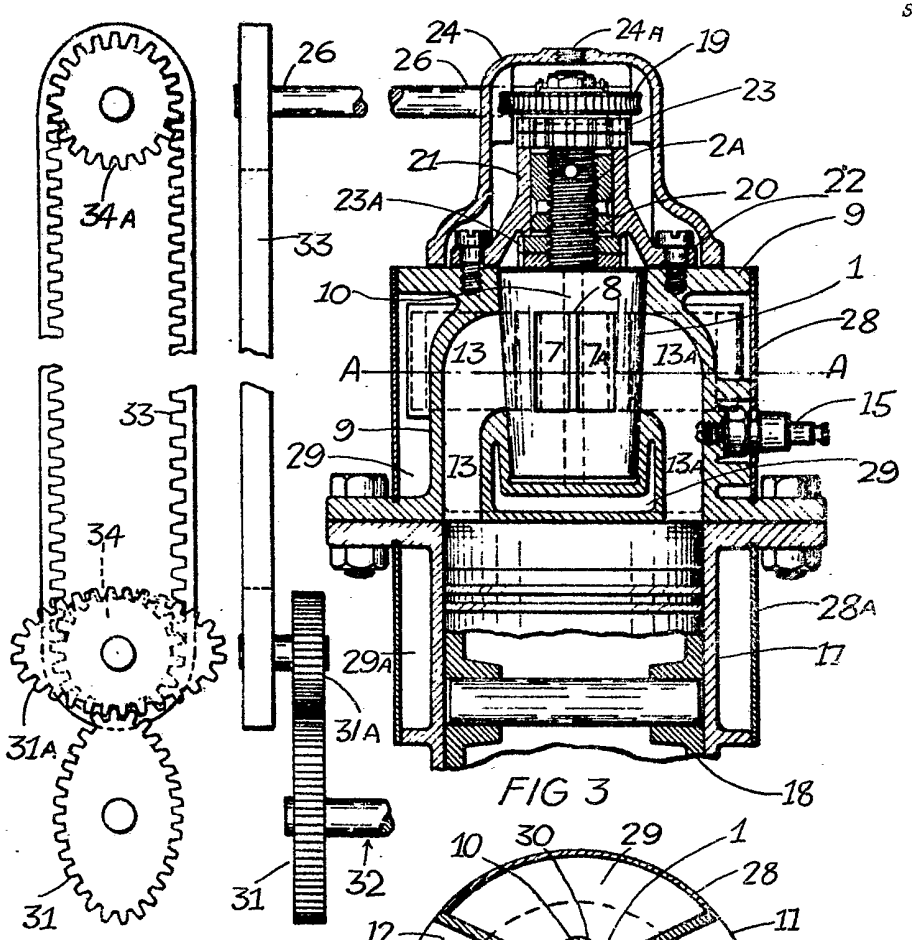

FIG 3

FIG 6.

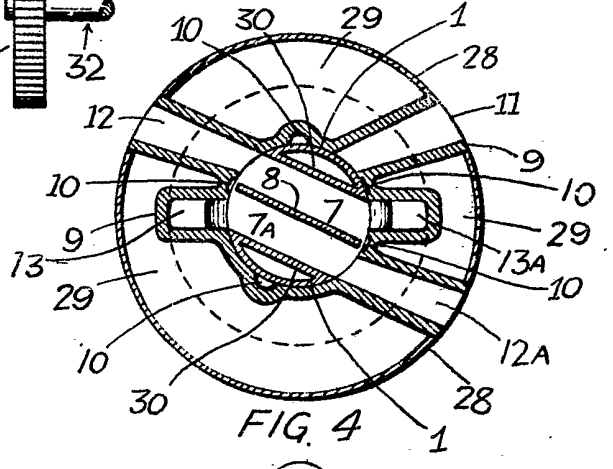

FIG. 4

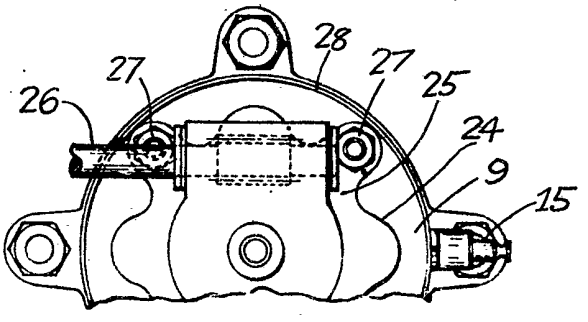

FIG. 5.

Malby&Sons, Photo-Litho