

# PATENT SPECIFICATION



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151,994

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## COMPLETE SPECIFICATION.

### Improvements in and relating to Internal Combustion Engines with Rotary Distributing Valves.

I, ALESSANDRO TEBALDI, of 73, via Mario Pagano, Milan, Italy, a subject of the King of Italy, 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:—

This invention relates to internal combustion engines with rotary distributing valves which are situated on an axis perpendicular to the axes of the cylinders.

The special features which a rotary distributing valve for an internal combustion engine must have are as follows:—

(a). Gas ports of the largest possible area,

(b). The opening of these ports in the shortest possible time,

(c). The operation of the valve must not be disturbed either by the heat produced by the successive explosions and by the exhaust gases passing through same or by the pressures which are generated at the moment of the explosions and during the expansion.

In the present day internal combustion motors the suction and exhaust phases are almost always effected by means of lift valves which open at the proper moment.

It has however been proposed to effect the suction and exhaust phases by means of a rotary distributing valve comprising two concentric ported cylindrical sleeves one within the other rotating at equal speeds in opposite directions and controlling inlet and exhaust ports which connect respectively with the induction and exhaust pipe.

The object of the present invention is to provide an improved rotary distributing valve which will fulfil all the above-

mentioned conditions, and the improved valve comprises a cylindrical casing containing two concentric sleeves one within the other having ports therein registering with ports in the cylinder heads characterised by the feature that both the sleeves are rotatable and are adapted to revolve at different speeds.

An embodiment of the invention is illustrated in the accompanying drawings, in which

Fig. 1 is a longitudinal section of the arrangement shown in a plane perpendicular to the axes of the motor cylinders.

Fig. 2 is a cross-section of the arrangement on the line 2—2 of Figure 1, *i.e.*, in the axial plane of the motor cylinder, and containing the rotary valve;

Fig. 3 is the same section as Fig. 2 but without the rotary valve;

Fig. 4 is a cross section of the rotary valve casing on the line 4—4 of Figure 1, *i.e.*, at a point between two of the motor cylinders;

Fig. 5 shows the rotary valve at the commencement of the exhaust phase;

Fig. 6 shows a variation in the construction of one of the sleeves of the rotary valve;

Fig. 7 shows a longitudinal section through the valve casing with the rotary valve removed;

Fig. 8 shows a section of the rotary valve at the commencement of the suction phase;

Fig. 9 shows a section of the rotary valve at the commencement of the compression phase, and

Fig. 10 shows a development of the outer sleeve of the rotary valve.

The motor cylinder consists of the usual cylinder within which the piston F

reciprocates, and it is bifurcated into two chambers *a* and *b*, which form the compression and explosion chamber and contain the sparking plugs *m*. The end of these chambers is open and is formed of the two ports *d* which communicate with the cylindrical chamber or barrel *g* running at right angles to the axes of the cylinders in which the rotary distributing valve rotates.

The two ports *d* are equal, and in relation to the rotary valve are placed so that they are diametrically opposite each other and consequently, these ports being of equal section, the pressures acting on the rotary valve are equal and diametrically opposed.

The rotary valve, therefore, irrespective of the degree of pressure generated in the explosion chamber, remains in equilibrium and no compressional force can be generated between the rotary valve itself and the cylindrical chamber or barrel within which it rotates.

With the arrangement described below the largest and quickest contemporaneous opening possible of the ports *a* and *b* is obtained.

The rotary distributing valve is composed of two concentric sleeves or barrels C and C<sup>1</sup>. The outer sleeve C is provided with rings *n* (Figure 1) and revolves in a clockwise direction (Fig. 5) at a speed one-quarter that of the motor, and has two ports *f*, *f* diametrically opposed; each port *f* being divided into three separate openings by means of the cross pieces *v*, *v* shown in Fig. 10, for the purpose of obtaining a larger area of opening of the valve over the periods of exhaust and suction. The sleeve C acts as a valve to close the ports *p* during the compression and expansion phases, and to leave them open during the suction and exhaust phases.

Within the sleeve C the inner sleeve C<sup>1</sup> rotates at half the speed of the motor also in a clockwise direction, and puts the ports *d* *d* in communication alternately with the inlet and exhaust. It is provided with four ports *r*, *r* and *s*, *s* in pairs diametrically opposed. The two ports *s*, *s* serve for the suction and are in communication with the pipe from the carburettors; the other two ports *r*, *r* are for the exhaust and are in communication with the exhaust pipe.

The two sleeves co-operate with one another for the working of the rotary valve as follows:—

As shown in Fig. 5 the ports *d* are about to be opened to the exhaust through the ports *f* and *r* as both sleeves rotate

in a clockwise direction. Since the outer sleeve C rotates at half the speed of the inner sleeve C<sup>1</sup> the port *r* will travel twice as fast as the port *f* so that the port *r* will have opened and closed the port *d* by the time the port *f* has completely opened the port *d*. The two ports *f* and *r* will then have reached the position shown in Fig. 8 at which the admission is just commencing through the ports *s*, *s*. Similarly the port *s* in the inner sleeve C<sup>1</sup> will completely open and close the port *d* by the time the sleeve C has just closed the port *d* as shown in Fig. 9 at which the commencement of the compression phase begins.

The inner sleeve may be formed of a single sleeve C<sup>1</sup>, properly designed, and as long as the entire engine, or it can also be composed of a number of short sleeves C<sup>11</sup> (Fig. 6), there being one for each cylinder head, connected together by means of a central spindle S. This arrangement has the advantage of reducing the possibility of deformations due to dilation, and of facilitating the construction of the rotary distributing valve.

In order to obtain the uniform distribution of the oil—which is brought to the rotary valve at determined points by special ducts on the surface of the sleeves—the sleeve C may be provided with means, not shown in the drawing, which will give it a backwards and forwards movement along its own axis, so that the oil is obliged to lubricate all the parts of the surfaces which alternately come into contact with each other.

The explosion chamber is constructed so that it can be completely machined. To this end, the supporting member T is designed with two cylindrical surfaces having their centres respectively at O and O<sub>2</sub>, while it is hollow, so that the cooling water can run through same. The cylinder head, strictly speaking, is cast without the supporting member T, and is supplied with two supports *u*, *u*, Figs. 4 and 7, on opposite sides of the cylinder for supporting the member T.

It will therefore be seen that the cylinder head can be machined partly from the centres O<sub>4</sub>, O<sub>4</sub> and partly from the centre O<sub>2</sub> with radius O<sub>3</sub> as also the cylindrical seating *u* from the centre O<sub>2</sub>. When this work has been done the supporting member T is placed in position and attached with the screws *v* and then the machining of the cylindrical chamber from centre O, in which the rotary valve most rotate, is effected.

Having now particularly described and ascertained the nature of my said inven-

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tion and in what manner the same is to be performed, I declare that what I claim is:—

5 1. A rotary distributing valve for internal combustion engines comprising a cylindrical chamber containing two concentric sleeves one within the other having ports therein registering with ports in the cylinder heads characterised in  
10 that both the sleeves are rotatable and are adapted to revolve at different speeds.

15 2. A rotary distributing valve for internal combustion engines as claimed in Claim 1, characterised in that the outer sleeve has two ports therein for each cylinder, said ports being arranged diametrically opposite one another coinciding with ports in the cylinder head and  
20 the inner sleeve has four ports therein for each cylinder, said ports being arranged in pairs diametrically opposed, one pair

communicating with the induction pipe and the other pair with the exhaust pipe.

3. A rotary distributing valve for internal combustion engines as claimed in Claim 1, characterised in that the outer sleeve revolves at one quarter the speed of the engine and the inner sleeve revolves at one half the speed of the  
30 engine.

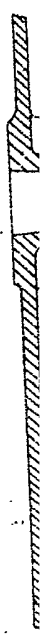
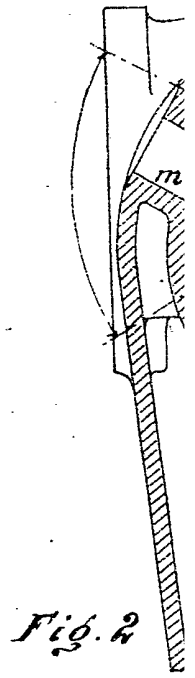
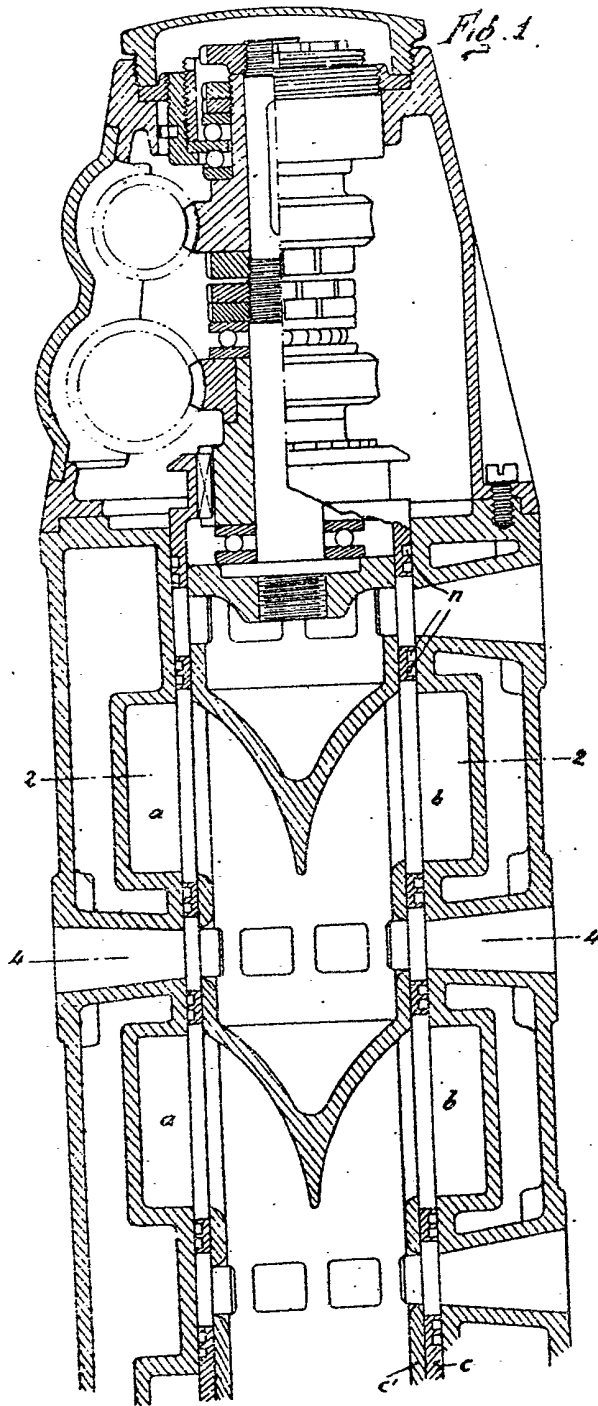
4. A rotary distributing valve for internal combustion engines as claimed in Claim 1, characterised in that the outer sleeve is provided with rings.

5. The improved rotary distributing valve for internal combustion engines substantially as hereinbefore described and as illustrated in and by the accompanying drawings.

Dated this 4th day of October, 1920. 40

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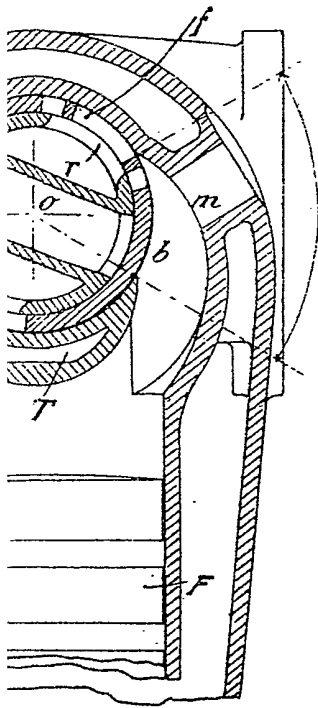


Fig. 3.

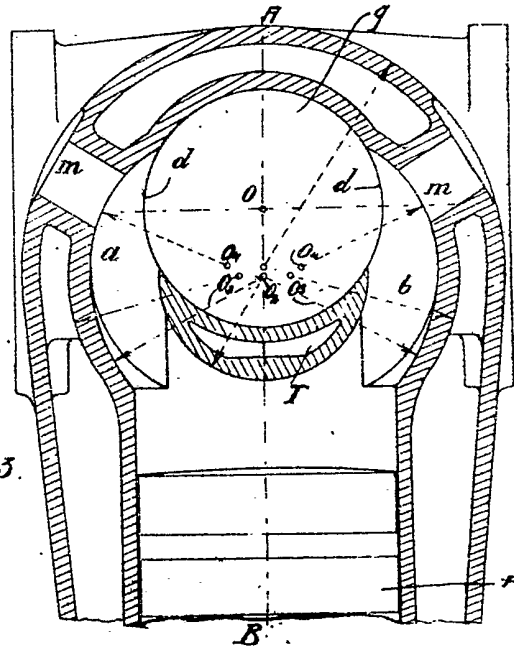


Fig. 4

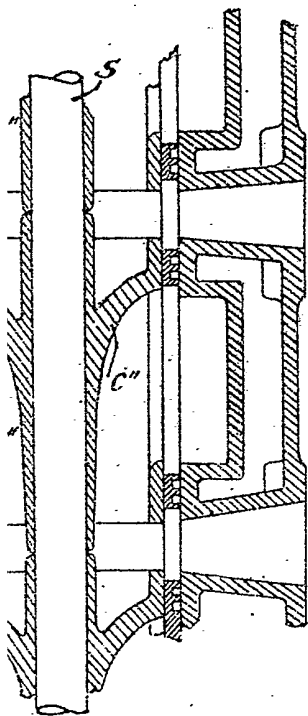
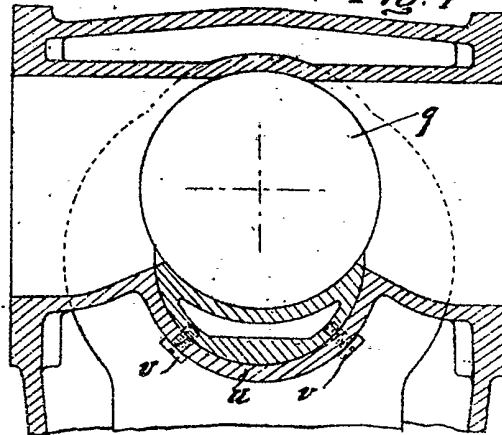
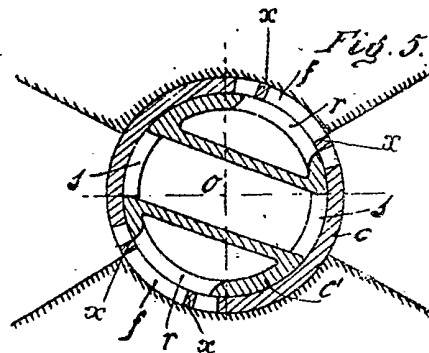
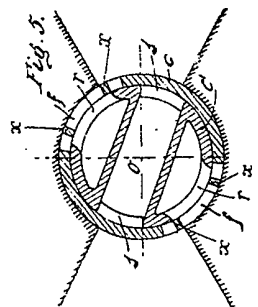
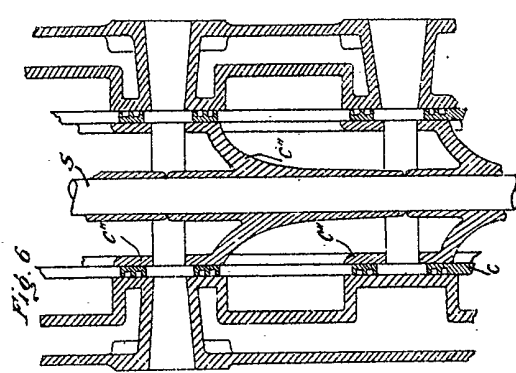
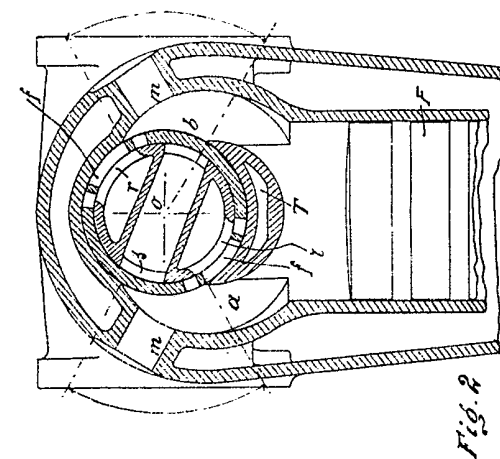
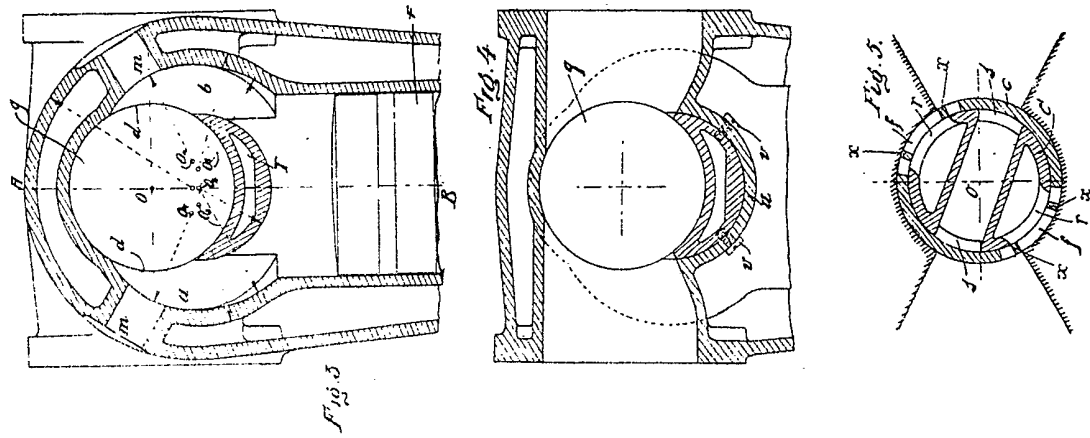


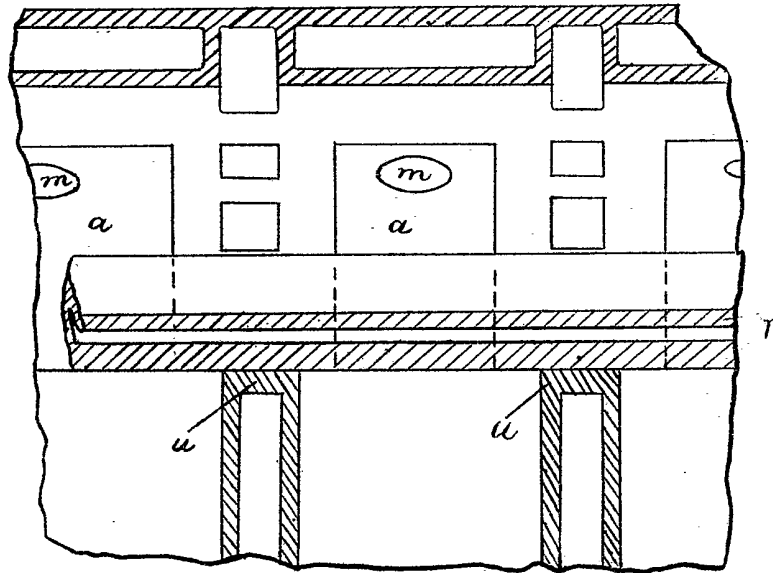
Fig. 5.



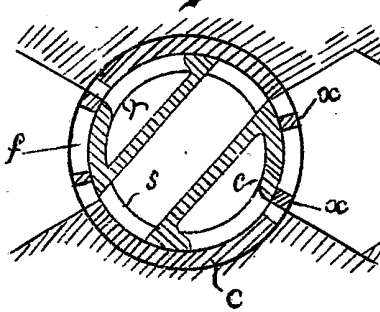


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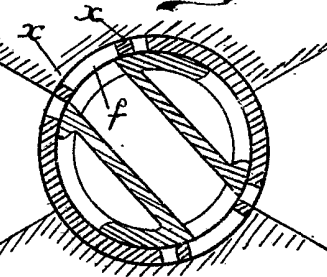
*Fig. 7.*



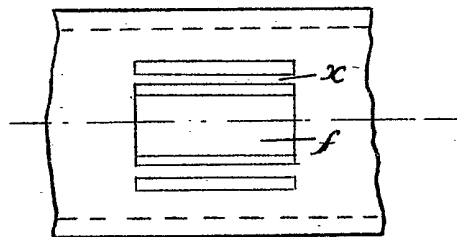
*Fig. 8.*



*Fig. 9.*



*Fig. 10.*



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