PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Improvements in Rotary Valves for Internal Combustion Engines.

I, DAGOBERT HASLER, 133, Heinrichstrasse, Zurich, Switzerland, of Swiss Nationality, 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 rotary valves for four-stroke cycle internal combustion engines of the kind comprising a mechanically driven rotary cylinder working in a cylindrical valve chamber which extends across the heads of a number of working cylinders and is provided with inlet and exhaust ports arranged to cooperate with ports in the rotary cylinder to connect the working cylinders individually to the inlet and exhaust at the proper times.

The object of the invention is to provide improvements in the construction of rotary valves of this type.

According to the invention the rotary cylinder is tapered and this cylinder is pressed axially into engagement with correspondingly tapered walls of the valve chamber by means arranged to act resiliently on one end of the cylinder and is rotated by means of a driving wheel mounted on the other end of the cylinder the valve cylinder being provided with two ports for each engine cylinder which ports are inclined to one another.

An embodiment of the invention is illustrated by way of example in the accompanying drawing in which:—

Fig. 1 shows in side elevation a four cylinder four stroke cycle internal combustion engine, partly in section on line I—I of Fig. 2.

Fig. 2 is a cross section through the control valve with its casing on larger scale, the control valve connecting the exhaust conduit with the cylinder space.

Fig. 3 is an end view illustrating the ports in the valve casing.

On the upper end of the row of cylinders a valve casing 2 is mounted on the cylinder block 1. This casing is provided with hollow spaces 3 for flushing with cooling water. The valve casing 2 has a tapered bore 5 extending parallel to the crank shaft 4 and in which the control valve 6 is mounted rotatable around its own axis. The control valve has over each cylinder a separate admission channel 7 and a separate exhaust channel 8, arranged at an incline to one another. The admission and exhaust channels 7 and 8 are arranged perpendicularly to the longitudinal axis of the control valve or extend therethrough diametrically. Admission ports 10 and exhaust ports 11 facing the cylinders 9 are provided in the valve casing within the range of movement of the admission and exhaust channels 7 and 9. A gas passage 13 and an exhaust passage 14 are provided in the upper part of the valve casing for each cylinder. The admission and exhaust ports 10 and 11 of these passages stand at an angle to the cylinder axis and, when the control valve is in certain positions, they can be brought into communication with the cylinder spaces 12 by the channels 7, 8.

The control valve is tapered correspondingly to the bore 5 and a spiral spring 15 presses against the front end thereof. A thrust ball bearing 16 is arranged between the spiral spring and the control valve. The spiral spring bears towards the front against an adjusting ring 17 which is mounted in a sleeve 18 fixed on the valve casing by screws 19. The resilient loading of the control valve in conjunction with the conicity thereof ensures a constant tight packing.

On the rear end of the control valve, projecting relative to the valve casing, a toothed wheel 20 having a concentric aperture is mounted, which is connected through the intermediary of a toothed wheel transmission gear 21 with a pinion 22 keyed on a crank shaft 4. The ratio of transmission is such that, during four rotations of the crank shaft 4, the control valve 6 performs one complete revolution.

The control valve has a continuous hollow space 23 and is open at the front and rear, to enable air to be blown therethrough by a blower for the purpose of cooling.

The function of the above-described controlling device is briefly as follows:—

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The control valve 6 is rotated clockwise (Fig. 2) from the crank shaft 4 through the intermediary of the toothed wheel gearing 22, 21, 20 in the ratio of 4 to 1. When the admission and exhaust channels 7, 8 come over the ports 10 and 11, they communicate with the passages 13, 14 and the cylinder spaces 12. The control valve with the admission and exhaust channels 7 and 8 opens the admission for the fresh-air-fuel mixture during the induction period owing to its rotary movement, in that the admission channel 7 moves past the opposite port 10 and the passage 13. During the next two piston strokes the compression and the combustion takes place in the cylinder and the control valve 6 closes all ports and connects the exhaust channel 8 with the ports 11 and 14 only during the end of the combustion and the exhaust following thereon, thereby opening the exhaust for the burnt gases in order, after the termination of the exhaust, to again open the admission and to completely close the exhaust, after which, the cycle of operations commences afresh and the respective gases flow in the opposite direction through the control channels 7, 8 during the next following opening periods.

For driving the control valve 6 from the crank shaft 4 several intermeshing spur wheels may be provided. The toothed wheel 20 on the control valve can be arranged axially shiftable within certain limits. Two or more control valves might, for example, be arranged on the upper end of the working cylinder so that one group controls the charge admission and the other the exhaust of the burnt gases. The control valve may also effect an oscillating reciprocating movement instead of a continuous rotary movement.

In Fig. 1 the piston K is in compression position, K_1 in the position of combustion, K_2 that of induction and K_3 that of exhaust.

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. A rotary valve for four-stroke cycle internal combustion engines of the kind referred to wherein the rotary cylinder is tapered and wherein said cylinder is pressed axially into engagement with correspondingly tapered walls of the valve chamber by means arranged to act resiliently on one end of the cylinder and is rotated by means of a driving wheel mounted on the other end of the cylinder said valve cylinder being provided with two ports for each engine cylinder which are inclined to one another.

2. A rotary valve according to Claim 1 wherein said rotary cylinder is formed with a hollow space through which a cooling medium is circulated and wherein the casing of said valve chamber is water-cooled.

3. A rotary valve as claimed in Claim 1 wherein the means arranged to act resiliently on one end of the valve cylinder consists of a spring bearing against the valve cylinder, through the intermediary of a thrust bearing, the tension of said spring being adjustable.

4. A rotary valve for four-stroke cycle internal combustion engines constructed and adapted to operate substantially as described and as shown in the accompanying drawings.

Dated this 25th day of August, 1932.

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Reference has been directed in pursuance of Section 7, Sub-section 4, of the Patents and Designs Acts, 1907 to 1932, to Specifications Nos. 275,557 and 138,919.

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Fig. 1

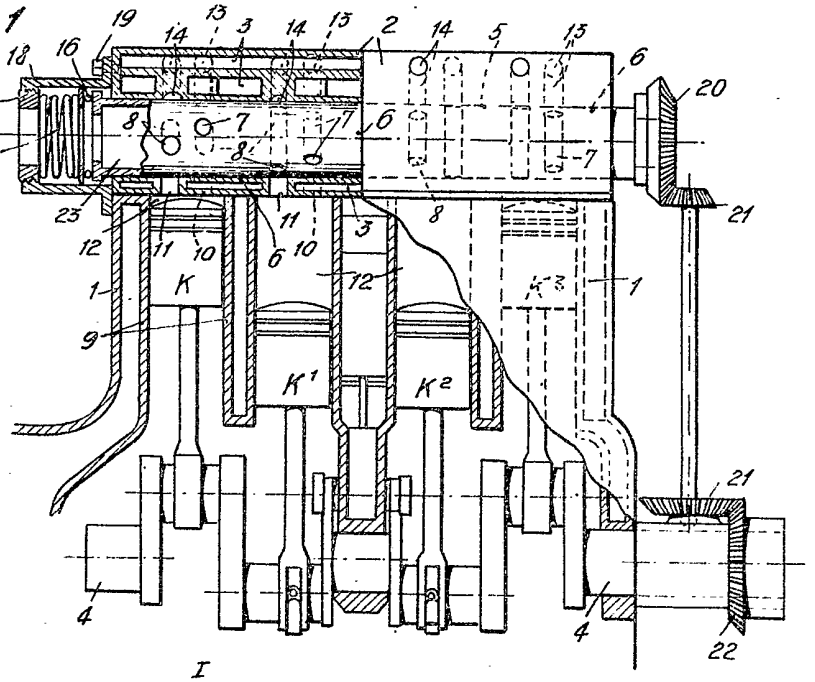


Fig. 2

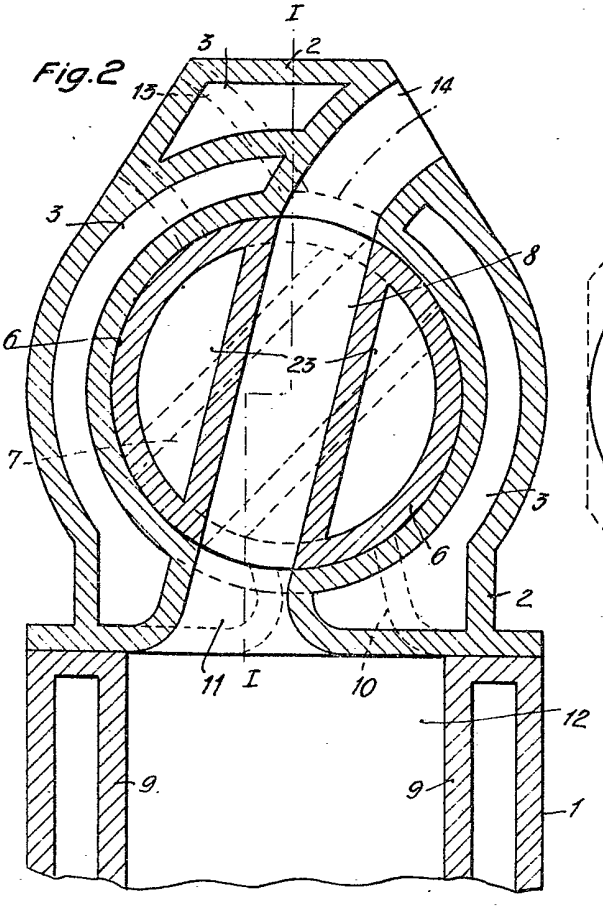
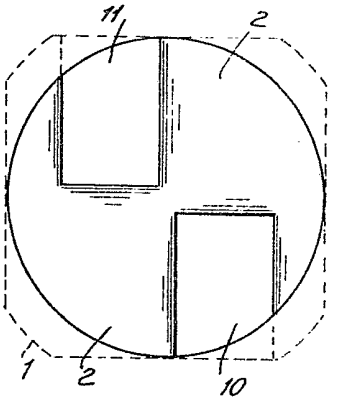


Fig. 3



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