PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Improvements in and connected with the Lubrication of Rotary Valves.

I, DANIEL HIGHBERGER FRANCIS, a citizen of the United States of America, residing at No. 605, Main Street, in the City of Grand Junction, County of Mesa, State of Colorado, United States of America, Inventor, 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 conical rotary valves intended particularly for internal combustion engines, of the kind wherein lubrication is effected by supplying oil under pressure to a chamber at the valve end, which oil is subsequently fed along the rubbing surfaces of the valve and its casing by way of grooves cut in said faces and arranged as hereinafter described in such manner as to prevent direct communication between the oil chamber and the valve ports.

The object of the present invention is to provide an improved construction and arrangement of such valves which will result in improved action and more efficient lubrication.

According to the present invention the valves are arranged co-axially in pairs, operatively connected together with their larger ends towards one another in a casing, the small ends of the valves co-operating with the casing in providing end lubricating chambers and the large ends of the valves co-operating in forming a central lubricating chamber and the surfaces of the casing and the valves are grooved to establish communication between the end and central chambers. To facilitate the construction and assembly of the parts the valve casing is constructed of two parts connected together centrally of the length of the casing each part containing a valve and the valves are operatively connected by means permitting the valves slight longitudinal movement independent of each other. The lubricant is supplied under pressure to the central chamber and is conducted to the end chambers by way of the grooves in the casing and valves, which grooves are as previously stated so arranged as to prevent direct communication being established between the oil chamber and the valve ports.

In relation to the prior art it should be admitted that internal combustion engines are known wherein conical rotary admission and exhaust valves arranged co-axially with their small ends together in a casing, are lubricated by oil introduced to grooves in the rubbing surfaces of the casing and valves which oil is drawn off by means of a well provided centrally of the casing and between the smaller ends of the two valves.

The invention is hereinafter more particularly described with reference to the accompanying drawing, wherein:—

Figure 1 is a vertical longitudinal sectional view of a portion of an internal combustion engine showing the valve construction and lubricating means;

Fig. 2 is a cross sectional view of the same;

Fig. 3 is a perspective view of a removed valve;

Fig. 4 is a side elevation of a portion of a four cylinder internal combustion engine provided with a valve having lubricating means in accordance with this invention, and

Fig. 5 shows another arrangement of valves.

Referring to the drawings, I have illustrated a set or pair of the valves in con-

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nection with a twin cylinder engine having cylinders 1 and suitable spaces 2 for a cooling agent. On the upper ends of the cylinders 1 is mounted a two-part or sectional head composed of sections 3 and 4 having lateral flanges 5 bolted or otherwise connected, as at 6, to the upper end of the cylinder block. The head sections 3 and 4 have the confronting ends thereof provided with flanges 7 and these flanges are adapted to be connected as at 8, so that the sections 3 and 4 are as though integral.

Each head section is formed with a tapering valve casing 9 surrounded by a water space 10 communicating with the spaces 2 of the cylinder block and communicating with the valve casing 9 are angularly disposed intake and exhaust ports 11 and 12, said ports being walled through the spaces 10 with the axes of said ports intersecting the longitudinal axis of the valve casing 9, as best shown in Fig. 2. The upper ends of the ports 11 and 12 are adapted to communicate with suitable intake and exhaust manifolds and the lower ends of said ports communicate with a cylinder cavity 13 in the bottom of the head section, said cavity providing a closing dome for the cylinder 1.

According to the invention the tapering valve casings 9 have the large ends thereof disposed end to end, as best shown in Fig. 1 and these valve casings provide tapering seats 14 with a lubricant or cushion chamber 15 therebetween. The tapering seats of the valve casings have longitudinal lubricating grooves or channels 17, which as shown in Fig. 2 may be distributed around said seats so as to establish communication between the outer and inner ends of said seats and insure a thorough oiling of the inner walls or seats of the valve casings.

The outer ends of the head sections 3 and 4 are provided with stuffing boxes 18 of a conventional form for the valve rods 19 of tapering or conical rotary valves 20. These valves are necessarily disposed with the large ends thereof confronting each other at the lubricant chamber 15, and the large ends of said valves have axial interlocking members 21 to establish a driving relation between said valves. The members 21 may be interlocked by a tongue and groove connection, by clutch faces or any other mechanical means so that said valves may have longitudinal movement independent of each other, if necessary. The members 21 are encircled by a coiled compression spring 22 having its large convolutions bearing against large ends of the valves so as to maintain said valves normally seated in the valve casings 9.

The small ends of the valves 20 are in spaced relation to the outer ends of the head sections 3 and 4, thereby providing lubricant chambers 23 at the small ends of said valves. These small lubricant chambers 23 are adapted to receive lubricant from the large central chambers 15 through the medium of the grooves 17 and a series of grooves 24 in the large and small ends of each of the valves 20, the said grooves 24 being disposed other than in the plane of any ports in the valves 20. The small grooves 24 are circumferentially disposed about the large and small ends of the valves 20 and said small grooves are adapted to have the inner ends thereof communicate with the ends of the grooves 17 and thus permit of the lubricant in the chamber 15 flowing into the chambers 23 and being distributed upon the valve casings 9.

The lubricant is supplied to the chamber 15 through a suitable passage 25 in the flange 7 of the head section 3 and the lubricant may flow therein by gravity or be under forced feed. A conventional form of check valve 16 may be placed in the passage 25 to prevent the back flow of the lubricant.

Each valve 20, which is preferably hollow, has a walled transverse port or slot 26 which is brought into registration with the intake and exhaust ports 11 and 12 of the head sections 3 and 4 in the proper time, so that the cylinders may receive an explosive mixture and exhaust burned gases according to the cycle of the engine.

During the rotation of the valve, the ports 26 may register with the groove 17, but during such communication the lubricant in the groove 17 is cut off from the main supply by reason of the groove 24 being out of longitudinal alinement with the ports 26, consequently no lubricant under pressure, can enter the ports 26. The small quantities trapped in the groove 17 may enter the ports 26, but such lubricant is not under pressure nor of any great quantity.

As an instance of operating means for a pair of valves, one or both of the valve rods 19 may be provided with a beveled gear wheel 27 meshing with a similar wheel 28 on the driven shaft 29, as shown in Fig. 4, and when the valve construction is associated with a four cylinder engine, the alining valve rods 19 may be coupled together as at 30, thus permitting of a series of valves being rotated about

a common axis and all of said valves rotated in timed relation to the piston strokes within the engine.

In Fig. 5 there is illustrated a modified form of cylinder head or a different arrangement of conical valves for serving a multi-cylinder internal combustion engine. The head in this instance comprises a central section 31 and end sections 32, said sections being suitably connected together. In the central section 31 conical valves 33 are disposed with the small ends thereof in confronting relation and these ends may be suitably articulated so that the valves may be driven in unison. Confronting the outer large ends of the valves 33 are other valves 34 cooperating with the valves 33 in providing a valve arrangement such as shown in Fig. 1. This constructive arrangement of parts obviates the necessity of certain of the stuffing boxes 18 and the coupling 30 shown in Fig. 4, as it is only necessary to provide the head section 31 with tapering valve seats communicating with each other by an opening 35 that permits of the valves 33 being coupled together by a short stem of square section on one valve fitting in a corresponding socket in the other valve or by any other mechanical connection that will establish a driving relation between said valves. Suitable provision is made for ports, lubricant passages and other refinements of my invention as before recited.

It is thought that the operation and utility of the valve construction and lubricating means will be apparent without further description, and while in the drawing there is illustrated a preferred embodiment of my invention, it is to be understood that the structural elements are susceptible to such variations and modifications as fall within the scope of the appended claims.

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. Means for lubricating rotary valves of the kind referred to for internal combustion engines comprising the combination of tapering valve casings, tapering rotary valves in said casings and having the small ends co-operating therewith in providing end lubricant chambers and the large ends co-operating to form a central lubricant chamber, said valves and valve casings being grooved to establish communication between said end and central chambers, and means operatively connecting valves in said central chamber.

2. Means for lubricating rotary valves for internal combustion engines as set forth in Claim 1, wherein each casing is composed of two parts connected together centrally of the length of the casing substantially as described.

3. Means for lubricating rotary valves for internal combustion engines as set forth in Claim 1, wherein the valves are operatively connected together by means permitting the valves slight longitudinal movement independently of each other, substantially as described.

4. The improved means for lubricating rotary valves for internal combustion engines substantially as described, and as illustrated in the drawing.

Dated this 5th day of May, 1920.

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Fig. 1

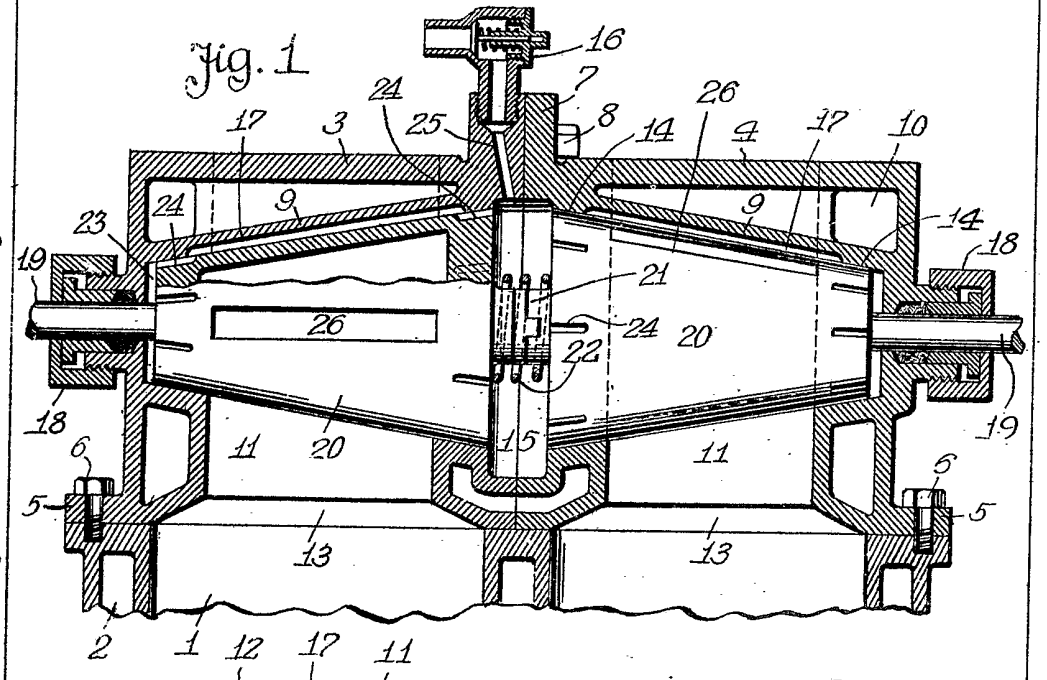
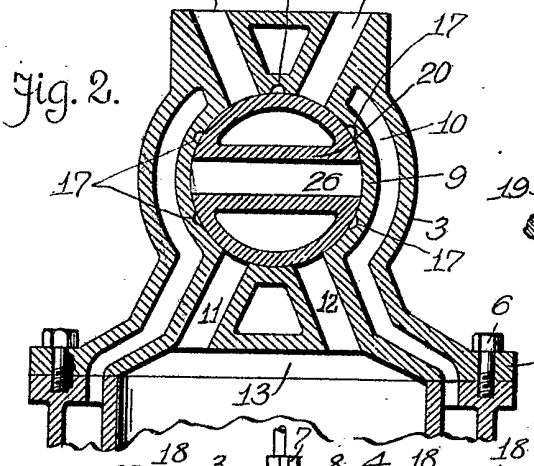


Fig. 2.



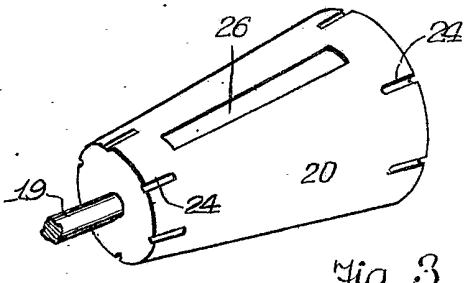


Fig. 3.

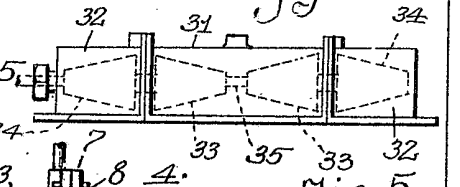


Fig. 5.

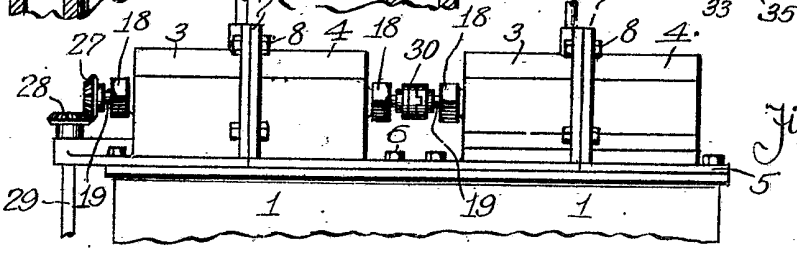


Fig. 4.

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