

# PATENT SPECIFICATION

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## PROVISIONAL SPECIFICATION

### Improvements in or relating to Lubrication Control Means for Valves for Internal Combustion Engines and the like

I, FRANK METCALF ASPIN, a British subject, of Walmer Place, 149, Walmersley Road, Bury, Lancashire, do hereby declare the nature of this invention to be as follows:—

This invention relates to lubrication control means for rotary valves for internal combustion engines and the like, such as compressors of the kind in which the rotary valve member and its housing have complementary tapered bearing and gas-sealing surfaces, and in which the said rotary valve member has an end area exposed to the fluctuating fluid pressure against which it functions as a valve and is therefore subject to axial loads generated by the said fluid pressures.

Examples of rotary valves of the kind aforesaid are to be found in my earlier Patents and pending Applications such as No. 463,412 and No. 3949/43 (564,850).

To facilitate lubrication at the said bearing and gas-sealing surfaces, it has been found advantageous to mount the rotary valve member so that it is permitted some freedom of axial movement, the said member being held to its seating in the housing by a loading spring, at least one function of which is to counteract in part the effect of sub-atmospheric pressure obtaining for example in an internal combustion engine during the induction cycle of the engine.

In order to reduce loss of lubricant it is known in such valves to provide sealing rings in cylindrical portions at each end of the tapered gas-sealing and bearing surfaces. Such rings are effective for their purpose but the object of the present invention is a further constructional improvement in the maintenance of lubrication for the said complementary tapered gas sealing and bearing surfaces.

According to the invention, lubrication control means for rotary valves for internal combustion engines and the like of the kind referred to, comprising annular rings located in grooves immediately above and below the port or ports in the tapered conical bearing and gas-sealing surface of the valve and having a conical periphery complementary to and

engaging such surface.

The said means may be characterised in that the rings are located in the rotary valve member and engage the conical surface of the seating therefor and in that the end faces of the rings lie in parallel planes.

The accompanying drawing is a sectional elevation of part of the head of an internal combustion engine constructed in accordance with one example of the invention.

As shown in the drawing the engine head includes a housing 10 for a rotary valve member 11 such parts having complementary conical gas-sealing and bearing surfaces. In the rotary valve member is a combustion space 12 terminating at a port 13 at the said conical surface. In the housing 10 is a complementary port 14. The rotary valve member 11 is fitted with sealing rings 15 and 16 respectively above and below the port 10, each located in an annular groove and each having a conical outer periphery complementary and engaging the inner conical gas-sealing surface of the valve housing or seating. The upper and lower end faces of the rings lie in parallel planes and their inner periphery is substantially cylindrical as in a piston ring. The adjacent ends of the rings are cut on the slope also in the usual manner of a piston ring, but they may be cut in any other known manner.

In addition to the sealing rings at the tapered surface as above described, there are provided upper sealing rings 17 and a lower sealing ring 18. The rotary valve member is mounted to permit axial movement at splines 19 against the load of a spring 20.

In operation, the sealing rings 15 and 16 effectively impede any excess flow of oil to the zone between them when the gaseous pressures in the cylinder are low or sub-atmospheric as during an induction cycle, whilst at the same time impeding any undue displacement of the lubricant from such zone during the high or super-atmospheric periods of gaseous pressure. At the same time such rings are capable,

within required limits, of expanding and contracting to maintain sealing contact with the conical surface of the housing in spite of axial movement of the rotary valve member, as permitted by the floating mounting the latter as above explained. In spite of such movement of the rotary valve and the additional factor thereby introduced, it is found that sealing rings in the location above described are very effective to reduce loss of lubricant and to maintain effective lubrication of the conical bearing and gas sealing surface of the valve.

The invention is not limited to all the details of construction of the example above described, some of the details of

which may be modified without departing from the nature of the invention, as for instance two or more rings may be used in place of either one of the examples, either in separate grooves, or in the same groove and certain well known special forms of ring may be adapted by finishing them with the necessary conical outer periphery. Alternatively, the rings might be located in the housing instead of on the rotary member.

Dated this 6th day of July, 1944.

For the Applicant,  
WILSON, GUNN & ELLIS,  
Chartered Patent Agents,  
54/56, Market Street, Manchester, 1.

### COMPLETE SPECIFICATION

#### Improvements in or relating to Lubrication Control Means for Valves for Internal Combustion Engines and the like

I, FRANK METCALF ASPIN, a British subject, of Walmer Place, 149, Walmersley Road, Bury, Lancashire, 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 lubrication control means for rotary valves for internal combustion engines and the like, such as compressors of the kind in which the rotary valve member and its housing have complementary tapered bearing and gas-sealing surfaces, and in which the said rotary valve member has an end area exposed to the fluctuating fluid pressure against which it functions as a valve and is therefore subject to axial loads generated by the said fluid pressures.

Examples of rotary valves of the kind aforesaid are to be found in my earlier Patents and pending Applications such as No. 463,412 and No. 3949/43 (564,850).

To facilitate lubrication at the said bearing and gas-sealing surfaces, it has been found advantageous to mount the rotary valve member so that it is permitted some freedom of axial movement, the said member being held to its seating in the housing by a loading spring, at least one function of which is to counteract in part the effect of sub-atmospheric pressure obtaining for example in an internal combustion engine during the induction cycle of the engine.

In order to reduce loss of lubricant it is known in such valves to provide sealing rings in cylindrical portions at each end of the tapered gas-sealing and bearing surfaces. Such rings are effective for

their purpose but the object of the present invention is a further constructional improvement in the maintenance of lubrication for the said complementary tapered gas sealing and bearing surfaces.

According to the invention, lubrication control means for rotary valves for internal combustion engines and the like of the kind referred to, comprising annular rings located in grooves immediately above and below the port or ports in the tapered conical bearing and gas-sealing surface of the valve and having a conical periphery complementary to and engaging such surface.

The said means may be characterised in that the rings are located in the rotary valve member and engage the conical surface of the seating therefor and in that the end faces of the rings lie in parallel planes.

The Drawing filed with the Provisional Specification is a sectional elevation of part of the head of an internal combustion engine constructed in accordance with one example of the invention.

As shown in the drawing the engine head includes a housing 10 for a rotary valve member 11 such parts having complementary conical gas-sealing and bearing surfaces. In the rotary valve member is a combustion space 12 terminating at a port 13 at the said conical surface. In the housing 10 is a complementary port 14. The rotary valve member 11 is fitted with sealing rings 15 and 16 respectively above and below the port 10, each located in an annular groove and each having a conical outer periphery complementary and engaging the inner conical gas-sealing surface of the

valve housing or seating. The upper and lower end faces of the rings lie in parallel planes and their inner periphery is substantially cylindrical as in a piston ring.

5 The adjacent ends of the rings are cut on the slope also in the usual manner of a piston ring, but they may be cut in any other known manner.

10 In addition to the sealing rings at the tapered surface as above described, there are provided upper sealing rings 17 and a lower sealing ring 18. The rotary valve member is mounted to permit axial movement at splines 19 against the load of a  
15 spring 20.

In operation, the sealing rings 15 and 16 effectively impede any excess flow of oil to the zone between them when the gaseous pressures in the cylinder are low or sub-atmospheric as during an induction  
20 cycle, whilst at the same time impeding any undue displacement of the lubricant from such zone during the high or super-atmospheric periods of gaseous pressure.

25 At the same time such rings are capable, within required limits, of expanding and contracting to maintain sealing contact with the conical surface of the housing in spite of axial movement of the rotary  
30 valve member, as permitted by the floating mounting the latter as above explained. In spite of such movement of the rotary valve and the additional factor thereby introduced, it is found that seal-  
35 ing rings in the location above described are very effective to reduce loss of lubricant and to maintain effective lubrication of the conical bearing and gas sealing surface of the valve.

40 The invention is not limited to all the details of construction of the example above described, some of the details of which may be modified without departing from the nature of the invention, as  
45 for instance two or more rings may be used in place of either one of the ex-

amples, either in separate grooves, or in the same groove and certain well known special forms of ring may be adapted by  
50 finishing them with the necessary conical outer periphery. Alternatively, the rings might be located in the housing instead of on the rotary member.

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

1. Lubrication control means for rotary valves for internal combustion engines  
60 and the like of the kind referred to, comprising annular rings located in grooves immediately above and below the port or ports in the tapered conical bearing and gas-sealing surface of the valve and hav-  
65 ing a conical periphery complementary to and engaging the complementary tapered conical bearing and gas-sealing surface.

2. Lubrication control means according to Claim 1, characterised in that the rings  
70 are located in the rotary valve member and engage the conical surface of the seating therefor.

3. Lubrication control means according to Claim 1 or 2, characterised in that the  
75 end faces of the rings lie in parallel planes.

4. Lubrication control means for rotary valves for internal combustion engines and the like of the kind referred to con-  
80 structed and arranged substantially as herein described with reference to and as illustrated in the accompanying drawings filed with the Provisional Specification.

5. A rotary valve assembly having  
85 lubrication control means as claimed in any of the preceding Claims.

Dated this 26th day of July, 1945.

For the Applicant,  
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*[This Drawing is a full-size reproduction of the Original.]*

