PATENT SPECIFICATION

DRAWINGS ATTACHED

859,366

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International Classification: —F02f.

COMPLETE SPECIFICATION

Improvements in or relating to Rotary Valves for Internal Combustion Engines

We, F. M. ASPIN ENGINES LIMITED, a British Company, of 2, St. James' Square, Manchester 2, in the County of Lancaster, and FRANK METCALF ASPIN, a British subject, of Westray, Horseshoe Lane, Alderley Edge, in the County of Chester, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

This invention relates to rotary valves for internal combustion engines of the kind comprising a conical head portion with cumbustion chamber formed therein and having a co-axial bearing stem. A rotary valve of such kind is described in Patent No. 463,412.

In order to obtain the fullest possible control of combustion it is desirable to keep the combustion chamber as cool as possible. Also in order to obtain optimum conditions for the bearing surfaces of the valve and its seating, these should be kept as cool as possible.

The object of the present invention is an improved construction of rotary valve to obtain the aforesaid conditions.

According to the invention a rotary valve of the kind referred to is characterised in that it comprises an outer conical shell and an inner conical lining secured together against relative movement and with complementary conical contacting but unbonded surfaces between the said parts whereby resistance is provided at such surfaces to heat conductivity through such surfaces.

The expression "shell" is used herein to define a relatively thin shell-like structure but of sufficient thickness to perform its required function as a valve complementary to the seating of the housing in which it is to rotate.

The rotary valve aforesaid may be further characterised in that the outer shell and lining are of different materials; or further characterised in that the separating surfaces of the shell and lining are mutually contacting over their whole area, or further characterised by means such as surface treatment of, or an intermediate material or liner between, said complementary surfaces to reduce further the heat conductivity, or further characterised by an intervening material of low heat conductivity between the shell and lining; or further characterised in that the lining is made of high thermal conductivity material and adapted for internal cooling; or further characterised in that the shell is made of ferrous material such as cylinder iron for its bearing properties and rigidity and low thermal expansion.

The expression "cylinder iron" is used herein to define cast iron suitable for the cylinder of an internal combustion engine.

In the drawings accompanying the provisional specification: —

Fig. 1 is an axial section of one example of a rotary valve made in accordance with the present invention.

Figs. 2 and 3 show respectively the shell and the lining parts of the valve shown in Fig. 1.

As shown in the drawing the valve comprises an outer shell having a conical head 10 and bearing stem 11. The upper end of the stem is splined internally at 12 and the lower end of the cone is grooved at 13 for a sealing ring 14. In the shell is a lateral port 10*a*. The shell is made of cylinder iron and the stem is splined at its upper end at 15 for a driving pinion (not shown). The lining is made of aluminium alloy and has a complementary conical end 16 and stem 17. The upper end of the stem is screwed at 18 for an assembly nut 19 and has splines 20 complementary to the splines at 12 aforesaid in the shell. Below the splines is a groove 21 for a rubber or like O-ring 22 and at the lower

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end of the stem are a plurality of grooves forming a sealing labyrinth 23. The lining is hollow to provide a space 24 for coolant fluid, and is formed in the conical head with the combustion chamber 25.

By reason of the 2-part construction it is possible as above described to use a metal such as aluminium or copper, as a good thermal conductor in spite of its unsuitability in this instance as a bearing and therefore the combustion heat can be taken away quickly by the coolant fluid. At the same time, the mutual contacting surfaces between the shell and the lining provides resistance to the conduction of heat to the shell. The shell itself can be made of cylinder iron or other suitable material for a rotary valve and by providing resistance to heat conduction from the lining, the shell can be kept at a lower and better temperature for the bearing surfaces. In consequence also the shell is less liable to distortion.

In order further to reduce heat conductivity between the intervening surfaces, such surfaces may be suitably treated, or an intermediate material or liner of low heat conductivity may be provided between the shell and the inner lining for the same purpose or one of the complementary surfaces so shaped that mutual contact does not occur over the whole area.

The invention is obviously not limited to all the details above described which are only given by way of example.

In the earlier Patent No. 556,740 granted to the same inventor there is described a lined valve and housing. Not only was such construction devised for a different purpose but it would act adversely to the present purpose in that it would impede the escape of heat from the conical seating surface of the housing whereas the present invention impedes the transmission of heat to such surfaces. Also in another such earlier Patent No. 511,208 the valve was provided with an integral outer shell forming the conical seating face but the integral nature of such structure, obtained by fusing or like operation would not effectively impede the passage of heat from the inner part through the shell to the said conical bearing surface.

WHAT WE CLAIM IS:—

1. A rotary valve of the kind referred to characterised in that it comprises an outer conical shell and an inner conical lining secured together against relative movement and with complementary conical contacting but unbonded surfaces between the said parts whereby resistance is provided at such surfaces to heat conductivity through such surfaces.

2. A rotary valve according to Claim 1 further characterised in that the separating surfaces of the shell and lining are mutually contacting over their whole area.

3. A rotary valve according to Claim 1 or 2 further characterised by means such as surface treatment of, or an intermediate material or liner between, said complementary surfaces to reduce further the heat conductivity.

4. A rotary valve according to Claim 1 further characterised by an intervening material of low heat conductivity between the shell and lining.

5. A rotary valve as claimed in any of the preceding claims further characterised in that the outer shell and lining are of different materials.

6. A rotary valve according to Claim 5 further characterised in that the lining is made of high thermal conductivity material and adapted for internal cooling.

7. A rotary valve according to Claim 5 further characterised in that the shell is made of ferrous material such as cylinder iron for its bearing properties and rigidity and low thermal expansion.

8. A rotary valve constructed and arranged substantially as herein described with reference to and as illustrated in the drawings accompanying the provisional specification.

For the Applicants:
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PROVISIONAL SPECIFICATION

Improvements in or relating to Rotary Valves for Internal Combustion Engines

We, F. M. ASPIN ENGINES LIMITED, a British Company, of 2, St. James' Square, Manchester 2, Lancashire, and FRANK METCALF ASPIN, a British subject, of Westray, Horseshoe Lane, Alderley Edge, in the County of Chester, do hereby declare this invention to be described in the following statement:—

This invention relates to rotary valves for internal combustion engines of the kind comprising a conical head portion with combustion chamber formed therein and having a co-axial bearing stem. A rotary valve of such kind is described in Patent No. 463,412.

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The object of the present invention is an improved construction of rotary valve to obtain the aforesaid conditions.

According to the invention a rotary valve of the kind referred to is characterised in that it comprises an outer shell and an inner lining with mutual contacting surfaces between the shell and lining whereby resistance is provided to heat conductivity at such surfaces.

The rotary valve aforesaid may be further characterised in that the outer shell and lining are of different materials; or further characterised in that the lining is made of high thermal conductivity material and adapted for internal cooling; or further characterised in that the shell is made of ferrous material such as cylinder iron for its bearing properties and rigidity and low thermal expansion.

In the accompanying drawings:—

Fig. 1 is an axial section of one example of a rotary valve made in accordance with the present invention.

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By reason of the 2-part construction it is possible as above described to use a metal such as aluminium or copper, as a good thermal conductor in spite of its unsuitability in this instance as a bearing and therefore the combustion heat can be taken away quickly by the coolant fluid. At the same time, the mutual contacting surfaces between the shell and the lining provides resistance to the conduction of heat to the shell. The shell itself can be made of cylinder iron or other suitable material for a rotary valve and by providing resistance to heat conduction from the lining, the shell can be kept at a lower and better temperature for the bearing surfaces. In consequence also the shell is less liable to distortion.

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859,366 PROVISIONAL SPECIFICATION
1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

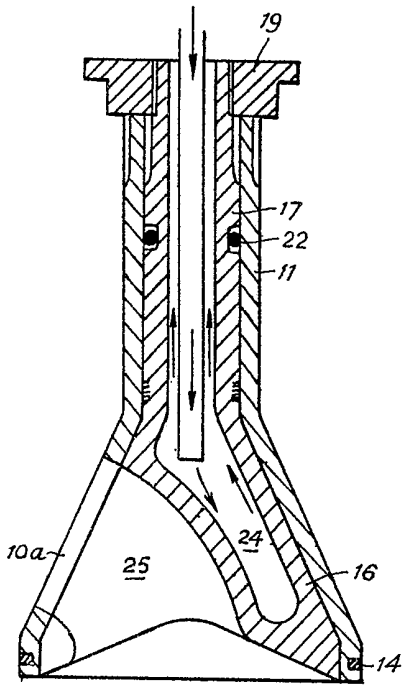

FIG. 1

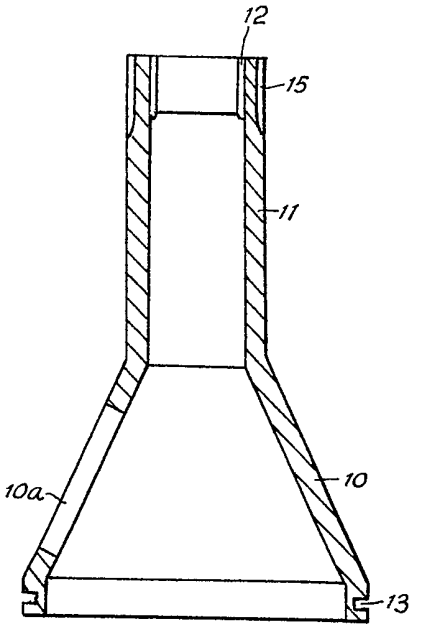

FIG. 2

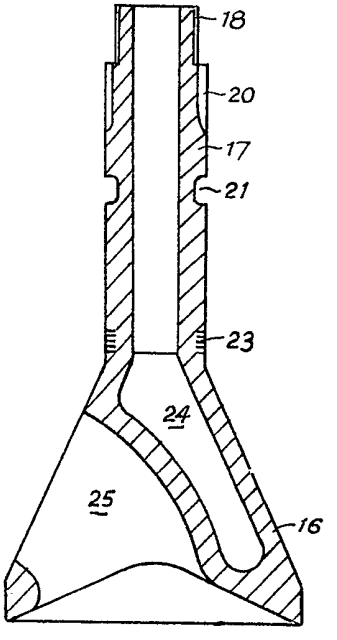

FIG. 3