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COOLING MEANS FOR ROTARY VALVES

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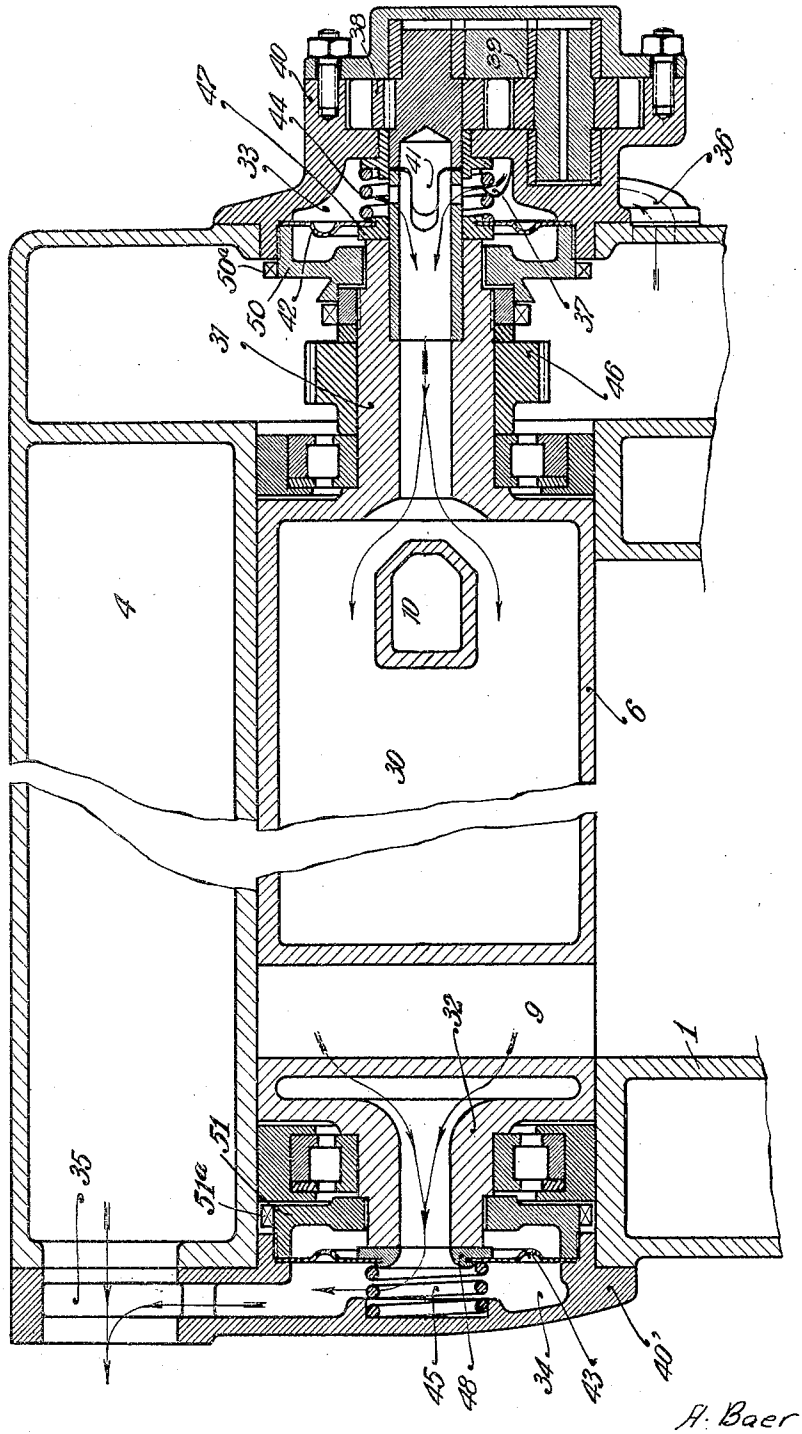

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UNITED STATES PATENT OFFICE

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COOLING MEANS FOR ROTARY VALVES

Original application filed September 18, 1928, Serial No. 306,640, now Patent No. 1,841,344, dated January 12, 1932. Divided and this application filed February 9, 1931. Serial No. 514,683.

This invention relates to improvements in rotary valves for internal combustion engines, the invention herein claimed being divided out of my Patent No. 1,841,344, Jan. 12, 1932.

The object of the invention is to provide for the effective cooling of the engine valve and contiguous portions of the engine cylinder by an induced circulation of a fluid cooling medium through the valve.

In the accompanying drawing wherein an approved embodiment of the invention is illustrated, the figure is a fragmentary section through the head portion of an engine cylinder showing the invention applied thereto.

Referring to the drawing in detail, the rotary valve 6 is mounted in a housing 4 forming the head of the cylinder 1 and is provided with passages 9 and 10 which, respectively, permit of the admission of fresh fuel mixture to and the discharge of exhaust gases from the combustion chamber of the engine in a manner disclosed in detail in my Patent No. 1,841,344, above referred to.

The cooling of the rotary valve is effected by passing cooling fluid through the valve and around the exterior of the passages 9 and 10. To achieve this end the valve is made hollow and the interior space 30 thereof is connected to the shallow circular chambers 33 and 34 which are formed in the covers 40 and 40′ respectively of the valve housing.

The chamber 34 is in direct communication with the discharge opening 35 of the cooling jacket for the cylinder, a feed pump being arranged between said cooling jacket and the chamber 33 for drawing the required volume of cooling medium from the cylinder jacket by means of a pipe 36 and delivering it to said chamber through an opening 37. As illustrated, this pump consists of two toothed wheels 38, 39 which are arranged in well known manner in the cover 40 which, as hereinbefore described, closes the housing for the rotary valve 6 in the cylinder head 4. Operation of the pump is effected by a claw clutch arranged on the spindle 31 of the rotary valve, said clutch permanently engaging with the toothed wheel 38. In view of this arrangement it will be seen that the flow of cooling medium through the rotary valve 6 is always in accurate ratio to the speed of revolution of said valve.

To prevent leakage past the journals 31 and 32 into the chambers 33 and 34 respectively, elastic packing discs 42 and 43 are provided. The central part of the discs 42 and 43 is provided with collars 47 and 48 whilst the outer peripheries of the said discs 42 and 43 are clamped in the covers 40 and 40′ by means of threaded rings 50 and 51 having wrench engaging members 50*a* and 51*a*.

To ensure a sound joint even in the case of heavy loads the collars 47 and 48 and consequently the central part of the discs 42 and 43 respectively are respectively loaded by heavy spiral springs 44 and 45 which maintain the collars in constant contact with the front surfaces of the journals 31 and 32 without interrupting in any way the passage of the cooling fluid.

The rotary valve 6 is rotated by means of a toothed wheel 46 fixedly mounted on the spindle 31. The continuous internal cooling of the rotary valve which can be obtained by the arrangement above described in conjunction with the various means for preventing leakage enables continuous working to be effected without breakdown even under very heavy loads as owing to the prevention of expansion of the rotary valve due to increase of temperature satisfactory lubrication can be continuously maintained and all risk of binding between the valve and its operative surfaces is entirely overcome.

What I claim is:

1. Improved packing for the rotary valves of internal combustion engines of the type specified, hollow spindles for supporting said rotary valve, abutment surfaces on said spindles, collars for engaging with said abutment surfaces, elastic annular diaphragms connected by their inner peripheries to said collars, means for clamping the external periphery of said diaphragms against an abutment formed on the covers of the valve housing, springs for maintaining said collars in cooperation with said abutment surfaces on the hollow spindles, and means for conduct-

ing cooling fluid through one hollow spindle to the interior of said valve and through the other hollow spindle from the interior of said valve in order that continuous cooling of said valve may be effected.

2. Improved packing for the rotary valves of internal combustion engines of the type specified, hollow spindles for supporting said rotary valve, abutment surfaces on said spindles, collars for engaging with said abutment surfaces, elastic annular diaphragms connected by their inner peripheries to said collars, means for clamping the external periphery of said diaphragms against an abutment formed on the covers of the valve housing, springs for maintaining said collars in cooperation with said abutment surfaces on the hollow spindles, means for conducting cooling fluid through one hollow spindle to the interior of said valve and through the other hollow spindle from the interior of said valve, a pump receiving cooling fluid from the jacket of the cylinder and delivering said cooling fluid to the interior of the rotary valve, and means for operating said pump from the valve spindle.

3. Improved packing for the rotary valves of internal combustion engines of the type specified, hollow spindles for supporting said rotary valve, abutment surfaces on said spindles, collars for engaging with said abutment surfaces, elastic annular diaphragms connected by their inner peripheries to said collars, means for clamping the external periphery of said diaphragms against an abutment formed on the covers of the valve housing, springs for maintaining said collars in cooperation with said abutment surfaces on the hollow spindles, means for conducting cooling fluid through one hollow spindle to the interior of said valve and through the other hollow spindle from the interior of said valve, a toothed wheel on the spindle of the rotary valve, a second toothed wheel cooperating therewith and a casing formed integral with the cover of the valve housing for enclosing said wheels and forming a pump, a conduit for supplying cooling medium from the jacket of the cylinder to the suction of such pump and a conduit for delivering the discharge from said pump to the interior of the valve in order that continuous cooling of said valve may be effected.

4. In a valve structure, a rotary hollow valve having hollow supporting spindles, inclosing means for the valve, means for conducting cooling fluid through one hollow spindle to the interior of said valve and through the other hollow spindle from the interior of said valve in order that continuous cooling of said valve may be effected, sealing diaphragms coacting with the valve spindles and secured in fluid tight relation to the valve inclosing means.

5. In a valve structure, a rotary hollow valve having hollow supporting spindles, inclosing means for the valve, means for conducting cooling fluid through one hollow spindle to the interior of said valve and through the other hollow spindle from the interior of said valve in order that continuous cooling of said valve may be effected, sealing diaphragms coacting with the valve spindles and secured in fluid tight relation to the valve inclosing means, and yieldable means maintaining the sealing diaphragms in fluid tight relation to the valve.

In testimony whereof I affix my signature.

ALFRED BAER.