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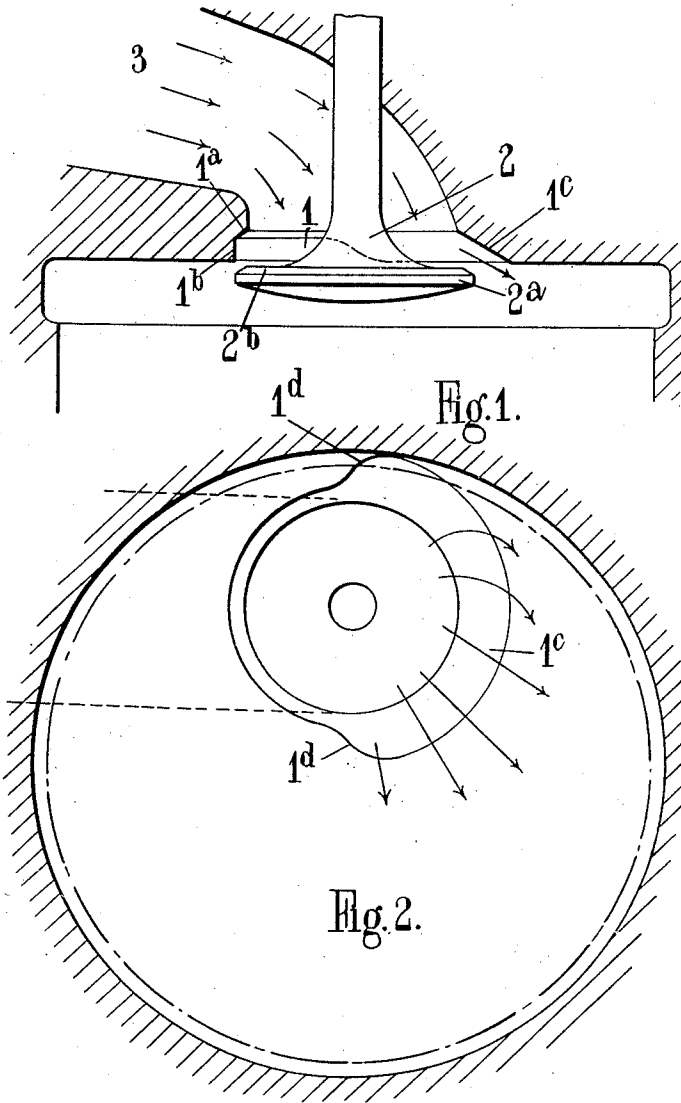
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VALVE FOR INTERNAL COMBUSTION ENGINES

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2 Sheets-Sheet 1



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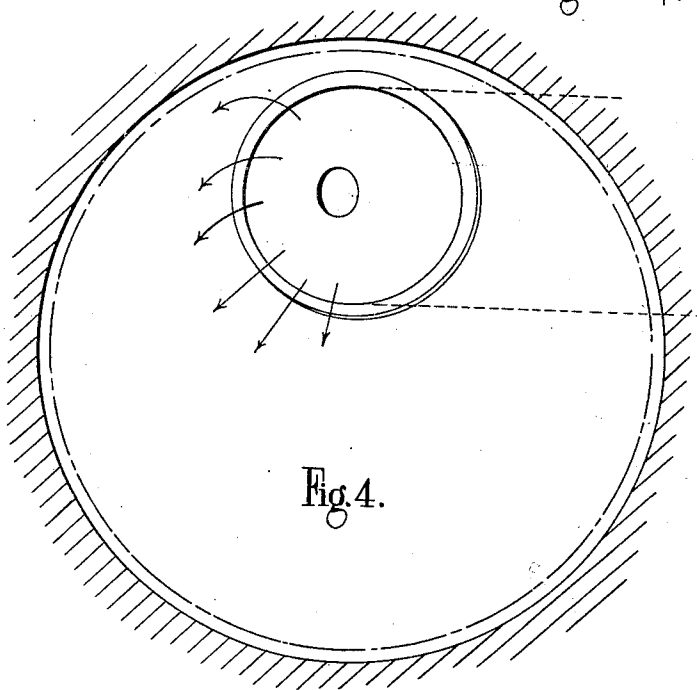
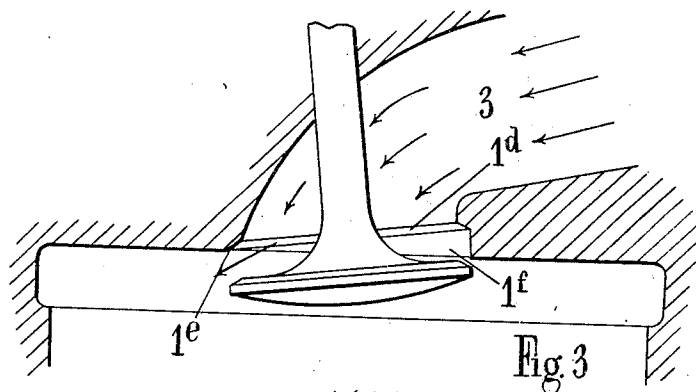
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VALVE FOR INTERNAL COMBUSTION ENGINES

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UNITED STATES PATENT OFFICE

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VALVE FOR INTERNAL-COMBUSTION ENGINES

Application filed February 29, 1928, Serial No. 258,022, and in Great Britain March 28, 1927.

This invention has reference to valves or valvular devices of the poppet or mushroom type for admitting the air to the cylinder of an internal combustion engine of the type in which the ignition of the fuel is produced by the heat of compression and to such valves or valvular devices as are formed or arranged to afford a preferential path to the air entering the cylinder. The invention is particularly applicable to cylinders of the "over-head-valve" type and may be employed in connection with engines operating on either the two- or four-stroke cycle.

In engines of the type above referred to it is desirable, for the purpose of improving the distribution of the injected fuel throughout the charge of air, to induce a state of rapid rotational swirl about the axis of the cylinder. To foster this effect it has been proposed to offset the inlet valve from the cylinder centre and to provide the head of the valve with a shield extending over about half of its periphery. It has also been proposed to secure a shield of this character to the valve casing.

The object of the present invention is to provide an improved construction of valvular device or valve seat adapted to afford a preferential path for the air entering the engine cylinder without the formation of minor eddies.

A further aim of the invention is to obtain this effect while avoiding the use of excrescent fixed parts or walls, which are costly and difficult to arrange and are liable to come loose and, at the same time, to avoid the use of special, unsymmetrical valves, which require special methods of manufacture, add to the reciprocating weight and must be constrained so as to prevent their rotation and which tend to reduce the volumetric efficiency.

According to the invention, the valve seat member or the part immediately adjacent to that in which the valve seat is formed (hereinafter referred to as the "valve seat member") is asymmetrical in shape, a portion being formed in such a manner that a preferential path is given to the entering air. On one side the valve seat is heavily masked,

while on the side which lies in the direction towards which the turbulent flow is desired to rotate, this mask is more or less completely cut away. This cut-away portion may occupy more or less of one-half the circumference of the valve seat.

In the accompanying drawings:—

Figure 1 is a sectional elevation, and

Figure 2 an inverted plan view showing one form of the valve seating according to the invention; and

Figures 3 and 4 are similar views of another form according to the invention.

In order to avoid the employment of a valve member the mass of which is unbalanced or out of true, it is preferred to apply the invention to the seat or a fixed part of the control. This form also has the advantage that a normal or standard type of movable valve member may be utilized which also facilitates replacement or repair.

In carrying the invention into effect as applied by way of example to a valvular device for the combustion chamber of an overhead-valve internal combustion engine of the kind in which the ignition of the fuel is produced by the heat of compression, the cylinder head is formed with a valve seat, the axis of which is eccentric to that of the cylinder and preferably such that the whole of the seat lies to one side of the diametric plane of the cylinder. The approach to this valve is preferably along a path which is nearly horizontal and which forms a tangent to the desired whirl path.

This valve seat, which is denoted by the general reference 1, is formed with an active valve seating portion 1^a of known kind and a rebated recess 1^b. This rebated portion, instead of continuing wholly around the valve seat, is mutilated or removed over a substantial arc, for example half of the circumference of the seat, the cutting away or removal being effected in an even continuation of the bevel or inclination of the valve seat proper 1^a as exemplified by the surface 1^c. This surface 1^c merges into the valve seat and rebate 1^b gradually as seen at 1^d adjacent the diametric plane of the valve.

A standard valve member 2 is provided

having a valve head 2^a formed with a part 2^b adapted to co-operate with the valve seat 1^a and effect control of the aperture.

In operation, when the valve opens the gases passing through the conduit 3 will have a tendency to escape to the right of the valve as seen in Figure 1 rather than to the left. The formation of the part 1^a affords a preferential path for the gases so that while some of the gases may escape to the left side of the valve (see Figures 1 and 2) the major portion thereof flows out to the right and inwardly as indicated by the arrows—Figure 2. Thus it will be appreciated that the incoming air is directed off the centre of the cylinder and towards the wall in a somewhat tangential fashion so that the gases tend to travel with a circular movement in planes more or less normal to the cylinder axis, thereby creating a whirling or helical turbulent effect.

In carrying the invention into effect according to another convenient mode (see Figures 3 and 4) the valve and valve seat are, as already described in connection with Figures 1 and 2, disposed eccentric to the cylinder but in this case the valve and seat have their axis inclined away from the perpendicular to a plane at right-angles to the axis of the cylinder. In addition to the inclination the valve seat 1^a towards one side is arranged so that it lies adjacent and preferably practically merges into the under surface of the cylinder head as shown, for example, at 1^b, the opposite side of the valve seat lying within a recessed part 1^c which it will be observed gradually tapers off towards the part 1^a. This tilting or canting of the valve seat and the elimination of the wall bounding the recess 1^c affords a preferential path for the air to the left of the valve seen in Figures 3 and 4 as indicated by the arrows in Figure 3 and to enhance this effect the conduit 3^a is preferably curved or inclined to the right so that the air travelling to the valve moves in a direction generally corresponding with that of the direction of escape of the gases through the valve.

The invention is particularly suitable for use with internal combustion engines provided with pistons with heads formed as a surface of rotation about the cylinder axis, more especially if this takes the form of a cup which, co-operating with the cylinder head at the inward dead centre, reduces the effective diameter of the inlet whirl and thus increases its rotational velocity just as injection takes place.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A valvular device of the type described in which the valve seat is formed in a recess or port a portion of which immediately adjacent to the valve seat is cut away or mu-

tilated towards one side so as to afford a preferential path or greater area of opening for the air.

2. A valvular device of the type described or as claimed in claim 1 in which the axis of the valve is inclined so as to provide a preferential path or greater area of opening at that side of the valve towards which the axis is inclined.

3. A valvular device as claimed in claim 1 in which the cut-away portion or mutilation extends over substantially one-half of the valve seat member.

4. A valvular device as claimed in claim 1, wherein the valve and valve seat are eccentric to the cylinder axis and preferably arranged wholly to one side of a diametric plane of the cylinder.

5. A valvular device as claimed in claim 1, wherein the inlet conduit is curved or inclined to the axis of the valve in such a manner as to conform to the preferential path.

In testimony whereof I have signed my name to this specification.

HARRY RALPH RICARDO.