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VALVE MEANS FOR CRANKCASE COMPRESSION TWO-STROKE
CYCLE INTERNAL COMBUSTION ENGINES
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Fig. 1

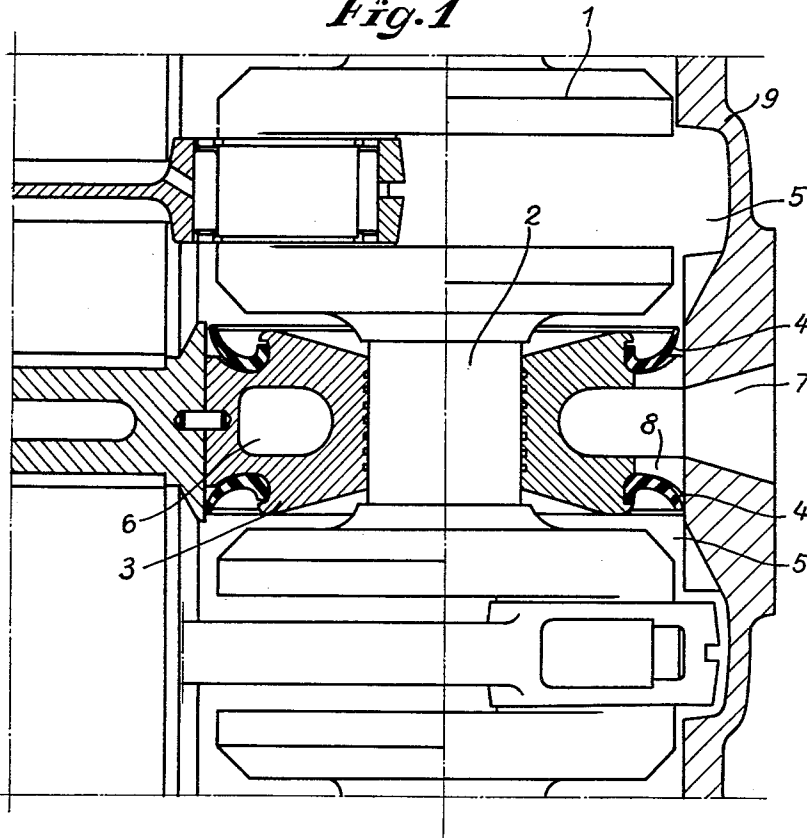
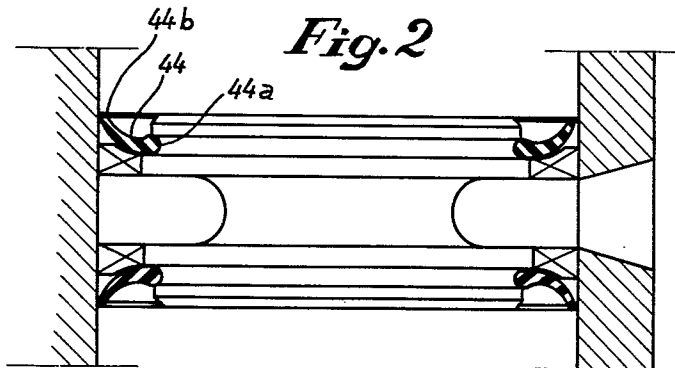


Fig. 2



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VALVE MEANS FOR CRANKCASE COMPRESSION TWO-STROKE CYCLE INTERNAL COMBUSTION ENGINES

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This invention relates to two-stroke internal combustion engines having a fuel-air mixture delivery control valve in the crank case.

Two-stroke internal combustion engines are known in which induction is controlled by valves moving under the action of suction and compression by the piston in the crank case chamber acting as a pump. Such valves, which are mostly made of metal of special rather elaborate form, require special measures on assembly and do not always afford a satisfactory seal; moreover, they are rather clumsy in construction and difficult to arrange.

An object of this invention is to provide a two-stroke internal combustion engine equipped with valves obviating the above mentioned drawbacks, very simple in construction and reduced in size.

A further object of this invention is to provide a delivery control valve of reduced weight and inertia for two-stroke internal combustion engines.

A further object is to provide a fuel-air mixture delivery control valve in the crank case of internal combustion engines, capable of effecting uniform delivery of the mixture throughout the crank case chamber.

The improved two-stroke internal combustion engine is characterized in that the mixture delivery control valve in the crank case comprises a ring of resilient elastomer material capable of withstanding high temperature and the action of oil and fuel, the ring having an annular sealing lip cooperating with a seating surface for sealing the compression chamber in the crank case during the mixture compression stroke therein and establishing connection of the said chamber with a conduit extending from the carburettor during the mixture induction stroke.

Further characteristic features of this invention will be understood from the appended detailed description referring to the accompanying drawings given by way of a non-limiting example, wherein:

FIGURE 1 is a part axial sectional view of a two-stroke internal combustion engine having an automatic valve and

FIGURE 2 is a detailed view of a modification of FIGURE 1.

On the drawing 1 denotes the crankshaft of a two-stroke internal combustion engine including two cylinders in line; the intermediate journal 2 on the crankshaft 1 is rotatably supported from a journal bearing 2 providing at the same time a body for two valve members 4 associated with the compression chambers 5 in the crank case 9. The valve body 3 is of annular shape and is formed inside with an annular chamber 6 connecting with a conduit 7 extending from the carburettor (not shown on the drawing).

The annular chamber 6 is circumferentially formed with two sets of axially extending ports 8 controlled by the valve members 4.

The valves each comprising a belt-shaped ring of rubber or similar material which should of course withstand heat and fuel and oil vapours, said belt-shaped ring including a cylindrical collar which fits into a mating recess in the valve body 3 and an annular sealing lip

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having a curving tapered shape in cross section to avoid any substantial pressure drop during the suction stroke and engaging the crankcase 9 to act as an effective non-return valve for the mixture being compressed in the compression chamber 5.

The low pressure set up during the suction stroke causes the valve lip to lift and mixture to flow to the compression chamber 5. The low pressure is reduced when the compression stroke starts, and the lip on the valve is returned to its seat both through its natural resiliency and difference in pressure created between the crank case chamber and annular chamber 6 in the valve body, the pressure in the carburettor conduit prevailing in the chamber 6.

The annular section of the valve body 6 positioned behind the lip is concave in profile to afford a proper supporting surface for the convex-concave lip during the compression stroke.

Since two in-line cylinders operating with a 180° shift should be fed with mixture, one valve should be provided at each of the opposite faces of the valve body 3. The valves alternately act with a 180° shift in timed relationship to alternate high pressure and low pressure stages in the chambers of the two cylinders.

The valve carrying body 3 is of a sectional structure when the engine shaft is integrally formed as in the construction shown on the drawing. The valve body located in the crank case acts as an intermediate journal bearing supporting the journal 2 either directly or through the interposition of a needle bearing.

With a conventional shape of the shaft cranks and their respective counterweights the rubber valves made of one piece of sufficient radial size are easily assembled without requiring any appreciable deformation thereof.

The radial size of the valves should be selected according to the pressure differential acting on the annular surface of the valve and resiliency of the material employed for the valve.

In addition to the reduction in weight and inertia, size and cost a further advantage of the improved delivery control valve construction, resides in the fact that supply of the mixture is uniformly effected throughout the circumference, which is advantageous for prompt lubrication of the big end of the connecting rod and uniform supply of mixture to the crank case.

The valve lip seals instead of against the valve body 3 against the cylindrical surface of the crankcase accommodating the body 3, as clearly visible in connection with the lower valve in FIGURE 1.

Alternatively, the valve may be of the construction denoted at 44 in FIGURE 2, comprising a base portion 44a of bead form and a tapered annular lip 44b integral with the former.

What I claim is:

1. In a two-stroke internal combustion engine having two cylinders, a journaled crankshaft, a crankcase receiving the fuel mixture for precompression prior to transfer to the cylinders, an annular valve body having oppositely disposed faces, an annular groove in each face, an annular fuel mixture chamber disposed between said faces and communicating with a mixture inlet, a series of axial ports extending between said mixture chamber and each face and disposed outside of said annular groove, the said annular valve body abutting circumferentially against a cylindrical portion of the crankcase and having a center bore fitting the shaft portion between cranks, so as to subdivide said crankcase into individual crankchambers, said cylindrical portion of the crankcase being of greater width than that of the annular valve body, a valve means for each valve body face comprising a ring of resilient elastomer having an

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inner edge portion adapted to fit sealingly into said annular groove and an arcuate tapered lip extending from said inner edge portion and having its external diameter larger than that of the valve body, whereby the said valve means normally cuts off the fuel mixture chamber from each of the crankchambers by sealing cooperation of the said lip and the cylindrical portion of the crankcase and in open condition directs the fuel mixture entering the crankchamber axially with respect to the crankshaft.

2. In a two-stroke internal combustion engine having two cylinders, a journaled crankshaft, a crankcase receiving the fuel mixture for precompression prior to transfer to the cylinders, an annular valve body having oppositely disposed faces, an annular groove in each face, an annular fuel mixture chamber disposed between said faces and communicating with a mixture inlet, a series of axial ports extending between said mixture chamber and each face and disposed outside of said annular groove, the said annular valve body abutting circumferentially against a cylindrical portion of the crankcase by means of radial extensions formed between said ports and having a center bore fitting the shaft portion between cranks, so as to subdivide said crankcase into

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individual crankchambers, said cylindrical portion of the crankcase being of greater width than that of the annular valve body, a valve means for each valve body face comprising a ring of resilient elastomer having an inner edge portion adapted to fit sealingly into said annular groove and an arcuate tapered lip extending from said inner edge portion and having its external diameter larger than that of the valve body, whereby the said valve means normally cuts off the fuel mixture chamber from each of the crankchambers by sealing cooperation of the said lip and the cylindrical portion of the crankcase and in open condition directs the fuel mixture entering the crankchamber axially with respect to the crankshaft.

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