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INTERNAL COMBUSTION ENGINE

Filed March 17, 1923

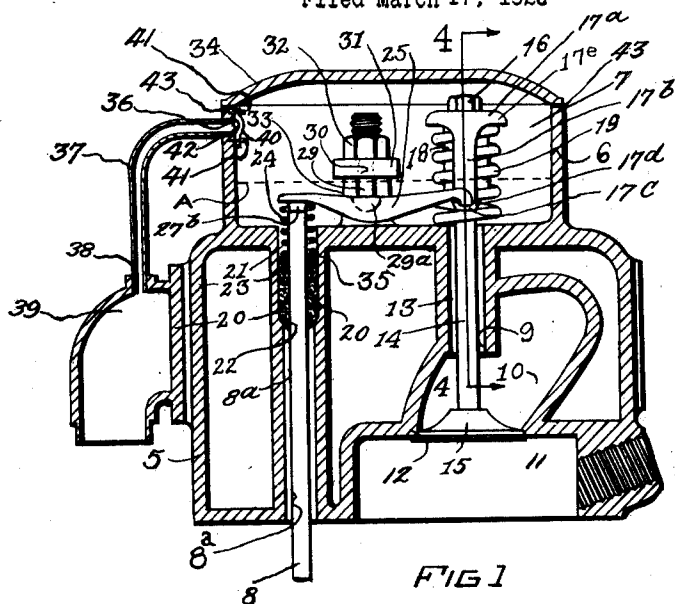


FIG 1

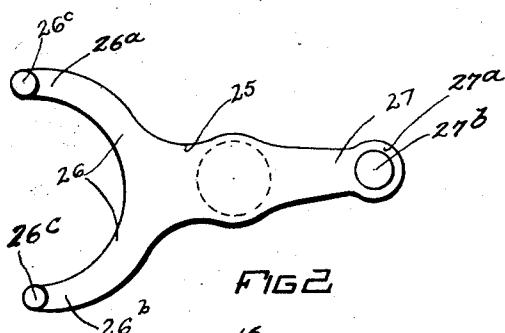


FIG 2

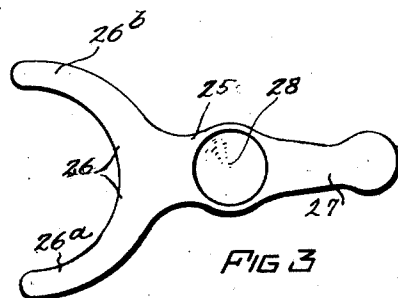


FIG 3

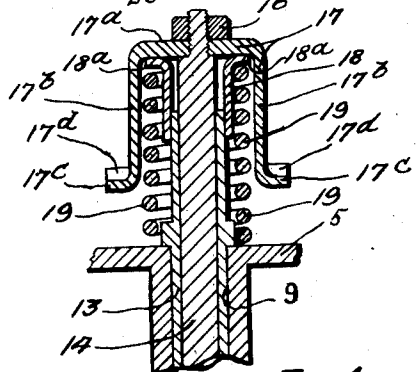


FIG 4

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INTERNAL-COMBUSTION ENGINE.

Application filed March 17, 1923. Serial No. 635,795.

This invention relates to internal combustion engines and has for its object the provision of an improved overhead valve mechanism which, while capable of general application, is primarily designed for use on the engines of motor driven vehicles, motor boats and the like.

The invention constitutes improvements in the invention set forth and described in my pending application for United States Patent, Serial Number 610,128, and aims to provide certain improvements in the structure therein shown and described.

Other objects and advantages of the invention are to provide an engine having an oil chamber associated with the top thereof and adapted to contain a quantity of oil and having practical and efficient overhead valve mechanism positioned in said chamber with the working parts thereof immersed in oil.

Another object of the invention is to provide a new and improved rocker arm and to provide new and improved means for positioning a push rod in operative position thereto so that the same will be silent in operation and may be operated in an oil reservoir with a minimum loss of oil.

An additional object is to provide a new and improved overhead valve mechanism whereby a longitudinal movement of a push rod will impart an opposite longitudinal movement of the valve rod with a minimum loss of motion.

Other objects are accomplished and additional and numerous other advantages gained by the novel construction, combination and arrangement of parts hereinafter described and illustrated in the accompanying drawing, wherein I have shown a preferred form of the invention, it being understood that changes and modifications may be made and that substitutions may be resorted to which come within the scope of the claims hereunto appended.

In the drawings which form a part hereof and in which similar characters of reference are used to indicate like parts as the same appear in any of the several views and in which:—

Figure 1 is a transverse, sectional view of an engine head constructed in accordance with this invention.

Figure 2 is a bottom view of my improved rocker arm.

Figure 3 is a top plan view of same.

Figure 4 is a fragmentary, sectional view taken as indicated by the lines 4—4 of Figure 1.

In an engine of the class described in which the valve mechanism is designed to be immersed in oil and arranged to operate with the contacting parts under oil, it is exceedingly difficult to provide a packing for the valve rods and push rods which will permit a free reciprocatory movement of the rods and at the same time prevent a leakage of oil through the bores in which the said rods are located.

One of the particular objects of this invention is to provide an engine having reciprocatory rods leading to the valve chamber and oil reservoir and to provide new and improved packing means to prevent a loss of oil therefrom and in addition to said packing means, it is an aim of this invention to provide automatically operable means whereby the air pressure in the valve chamber will be reduced during the operation of the engine and to thereby prevent oil from escaping around said rods.

The invention aims to provide an enclosed valve chamber adapted to hold oil and having a tube or other suitable communicating means leading from the reservoir to the intake manifold, whereby the suction created by the reciprocatory movement of the piston will cause a vacuum or partial vacuum to be created in the valve chamber which will effectually prevent any loss therefrom.

While the invention has been illustrated as applied to an engine head, it is to be understood that the same may be applied to engines having heads integral therewith and that the improved valve mechanism herein described is adapted to be used on engines generally, and may be used on devices of any kind in which a similar valve movement is desired.

Proceeding now to a detailed description of the invention with reference to the particular adaptation thereof illustrated in the drawings, the numeral 5 is used to denote an engine head and the numeral 6 a vertical flange which is arranged on the top thereof and extends therearound in spaced relation to the sides and ends of the head to form the oil chamber 7.

The numeral 8 denotes a push rod and the characters 8* a push rod bore which extends vertically through the head 5 adjacent one

side thereof. The numeral 9 denotes a valve rod bore which extends from the chamber 7 to the exhaust chamber 10. The numeral 11 denotes a firing chamber and the numeral 12 a port leading from the firing chamber to the exhaust chamber. The numeral 13 denotes a valve rod bushing which is mounted in the bore 9 and projects upwardly into the chamber 7. The numeral 14 denotes a valve stem which is mounted in said bushing. The valve rod 14 is provided on the lower end thereof with a valve 15 which is arranged thereon to close the port 12. The valve rod is provided at the upper end thereof with a shoulder on which is secured by the nut 16, the valve saddle 17. The valve saddle 17 comprises a circular central portion 17^a which is provided at the outer edge thereof with a downwardly turned, circumferentially extending flange 17^c. The saddle 17 is provided with a pair of arms 17^b which project downwardly from opposite sides thereof. Each arm 17^b is provided at the lower end thereof with an outwardly projecting, horizontal portion 17^c and each portion 17^c is provided on each lateral side thereof with the flanges 17^d which are arranged thereon to form a seat for the prongs on the rocker arm hereinafter described.

The numeral 18 denotes a tube which is fitted on the upwardly projecting end of the bushing 13. The tube 18 is provided at the upper end thereof with an outwardly projecting flange 18^a which is adapted to be positioned against the lower face of the central portion 17^a and be retained in a position centrally thereof by the flanges 17^c. A coil spring 19 is mounted on the bushing 13 and the tube 18 and is compressed between the flange 18^a and the bottom of the reservoir 7 so as to normally hold the valve 15 in a closed position and to hold the tube 18 against the central portion 17^a.

The bore 8^a is substantially larger in diameter adjacent the upper end thereof, the same being counterbored to receive the packing 20 and the spring 21, thus forming at the bottom of said enlarged portion an inclined annular shoulder 22. The enlarged portion of the bore is filled with suitable packing to a point in spaced relation to the bottom end thereof and a washer 23 is pressed down against the packing by the spring 21 forcing the same against the inclined shoulder 22 and thus fitting the packing 20 tightly around the rod 8.

The rocker arm 25 is provided with a semi-circular fork 26 having the fork members 26^a and 26^b, and, each of the fork members 26^a and 26^b are provided with a downwardly projecting end portion 26^c which are adapted to seat on the horizontal portions 17^c of the saddle 17, and be retained thereon by the flanges 17^d. The rocker arm is provided at the other end thereof with one prong 27 which is provided at the end thereof, on the under side thereof, with a flat surface 27^a adapted to bear against the spring 21. The prong 27 is further provided with a downwardly projecting substantially cylindrical lug 27^b which is adapted to be received in the upper end of the coil spring 21 and is adapted to contact with the upper end of the push rod 8. The arm 25 is further provided in the upper face thereof, at a point in the central portion thereof, with a semi-spherical socket 28 which is adapted to receive the head 29^a of the bolt 29. The bolt 29 is threaded in the vertical bore 30 in the bar 31 so as to be adjustable relative thereto and is provided on the upper end thereof with the lock-nut 32.

The bar 31 is suitably secured on the upstanding lug 33 which is preferably cast integrally with the head 5, but may be positioned thereon in any suitable manner to provide a support for the bar 31. The numeral 34 denotes a lid which is positioned on the flange 6 and is suitably secured thereon so as to enclose the oil chamber 7.

In use, the bolt 29 is operated in the bore 30 to properly position the rocker arm 25 on the seats 17^c and on the top of the push rod, to take up all play therebetween. The chamber 7 is preferably filled with oil to a point indicated by the dotted line "A" and it will be noted that all contact points in the valve mechanism are below the oil level.

If desired, a small quantity of graphite may be placed in the enlarged end of the bore 8 so as to cover the upper face of the washer 23 and prevent the actual contact of the oil in the reservoir with the packing 20.

In addition to the features above described, the invention provides means whereby the suction caused by the reciprocatory movement of the engine piston may be utilized to prevent a loss of oil during the operation of the engine. A gasket 43 or other suitable packing means is positioned between the lid 34 and the flange 6 and the lid 34 is bolted or otherwise secured on said flange 6 to provide a substantially air-tight joint therebetween. A bore 36 is formed in the flange 6 at a point adjacent the top thereof and above the level A of the oil and a tube 37 is secured in said bore 36. The tube 37 extends downwardly with the other end thereof operatively mounted in the bore 38 in the intake manifold. The numeral 40 denotes a plate which is secured to the inner face of the flange 6 by means of the screws 41 to cover the opening in the tube 37 and prevent the oil in the chamber 7 from splashing into the end of said tube. The plate 40 is provided with a centrally positioned inwardly directed, horizontal bulge which forms an opening 42 at each lateral side thereof, which openings are

adapted to prevent the free passage of air from the valve chamber 7 into the tube 37.

It will thus be seen that during the operation of the engine, the suction formed in the manifold will be communicated to the tube 37, drawing the air from the chamber 7 and creating a vacuum or partial vacuum therein, which will prevent the escape of oil through the valve rod or piston rod bores.

It will be noted that the spring 24 not only holds the prong 27 in an upward position and prevents the rocker arm from forming a loose contact with the seats 17^c and the seat 28, but, it also exerts a pressure on the washer 23 and forces the packing downwardly against the inclined shoulder 22 so that the packing can be worn away to a considerable extent without affecting its efficiency.

While I have shown a cross sectional view of an engine head and have illustrated the invention as the same is applied to the intake port of such head, it is to be understood that the same is intended for like application on exhaust valves and that it is to be ordinarily applied to multiple cylinder engines.

Having thus illustrated my invention and described the same in detail, what I claim as new and desire to secure by Letters Patent is:—

1. In an internal combustion engine, a head having a chamber on the top thereof, said chamber adapted to contain oil, valve mechanism located with said chamber; a bore leading upwardly through said head to said chamber, a rod mounted in said bore with the upper end thereof in operative contact with said valve mechanism; the upper portion of said bore being enlarged to provide a packing chamber around said rod; the lower wall of said packing chamber being inclined at an acute angle to said rod; packing in said packing chamber and a coil spring mounted on said rod and extending into the upper end of said packing chamber, said spring arranged to force said packing against the inclined lower wall of said chamber to maintain the same in a packed condition.

2. In an engine, a head, a chamber on the top of said head, said chamber adapted to contain oil, bores extending through said head to said chamber, valve operating rods mounted in said bores and projecting into said chamber, a rocker arm fulcrumed in said chamber and operatively connecting said rods, one of said bores being enlarged adjacent the upper end thereof to provide a packing chamber, the lower wall of said packing chamber being inclined at an acute angle to the rod positioned therein, packing in said packing chamber and a spring mounted on

the upper end of said rod and compressed between said packing and said rocker arm.

3. In an internal combustion engine, an engine head; an oil reservoir on the top thereof, a rocker arm fulcrumed in said reservoir, a bore through said head, a push rod mounted in said bore with the upper end thereof operatively contacting with said arm, said bore enlarged at the upper end thereof to provide a packing gland, packing in said gland, a spring mounted on said rod and compressed between said arm and said packing.

4. In combination, an engine head; an enclosed chamber associated with the top thereof; overhead valve mechanism in said chamber; said chamber adapted to contain oil at a level above the contacting parts of said mechanism, a push rod bore extending through said head to said chamber, a push rod mounted in said bore, the upper end of said bore enlarged to provide a packing gland, packing in said gland and resilient means to compress said packing.

5. An engine head, a chamber associated with the top thereof, said chamber adapted to contain a quantity of oil, a push rod bore extending through said head to said chamber, a push rod mounted in said bore, said bore enlarged at and adjacent the upper end thereof to provide a packing gland, packing in said gland, a valve rod bore leading to said chamber, a valve rod bushing mounted in said bore, said bushing projecting upwardly into said chamber, a valve saddle on the top of said valve rod, said saddle including a tube telescoping with said bushing; arms projecting downwardly from diametrically opposite sides of said saddle, a seat at the lower end of said arms, a spring adapted to normally hold said valve rod in an upward position, a support mounted in said chamber, a bolt threaded in said support from the underside thereof, said bolt having a semi-spherical head, a rocker arm having a socket adapted to receive said head, one end of said arm provided with a pair of diverging prongs adapted to seat on the lower ends of said first mentioned arms, a single prong on the other end thereof, said prong provided with a downwardly protruding lug arranged to contact with the upper end of said push rod, a coil spring mounted on said push rod with said lug received in the upper end thereof said spring arranged for compression between said packing and said single prong.

In testimony whereof I have hereunto set my hand.

HARRY L. HOSTERMAN.