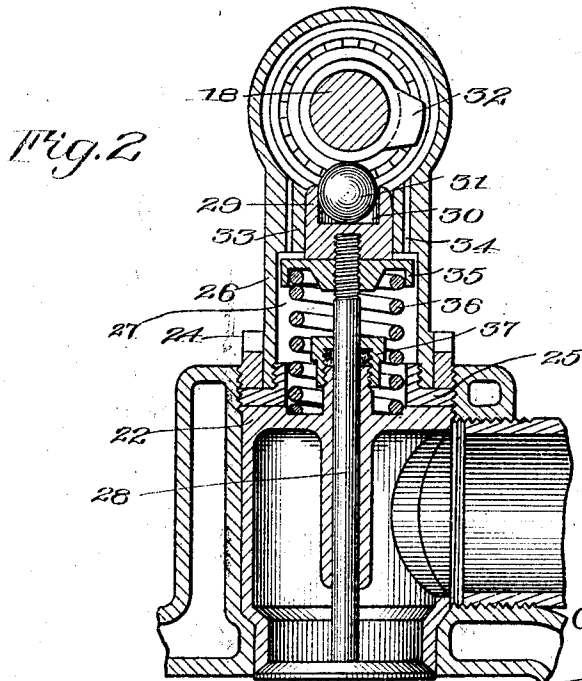
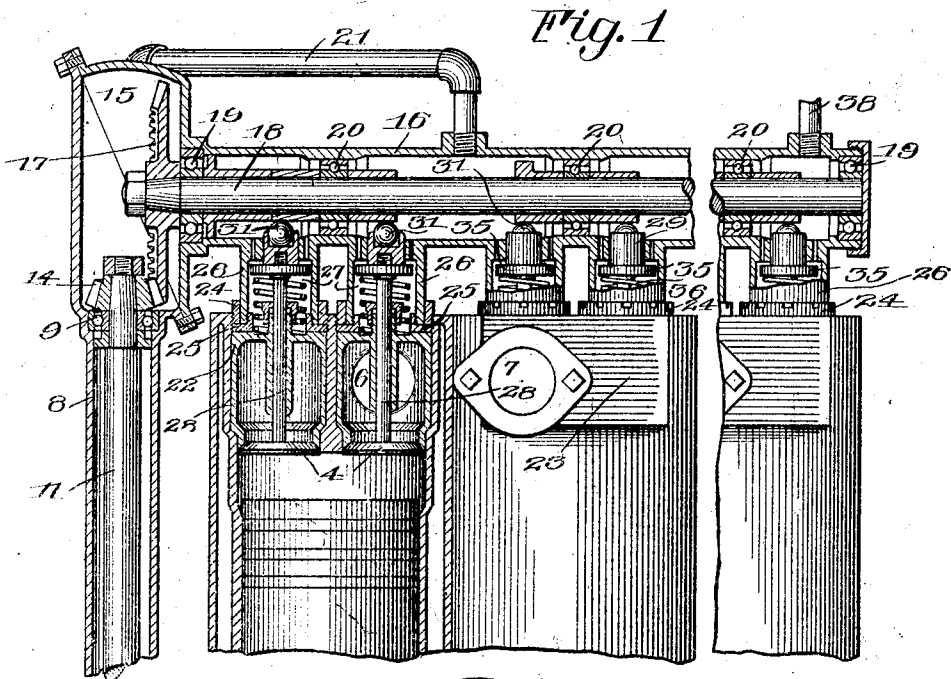


C. J. PEMBROKE.
VALVE MECHANISM.
APPLICATION FILED DEC. 30, 1912.

1,102,605.

Patented July 7, 1914.



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VALVE MECHANISM.

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Specification of Letters Patent.

Patented July 7, 1914.

Original application filed August 3, 1910, Serial No. 575,282. Divided and this application filed December 30, 1912. Serial No. 739,188.

To all whom it may concern:

Be it known that I, CHARLES J. PEMBROKE, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Valve Mechanisms; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference-numerals marked thereon.

My present invention relates to internal combustion engines and more particularly to valve mechanisms for such engines, and it has for its object to provide such a mechanism in connection with a lubricating system that will profusely oil the working parts without waste, and at the same time operate to silence the noise usually attendant upon the operation of valve mechanism.

To these and other ends the invention consists in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings: Figure 1 is a longitudinal central section through the valve mechanism of a multiple cylinder gas engine, the same being constructed in accordance with and illustrating one embodiment of my invention; Fig. 2 is a sectional view through one of the valve units taken in a plane at right angles to the plane of section of Fig. 1 and on an enlarged scale.

Similar reference numerals throughout the several figures indicate the same parts.

The present application is a division of my prior application, Serial No. 575,282, filed August 3, 1910, in which I disclose lubricating features applicable generally to engine structure and reference is made to that application, or its resulting patent, for the complete system of lubrication of which the present disclosure is a part and with which the present invention is well adapted for use. Only so much of the construction there completely illustrated is shown in the accompanying drawings as is necessary to gain an understanding of the valve mechanism alone and, referring more particularly to the drawings, 1 indicates the cylinder casting, 3 the cylinders, 4 and 5 the intake and exhaust valve heads, respectively, which

may themselves be of the usual type, and 6 and 7 the intake and exhaust ports that they control.

Arranged preferably at one side of the cylinder block and to extend parallel with the axes of the cylinders is a tubular jacket 8 in the upper and lower ends of which are the bearings 9 and 10 of a jack shaft 11 which it incloses, the latter being driven by the engine through any suitable means of driving connection at its lower end while at its upper end, above the bearing, is a beveled gear 14 in a gear case 15 that connects the jacket 8 with a similar tubular jacket 16 extending across the cylinder heads of the engine, the said gear case being preferably formed as shown by constituent parts on the jackets. The gear 14 on the jack shaft drives a gear 17 in the gear case mounted on the end of a cam shaft 18 and closed by the jacket and having end bearings 19 and intermediate bearings 20 contained and supported therein.

A pipe 21 forms a circulating passage for conducting oil from a suitable source of supply to the cam shaft jacket 16 which it preferably joins at a point near the front end thereof, as shown.

The valves 4 of the engine are carried by valve casings 22 fitted within and preferably easily removable from the cylinder head 23 into which they are secured, in the present instance, by threaded rings 24, all as clearly shown in the figures. Between the clamping rings 24 and the valve casing are interposed nuts 25 through which are threaded or otherwise secured the lower ends of collars 26 on the cam shaft jacket 16 constituting extensions thereof that support the jacket and the parts carried thereby and form chambers 27. Through these chambers pass the stems 28 of the valves that project from the casing 22 and are provided with cap pieces 29 having pockets 30 for balls 31 with which contact the cams 32 on the cam shaft to operate the valves as usual. Webs 33 at the bases of the collars constituting walls of the chambers 27 form guides for the heads 29 of the valve stems, these webs being preferably cut by perforations or passages 34 to form communication between the chambers 27 and the jackets 16, while mounted on the stems below the heads are disks forming pistons 35 operat-

ing in the chambers. A coil spring 36, interposed between the piston or enlargement and the valve casing in each instance, operates to return the valve, or at least to actuate it in one direction, and a suitable gland 37 surrounds the valve stem bearing to prevent an excess of oil from flowing into the latter around the valve stem though a sufficient amount is admitted to well lubricate the stem.

In operation, the oil delivered by the pipe 21 into the cam shaft jacket 16 at one end and withdrawn through a pipe 38 at the other, passes through the various intermediate bearings 20 of the cam shaft. By the provisions of my invention before alluded to involving the entire lubricating system of the engine, a flow is also set up from the jacket 16 through the main end bearings 19 and gear case 15 into the jack shaft jacket 8 but such arrangement is only ancillary to the present invention, it being here sufficient to point out that the cam shaft revolves in oil so that it is not only perfectly lubricated both as to its bearings and its cams, but is made noiseless in operation. The jacket 16 being constantly filled, it acts as a reservoir for supplying the chambers 27 in which the valve stems operate and into which entrance is freely gained through the passages 34. The oil thus inclosed in the chamber 27 not only serves to lubricate the valve stems but also acts as a cooling agent that does more in that it makes such lubrication extremely effective and the reciprocations of the pistons 35 on the valve stems churn up the body and cause it to circulate with that in the jacket 16 so that overheating is prevented. It will be seen that the oil is constantly in motion and may be used over and over again. Furthermore, besides the lubricating function, it acts as a cooling agent for the valve mechanism, as pointed out, and as a muffler for silencing the moving parts. This last property is of particular value with respect to the valve mechanism, the clatter of the valves, their springs 36 and the contact of the cams 32 with the valve stems, being well known to constitute much of the noise attendant upon the running of an internal combustion engine, especially that type known as the valve in head motor, as it not only does away with the difficult oiling feature of this type of motor, but also dispenses with the use of several objectionable parts, such as push rods, pinned rollers, walking beams, grease cups, etc.

The inclosing of the cam shaft 30 and the valve operating devices in an air tight, oil tight and dust proof casing containing a liberal supply of lubricating fluid, not only renders the valve mechanism noiseless when in operation but obviates many disadvantages otherwise encountered, such as insufficient lubrication, inability to cool the valve

cage heads and loss of temper in the exhaust valve spring. A still further advantage is obtained in the arrangement of parts I have adopted in that I am able to obviate the possibility of the pistons sucking air through the spaces surrounding the valve stems when the latter becomes worn, a circumstance which materially affects the operation of an explosive engine when it is operated with a partly closed throttle. The valve parts being surrounded with oil, prevents the entrance of the air into the pistons at these points and permits the motor to run at low speeds with a perfectly timed movement, even after the motor has been subjected to long continued service.

I claim as my invention:

1. The combination with an explosive engine having a cylinder, a valve casing and a valve stem projecting therefrom, of a cam shaft for actuating the valve stem and an oil holding jacket inclosing the cam shaft and valve stem, the engine cylinder being arranged exteriorly of said jacket.

2. The combination with an explosive engine having a valve casing and a valve stem projecting therefrom, of a cam shaft for actuating the valve stem, an oil holding jacket inclosing the shaft and supporting the bearings thereof and a collar on the jacket inclosing the valve stem and connected to the valve casing to support the jacket thereon.

3. In an explosive engine, the combination with a valve casing, a chamber adjacent thereto and an oil reservoir communicating with the chamber, of a valve stem projecting from the casing into the chamber and a piston thereon for maintaining a circulation of oil between the chamber and reservoir.

4. In an explosive engine, the combination with a valve casing, a chamber adjacent thereto and an oil reservoir communicating with the chamber, of a valve stem projecting from the casing into the chamber, a piston thereon for maintaining a circulation of oil between the chamber and reservoir and a valve spring interposed between the piston and valve casing.

5. In an explosive engine, the combination with a valve casing, and an oil chamber adjacent thereto, of a valve stem projecting from the casing and extending through the chamber being guided in the opposite wall thereof.

6. In an explosive engine, the combination with a valve casing, and an oil chamber adjacent thereto, of a valve stem projecting from the casing and extending through the chamber being guided in the opposite wall thereof, an abutment thereon within the chamber and a valve spring interposed between the abutment and valve casing.

7. In an explosive engine, the combination with a valve casing, and a valve stem pro-

jecting therefrom, of a cam shaft for actuating the stem, an oil holding jacket inclosing the same, a collar thereon connected to the valve casing and forming a communicating chamber surrounding the valve stem, a piston on the latter operating in the chamber and a spring in the chamber en-

gaging the piston to operate the valve in one direction.

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