Aug. 9, 1966 C. C. FITZSIMONS 3,265,053

VALVE ASSEMBLY

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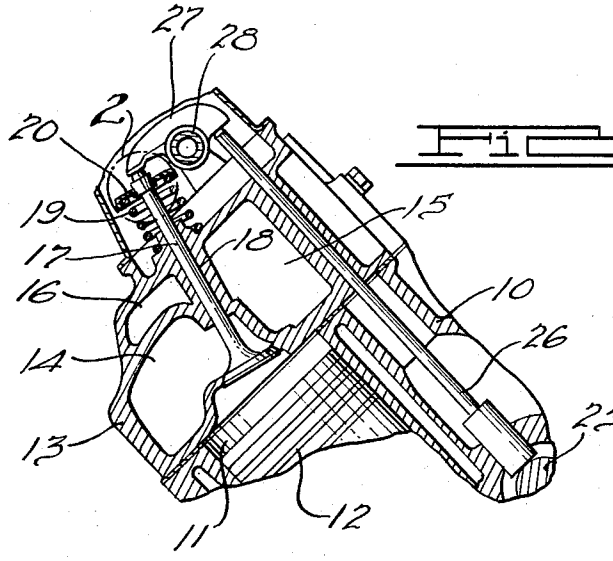


Fig. 1.

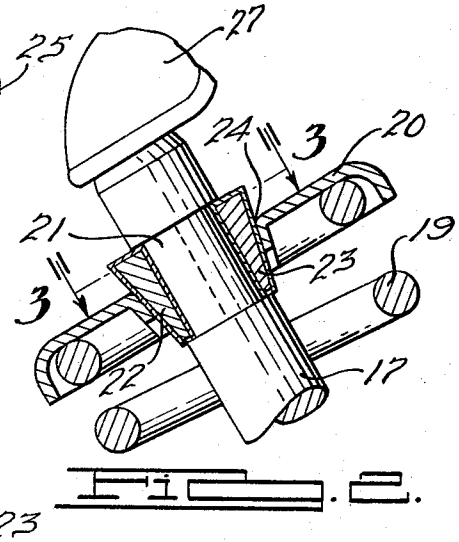


Fig. 2.

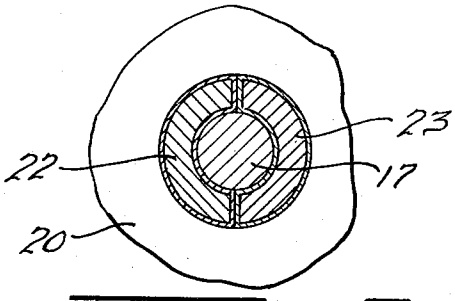


Fig. 3.

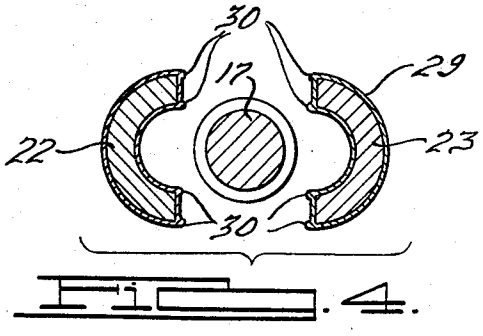


Fig. 4.

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VALVE ASSEMBLY

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This invention relates generally to valve assemblies.

In particular, this invention is primarily concerned with poppet valve assemblies of the type conventionally employed in internal combustion engines.

The problem with which this invention is concerned has to do with the elimination, as far as possible, of the leakage of lubricants into the combustion chamber which the poppet valve serves.

Virtually all poppet valves, whether intake or exhaust, are actuated either directly by a cam shaft or by a push rod and rocker arm assembly which, in turn, is actuated by a cam shaft geared in timed relation to the crank shaft of the engine. In either event, substantial lubrication of the cam shaft and associated actuating mechanism is essential.

The presence of these lubricants, particularly under the temperature conditions prevailing, provide the opportunity for them to flow along the stem of the valve by capillary action or otherwise and thereby to enter the combustion chamber.

The deleterious effects of lubricants in the combustion chamber of internal combustion engines are well known, and the desirability of avoiding this sort of contamination wherever possible is always an important aspect of the design and construction of internal combustion engines.

The present invention is concerned with minimizing, as far as possible, one aspect of this problem. It has been found that if an adequate seal is provided around the valve stem, at the point where the spring mounting washer engages the stem, a significant amount of leakage of lubricants into the combustion chamber can be avoided.

In addition to providing the above described sealing action, it is an object of the present invention to provide means for mounting the conventional spring supporting washer in snug engagement completely surrounding the conventional reduced diameter portion of the valve stem with which it is associated.

Other and further objects, advantages and features of the present invention will become clearly apparent from the following specifications when considered in connection with the accompanying drawings forming a part thereof.

FIG. 1 is a fragmentary sectional view through the cylinder head of a more or less conventional overhead valve type internal combustion engine showing, in detail, the mounting of the valve assembly.

FIG. 2 is a considerably enlarged fragmentary cross sectional view through that portion of the valve assembly generally designated A in Section 1.

FIG. 3 is a cross sectional view taken along line 3—3 of FIG. 2.

FIG. 4 is an exploded view of the component parts shown in FIGURES 2 and 3 illustrating the manner in which they are formed and associated.

With more particular reference to the drawings, the portions of the internal combustion engine shown comprise a cylinder block **10** having a cylinder **11** formed therein in which the conventional piston **12** reciprocates. The cylinder block has associated therewith a conventional cylinder head **13**, which is formed to provide an inlet or exhaust port **14** as well as the conventional cooling water jackets shown as the cavities **15** and **16** in FIG. 1.

Communication between the port **14** and the cylinder

11 is controlled by a poppet valve **17** which is mounted for reciprocal movement in a suitable bore **18** formed in the cylinder head **13**.

The valve **17** is normally urged into closed position by means of the spring **19**, one end of which is seated on a suitable boss formed on the cylinder head, and the other end of the spring is engaged by an annular washer **20**. The washer **20** has a central frustro-conical opening therein, the purpose and function of which will hereinafter be described.

The stem of the valve **17** has a reduced diameter portion **21** adjacent its upper end which is generally of cylindrical form, coaxial in relation to the overall surface of the valve stem, thereby providing a shouldered recess which serves to provide means for mounting and anchoring the washer **20** with respect to the valve stem.

Surrounding the valve stem in this reduced diameter area are a pair of semi frusto-conical elements **22** and **23** which, together, completely and entirely surround the reduced diameter portion of the valve stem and have an overall length which permits them to snugly fit into the reduced diameter section of the valve stem.

These semi frusto-conical elements, when mated together, form a frusto-conical surface adapted to be engaged by the frusto-conical opening **24** in the valve spring retaining washer above described. As a result of the engagement of these elements, the pressure of the spring **19** not only serves to urge these semi frusto-conical elements into engagement with each other but also into engagement with the reduced diameter portion **21** of the valve stem.

As is conventional in constructions of this general character, the valve assembly above described is actuated by a cam shaft **25** which serves to cause reciprocation of a push rod **26** which, by means of a rocker arm **27** journaled on a stationary shaft **28**, serves to cause reciprocation of the valve **17** in accordance with movement of the push rod **26**.

Since the clearance between these two semi frusto-conical elements and the reduced diameter portion of the valve stem is a critical matter it has, in the past, been found difficult to provide an adequate seal to prevent the flow of lubricants along the valve stem at this point.

In order to overcome this, applicant has discovered that a most satisfactory seal may be obtained by coating the elements **22** and **23** with lead, such coating being illustrated, in perhaps slightly exaggerated form, in FIG. 4 of the drawings.

This lead coating may be applied to the elements **22** and **23** in any suitable manner. These elements **22** and **23** are usually formed of steel but, obviously, may be produced from any other suitable metal. The lead coating is, or may be, applied by electro-deposition, and it has been found that particularly beneficial results are obtained by the utilization of an electrically deposited coating. The lead coating **28** applied to these parts is applied to a thickness of approximately .003 of an inch on the principal surfaces of the parts. As is inherent in most electroplating operations, due to the localized current densities involved, the lead coating on the sharp corners of these parts, generally designated **29**, is built up to a thickness of approximately double the thickness of the coating on the principal surfaces of the parts.

Most beneficial results have been obtained by applying to the surface of the parts a lead coating of .002–.003 of an inch in thickness, thereby automatically providing a coating thickness of .004 to .006 of an inch on the corner portions designated **29**.

When these two frusto-conical elements are assembled in the manner shown in the drawings, the lead coating, which is reasonably plastic at normal temperatures and particularly so at the elevated temperatures found in an

internal combustion engine, provides a close fitting sealing engagement not only between the mating faces of the frusto-conical elements **21** and **22**, but also between the interior surfaces of these elements and the reduced diameter portion of the valve stem thereby providing a particularly satisfactory seal against the flow of lubricants along the valve stem into the combustion chamber of the engine.

It will be obvious that modifications of the above described specific example of the invention herein disclosed may be made, falling within the scope of this invention as seen further in the following claims.

What is claimed is:

1. A locking assembly for association with the valve stem of a valve for internal combustion engines comprising a pair of metallic elements, each of said elements having semicylindrical recess in one face thereof, the exterior surface of each element having a semi-frusto conical configuration, all surfaces of said elements being coated with lead to a substantial thickness.

2. An assembly as set forth in claim **1** wherein the lead coating has a thickness of not less than .002 inch.

3. An assembly as set forth in claim **1** wherein the lead coating is electro deposited and has a minimum thickness of .002 inch but has a thickness of .004 inch or more on the corners of said element.

4. A valve assembly comprising a poppet valve having a cylindrically surfaced stem, said stem having a portion near one end thereof of reduced diameter to form a cylindrically surfaced recess, coaxially arranged with respect

to the surface of the valve stem, a pair of semi-frusto conical surfaced elements each having a semicylindrical inner surface, said elements adapted to seat in the recess on said valve stem, a mounting washer having a frusto conical opening therein engaging the exterior surfaces of said elements, and a spring urging said washer into engagement with said elements to urge said elements into snug engagement with each other and into snug engagement with the reduced diameter portion of said valve stem, said elements being coated with lead to a substantial thickness.

5. An assembly as set forth in claim **4** wherein the lead coating has a thickness of not less than .002 inch.

6. An assembly as set forth in claim **4** wherein said lead coating has a minimum thickness of .002 inch and has a thickness of at least .004 inches on the corners of said elements.

References Cited by the Examiner

UNITED STATES PATENTS

1,998,888	4/1935	Wallgren	308—237
2,028,556	1/1936	Murdock	308—71
2,067,061	1/1937	Moffatt	308—237
2,357,106	8/1944	Grenot	308—237
2,705,486	4/1955	Norton	123—188

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