

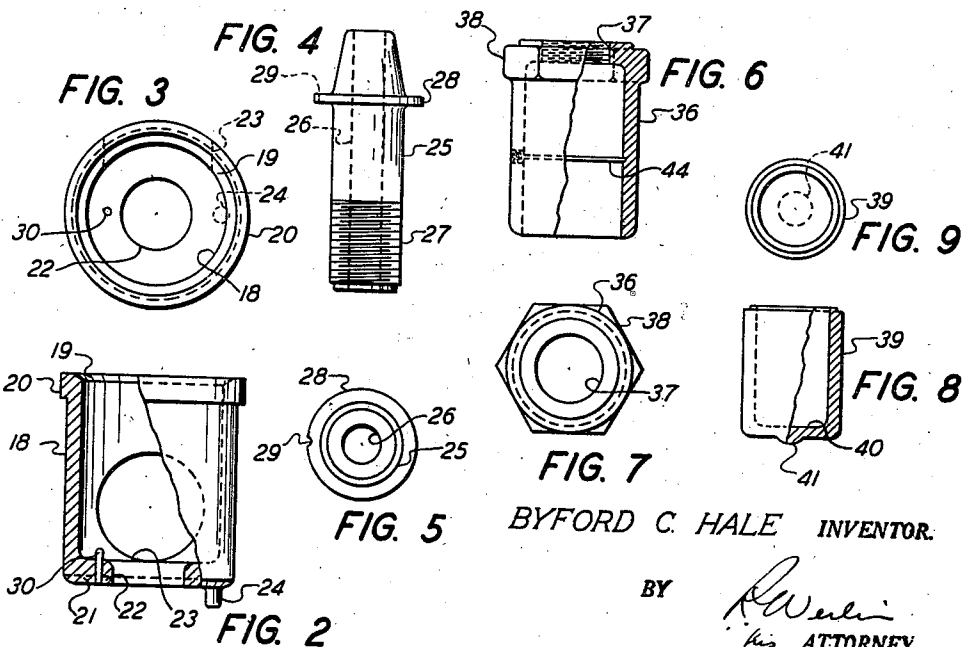
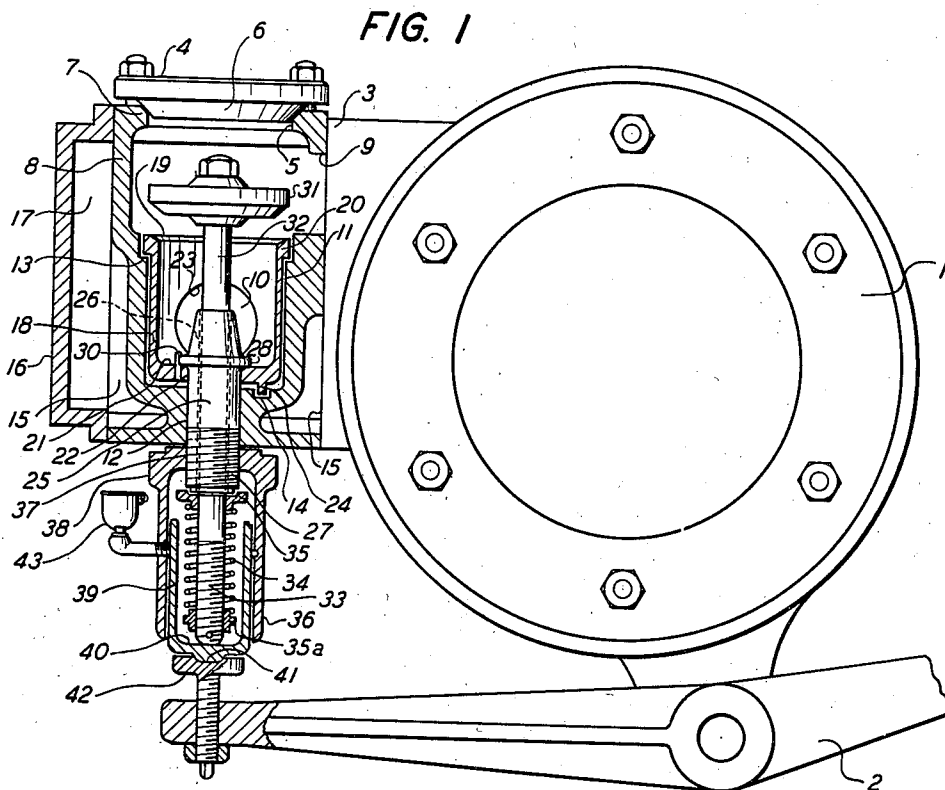
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VALVE MECHANISM

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VALVE MECHANISM

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3 Claims. (Cl. 123—189)

This invention relates to valve mechanisms and particularly to the exhaust valve mechanism employed with internal combustion engines, especially of the heavy duty type.

The principal object of this invention is to provide an improved valve mechanism of the poppet valve type conventionally employed with engines of the class described.

An important object is the provision in such mechanisms of a seat-and-guide combination, all the part of which are quickly and easily removable from or applicable to the valve chambers without removal of the chambers from the engine cylinders.

Another object is the provision of an improved form of valve guide whereby the valve is fully guided and side thrust and consequent uneven wear of the valve parts eliminated or greatly reduced.

Other and more specific objects and advantages of this invention will become apparent from the following detailed description when read in conjunction with the accompanying drawing which illustrates one useful embodiment in accordance with this invention. It will be understood that various changes may be made in the details of the invention without departing from the scope of the appended claims, but within the spirit of the invention.

In the drawing:

Fig. 1 is a sectional elevation of the valve mechanism in accordance with this invention, showing the same attached to an engine cylinder; Fig. 2 is a detail, partly in section, of the replaceable valve seat forming a part of the invention; Fig. 3 is a top view of the element shown in Fig. 2; Fig. 4 is an elevational view of the internal guide element of the invention; Fig. 5 is a bottom view of the element shown in Fig. 4; and Figs. 6 and 7, 8 and 9 are details of the external guide elements of the device.

Referring to the drawing in which the same numerals designate the same or similar parts in the several figures, 1 designates the cylinder head of an internal combustion engine, on which a rocker arm 2 is mounted for actuation by the usual cam mechanism, not shown. A valve chamber housing 3 is rigidly attached to cylinder head 1 as shown. The housing 3 is provided with a removable plate 4 for permitting access to the interior of the valve chamber 8 and to the mechanism disposed therein through an opening 5 in the top of the housing. Plate 4 is provided with a downwardly extending con-

cal seat boss 6 which cooperates with a chamfered annular seat 7 surrounding the edge of opening 5 to provide a ground joint closure for opening 5 to thereby eliminate the more conventional ring gaskets commonly employed for sealing such openings, and which are frequently a source of leakage and other difficulties in engines of the class described.

The valve chamber 8 is provided with a gas passageway having one end communicating with cylinder 1 by means of an inlet port 9 extending through the side of the chamber, and having its other end communicating with the usual exhaust manifold, not shown, by means of an exhaust port 10 extending through one side of the lower portion of the chamber and housing. Between ports 9 and 10 the gas passageway comprises a vertically extending tubular cylinder having an axial opening 12 bored in the bottom of the cylinder formed by the turn thereof toward port 10, and communicating therethrough with the exterior of the housing. The upper end of cylinder 11 is annularly recessed to provide an annular shoulder 13 and the bottom of cylinder 11 is provided with a small recess 14 positioned to one side of opening 12. The usual cooling fluid passageways 15 extend through housing 3 and surround the exterior of chamber 8 and communicate with similar fluid passageways in cylinder 1, not shown. A cover plate 16 is attached to the outside of housing 3 to permit access to fluid passageways 15 and has a deeply recessed chamber 17 in communication with passageways 15 to provide ample space for free circulation of cooling fluid through housing 3 and for deposition and accumulation of dirt and scale frequently carried by the cooling fluid.

Removably disposed in cylinder 11 is a generally tubular valve seat member 18, open at its upper end. The upper inner edge of member 18 is chamfered to provide an annular valve seat 19. An annular flange 20 is provided exteriorly about the upper end portion of member 18 and is adapted to be received on and supported by shoulder 13 when member 18 is fully inserted in cylinder 11. Member 18 is provided with a bottom 21 through which is an axial opening 22 registering with opening 12 in the bottom of valve body 8. An opening 23 is provided in the side of seat member 18 and is adapted to register with exhaust port 10. A lug 24 extends downwardly from the bottom of seat member 18 and is adapted to enter and engage recess 14 in the bottom of valve body 8. When lug 24

enters recess 14, seat member 18 becomes automatically positioned in cylinder 11 so as to bring opening 23 into registration with exhaust port 10 and to lock seat member 18 against rotation relative to cylinder 11, to thereby insure unobstructed passage of gases from inlet port 9 to exhaust port 10.

An internal guide member 25, generally tubular in form and having an axial bore 26 extending therethrough, is removably inserted through axial openings 22 and 12, the lower end of member 25 being threaded externally at 27 and protruding from the bottom of housing 3. An annular flange 28 is provided about the upper portion of guide member 25 and is adapted to engage the upper edge of opening 22 to seal this opening and to prevent member 25 from slipping through opening 22. A longitudinal slot 29 in the peripheral edge of flange 28 engages an upwardly extending pin 30 fixedly mounted in the bottom 21 of valve seat member 18 to lock guide member 25 against rotation relative to seat member 18.

A poppet type valve 31 is mounted on an elongated stem 32 and is adapted to cooperate in the usual way with seat 19 for controlling the passage of gases between ports 9 and 10. Stem 32, threaded externally at its lower end at 33, passes through bore 26 of the internal guide member and extends exteriorly of housing 3 below the end of guide member 25. The protruding end of valve stem 32 is surrounded by the usual coil spring 34 thrusting against an annular spring retainer 35 which is seated against the lower end of member 25 and held under compression by the usual follower nut 35a screwed on the threaded end 33 of the valve stem. Surrounding the protruding ends of member 25 and stem 32 is an external guide member comprising a tubular skirt 36 having an axial opening 37 in its upper end and threaded internally to engage the threads 27 of the member 25, and having an open lower end. A hexagon flange 38 surrounds the upper portion of skirt 36 to provide means for the application of a wrench thereto. Extending through the open lower end of skirt 36 and slidably disposed therein is a tubular stem guide 39 surrounding stem 32 and spring 34. The lower end of guide 39 is closed by means of a bottom 40, the exterior of which is provided axially thereof with a rounded projection 41 which is normally held in contact with an adjustable thrust member 42 carried by the end of rocker arm 2. An oil cup 43 is mounted on the side of skirt 36 and supplies lubricant to the interior of the external guide through an annular oil groove 44 cut in the inner surface of skirt 36.

When it is desired to dis-assemble the valve mechanism above described, in order to remove or replace any of the parts thereof, plate 4 is removed, the rocker arm 2 is displaced from contact with guide 39 and the latter is withdrawn from skirt 36. Follower nut 35a is unscrewed from the end of the valve stem permitting the spring 34 and retainer 35 to be withdrawn from the interior of skirt 36 thus releasing the valve stem. Valve 31 and stem 32 are then withdrawn from chamber 8 through opening 5. Skirt 36 is then unscrewed from the end of guide member 25 and the latter, alone or together with seat member 18, is then withdrawn from cylinder 11, thereby completing the dis-assembly of the mechanism. To re-assemble all of the parts the above order is generally re-

versed, care being exercised only to see that proper engagement occurs between lug 24 and recess 14 and slot 29 and pin 30.

It will be seen that when skirt 36 is screwed on to the end of member 25 and tightened against the housing, this movement acts to draw flange 28 tightly against opening 22, thereby sealing the opening against escape of gases and also serves to hold seat member 18 tightly in its proper place in cylinder 11.

It will be seen, therefore, that all of the working parts of the valve mechanism in accordance with this invention may be quickly and easily removed or assembled and any one or all of the parts replaced without removing housing 3 from its connection to cylinder 1. This is an important consideration since, on heavy duty engines particularly, the housing is a heavy casting which is often very cumbersome and difficult to remove. Also, the provision of easily removable valve, valve seat member, and guide members permits the relatively easy and inexpensive replacement of any part which may become worn in service, without requiring the replacement of other parts of the mechanism or removal of the valve housing.

What I claim and desire to secure by Letters Patent is:

1. In a valve mechanism for engines, the combination of a casing, a gas passageway extending through said casing, a tubular valve seat member removably disposed in said passageway intermediate the ends thereof, a valve cooperating with said seat member and having a stem extending through said seat member to the exterior of said casing, a tubular internal guide member removably disposed in said seat member surrounding said stem and extending exteriorly of said casing, means carried by said seat member and said internal guide member to lock said members against relative rotation, and concentric external guide members surrounding the exteriorly extending end of said valve stem and removably attached to the exteriorly extending end of said internal guide member, one of said concentric guide members being longitudinally movable relative to the other and adapted upon longitudinal movement thereof to impart corresponding movement to said valve stem.

2. In a valve mechanism for engines, the combination of a casing, a gas passageway extending through said casing, valve means for controlling the passage of gases through said passageway including a tubular seat member removably disposed in said passageway and a valve cooperating with said seat member and having a stem extending axially therethrough to the exterior of said casing, a tubular internal guide member for said stem removably disposed in said seat member and extending axially therethrough to the exterior of said casing, means for locking said internal guide member against rotation relative to said seat member, concentric external guide members surrounding the exteriorly extending ends of said internal guide member and said stem, one of said external guide members being removably connected to the end of said internal guide member, and the second of said external guide members being reciprocable relative to the other and adapted upon reciprocation thereof to impart reciprocating movement to said valve stem.

3. In a valve mechanism for engines, the combination of a casing, a gas passageway extending through said casing and having an inlet port

extending through one side of said casing and an exhaust port extending through another side thereof, a tubular valve seat member removably disposed in said passageway intermediate said ports, said seat member having a side opening adapted to register with said exhaust port, and an end closure having an axial opening there-through adapted to register with a corresponding opening in one end of said casing, means carried by said seat member and said casing and cooperating upon insertion of said seat member in said passageway to align said side opening with said exhaust port and to lock said seat member against rotation relative to said casing, a tubular internal guide member removably disposed in said seat member and extending through said axial opening to the exterior of said casing, a valve cooperating with said seat member and

having an elongated stem extending through said tubular guide member to the exterior of said casing, an annular shoulder about said internal guide member engageable with the edge of said axial opening, a pin-and-slot connection between said internal guide member and said seat member to lock said members against relative rotation, and concentric external guide members surrounding the exteriorly extending end of said valve stem and removably attached to the exteriorly extending end of said internal guide member, one of said concentric guide members being longitudinally movable relative to the other and adapted upon such longitudinal movement to impart corresponding movement to said valve stem.

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