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OVERHEAD VALVE TESTING APPARATUS

Filed March 29, 1927

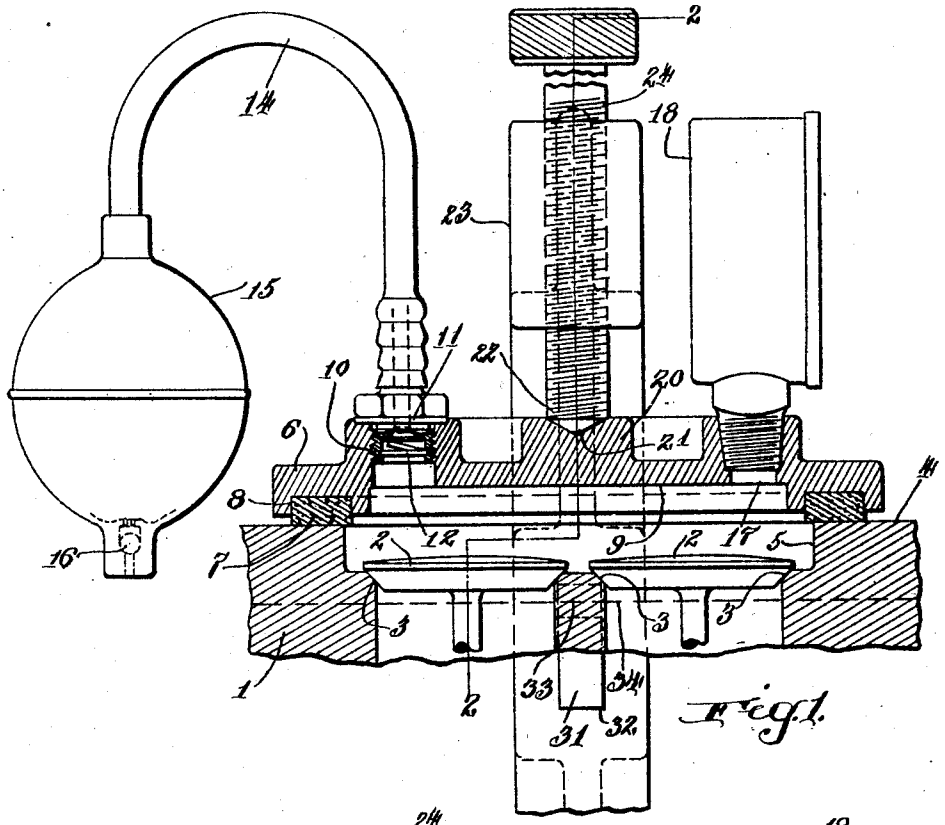


Fig. 1.

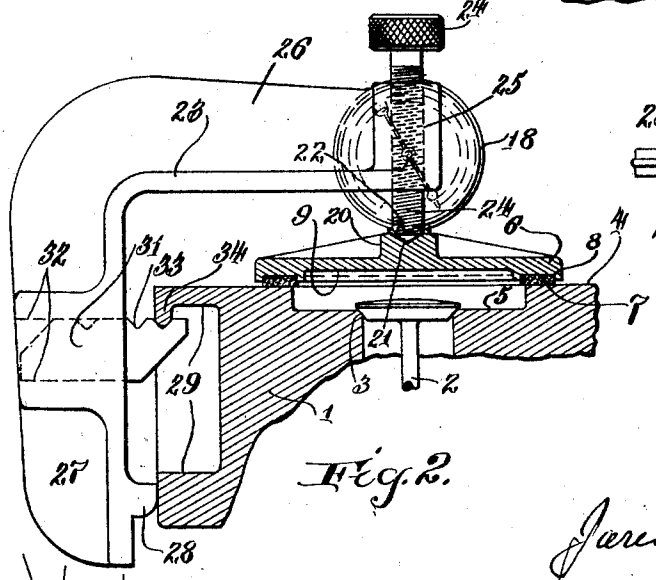


Fig. 2.

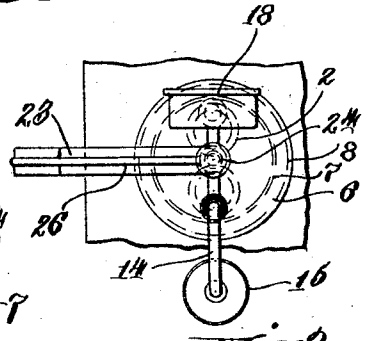


Fig. 3.

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WITNESSES

Pete, W. H. Caulk.

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UNITED STATES PATENT OFFICE.

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OVERHEAD-VALVE-TESTING APPARATUS.

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The manner of testing internal combustion motor valve contacts by forming an air tight chamber around the valve seat and observing the time required for the pressure therein to fall, due to the escape of air around the valve, is well known, such tests ordinarily being performed by placing a cup formed for this purpose in inverted position on top of the cylinder, enclosing the valve seat, the cylinder head being removed to give access to the valves for grinding, etc.

The present invention relates to a testing appliance for valve-in-the-head motors. Such motors have the valve seats formed in a counter-sink in the head, one of which counter-sinks registers with the bore of each cylinder. Because of the counter-sink the testing cup cannot be so placed as to form air tight contact around the valves and enclose the same for testing.

For the purpose of grinding the valves of a valve-in-the-head motor, in accordance with the invention, the cylinder head is removed with the valves and placed on the bench in inverted position to give access to the valve seats. When the grinding operation is supposedly completed, the valves are tested, in accordance with the present invention, by closing the counter-sink corresponding to each particular cylinder in turn by means of a plate or cover which is provided with packing and connected to a suitable air supply and preferably provided with a gauge for indicating the drop in pressure. This plate is held in position in any suitable manner and, in the preferred form shown, which has been developed in practical operation, the plate is held in position by means of a clamp having a hook which engages the side of the spark plug chamber just below the cylinder contacting surface of the cylinder head, and preferably a heel or fulcrum resting against the side of the cylinder head just below the spark plug chamber, the clamp also having a lateral arm which extends over the cover plate and is provided with a bearing member which engages the cover plate at a central point.

In the accompanying drawings I have illustrated a valve testing apparatus in connection with so much of the cylinder head of a valve-in-the-head motor as is considered necessary to a full comprehension of the device and the manner of operating the same.

In the drawings:

Figure 1 is a vertical section through the cylinder head and cover plate taken on a plane of the axis of the cylinder and the fore and aft line of the motor.

Figure 2 is a section on the line 2—2 of Figure 1 looking to the right in said figure.

Figure 3 is a top plan of the apparatus as shown in Figures 1 and 2, a fragment of the cylinder head also being shown.

Referring to the drawings by numerals, each of which is used to indicate the same or similar parts in the different figures, the illustration includes a fragmentary showing of the cylinder head 1 of a valve-in-the-head motor, the cylinder head having been removed and placed in inverted position on any suitable support, not shown. Two of the valves, supposedly released for grinding, are shown at 2, 2 resting on valve seat surfaces 3, 3. The flat surface of the cylinder head which is now uppermost and which is normally turned downwardly against the top surface of the cylinder, is indicated by reference character 4.

The valve grinding apparatus of the invention comprises a cover plate 6 of an area sufficient to cover and overlap the counter-sink 5 corresponding to any one of the cylinders, the overlap being sufficient for the placing of a gasket or packing ring 7 in a groove 8 in the bottom surface of the cover plate so that the packing ring 7 will rest on and contact, for substantially its full width, the portion of the surface 4 of the cylinder head surrounding the counter-sink 5 therein, in which the valves are placed.

The plate 6, in the form shown, is also provided with a counter-sink 9 spaced slightly inside the gasket or packing ring 7, though this latter counter-sink or depression

is not essential to the operation of the device. The cover plate 6 is provided with a suitable opening 10 into which is threaded a pump connection 11 having a non-return valve 12. This connection carries a flexible tube 14 to which is connected a bulb pump 15 having at the end opposite the tube 14 a non-return or check intake valve 16. The cover plate may also be provided with a threaded opening 17 in which is mounted a pressure gauge 18.

There is a boss 20 substantially in the center of said plate on the top side counter sunk at 21 for engagement of the plate by means of a presser member 22, pressure being applied thereto in any suitable manner as by means of screw 24 shown as carrying the presser member and threaded through a corresponding opening 25 in the lateral arm 26 of clamping member 23.

The clamp, in the form of the invention shown, comprises an angular clamping member 23 having an upright arm 27 and a lateral arm 26. The upright arm 27 has a heel or fulcrum point 28 which bears against the side of the cylinder head at a point which, in the form of cylinder head shown, is below the spark plug chamber 29. The clamp is also provided with a jaw or hook member 31 which, in the form shown, consists of an adjustable insert which fits in a horizontal opening 32 near the center of the upright 27, the insert 31 being provided with engaging means shown in the form of notches 33 upwardly disposed in the normal operative position of the parts, the notches 33 being adapted, in the various positions of adjustment, to engage the downwardly disposed top wall or top flange 34 of the spark plug chamber or particularly in the lower edge thereof.

In the preferred operative position of the clamp, with the hook 31 engaging the top of the spark plug chamber at 34, the arm 26 extends across the cover plate 6 in a horizontal direction to, and slightly beyond, the center of the cover plate when the latter is covering the corresponding counter-sink 5 of the cylinder head, and the screw 24 with its lower bearing point, referred to for the purposes of this application as presser member 22, engages the counter sink 21 in the center of the cover plate. The packing ring 7 engages the flat surface 4 of the cylinder head along the entire periphery of the counter-sink 5. The screw 24 is then duly tightened by turning the same in engagement with the threads in the opening 25 at the end of the arm 26 and the cover is duly pressed down into contact with the said surface of the cylinder head or, more particularly, the gasket 7 is compressed between the flat surface 4 of the cylinder head and the cover plate 6, the reaction of the pressure applied by the screw being taken up by the jaw or hook member or insert 31 bearing against the top wall or flange 34 of the spark plug chamber, the thrust being further taken up by and through a tendency to rotate the lever 23 about the point of engagement at 34, which tendency to rotate is resisted by the heel 28 bearing against the side of the cylinder head below the spark plug chamber.

It will be noted that not only is the hook or jaw member 31 adjustable, but that it is provided with a plurality of engaging points shown in the form of notches 33 which provides for the adjustment of the clamp to cylinder heads of varying sizes, permitting the cover plate 6 to be brought into registration with the respective cylinder head counter-sinks 5.

The jaw member 31 may be adjusted in and out of the opening 32 to give the desired variation of reach of the clamping arm 26 and the length of the arm and the position of the notches may, of course, be widely varied within the scope of the invention, as may all of the dimensions and minor details of the apparatus.

The width and location of the gasket 7 also provides for a certain variation of the diameter of the counter-sink corresponding to the variation in diameter of the cylinders.

The cover plate being thus pressed down against the cylinder, the valves being in position and it being assumed that they have been ground to a point where testing is desirable, air pressure is built up in the chamber formed of the counter-sink 5 closed by the cover plate 6, and the extent of this pressure and the period required for it to drop through a noticeable degree are preferably made apparent and indicated by means of the pressure gauge 18. The fit of the valves is easily compared in this way and a standard of efficiency is thus determined and easily maintained, the valves being brought to a uniform fit throughout the different cylinders by thus comparing, testing and re-grinding.

It will be further understood that with a cover plate, as described, and clamping means thus arranged, the fit of the valves in such a valve-in-the-head motor may be instantaneously tested with the cylinder head on the bench without the necessity for clamping it in a vice or otherwise moving it from the working position in which the valves are ground, the cover plate and clamp being conveniently and almost instantaneously moved from the counter-sink corresponding to one cylinder, to the counter-sink corresponding to the next cylinder, etc.

I have thus described specifically and in detail an apparatus embodying the features of my invention in the preferred form in order that the nature and operation of the same may be clearly understood, however,

the specific terms herein are used descriptively rather than in a limiting sense, the scope of the invention being defined in the claims.

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

1. A valve contact testing appliance for use in testing the valves of valve-in-the-head motors having a depression in the head surrounding the valve seats, the said appliance consisting of a cover plate for said counter-sink, means for supplying fluid under pressure to the cavity enclosed thereby, and means for holding the cover plate in fluid tight contact with the portions of the head surrounding the counter-sink, converting the counter-sink into an enclosed fluid tight chamber.

2. A valve contact testing appliance for use in testing the valves of valve-in-the-head motors having a counter-sink surrounding the valve seats, the same comprising a cover plate for said counter-sink, said cover plate having attached thereto, forming an integral valve testing unit, means for supplying fluid under pressure, a pressure gauge reading from the upper side of the plate and connected to the lower side by a suitable passage, the plate having a packing member on its lower side encircling the plate and adapted to bear against the cylinder head casting around the counter-sink, and clamping means for holding the cover plate in contact with the head having an offset hook for engaging the cylinder head, a fulcrum point resting on the cylinder head below said hook, an arm extending across the top of the cylinder head, a bearing member engaging a central point of the cover plate and means engaging said arm to apply pressure to said bearing member.

3. A valve contact testing appliance for use in testing the valves of valve-in-the-head motors, particularly the type having a counter-sink corresponding to each cylinder, said appliance comprising a cover plate of a diameter exceeding the diameter of the counter-sink and adapted to engage the surface of the cylinder head surrounding the depression whereby the plate forms, with the cylinder head, a closed chamber, means for creating fluid pressure in said chamber, means for determining the pressure in said chamber and clamping means for holding the plate in position comprising a hook and a fulcrum bearing member engaging the cylinder head at the side and below the hook, an arm above the hook extending across the cylinder head, means carried by the arm and engaging a central point on the cover plate comprising a screw for applying pressure to said cover plate.

4. A valve contact testing appliance for valve-in-the-head motors comprising a cover plate with means for supplying fluid under pressure and leading it thereto and means for holding the plate, comprising an arm having a hook, and bearing means engaging a central point on the cap.

5. A valve testing appliance for use in testing the valves of valve-in-the-head motors having a removable head with a counter-sink surrounding the valve seats and a spark plug depression in the side, the said appliance comprising a cover plate for said counter sink, means for supplying fluid under pressure to the cavity enclosed thereby and means for holding the cover plate in fluid tight contact with the portion of the head surrounding the counter sink, converting the counter sink into an enclosed fluid tight chamber, said means comprising a clamp having a hook engaging the top wall of the spark plug depression, an arm extending over the plate and means supported by said arm and engaging a central point on the plate for applying pressure to the plate.

6. A valve testing appliance for use in testing the valves of valve-in-the-head motors having a removable head with a counter sink surrounding the valve seats and a spark plug depression in the side, the said appliance comprising a cover plate for said counter sink, means for supplying fluid under pressure to the cavity enclosed thereby and means for holding the cover plate in fluid tight contact with the portion of the head surrounding the counter sink, converting the counter sink into an enclosed fluid tight chamber, said means comprising a clamp having a hook engaging the wall of the spark plug depression, an arm extending over the plate and means supported by said arm and engaging the outside of the plate applying pressure to the plate holding it in uniform contact with the surface of the head surrounding the counter sink.

7. A valve contact testing appliance for use in testing the valves of valve-in-the-head motors, particularly of the type having a counter-sink or depression surrounding the valve seats, the same comprising a cover plate for said counter-sink, said cover plate having attached thereto, forming an integral valve testing unit, a pressure gauge reading from the upper side of the plate and connected to the lower side by a suitable passage and a pressure pump mounted on the upper side of the plate and connected to the lower side by a suitable delivery passage, a packing member on its lower side encircling the plate and adapted to bear against the cylinder head casting around the counter-sink, means for centering the plate with the counter-sink and means for holding the cover plate in fluid tight contact with the portions of the head surrounding the counter-sink, converting the counter-sink into a fluid tight chamber.

8. A valve contact testing appliance for

use in testing the valves of valve-in-the-head motors having a depression in the head surrounding the valve seats, the said appliance consisting of a cover plate for said counter-sink, means for supplying fluid under pressure to the cavity enclosed thereby, means for holding the cover plate in fluid tight contact with the portions of the head surrounding the counter-sink, converting the counter-sink into an enclosed fluid tight chamber, and means for indicating the pressure in the chamber.

Signed by me at Towson, Maryland, this 22nd day of March, 1927.

JARED BARTON FLEMING.