

April 7, 1942.

A. R. ORR

2,278,710

GAUGE FOR DETERMINING VALVE CLEARANCE

Filed Dec. 3, 1940

2 Sheets-Sheet 1

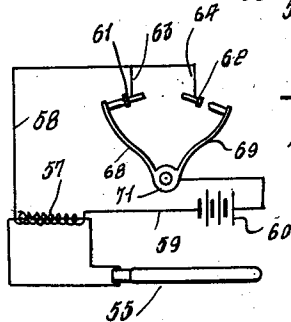
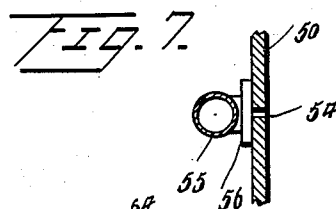
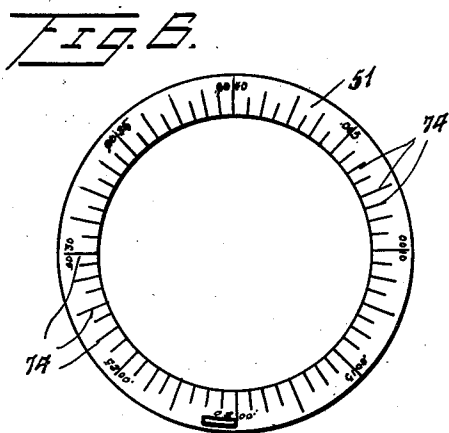
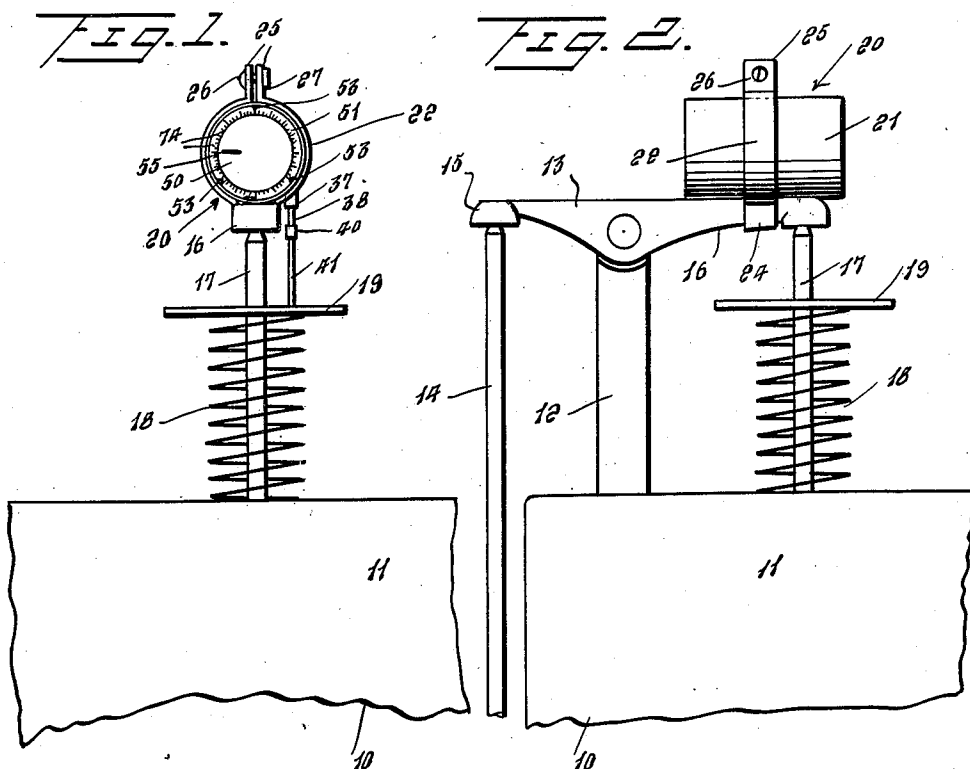


Fig. 8.

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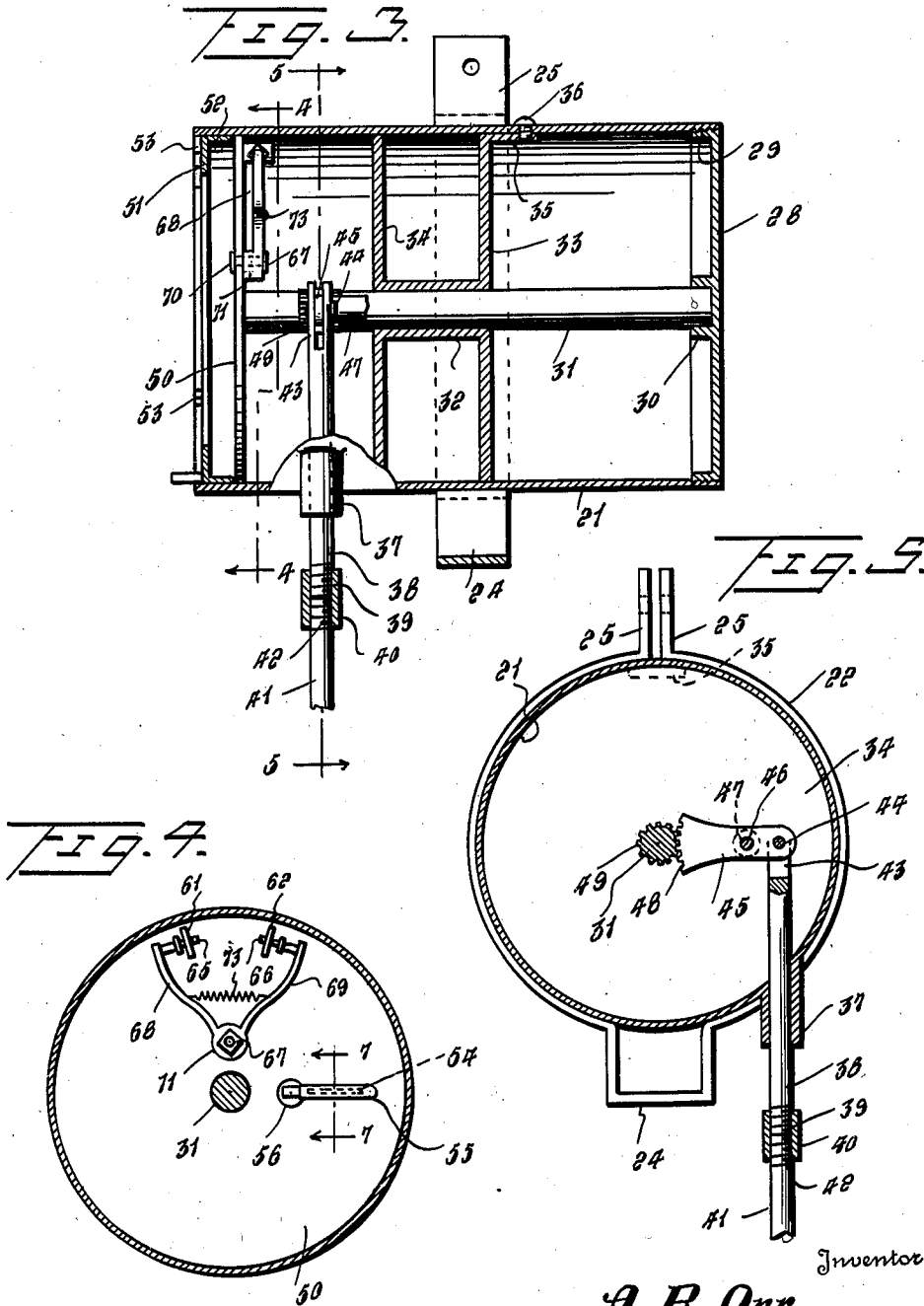
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,278,710

GAUGE FOR DETERMINING VALVE
CLEARANCE

Alfred Richard Orr, Cripple Creek, Colo.

Application December 3, 1940, Serial No. 368,387

5 Claims. (Cl. 33—181)

The present invention relates to a gauge for determining valve clearance.

The primary object of the invention is to provide a gauge which may be readily attached to the operative parts of an internal combustion engine valve gearing whereby the exact clearance of the valve gearing may be accurately determined.

A further object of the invention is to provide a device of the above-mentioned character which will produce a visible signal or indication in a unique manner whereby clearance distances may be more readily observed.

A still further object of the invention is to provide a valve clearance gauge for use in connection with internal combustion valve gearing capable of being easily attached to the valve gearing and removed so that accurate clearance distances may be determined in a shorter period of time.

Other objects and advantages of the invention will become apparent during the following description of the accompanying drawings, wherein,

Figure 1 is a detailed end elevational view illustrating the device embodying the invention, applied to the rocker arm of an over-head type valve gearing;

Figure 2 is a detailed side elevational view illustrating the manner in which the gauge is attached to the rocker arm of an over-head type valve gearing;

Figure 3 is a detailed cross-sectional view illustrating the gauge greatly enlarged to disclose the operative parts thereof;

Figure 4 is a vertical cross-sectional view taken on line 4—4 of Figure 3, looking in the direction of the arrows, illustrating a circuit maker and breaker for controlling a neon light or other visible indicator;

Figure 5 is a vertical cross-sectional view taken on line 5—5 of Figure 3, looking in the direction of the arrows, illustrating the drive connection between the single offset contact and the indicating disk;

Figure 6 is a detail plan view of the graduated ring employed in the gauge;

Figure 7 is a vertical cross-sectional view taken on line 7—7 of Figure 4, looking in the direction of the arrows, illustrating in detail the location of the neon light; and

Figure 8 is a diagrammatic view showing the wiring between the circuit maker and breaker and neon light.

In the drawings, wherein for the purpose of illustrating the invention and wherein like refer-

ence characters will be employed to designate like parts throughout the same, the reference character 10 will generally be employed to designate an internal combustion engine having a removable head 11 which carries a rocker arm support 12 on the upper end of which is pivoted a rocker arm 13. A push rod 14 engages one end of the rocker arm as at 15 while the other end 16 of the rocker arm is adapted to engage a valve stem 17 projecting upwardly through the head 11. A coil spring 18 surrounds the valve stem 17 and has one end abutting the upper wall of the removable head 11, while the opposite end is in abutting relation with a washer 19 rigidly secured to the valve stem.

The above structure is shown for purpose of illustrating the invention and is known in the art of internal combustion engines as an over-head type valve gearing.

The invention comprises a gauge generally designated by the reference character 20 which includes a cylindrical casing 21 adapted to be clamped to the end 16 of the rocker arm 13 by means of an encircling band 22 having an offset portion 24 for surrounding the rocker arm. The offset free ends 25 of the band 22 are locked together by means of a bolt 26 extending there-through and being held in place by a nut 27 threaded on the end thereof.

One end of the cylindrical casing 21 is closed by an end wall 28 threaded in place as at 29 and centrally disposed on the inside of the end wall 28 is a boss 30 which forms an end thrust bearing for a rotary shaft 31, the opposite end of which is supported by means of a spool-shaped bearing member having a hub 32 through which the rotary shaft 31 extends. The hub is provided with end disks 33 and 34 which are adapted to engage the inner face of the cylindrical casing 21 and the disk 33 is provided adjacent its periphery with a lug 35 which is anchored in place by a machine screw 36 extending through the casing and anchored in the lug.

Projecting tangentially from the cylindrical casing 21 is a tubular boss 37 adapted to form a bearing for a slide rod 38, the lower end of which is threaded as at 39 for receiving a threaded coupling thimble 40 so that a single contact member 41 may be secured thereto by having its threaded end 42 received therein. The lower end of the contact rod 41 is adapted to engage the valve gearing washer 19 and it will be seen that as the contact rod 41 is carried by the rocker arm 13, the rod will be reciprocated during the intermittent motion of the valve gearing accord-

ing to the clearance existing between the end 16 of the rocker arm and the end of the valve stem 17.

The upper end of the slide rod 33 is bifurcated as at 43 and is attached as at 44 to one end of an oscillating lever 45 pivoted as at 46 to a stub shaft 47 rigidly secured to the disk 34 of the spool-like bearing. The other end of the oscillating lever 45 carries segmental gear teeth 48 which are adapted to engage gear teeth 49 formed on the rotary shaft 31 so that reciprocation of the slide rod 33 and contact rod 41 will cause the rotary shaft 31 to rotate in alternate directions.

Rigidly secured to the free end of the rotary shaft 31 is a disk 50, the periphery of which extends nearly to the inner surface of the casing 21, and the disk 50 is presented adjacent the open end of the casing so that it may be visible therethrough.

Rotatably mounted in the open end of the cylindrical casing 21 is a graduated ring 51 having a flange 52 which engages the inner surface of the cylindrical casing and abutments 53 are formed on the end of the casing for holding the rotatable graduated ring 51 in position.

Formed in the disk 50 is an attenuated slot 54 in back of which is located a neon-type light 55 which is supported by a suitable base 56. The neon light 55 is of the same length as the slot so that said slot will be illuminated intermittently at the end of the rotary movement of the disk 50 in alternate directions.

As shown in Fig. 8, the neon light 55 is in circuit with a series transformer 57 having a line terminal 58 and a line terminal 59, the latter being connected to a source of current 60 which is adapted to be alternately closed to produce intermittent flashes of light when the disk 50 reaches the ends of its oscillating motions.

To produce the intermittent closing of the circuit through the neon light 50 at the ends of its oscillatory travel, a switch is carried by the disk 50 and includes a pair of stationary contact members 61 and 62 connected by lead lines 63 and 64 to the line terminal 58. The stationary contact members are provided with respective adjusting screws 65 and 66 threaded in place whereby minute adjustments may be made to compensate for variations in desired closing of the circuit.

Rigidly secured to the disk 50, as at 67, is a pair of spring contact arms 68 and 69 which are adapted to normally be out of contact with their respective adjustment screws 65 and 66 and said spring arms are held in place by means of a bolt 70 extending through the disk 50 and the anchoring hub 71 carrying the spring arms.

A light coil spring 73 has its ends connected to the spring arms 68 and 69 to exert a slight inward pressure thereon into engagement with the contacts 61 and 62.

The graduated ring 51 may be marked off to provide graduations denoting thousandths of an inch so that as the disk 50 reaches the end of its oscillatory movement in one direction, the light tube 55 will be illuminated and then by moving the graduated dial 51 to registry with the zero marking thereon in alignment with the occurrence of the light, the exact clearance of the valve gearing may be determined by denoting the occurrence of the light in registry with the graduations 74 upon its second occurrence.

It is to be noted that as the disk 50 is rotated in opposite directions, the inertia thus produced

when the disk stops at the end of its travel in one direction for its return movement, will cause the contact arms 68 and 69 to alternately close thereby producing a complete circuit through the source of current 60 and gaseous tube element 55. When the rotary disk 50 is rotating clockwise, the inertia will cause the spring contact arm 68 to engage the adjustable contact screw 65 when the disk reaches the end of such rotary movement. Similarly, upon the return movement of the rotary disk 50 in a counterclockwise direction, the spring contact arm 69 will be closed by the inertia force when the disk reaches the end of such rotary movement so that the gaseous neon light 55 will again be illuminated. The wiring arrangement and the source of energy for the illumination of the neon light 55 is shown in Fig. 8 and in said figure the rotary disk 50 has been rotated to its limit of movement in a clockwise direction which by inertia has brought the contact arm 68 into engagement with the contact 61, the current then flowing from one terminal of the battery 60 over the wire 59 and through the series transformer 57, wire 58 and wire 63 to the contact 61 and contact arm 68 and over the wire from said contact arm 68 to the other terminal of the battery 60. The neon light 55 is shown in circuit with the series transformer 57 and is illuminated. When the disk 50 reaches its limit of rotary movement in a counterclockwise direction, the contact arm 69 moves into engagement with the contact 62, the circuit then flowing over the lines described for the illumination of the neon light 55. It will be understood that between the extreme limits of oscillatory movements of the disk 50, both contact arms 68 and 69 remain spaced from the contacts 61 and 62 with the battery 60 out of communication with the neon light 55.

It will be readily observed, that the current from the source 60 being placed in circuit with the neon light 55 at the end of the rotary movement of the disk 50 in alternate directions will produce the occurrence of the light in two different positions, which occurrences when aligned in registry with the graduations 74 on the rotary dial 51 may be employed for determining the clearance between the valve gearing, including the rocker arm 13 and the upper free end of the valve stem 17.

It is to be noted that the resiliency of the movable contact arms 68 and 69 is such as to allow the contacts to open after they have closed at the end of the alternate rotary movements imparted to the disk 50. In this manner, the light is not illuminated between the limits of the alternate rotary movements of the disk.

It is also to be noted that the form of the invention herewith shown and described is to be taken as a preferred embodiment of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the sub-joined claims.

I claim:

1. A valve gauge comprising a casing adapted to be positioned on the valve gearing of an engine, an offset contact carried by the casing, an oscillatable disk within the casing, operative connections between the disk and offset contact for effecting oscillations of said disk and means rendered visible at the limits of oscillatory movements of the disk for determining the extent of movements of the disk.

2. A valve gauge comprising a casing adapted to be positioned on the rocker arm of valve gearing, a movable contact member carried by the casing for engaging a portion of the valve stem of the gearing and movable means operatively engaged with the contact member and rendered visible only at the limits of movements of said means for indicating the clearance between the rocker arm and valve stem.

3. A valve gauge comprising a casing, an offset contact member carried by the casing, a rotary disk mounted within the casing, operative connections between said contact member and disk for effecting oscillatory movements of the disk, illuminating means carried by the disk and means for operating the illuminating means at the end of the rotary movements in alternate directions of said disk.

4. A valve gauge comprising a casing, an offset contact member carried by the casing, a rotary disk mounted within the casing, a lever

operatively engaged at its opposite ends with the contact member and the rotary disk whereby reciprocations of the contact member will cause oscillations to be imparted to the disk and illuminating means carried by the disk operable when the rotary disk reaches the end of its oscillation.

5. A valve gauge comprising a casing, an offset contact member carried by the casing, a rotary disk mounted within the casing operatively engaged with the offset contact member and adapted to be operated thereby, illuminating means carried by the rotary disk for projecting a light beam through an attenuated slot formed therein, a circuit maker and breaker carried by the rotary disk adapted to close the circuit through the illuminating means when the rotary disk reaches the end of its travel in alternate directions and a dial for registry with the occurrence of the illuminating means.

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