Sept. 2, 1924. 1,507,555

H. D. GEYER

ENGINE INDICATOR

Filed March 21, 1921

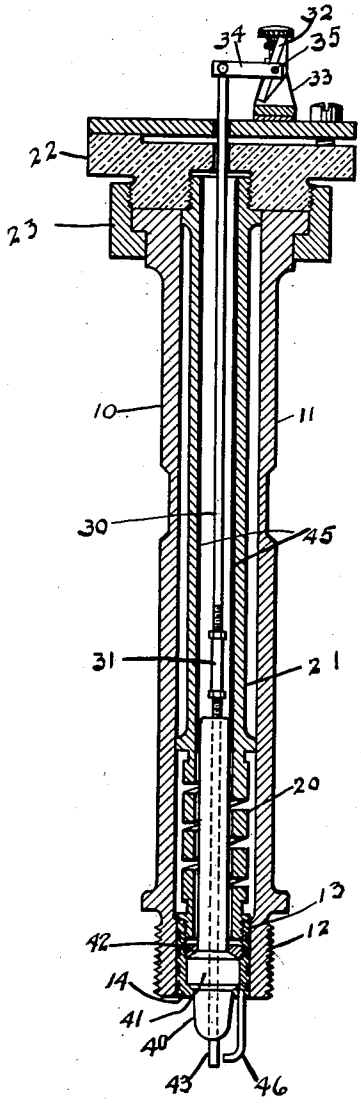


Fig. 2

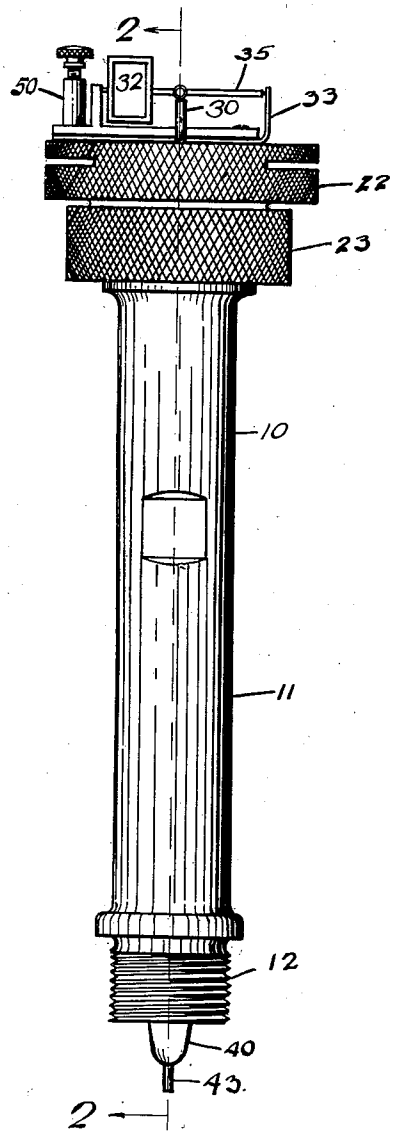


Fig. 1

Witnesses
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Patented Sept. 2, 1924. 1,507,555

UNITED STATES PATENT OFFICE.

HARVEY D. GEYER, OF DAYTON, OHIO, ASSIGNOR TO GENERAL MOTORS RESEARCH CORPORATION, OF DAYTON, OHIO, A CORPORATION OF DELAWARE.

ENGINE INDICATOR.

Application filed March 21, 1921. Serial No. 454,271.

To all whom it may concern:

Be it known that I, HARVEY D. GEYER, a citizen of the United States of America, residing at Dayton, county of Montgomery, and State of Ohio, have invented certain new and useful Improvements in Engine Indicators (Docket No. 58), of which the following is a full, clear, and exact description.

The present invention relates to optical engine indicators and in its preferred form of embodiment relates particularly to pressure elements for such instruments.

In prior application, Serial No. 370,427, filed April 1, 1920, by Thomas Midgley, jr., on "indicators", there has been described an optical indicator, more particularly for use on internal-combustion engines of the high speed type, and designed to enable obtaining pressure-time as well as pressure-volume indications. The indicator is provided with a pressure element carrying a mirror so arranged as to oscillate in accordance with the variation in pressure in the cylinder. From this mirror a beam of light is reflected to another mirror and thence to a surface upon which the movements of the path of the beam may be observed.

In operating the device forming the subject matter of this prior application, it is sometimes difficult to secure the pressure element to the cylinder of an internal-combustion engine, as in some instances the cylinders do not offer a convenient place for attachment.

It is among the objects of the present invention, therefore, to provide a pressure element which is adapted to be attached to a cylinder of an internal-combustion engine without specially preparing the cylinder and which permits the normal operation of the cylinder when attached.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is an external view in elevation of a preferred form of pressure element.

Fig. 2 is a view, partly in section and partly in elevation along the line 2—2 of Fig. 1, showing more particularly the sparking elements.

A very desirable manner of locating the pressure element is to secure it in the spark plug socket of the cylinder. In order to do this some means of producing a correct spark within the cylinder must be provided and it was for accomplishing this result that the pressure element embodying the present invention was produced.

The pressure element, designated as a whole by the number 10, comprises a casing 11 threaded at its bottom end 12 for screwing into the spark plug socket of an internal-combustion engine.

The casing 11 at its bottom portion forms a short cylinder 13 for a piston 14 which is carried by and operates against a spring member 20 forming part of an internal tube 21. This latter tube is secured to the top plate 22 of the pressure element, and this top plate, (which is of suitable insulating material, for example hard rubber), is secured to the casing 11 by means of a sleeve joint 23. Secured in the piston 14 is an extending rod 30 having means such as turnbuckle 31 for adjusting the length thereof. This rod extends up through the tube 21 and the top plate 22, operating a mirror 32, pivotally mounted in bracket 33, by means of an arm 34 secured to mirror shaft 35, which mirror and mounting are secured in suitable fashion to the insulating plate 22, and are provided with a suitable binding post 50.

The rod 30 is secured at its lower portion within an electrical insulating member 40 preferably in the form of a porcelain insulator commonly used in spark plugs. This insulator has an enlarged portion 41 for securing it within the piston 14, and the latter is provided with a tightening screw 42 for firmly holding the insulator in place. The rod 30 extends from the lower end of the insulator 40 forming at 43 the inner electrode of a spark plug. It is also desirable to have an insulating tube within the tube 21 to insulate the latter from rod 30. Such an insulating tube is indicated in section by the heavy lines 45.

Also secured to the piston is the outer electrode 46 which, although insulated from the central electrode by the insulator 40, is in electrical contact with the piston itself.

By the present device a suitable electrical circuit is provided for the engine through the pressure element in that one side of the

high tension line may be connected to the binding post 50 and the flow will then be through the mirror mounting, rod 30, and across the spark gap to the electrode 46 which latter is grounded to the engine.

Although the ignition for the cylinder could be readily accomplished by having the outer electrode secured to the casing 11, it is preferred to have the electrode secured to the piston 14 because a constant spark gap will be maintained owing to the fact that both electrodes will move up and down corresponding to the movements of the piston due to the pressures within the cylinder.

And, although the invention has been described relative to the adaptation of the ordinary elements of the spark plug to a a pressure element for an optical engine indicator it is obvious that deviations from this method of creating the igniting spark might be utilized in conjunction with the pressure element without departing from the spirit of the invention.

Further, while the form of mechanism herein shown and described, constitutes a preferred form of embodiment of the present invention, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

I claim:

1. In a pressure element for optical engine indicators which is adapted to be attached to the cylinder walls, the combination of means permitting the ignition of the fuel in the cylinder with means responsive to pressure directly therewithin, and including a pressure receiving surface located so as to be substantially flush with interior of the cylinder when such element is attached to the cylinder.

2. In an optical engine indicator, a pressure element adapted to be attached to the engine cylinder, pressure responsive means within said element adjacent the point of attachment; sparking electrodes adapted to extend into the cylinder; and means for connecting a source of current to said electrodes.

3. In an optical engine indicator, a pressure element having means responsive to the pressures directly within the cylinder and adapted to be attached to and extend into the cylinder in combination with spark plug electrodes secured to the pressure responsive means of said element and adapted for connection to a source of electric current.

4. In an optical engine indicator, a pressure element having a piston adapted to be actuated by the pressures within the engine cylinder in combination with spark plug electrodes attached to the piston, electrically insulated from each other, and adapted for connection to a source of electric current.

5. In an optical engine indicator, a pressure element adapted at its bottom end to be screwed into the spark plug socket of an engine cylinder, the pressure element having a piston adapted to be actuated by the pressures within the cylinder and to make electrical contact therewith; a mirror pivotally mounted on the top of the element; a spark plug outer electrode rigidly fixed to the piston; a spark plug inner electrode carried by the piston and adapted to communicate the movement of the piston to the mirror; an electrical connecting member secured to the mirror mounting; and an electric insulator for the inner electrode.

6. A pressure element for engine indicators consisting of a tubular casing adapted to extend into and be secured to an engine cylinder; a piston slidably mounted in and closing the cylinder end of the casing; spark plug electrodes carried by the piston; electrical connections for the electrodes; and means cooperating with the piston for indicating the movement thereof.

7. A pressure element for engine indicators comprising a spark plug whose outer shell is shaped to form a piston; a cylindrical element in which said piston is adapted to move; electrical connections for the plug; means for securing the pressure element to an engine cylinder; and means for indicating the movement of said piston.

In testimony whereof I hereto affix my signature.

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Witnesses:
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