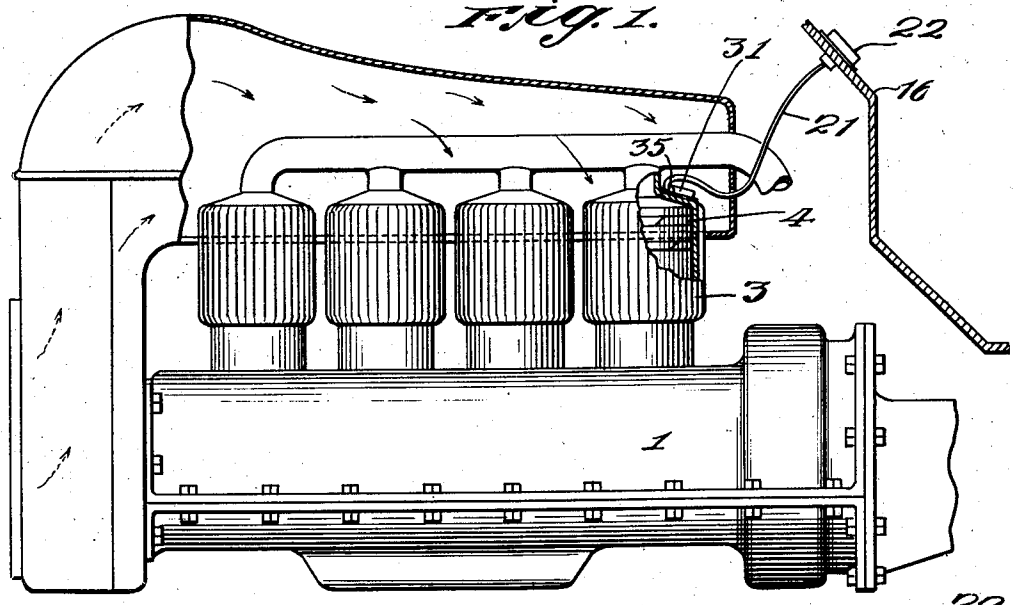
April 24, 1928. 1,667,027

H. H. BOYCE

TEMPERATURE INDICATING APPARATUS FOR VEHICLE PROPELLING MOTORS

Filed July 29, 1925

Fig. 1.



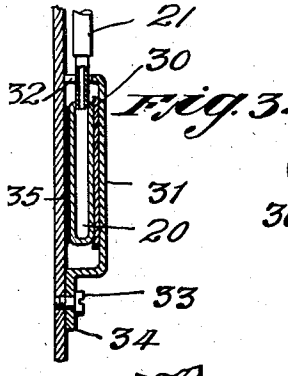


Fig. 3.

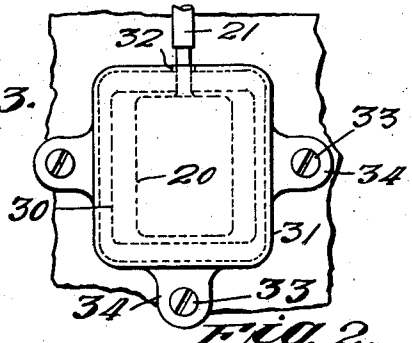


Fig. 2.

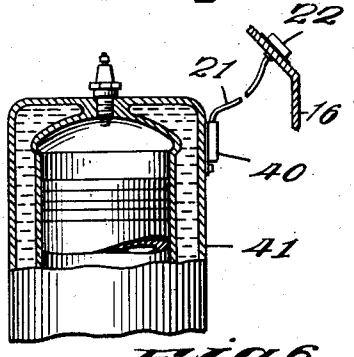


Fig. 6.

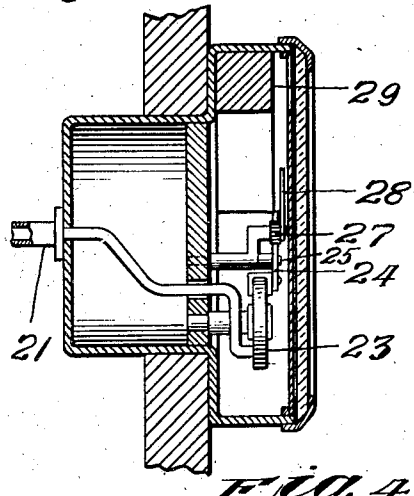


Fig. 4.

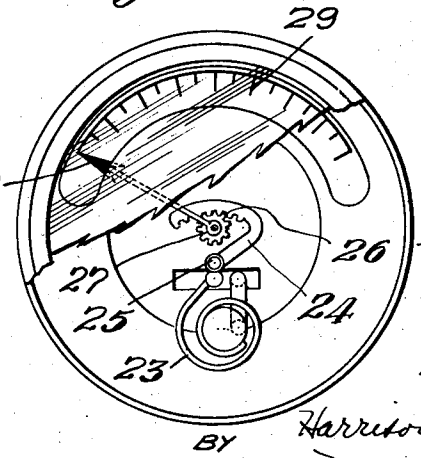


Fig. 5.

INVENTOR

Harrison H. Boyce

BY Moses & Holt

ATTORNEYS

Patented Apr. 24, 1928. 1,667,027

UNITED STATES PATENT OFFICE.

HARRISON H. BOYCE, OF JERICHO, NEW YORK.

TEMPERATURE-INDICATING APPARATUS FOR VEHICLE-PROPELLING MOTORS.

Application filed July 29, 1925. Serial No. 46,731.

In my Patent No. 1,206,783, dated November 28th, 1916, I have disclosed an invention in means for indicating the thermal condition of internal combustion engines of automobiles, aeroplanes and the like, by which it is possible to secure at all times an indication of the thermal condition of the engine, said indication being rendered readable at the desired location as by means of an indicating instrument located on the vehicle dash board, which is connected by suitable operative means with a temperature responsive element thermally associated with the engine or cooling system.

In the construction illustrated in said patent, the instrumentality employed comprises a temperature responsive element which is shown as immersed in the cooling liquid in the return pipe of the engine, this temperature responsive element being connected by a flexible tube to an indicating strument mounted on the vehicle dash. The present invention relates to a system of the general character set forth in said patent and comprises particularly an improved or alternative mode of applying the temperature responsive element to the engine.

The specific construction illustrated in my patent embodying the immersion of the bulb or temperature responsive element in the cooling liquid, while very effective in securing the thermal responsiveness of the instrument, is open to certain objections from a mechanical standpoint in that it requires the making of an aperture in some part of the wall of the cooling system to admit the bulb and it also requires the construction and maintenance of a fluid tight joint so as to prevent leakage. While a satisfactory construction of this character is perfectly feasible with the exercise of proper care there nevertheless exists the danger that when an attachment of the bulb is attempted by unskilled hands or in a careless manner, trouble may result. There also exists the possibility, owing to the vibration of the engine, of the bulb or tube becoming detached during use. In accordance with the present invention, these difficulties are overcome as necessity for tapping the circulating system is entirely done away with and the thermal connection of the temperature responsive element obtained in an exceedingly simple and inexpensive manner.

I achieve these objects by making use of a characteristic which I have observed, that the temperature of an outer surface of a motor wall, as for example the cooling jacket of an air cooled motor or the cylinder wall of a motor of the air cooled type, may for practical purposes be taken as a sufficiently accurate measure of the temperature of the engine cylinder.

In the present application I propose to describe and claim the invention with particular reference to air cooled motors. In addition, however, it is my intention to cover herein other features of my invention which are applicable to a water cooled as well as an air cooled type of motor.

In the accompanying drawings, in which I have illustrated certain preferred embodiments of my invention:

Figure 1 is a side elevation, diagrammatic in character, of an engine of the air cooled type, hood and a portion of the dash of an automobile.

Figure 2 is a detailed view in side elevation of the means for securing the temperature responsive element to the cylinder jacket.

Figure 3 is an enlarged vertical sectional view through a portion of the engine cylinder and a temperature responsive element attached thereto.

Figure 4 is a vertical sectional view of a form of indicating instrument which may be employed in carrying out my invention.

Figure 5 is a face view of the instrument, parts being broken away to show the interior construction.

Figure 6 is a diagrammatic view illustrating the application of one feature of the invention to a water cooled motor.

Referring to the drawings in detail, and particularly to Figures 1 to 5, the numeral 1 designates an automobile engine provided with cylinders 2 containing the customary pistons 2^a. As shown, the side walls of the cylinders are surrounded by cooling fins 3. As the ignition and combustion or explosion of the charge takes place primarily in the upper ends of the cylinders when the pistons are at or near the upper limits of their strokes, it will be seen that these portions of the cylinders constitute combustion chambers (designated by the numeral 4) where the greatest temperature is reached.

The engine described is shown connected with the usual instrument board 16 which forms a part of the vehicle body and which is as customary located immediately in front

of the driver's seat so that instruments placed thereon may be readily observed by the driver when operating the car.

In accordance with the present invention, I have provided means for indicating the thermal condition of the engine comprising an indicating device or instrument proper located in a position convenient for observation and connected in an operative manner with temperature responsive or sensitive element applied in suitable thermal relation to the engine, preferably to the outside of an engine cylinder, when the element is applied to a finned cylinder it is preferably applied to a portion of the exterior surfaces unprovided with cooling fins 3. As illustrated, an indicating instrument 22 is mounted on the dash or instrument board 16 and is connected by means of a flexible tube 21 to bulb 20 preferably of metal attached to the cylinder, and preferably containing an expansible fluid, either gas or liquid. The bulb and its contents thus constitute the temperature responsive part of the apparatus. The specific construction of the indicating instrument proper is no part of the present invention and this instrument may be of any suitable character. As illustrated, it comprises a Bourdon tube 23 which is in communication with the tube 21, the free end of the Bourdon tube being connected with a lever 24, pivoted at 25 and carrying on its outer end a toothed segment 26 which meshes with a pinion 27 carrying an indicating hand 28 which is adapted to move over a scale 29. Changes in pressure or volume due to the expansion and contraction of the fluid in the bulb 20 will cause corresponding movements of the indicating hand in a well understood manner.

As will be understood, the arrangement herein disclosed aims to dispose the temperature responsive element or elements so as to secure the desired influencing thereof, in accordance with the thermal condition of the engine without having to tap the cylinders or when applied to the water cooled engine, without having to tap the cooling system. Therefore, I apply a bulb or other temperature responsive element or casing containing the same in intimate thermal contact with a heated part of the engine, for instance to the wall of a cylinder unprovided with cooling fins, or to a part of the cooling system containing heated cooling fluid. I also preferably shape the bulb or other temperature responsive element so as to secure a large surface of contact, and insulate the outer side of the hulb so as to retain heat, as illustrated. Bulb 20 is shown flattened out and applied to the top portion of the cylinder, it being enclosed on the outer side by a layer 30 of asbestos or other heat insulator, the bulb and asbestos layer being clamped in position by a metal casing 31, notched at 32 to permit passage of the tube 21 and attached to the cylinder jacket in any suitable manner, as by means of three screws 33, engaging ears 34 formed in the casing, the casing and ears being preferably formed of an integral sheet metal stamping, although other construction may be employed. Preferably, and as shown, the insulating layer 30 extends over an area substantially larger than that of the bulb or other temperature responsive instrument whereby radiation from the area of the cylinder wall surface in contact with the bulb is minimized and a more accurate measure of the cylinder temperature obtained. In order to improve the thermal contact between the flattened bulb and the jacket wall, the bulb is preferably united to the wall by a metallic film 35 formed by soldering, brazing, welding or by other means. While other heat conducting films may be employed, I prefer those of metal.

Figure 6 illustrates my invention in connection with a motor of the water cooled type. As shown, a temperature responsive element and covering therefor, designated generally by 40, is attached to the cylinder jacket 41, the construction of the instrument 40 and its manner of attachment to the jacket 41 being in all respects similar to what has been disclosed in connection with Figures 1 to 3, inclusive.

From the foregoing it will be seen that I have provided a means for indicating the thermal condition of the engine which does not necessitate the modification of or the interference with any part of the engine or its auxiliaries. It will be further seen that I have provided an effective and efficient means for indicating the thermal condition of an air cooled engine and an improved means for insuring intimate thermal contact between the temperature responsive element and the engine cylinder or jacket in the form preferably of a metal film, this latter feature being applicable to both air and water cooled types of motors.

While I have described my invention with reference to the temperature responsive instrument of a fluid filled type, it will be understood that other types, as for example, those employing an electric current, may be used.

This application is a continuation in part of my copending application, Serial No. 159,907, filed April 5, 1917.

What I claim is:

1. In temperature indicating means for air-cooled internal combustion motors or motor vehicles, the combination of a flattened fluid filled bulb, means for securing said bulb with a flattened side in intimate thermal conductive contact with a portion of the outer surface of a cylinder wall of the motor, said means comprising a metallic casing extending over the bulb and secured to the motor wall, and

a layer of non-conducting material between said casing and the bulb, an indicating instrument located in a position to be observed by the driver when operating the vehicle, and a means connecting said instrument for operating from bulb.

2. In temperature indicating means for air cooled internal combustion motors of motor vehicles, the combination of a temperature responsive element having an extended surface substantially conforming to and secured in thermal contact on the outer surface of a cylinder wall defining a combustion space of the motor, a casing containing said element and securing same to said wall, non-conducting material between said casing and the bulb, said material and said casing being extended over a substantially greater area of said wall than the area covered by said instrument, and indicating means operated by said element.

In testimony whereof I have affixed my signature to this specification.

HARRISON H. BOYCE.