April 9, 1940. A. B. NASH 2,196,936

MOTORSCOPE

Filed April 14, 1938

Fig. 1.

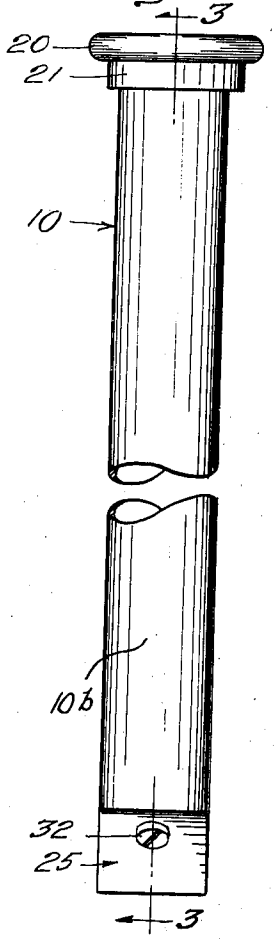


Fig. 3.

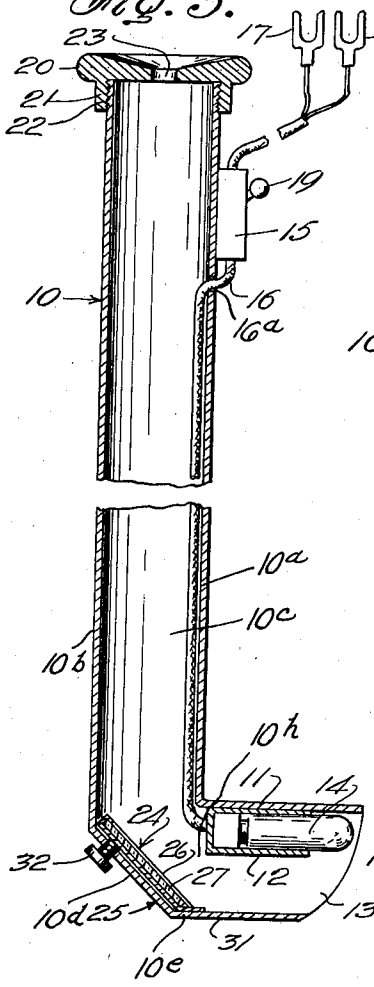


Fig. 2.

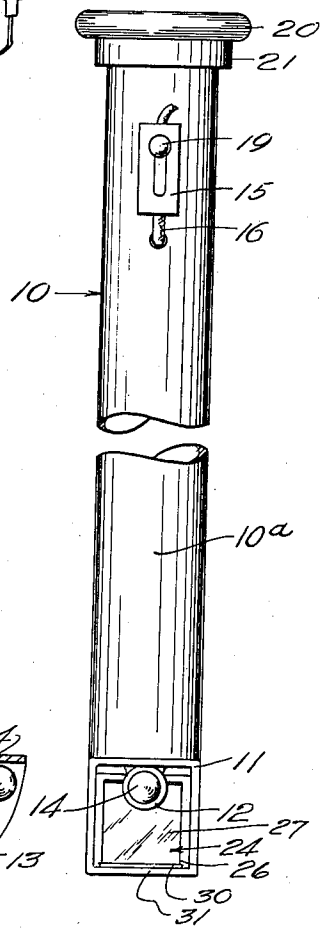


Fig. 4.

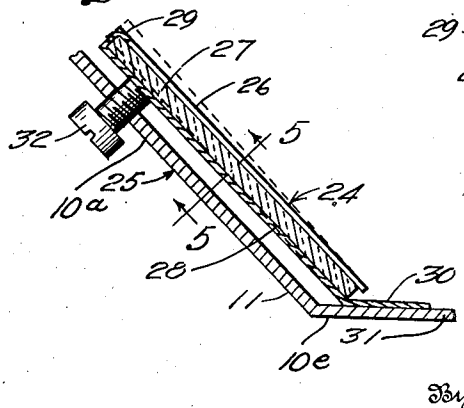
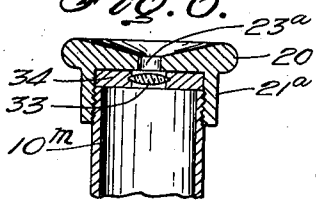


Fig. 5.

Fig. 6.



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Patented Apr. 9, 1940 2,196,936

UNITED STATES PATENT OFFICE

2,196,936

MOTORSCOPE

Austin B. Nash, Oklahoma City, Okla.

Application April 14, 1938, Serial No. 202,090

1 Claim. (Cl. 88—71)

This invention relates to a device for use in inspecting the interior of an internal combustion engine.

An object of this invention is to provide a device which is termed a "Motorscope" and which is constructed in the form of a tubular member provided with means at one end thereof for projecting through an opening such as a spark plug opening in an engine so that the interior of the engine can be inspected without removing the head of the engine.

Another object of this invention is to provide a device of this kind which includes an adjustable light reflecting means so that the light rays and lighted interior of the engine can be readily viewed from the eye-piece carried by the outer end of the device.

Another object of this invention is to provide in a device of this kind, means whereby if desired the interior of the engine may be magnified at the eye-piece end of the device so that a very close inspection may be had of the interior of the engine.

A still further object of this invention is to provide a device of this kind which can be quickly connected to the electric current supply present in the vehicle, the device including a light bulb and a switch which may be operated to light up the interior of the engine.

To the above objects and others which may hereinafter appear, the invention consists of the novel construction, combination and arrangement of parts as will be more specifically referred to and as illustrated in the accompanying drawing wherein embodiments of the invention are shown, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawing:

Figure 1 is a detail rear elevation, partly broken away, of a device constructed according to an embodiment of this invention,

Figure 2 is a fragmentary front elevation of the device,

Figure 3 is a longitudinal section taken on the line 3—3 of Figure 1,

Figure 4 is an enlarged fragmentary longitudinal section of the reflector at the lower end of the device,

Figure 5 is a sectional view taken on the line 5—5 of Figure 4, and

Figure 6 is a fragmentary longitudinal section of a modified form of this device.

Referring to the drawing, the numeral 10 designates generally a tubular member formed of what may be termed a front part 10a, a rear part 10b, and a pair of side parts 10c. The front part 10b is of less length than and has its inner or lower end spaced from the inner ends of the said other parts. The lower or inner end terminal portions of the parts 10c are of reduced thickness and set up so as to form the rear side of such portions of obtuse angled contour. The lower or inner end terminal portion of the part 10b has the major part 10a thereof flat, disposed at an obtuse angle and merging at its lower end into a horizontal part 10c. The lower end terminal portion of part 10b merges into the rear sides and also into the lower ends of the lower or inner terminal portions of the parts 10c. The remaining portion of the part 10b merges into the parts 10c. The part 10a merges throughout the length thereof into the parts 10c. The inner or lower end of part 10a is spaced from the inner or lower end terminal portions of the parts 10c. The member 10 is open at its upper end, and it is formed with an opening 10b at the lower end of its front and such opening 10b is disposed at right angles to the said open upper end. Formed integral with the inner or lower end of part 10a and the lower or inner end terminal portions of the parts 10c, as well as the portion 10c is the inner end of a hollow extension 11 of rectangular contour in vertical cross section. The extension 11 is disposed at right angles to the member 10 and has secured to and lengthwise of the inner face of its top wall 11a a socket 12. The extension 11 at its inner ends opens into the member 10, and is formed with an outer open end indicated at 13. Mounted in the socket 12 is an electric light bulb 14. Secured to the outer face of the part 10b of member 10 is a switch 15 from which extends a two-wire conductor 16 passing through an opening 16a in part 10a of member 10, thence downwardly through the latter into extension 11 and then connected to the bulb 14. The switch 15 is adapted to be connected to a source of current supply by means of a pair of clips or connectors 17 and 18. In the present instance the light bulb 14 is a bulb of the 6-volt type, which is of the same power as the storage battery normally used in a motor vehicle so that one of the connectors or clips may be connected to the frame of the vehicle and the other connector or clip may be connected to the other or positive side of the electric circuit forming part of the motor vehicle. The switch 15 in the present instance is in the form of a toggle switch, although I do not wish to be limited to the par-

ticular type of switch shown as this switch 15 is of conventional construction and is adapted to be maintained in either open or closed position depending on the relative position of the operator 19 thereof.

The upper or outer end of the tubular member 10 is provided with a cap or eye-piece 20 having a cylindrical flange 21 which is threaded as at 22 unto the upper or outer end of the tubular member 10. The eye-piece 20 is provided with an axially disposed sight opening 23 so that an eye may be engaged with the eye-piece 20 and the interior of the tube 10 viewed from above.

The part 10a of the inner or lower terminal portion of the part 10b of the member 10 provides an angularly disposed wall 25 extending forwardly to a point in close proximity to the junction between member 10 and extension 11. The said wall 25 is disposed at an obtuse angle to the length of the tubular member 10 and the longitudinal axis of the extension 11. The part 10c of the lower or inner end terminal portion of the part 10b forms a support and also provides a closed lower or inner end for the member 10. Opposing the inner face of wall 25 and disposed at an obtuse angle is a reflector structure generally indicated at 24, which in the present instance, comprises a flanged frame member 26 encompassing a mirror 27. The frame 26 includes a back wall or plate 28 having a substantially U-shaped flange 29 engaging over the marginal edge portions of the mirror 27. The lower end of the frame 26 is provided with an obtusely disposed extension 30 which is adapted to be soldered or otherwise fixedly secured to the upper face of the part 10c of the lower terminal portion of the part 10b of member 10. The remaining portion of the frame 26 is preferably free and is of a substantially resilient construction which is normally biased in the direction of the angularly disposed wall 25. A screw 32 is threaded through the wall 23 and engages at its inner end against the frame 26 so that the angular position of the frame 26 and the reflector or mirror 27 may be finely adjusted in order that the parts of the engine disposed forwardly of the open end 13 of the extension 11 may be readily viewed through the eye-piece 20.

In Figure 6 there is disclosed a slightly modified form of this invention wherein the tubular member 10m is provided with an eye-piece 20a on the upper end thereof which has a relatively long cylindrical flange 21a threaded onto the upper end of the tubular member 10m. This eye-piece 20a has an axially disposed sight opening 23a, and a magnifying glass 33 is mounted in a plate 34 which is interposed between the eye-piece 20a and the upper end of the tubular member 10m.

In the use of this device a spark plug or other member connected to an internal combustion engine may be removed so that access may be had to the interior of the engine. The extension 11 is then projected through the opening in the engine and the connectors 17 and 18 are connected to the electric circuit in the vehicle. The switch 15 may have the operator 19 moved to a switch-closing position, thereby lighting up the bulb 14. The light rays from the bulb 14 will be projected interiorly of the engine and the inside of the engine may then be viewed through the eye-piece 20. The reflector member 24 may be accurately adjusted through the medium of the adjusting bolt 32, the flange or extension 30 carried by the frame 26 of the reflector member permitting the accurate adjustment of this reflector member.

It will be apparent from the foregoing that a relatively simple device has been provided by means of which the interior of the vehicle may be inspected without removing some of the large or major parts of the vehicle and in this manner the operator of the device can quickly and easily determine whether it is necessary to remove the head of the engine or other major parts in order to work upon the interior of the engine.

What I claim is:

A device for inspecting the interior of an internal combustion engine or the like, comprising an elongated tubular member, a cap at one end of said member provided with a sight opening, an obtusely disposed flat wall at the other end of said member, a right angularly disposed extension carried by said member at the other end thereof, said extension being open at its free end and the marginal edge of said free end being inclined rearwardly from its upper to its lower edge, a mirror frame including a back wall confronting said obtuse wall and marginal flanges about three sides of said back wall, a mirror engaging between said flanges, an obtusely disposed resilient extension formed with said back wall and projecting into and fixed to the lower rear portion of said first extension, and normally urging the free upper end of said frame toward said back wall, an adjusting screw threaded through said obtuse wall and engaging said back wall of said mirror frame, a light socket within said first extension forwardly of said mirror and fixed to the upper portion of said first extension, a light bulb in said socket and projecting forwardly thereof, and a switch carried by said tubular member adjacent said cap and connected to said socket.

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