

[54] **OIL CONDITION INDICATOR**

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[58] Field of Search 356/70, 208, 244, 246

[56] **References Cited**

UNITED STATES PATENTS

3,744,907 7/1973 Whelan 356/70

FOREIGN PATENTS OR APPLICATIONS

500,892 2/1939 United Kingdom 356/70

Primary Examiner—Ronald L. Wibert

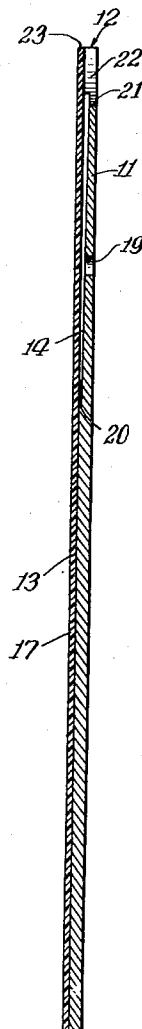
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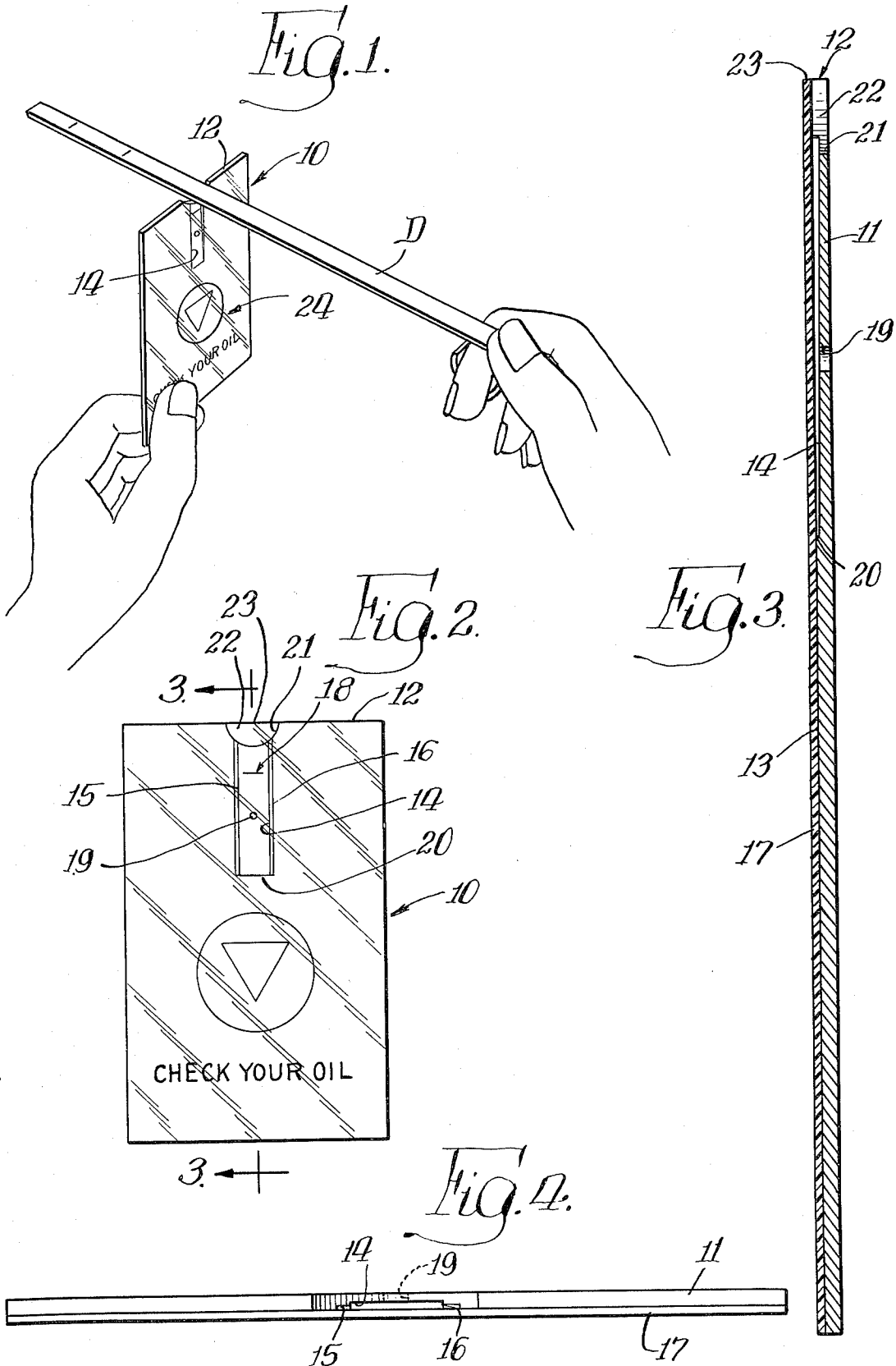
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[57] **ABSTRACT**

An oil condition indicator defined by a base element having a recess extending from an upper edge thereof with an indicium at the rear of the recess. A transparent cover overlies the recess for viewing of the indicium therethrough. The depth of the recess decreases downwardly from the upper edge of the base element and a vent is provided in the base opening rearwardly from a lower portion of the recess whereby engine lubricating oil deposited into the upper end of the recess flows downwardly therethrough permitting the user to determine the condition of the engine lubricating oil as a function of the opacity thereof. The base element defines channels at the side edges of the recess for providing improved downward flow of the lubricating oil in making the condition determination.

17 Claims, 4 Drawing Figures





OIL CONDITION INDICATOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to indicating means, and in particular to means for indicating the condition of engine lubricating oil.

2. Description of the Prior Art

A substantial number of different devices have been developed for indicating the condition of engine lubricating oil and the like. One improved form of such oil condition indicating means is that disclosed in copending application for U.S. letters patent Ser. No. 349,642, filed Apr. 9, 1973, of applicant and Albert L. Kimmel, and assigned to applicant which issued Aug. 13, 1974 as U.S. Pat. No. 3,829,217. In that application, a throw-away device for indicating the condition of engine lubricating oil includes a base member formed of low cost substantially nonfrangible sheet material, a light-transmitting substantially nonfrangible synthetic plastic flat cover member overlying the base member, one of the members defining a well opening toward the other member and having a progressively increasing depth for holding a corresponding progressively increasing-in-depth sample of the lubricating oil therein, the well further opening to one edge of the one member at a maximum depth portion thereof and terminating short of the opposite edge of the one member, and indicium means associated with one member viewable through the cover member and oil sample to an extent controlled by the opacity of the lubricating oil sample thereat thereby to indicate the condition of the oil as a function of the opacity, the base member having a substantial extent laterally of the well and being adapted to carry wording thereon for providing information to the user.

As further brought out in the above-identified copending application, another form of such oil condition indicating device is shown, in U.S. Pat. No. 2,133,544 of J. K. Kolb, to include a pair of separable transparent walls defining a holder for the oil sample. The walls are caused to have variable spacing so as to form a uniform thin light-transmitting film. Means are provided in the device for holding a clean sample of oil for comparison with the engine oil sample. Other U.S. patents showing the use of comparison means are John U.S. Pat. Nos. 1,854,143 and 1,925,254, and Garey U.S. Pat. No. 2,963,939. U.S. Pat. No. 2,622,471 to Sparks discloses an oil indicating means utilizing printed matter for indicating the quality of the oil.

A number of devices have been developed requiring the flow of the oil over an inclined plate. Illustrative of these devices are those disclosed in Turner et al. U.S. Pat. No. 2,486,080 and Thomas U.S. Pat. No. 2,068,476.

Another device for determining the quality of such oil is shown in the U.S. Pat. No. 209,924 to Rouaix wherein means are provided for determining the color change produced in oil by the adding of an acid. Another device for testing the oil condition is shown in U.S. Pat. No. 2,302,224 to Jones wherein absorption characteristics of the tester provide the means for determining the oil quality.

Devices using pistons and the like have been developed to provide such oil quality indication such as shown in U.S. Pat. No. 2,040,042 to Eckstein.

Further of interest pursuant to such condition-determining devices are the U.S. Pat. Nos. of: Milton A. Powers 2,062,929; Joseph A. Logan et al. 2,062,588; Clarence R. Scott et al 2,782,514; Steven B. Wilson 2,224,123; and Theodore W. Hallerberg 2,487,238.

Further of interest is the British Pat. No. 500,892 of Yacco S.A.F.

In another form of indicator used in determining engine oil quality, a piece of filter paper was provided onto which a drop of the oil sample was placed. The filter paper absorbed the fluid oil and the accumulated foreign matter was readily visible. Such indicating means did not indicate relatively small particles in the oil, such as those of colloidal size, including much of the carbonaceous particulate material. Because no completely effective means had been provided for providing a simple and economical indication of the condition of such engine lubricating oil, recourse has been had simply to utilization of the mileage or engine operating time as the indicator for the need of engine oil change. Such an indicating means has serious disadvantages because of wide variation in the parameters of the engine operation such as the engine condition, atmospheric conditions in which the engine is operated, driving habits of the operator, original quality of the oil, specific usage of the engine, such as for short run or long run operations, etc.

Other devices generally of the type disclosed above have been developed but none have been completely successful because of relatively high cost, difficulty of use, inaccuracy in reading, etc.

SUMMARY OF THE INVENTION

The present invention comprehends an improved device for indicating the condition of engine lubricating oil providing further improved functioning over that of the above-identified United States patent application. The present invention comprehends such an improved oil condition indicator which is extremely simple and economical of construction while yet providing such further improved functioning.

More specifically, the present invention comprehends providing in such an oil condition determining means improved means for facilitating the flow of lubricating oil into the oil receiving space of the indicator for facilitated improved determination of the opacity of the oil therein in connection with suitable indicium means on a base portion of the indicator. In the illustrated embodiment, the improved oil receiving means includes vent means for venting a lower portion of the oil receiving well, or recess, so as to permit free flow of the oil sample downwardly into the recess for rapid positive determination of the condition thereof.

The invention further comprehends providing means along at least one edge of the recess defining a capillary channel for further facilitating the downward movement of the oil for accurate determination of the opacity condition.

In the illustrated embodiment, the recess is defined by side edges, each of which is undercut to define the capillary channels.

The indicium in the illustrated embodiment comprises a horizontal line provided on the base element at a portion of the recess having a preselected depth such that when the opacity of the oil is sufficient to prevent

viewing of the indicium line, the need for replacement of the oil is indicated.

The vent opening is disposed below the indicium line and in the illustrated embodiment, is disposed above the lower end of the recess, and more specifically, approximately halfway between the indicium line and the lower end of the recess. The vent opening preferably is relatively small to prevent flow of the oil rearwardly through the base element therethrough while yet providing relatively unimpeded venting of the lower portion of the recess for facilitating the downward flow of the oil sample through the recess.

In the illustrated embodiment, the undercut channels have a square cross section approximately 2 mils wide and 2 mils deep. The vent opening in the illustrated embodiment has a diameter of approximately 1/10mm. Thus, the vent opening is of capillary size effectively preventing flow of the lubricating oil therethrough.

The upper end of the recess may be rounded to provide a facilitated entrance portion for introduction of the oil sample thereinto. Thus, the upper end of the recess may be defined by a semicircular cutout in the base element extending downwardly from the top of the element and effectively defining a rounded well rearwardly of the upper edge portion of the cover element. In using the device, the user may wipe the engine dipstick against the upper edge of the cover element, permitting the lubricating oil adhering to the dipstick to be scraped off into the well and to flow downward into the well through the recess. The upper edge of the cover element may be rectilinear and aligned with corresponding rectilinear upper edge portions of the base element extending laterally from the upper end of the semicircular well. The capillary channels at the side edges of the recess may open into the well for receiving a portion of the lubricating oil moving downwardly through the recess.

BRIEF DESCRIPTION OF THE DRAWING

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a perspective view of a device for determining the condition of engine lubricating oil embodying the invention in use;

FIG. 2 is a front elevation thereof;

FIG. 3 is an enlarged vertical section taken substantially along the line 3—3 of FIG. 2; and

FIG. 4 is a top plan view thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the exemplary embodiment of the invention as disclosed in the drawing, an improved device 10 for quickly determining the need for replacement of engine lubricating oil is shown to comprise a base element 11 defining an upper edge 12, a front surface 13, and a recess 14 in the front face extending downwardly from upper edge 12 and having a downwardly decreasing depth. The recess is defined by side edges 15 and 16 which may be undercut to define capillary channels.

Base 11 is preferably formed of a low cost sheet material which, illustratively, may comprise a sheet of synthetic resin. The base illustratively may have a thickness of approximately 0.030 inches.

A cover element 17, which is preferably transparent and which may comprise a sheet of transparent syn-

thetic resin, is suitably secured to the front face 13 to overlie recess 14 and permit viewing of an indicium 18 provided at the rear of the recess. In the illustrated embodiment, indicium 18 comprises a line on the base element 11 disposed at a portion of the recess having a preselected depth such that when oil is received in recess 14, the nonviewability of line 18 determines the need for replacement of the lubricating oil as a direct function of the opacity thereof. It has been found that a brown colored indicating line provides an improved condition indication and permits the use of a relatively wide line, such as one having a width of approximately one thirty-second inch, for improved facilitated reading of the oil condition.

For facilitated use of the device, it is desirable to assure free flow of the lubricating oil fully downwardly into the recess to below the indicating line 18 so as to assure a proper full depth of the oil at the indicating line. To facilitate such downward flow of the oil into the recess, a vent 19 is provided in the form of a small hole in base element 11 at a lower portion of the recess. As shown in FIG. 2, the vent 19 may be disposed approximately halfway between the indicating line 18 and the lower end 20 of the recess. The opening 19 is preferably of capillary size so that oil will be prevented from flowing outwardly therethrough notwithstanding the holding of the indicating device in a horizontal disposition with the opening 19 lowermost. In the illustrated embodiment, the vent opening has a diameter of approximately one-tenth mm. The undercut channels 15 and 16 are preferably of capillary size to facilitate the downward movement of the oil through recess 14, and in the illustrated embodiment, have a square cross section of approximately 2 mils wide and 2 mils deep. Capillary channels 15 and 16 and vent 19 cooperate to cause the rapid downward flow of lubricating oil through recess 14 so as to quickly permit the determination of the oil opacity and possible need for replacement by viewing of the oil sample through the cover 17 at indicium 18.

The upper edge 12 of base element 11 is further defined by a circular mid-portion 21 defining a semicircular well 22 opening downwardly into the recess 14. The well is adapted to receive the oil from the dipstick D, as shown in FIG. 1, when the dipstick is forwardly wiped across the upper edge 23 of cover element 17. From the well, the oil flows quickly downwardly through the recess 14 with the capillary channels 15 and 16 and vent 19 facilitating the downward movement as discussed above. The upper edge 23 of cover 17 may be rectilinear for facilitated wiping of the dipstick thereagainst. Thus, the well 21 effectively defines an upper pocket behind and below the upper edge 23 of cover 17 which initially receives the oil wiped from the dipstick D and conducts it downwardly through the recess 14 for providing a rapid, accurate determination of the oil condition by the subsequent simple expedient of the user determining the viewability of the indicium line 18. Where the line is viewable to the user, the opacity of the oil is sufficiently low to indicate that the lubricating oil condition is still sufficiently good to permit continued use thereof in the automobile engine. When the indicium line 18, however, cannot be seen by the user through the oil sample in recess 14, the opacity thereof is sufficient to indicate the need for replacement of the lubricating oil. This determination can be made quickly by the owner of the automobile, a service

station attendant, or other servicing personnel. The device 10 is extremely simple and economical of construction, and as it may be formed of low cost materials, such as synthetic resins, and may be economically assembled, the device may comprise a one-time use throwaway device.

Cover 17 is preferably formed of a material which is compatible with that of the base element 11 to permit ultrasonic welding therebetween for securing the cover to the front face 13 of the base element. Alternatively, the cover may be adhesively secured to the base element as desired.

As illustrated in FIGS. 1 and 2, the base element may further carry a legend, or information means, 24, which illustratively may comprise advertising material of the service station and/or information as to the use of the device.

The device may be made small so that a quantity of such devices may be maintained in the automobile glove compartment or readily stored as otherwise desired by the user. As discussed above, the indicium line 18 may be made relatively broad so that the determination of legibility of nonlegibility may be positively effected by the user for improved positive determination of the oil condition.

The foregoing disclosure of specific embodiments is illustrative of the broad inventive concepts comprehended by the invention.

I claim:

1. A device for quickly determining the need for replacement of engine lubricating oil comprising: a base element defining an upper edge, a front face, and a recess in said front face extending downwardly from said upper edge and having a downwardly decreasing depth, said recess being defined by said edges, at least one of said edges being undercut; a transparent cover overlying said recess; means defining a vent to said recess at a lower portion thereof whereby engine lubricating oil deposited into the upper end of the recess may flow readily downwardly through said recess and undercut edge, said vent comprising a capillary opening preventing leakage of the lubricating oil outwardly there-through while permitting free venting of the recess for facilitated flow of the oil downwardly therethrough; and indicium means at the rear of said recess, the viewability of which is a function of the opacity of the oil in the recess for indicating the need of replacement of the engine oil as whenever such oil opacity prevents the viewing of the indicium.

2. The engine oil replacement indicating device of claim 1 wherein said base element is formed of synthetic resin.

3. The engine oil replacement indicating device of claim 1 wherein said base element has a thickness of approximately 0.030 inch.

4. The engine oil replacement indicating device of claim 1 including weld means securing said cover to said base.

5. The engine oil replacement indicating device of claim 1 including ultrasonic weld means securing said cover to said base.

6. The engine oil replacement indicating device of claim 1 wherein said recess includes an upper, enlarged entrance portion.

7. The engine oil replacement indicating means of claim 1 wherein said recess includes a semicircular upper entrance portion.

8. The engine oil replacement indicating means of claim 1 wherein said recess includes a semicircular upper entrance portion and said cover defines an upper edge at the top of said entrance portion against which an oil dipstick may be wiped to transfer a sample of lubricating oil adhered to the dipstick into said recess for determination of the opacity thereof.

9. The engine oil replacement indicating means of claim 1 wherein said recess includes a semicircular upper entrance portion and said cover defines a rectilinear upper edge at the top of said entrance portion against which an oil dipstick may be wiped to transfer a sample of lubricating oil adhered to the dipstick into said recess for determination of the opacity thereof.

10. The engine oil replacement indicating device of claim 1 wherein said recess comprises a machined slot.

11. The engine oil replacement indicating device of claim 1 wherein said vent is disposed approximately halfway between said indicium means and the lower end of the recess.

12. The engine oil replacement indicating device of claim 1 wherein said vent comprises an opening having a diameter of approximately 0.1 mm.

13. A device for quickly determining the need for replacement of engine lubricating oil comprising: a base element defining an upper edge, a front face, and a recess in said front face extending downwardly from said upper edge and having a downwardly decreasing depth, said recess being defined by side edges, at least one of said side edges being undercut to define a capillary channel; a transparent cover overlying said recess; means defining a vent to said recess at a lower portion thereof whereby engine lubricating oil deposited into the upper end of the recess may flow readily downwardly through said recess and undercut edge; and indicium means at the rear of said recess, the viewability of which is a function of the opacity of the oil in the recess for indicating the need of replacement of the engine oil as whenever such oil opacity prevents the viewing of the indicium.

14. The engine oil replacement indicating device of claim 13 wherein each of side edges is similarly undercut.

15. The engine oil replacement indicating device of claim 13 wherein each undercut edge defines a channel having a width of approximately 0.002 inch.

16. The engine oil replacement indicating device of claim 13 wherein each undercut edge defines a channel having a depth of approximately 0.002 inch.

17. The engine oil replacement indicating device of claim 13 wherein said recess includes an upper, enlarged entrance portion, each recess undercut edge opening into said entrance portion.

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