Dec. 22, 1959 B. CALMENSON 2,917,832

DIPSTICK

Filed Jan. 17, 1958

FIG. 1

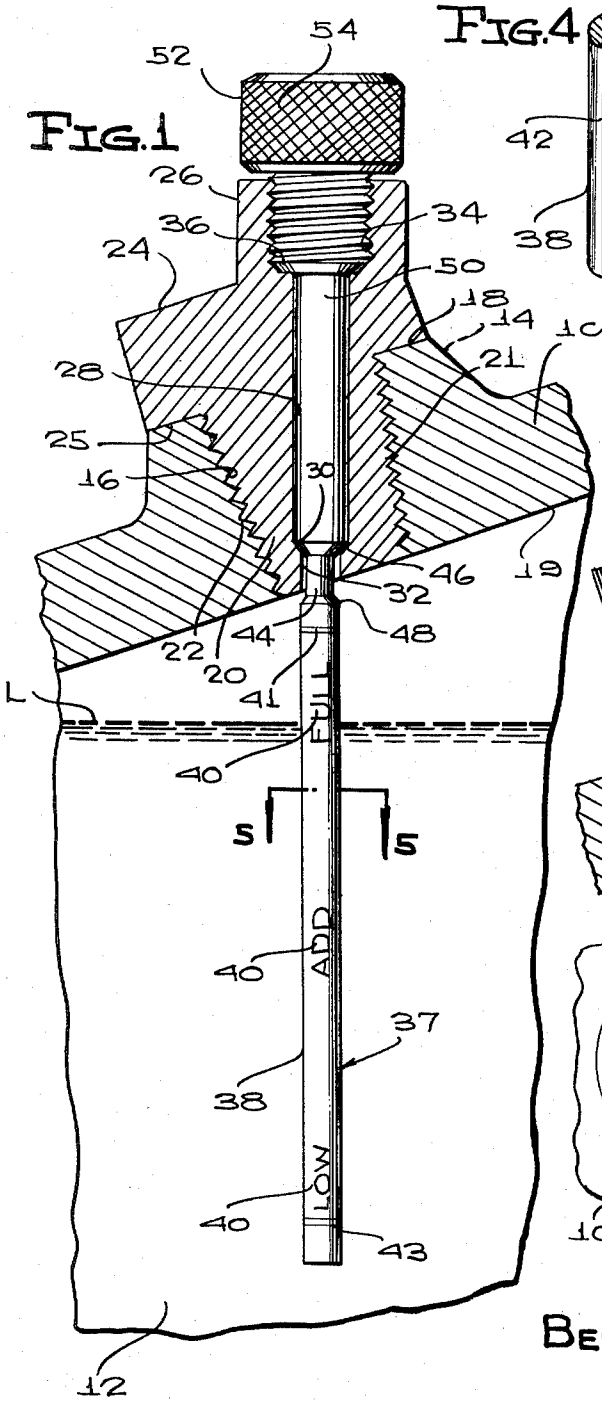


FIG. 4

FIG. 5

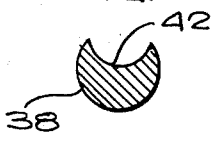


FIG. 2

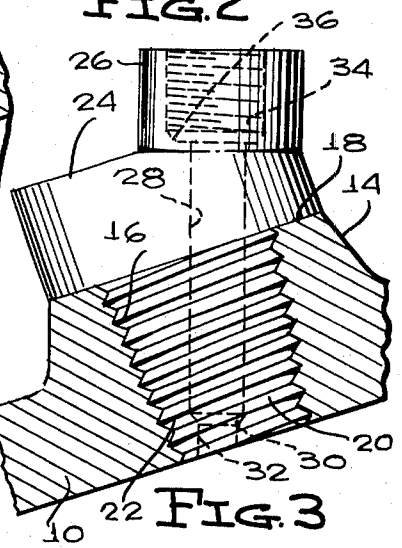
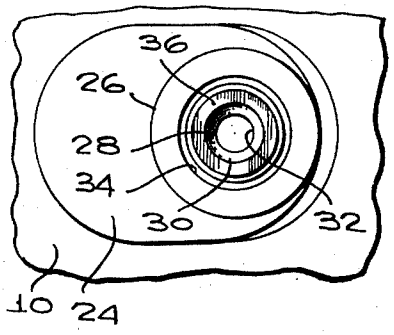


FIG. 3



INVENTOR.

BENJAMIN CALMENSON

BY

McMorrow, Berman + Davidson

ATTORNEYS

United States Patent Office 2,917,832
Patented Dec. 22, 1959

2,917,832

DIPSTICK

Benjamin Calmenson, St. Paul, Minn.

Application January 17, 1958, Serial No. 709,627

2 Claims. (Cl. 33—126.7)

This invention relates to dipsticks, that is, devices for checking the level of a liquid. In particular, the invention has reference to a dipstick, gauge, or equivalent device intended mainly for use in checking the level of oil in the crankcases of tractors or like machines. However, as will be apparent from the description and claims to be provided hereinafter, the dipstick has general utility in checking fluid level in various other types of vehicles, stationary engine installations, etc.

Dipsticks as heretofore devised have had certain deficiencies, which it is proposed to remedy by means of the present invention. For example, dipsticks are conventionally manufactured with comparatively easily breakable upper end portions, and the portion of the wall of the crankcase immediately surrounding said upper end portion of the dipstick may be of a thickness, and is often so formed, as to cause the dipstick to be broken or at least bent in the event it is carelessly removed or inserted.

Still further, it is difficult, on conventional dipsticks, to obtain a swift indication as to the amount of oil left in the crankcase, by reason of the fact that the dipstick as ordinarily shaped is not designed specifically for retention of the film of oil thereon. Said film of oil, as a result, immediately becomes thin during removal of the dipstick, to an extent such as to make difficult the task of obtaining a reading from the dipstick. In fact, it often happens that the dipstick will be drawn into contact with the dipstick-receiving slot or opening of the crankcase wall, during removal of the dipstick. This may tend to wipe off all or part of the film, so that a reading cannot be taken. Alternatively, an incorrect reading may result with possibly disastrous results to the engine if oil is not added when necessary.

The broad object of the present invention is to provide a dipstick which will eliminate the various deficiencies noted in connection with conventional constructions heretofore employed. In carrying out this object, I have provided a dipstick which, summarized briefly, comprises an elongated shank having an indicia-marked lower end portion that constitutes the part of the shank immersible in the oil. Said lower end portion merges at its upper extremity into a reduced neck portion, which in turn merges into an upper end portion which is greater in diameter than the lower end portion. The upper end portion is integral or otherwise made rigid at its upper extremity with a threaded plug portion, having at its upper end a knurled knob or head facilitating rotation of the device during insertion or removal of the dipstick.

In accordance with the invention, a tapered, threaded closure plug is engaged in a complementarily formed opening of the crankcase wall, and said closure plug has a large diameter head which, together with the larger part of the tapered plug portion is of substantial thickness in cross sectional area, thus to provide an important reinforcing means surrounding the upper end portion of the dipstick, to reduce to a minimum the possibility of breakage or bending of the dipstick. The head part of

the closure plug has an upwardly projecting extension having a threaded counterbore receiving the plug portion of the dipstick. Formed in the tapered part and head part of the closure plug is a bore, the upper end of which is counterbored as previously mentioned and threaded, for engaging the threaded plug portion of the dipstick. The counterbore merges into a main, smooth-walled portion of the bore, receiving the larger diameter, upper end portion of the dipstick. This smooth-walled portion has a tapered seat at its lower end, engaging the complementarily shaped lower end of the upper end portion of the dipstick shank. Then, at the lower end of the bore, there is a portion of reduced diameter, matching in diameter the indicia-marked lower end portion of the dipstick. Said lower end portion of the dipstick has, over its full length, a transversely, arcuately depressed longitudinal groove, forming a cavity specially shaped to retain a thick film of oil, for the purpose of facilitating the obtaining of a reading. The shape of the component parts of the device is such as to not only provide an effective seal and means preventing breakage of the dipstick, but also, means to insure that the oil will not be wiped off during extraction of the dipstick.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawing, in which like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a view of the dipstick showing the same in elevation, in its inserted position, the dipstick-supporting closure plug being shown in section, adjacent portions of the crankcase also being shown in vertical section;

Figure 2 is a view in which the dipstick has been removed, showing the dipstick-supporting closure plug in elevation and adjacent portions of the crankcase wall in vertical section;

Figure 3 is a top plan view of the closure plug shown in Figure 2;

Figure 4 is an enlarged, fragmentary perspective view of the lower end portion of the dipstick shank; and

Figure 5 is a still further enlarged, transverse sectional view substantially on line 5—5 of Figure 1.

Referring to the drawing in detail, designated at **10** is the conventionally sloped, top wall of the crankcase of a tractor. It will be understood at this point that the dipstick is usable in any engine crankcase, and may even have additional uses in determining fluid levels, as for example in oil storage tanks that are not part of any engine.

In any event, wall **10** overlies the cavity **12** of the crankcase, said cavity containing a supply of oil or equivalent lubricant L, the level of which is to be checked by means of the dipstick constituting the present invention.

The top wall **10** has a frusto-conical boss **14** on its top surface, the axis or center line of which is perpendicular to the plane of the top wall, that is, the boss **14** projects upwardly from the top wall **10** at an incline. Formed in boss **14**, centrally thereof, is a threaded, inwardly tapering opening **16**, having a uniform taper fully from the top surface **18** of the boss to the inside surface **19** of the wall **10**.

In accordance with the invention, normally closing the opening **16** is a complementarily tapered, threaded closure plug **20** having a body portion **21** formed with threads **22** engaging the threads of the opening **16**. Body portion **21** is integral at its upper end with an oval cap portion **24** of the closure plug. This is substantially greater in cross sectional area than the larger end of the tapered, threaded body portion **21**, and there is thus defined a downwardly facing, planiform shoulder **25** constituting the underside of the cap portion **24**, said shoulder

25 bearing tightly against the top surface 18 of the boss 14.

Cap portion 24 is integrally formed with a cylindrical, constant-diameter, upwardly projecting extension 26. Extension 26 is substantially smaller in diameter than the diameter of the cap portion 24, and as will be noted from Figure 1, the axis or longitudinal center line of the extension 26 is vertically disposed in the illustrated arrangement, and is oblique to the axis of the body portion and cap portions 21, 24 respectively. The oblique disposition of the longitudinal center line of the extension 26, of course, results in said extension 26 being vertically disposed when the cap and body portions are inclined with their common axis perpendicular to the general plane of the sloped top wall 10.

An elongated, vertically disposed bore 28 is formed in the closure plug, said bore having a smooth-walled, constant-diameter, elongated, intermediate portion 29 merging at its lower end into a downwardly tapering seat 30 which in turn merges at its lower end into a lower end portion 32 of bore 28, the diameter of which is less than the diameter of the intermediate portion 29. In other words, the diameters of the portions 29, 32 match the larger and smaller diameters of the downwardly frusto-conical seat 30.

At its upper end, bore 28 has a threaded counterbore 34 communicating with the upper end of the intermediate portion 29. The counter bore or upper end portion 34 cooperates with the intermediate portion 29, thus, in defining an upwardly facing shoulder 36 at the base of the counterbore. The counterbore is threaded for its full length, and opens upon the top surface of extension 26.

Bore 28 is vertically disposed, being coaxial with the extension 26, so that the length of the bore 28 is oblique to the axis of the tapered body portion 21 and cap portion 24.

Designated generally at 37 is the dipstick, and this includes an elongated, straight shank having a lower end portion 38 constituting the part of the shank that extends into the lubricant L. Lower end portion 38 of the shank at locations spaced longitudinally thereof has suitable indicia 40. The indicia 40, in the illustrated example, constitute the words "low," "add," and "full." Immediately above the last named words is a circumferentially extending line marking 41 indicating the "full" mark. A correspondingly extending lower line marking 43 is provided near the lower extremity of portion 38, indicating the low level.

Referring now to Figures 4 and 5, the lower end portion 38 of the dipstick shank is formed, over its full length, with a longitudinal groove 42. This is transversely, arcuately curved, through slightly less than 180°. The lower end portion 38, of course, is itself of circular cross section, except for the interruption to its cross sectional continuity produced by groove 42, groove 42 being struck on a radius somewhat smaller than the radius about which the lower end portion 38 is curved.

In any event, the groove 42 has the desirable characteristic of causing distinctly greater adhesion of the oil to the surface of the dipstick, than is true of a dipstick of flattened cross section, or of uninterrupted circular cross section. This is an important feature of the invention, since in effect the dipstick when removed brings with it a column of oil, substantially filling the groove 42, forming a thick film that is characterized by the ease of observation of the same. This results from the fact that the oil within the channel is substantially greater in depth than the ordinary, thin film that coats a dipstick surface.

This, however, is not the only important feature of the construction. As will be noted, the lower end portion 38 is of a diameter equal to the diameter of the lower end portion 32 of bore 28. Therefore, when the dipstick is removed, oil on the convex face of the lower end portion 38 will be wiped clean, but all the oil within the groove 42, that is, the oil coating the concave face of the lower end portion 38, will be preserved intact, and cannot possibly be wiped off accidentally during the removal of the dipstick from the crankcase.

Further, when the dipstick is reinserted, any infinitesimal particles of dirt that might adhere to the convex surface of the dipstick will be wiped off by the wall of the bore 32.

At its upper end, the lower end portion 38 of the dipstick shank merges into a reduced-diameter, short portion 44, which may appropriately be termed a neck. Neck 44 at its upper and lower ends merges into tapered or frusto-conical portions 46, 48 respectively, the portion 48 merging into the portion 38 and the portion 46 merging into an upper end portion 50 of the dipstick shank, the diameter of which is greater than that of the lower end portion 38.

The portion or shoulder 46 bears against the seat 30 in the inserted position of the stick. In this connection, neck 44 is longer than lower end portion 32 of the bore 28 and therefore, the neck projects downwardly out of the bore, exposing shoulder 48 within the cavity of the crankcase.

The advantage of this arrangement is that when the dipstick is removed, all oil coated upon the convex surface of the lower end portion 38 is wiped off by the lower end edge of the bore portion 32. Further, the provision of the neck permits a wider seat 30, and this is of importance because the abutting surfaces of the seat 30 and shoulder 46 prevent oil from getting inside the closure plug bore above the shoulder. In this way, smearing of oil on the stick, resulting from oil that might otherwise accumulate within the bore 28, is eliminated to insure correct reading.

With further reference to the neck 44, and the advantages resulting from the arrangement illustrated and described above, the above-mentioned extension of the neck below the lower end of the bore 28 causes an open space to be defined within the bore about the neck. This space communicates with the interior of the crankcase. Therefore, the lubricant within the crankcase is adapted to splash up into the open space, that is, into the lower end portion 32 of the bore 28. Said lubricant impinges upon the wall of the bore. The lower end portion 32 of the bore 28, of course, is of a diameter matching the diameter of the lower end portion 38 of the dipstick shank.

Accordingly, on removal of the dipstick, the dipstick shank moves upwardly from its Figure 1 position, and while oil coated upon the convex surface of the portion 38 is wiped off by the lower end edge of the bore portion 32, the wall of said bore portion is in actuality covered with a thin film of lubricant, sufficient to permit a marked facility or ease of sliding movement of the lower end portion 38 of the dipstick therein. Thus, there is a lubricated surface along which the lower end portion 38 slides during the insertion and removal of the dipstick. This lubricated sliding engagement between the lower end portion 38 of the dipstick and the bore portion 32 is provided, even though to all intents and purposes the convex surface of the lower end portion 38 is wiped clean as noted above, during the actual removal thereof from the bore of the plug.

The upper end portion 50 fits snugly in the intermediate portion 29 of the bore 28, and is integral at its upper end with a threaded plug portion 52 engaging in counterbore 34 with its lower end bearing tightly against shoulder 36. Plug portion 52 is larger in diameter than portion 50, and in turn merges into a still larger-diameter, knurled head 54 exposed outside the crankcase, in position to be grasped and rotated by a user.

In use, of course, the dipstick is ordinarily threaded into the closure plug as shown in Figure 1. When a reading is to be taken, the dipstick is rotated for the purpose of being screwed out of the extension 26. As

soon as the threads 34 are disengaged, the dipstick can be pulled straight outwardly without further rotation. When the dipstick has been removed, it is wiped off, reinserted, and removed again. Now, there will be a thick film of oil in the groove 42, permitting the taking of an accurate reading.

Important characteristics of the invention reside not only in the feature of the transversely concave face 42 of the dipstick shank, the advantages of which have been hereinbefore discussed in full detail, but also, there is a considerable advantage in the particular formation of the dipstick, in respect to the engagement of shoulder 46 against seat 30. As previously mentioned, this prevents oil from getting inside the closure plug or casting 20. Still further, the particular form of the casting in respect to the upper end portion of the dipstick, insures not only a full seal of the dipstick at its upper end, preventing dirt from getting into the crankcase, but laso, insures a thick wall completely surrounding the enclosed portions of the dipstick, to prevent bending or breakage of the dipstick, even if the same is carelessly handled.

It is believed apparent that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles of operation and the means presently devised to carry out said principles, it

being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. For engagement in an opening of a crankcase, a dipstick assembly comprising: a plug for the opening extending in a direction having a vertical component and formed with a longitudinal bore having a shoulder; and a dipstick removably engaged in the bore and having a shoulder seating against the first mentioned shoulder, a neck extending downwardly from the second mentioned shoulder beyond the lower end of the plug to provide an open, lubricant-receiving bore portion about the neck, and a channeled lower end portion below the neck having an outer surface of a diameter approximately matching that of said bore portion.

2. A dipstick assembly as in claim 1, wherein the length of the bore is oblique to the length of the plug, whereby said bore and dipstick will be vertically disposed in an inclined position of the plug.

References Cited in the file of this patent

UNITED STATES PATENTS

1,475,183	Harwood	Nov. 27, 1923
2,239,402	Sachs	Apr. 22, 1941

OTHER REFERENCES

Popular Mechanics, page 176, August 1956.