Dec. 3, 1935. J. A. LOGAN 2,022,919

ELECTRIC CELL TESTING TOOL

Filed May 29, 1934

Fig. 1.

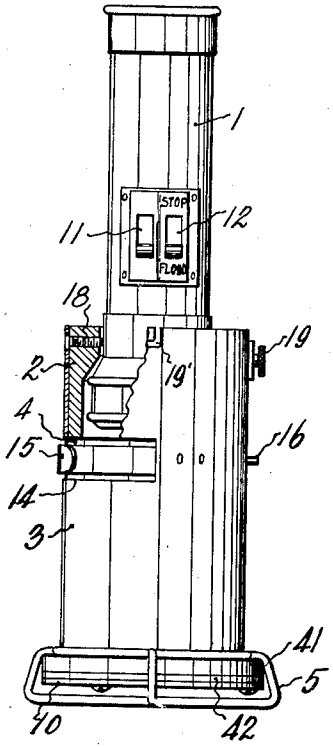
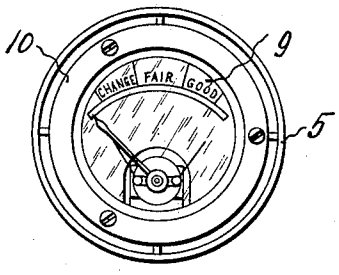


Fig. 3.



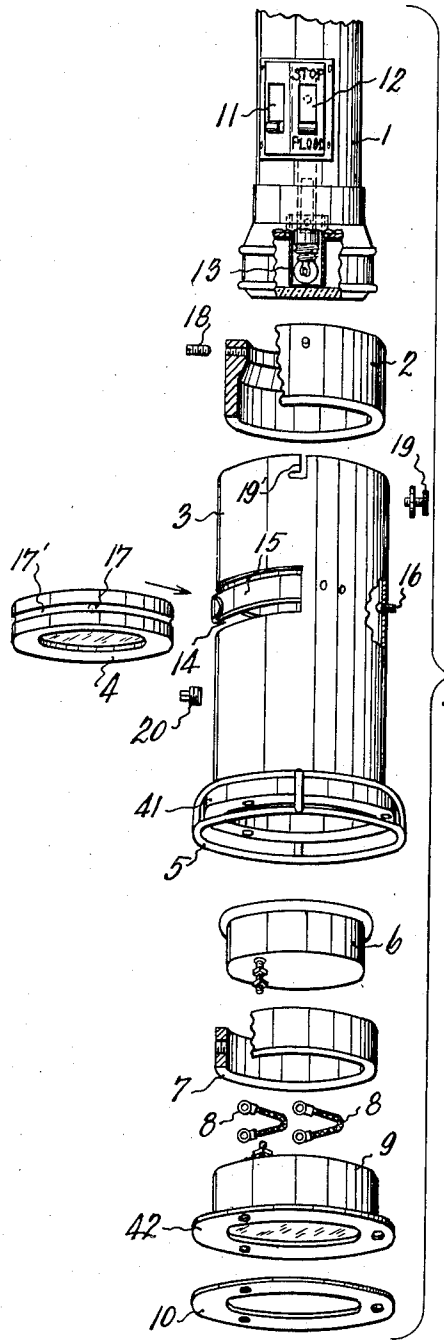


Fig. 2.

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Patented Dec. 3, 1935 2,022,919

UNITED STATES PATENT OFFICE

2,022,919

ELECTRIC CELL TESTING TOOL

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Application May 29, 1934, Serial No. 728,055

8 Claims. (Cl. 88—14)

This invention is a new and useful tool for electrically testing used automobile oil by the electric cell means. It shows the quantity of sediment in the oil. Of course it is useful in testing other materials.

Patent No. 1,940,772 is an example of prior art. I am aware that there are other patents showing the testing of materials by the same general method. This is to measure the current of an electric cell, upon which light shines through the successive test samples to vary the current and get a comparison with a known standard. My invention is found in the economy of manufacture, convenience of use, and specific features.

I refer to the drawing and following description for a complete disclosure.

Fig. 1 is a side view of the tool all assembled;

Fig. 2 is a view of the tool with parts separated and some detail shown in section; and

Fig. 3 is a bottom end view of the tool.

There is shown in combination a flash light 1, a collar 2 to hold the flash light, a casing 3, a sample holder 4, a wire foot stand 5, an electric cell 6, a collar 7, electric wiring 8, micro-ammeter 9, and foot ring 10. These parts of Fig. 2 are assembled into the complete tool of Fig. 1. This tool is shown ready for use. When the test is made the operator holds it in his hand like a flash light. He can quickly make the test as the customer looks on and he can quickly show the customer the test reading at the end of the tool as in Fig. 3.

In making up such a tool I find it of substantial advantage to use a commercial form of flash light as shown. It can be bought in any hardware store. I prefer the type having a cylindrical casing that has a finger switch 11 for "on" and "off" position and a finger piece or slide 12 that in one position gives a "flood" and the other a "spot" light. This known arrangement is merely indicated by showing the reflector casing cut away with the adjustable white glass shield 13 and the flash light bulb. Slide 12 moves shield 13 into different positions. When in "flood" position it shields the bulb by cylindrically skirting it, and with the light partially passing through the shield. A more intense light or "spot" is given when the shield is drawn back into the casing. The usual lamp reflector cooperates in the effect. This is all well known structure in flash light construction. My particular use of it in combination with other tool parts will be seen later.

Other parts which I can buy ready made for the combination are the electric cell 6 and the micro-ammeter 9. These are well known instruments made for general sale and use in many different ways. The remaining parts are (as I am disclosing my preferred form) made in special form for my tool.

Casing 3 is cylindrical with an end flange 41 to support the ammeter flange 42. The casing diameter is only slightly larger than the flash light, so as to serve as a straight line hood for the enlarged reflector head at one end of the flash light. This makes a large enough casing for a good sized ammeter indicator (seen in Fig. 3) at the other end.

The casing has a side slot 14 large enough to admit sample holder 4. The latter may be of various types as a double windowed frame with a film distance between. It may be made like those shown in my copending case filed March 30, 1934, Serial No. 718,218. A curved leaf spring 15, riveted to the casing, bends back, as holder 4 is wedged into the casing, and then presses into contact with the edge of holder 4. In this position spring 15 lies between the annular plates on the holder faces. I prefer to have the inner face of collar 2 located at the edge of slot 14 so as to serve as a flat shelf for the face of the sample holder 4.

I find it important to provide for easily and accurately positioning the sample holder in the casing. This I do by providing a fixed stud 16 on the inside of the casing. It makes a good fit with a hole 17 in the rim of holder 4. And hole 17 is located in a groove 17' in the edge of holder 4. In this way the holder as it is pushed in, is positively held out of position and into slight overlapping relation with the edges of the slot 14 until it is turned for stud 17 to first register with the groove 17' and by turning the holder to register hole 17 with stud 16. The spring 15 is put under tension during this time and when the hole and stud register, the spring acts to pull (with its curved spring grip) the holder 4 into final registering position. This arrangement makes the final movement automatic. Until the final movement occurs the holder 4 is obviously out of position. So there is no danger that the operator's eye will mislead him into thinking the holder is in proper position when it is not. By this means the user does not need to take the care that he otherwise would. The sample holder is the only part that is normally moved into and out of accurate position for successive tests. The other parts are normally fixed in accurate position.

To assemble flash light 1 into casing 3, collar 2 is slidover 1 as a hood for the reflector cas-

ing. The two are bound together by set screw 18 and telescoped into the top end of casing 3 to plug that end. They are then held in this end closing position by oppositely disposed set screws 19, one of which is shown. These have handle ends for ready manipulation and, merely by loosening them, the flash light with its collar can be removed from or inserted in casing 3 by means of bayonet joints, one being indicated at 19'.

Electric cell 6 is connected with ammeter 9 by wiring 8. These elements are assembled from the bottom with collar 7 slipped over the cell 6 against its flange to make the fit. A positioning set screw 20 enters a thread in the side of the collar and when turned down binds the two together. A like arrangement binds the collar to a predetermined position with the casing walls. The cell 6 in the casing is fixed a predetermined distance from the position of stud 16 which determines the final position of sample holder 4 against the end of collar 2. The edges of slot 14 preferably overlap the sample holder in final position just enough to help maintain the holder 4 in position. The ammeter casing 9 is positioned in the bottom of the casing with its flange fastened on the bottom flange of the casing by annular plate 10. Its indicator face covered with glass is the bottom face of the casing. And this is protected by the wire guard 5 which also serves as a foot stand for the whole assembly.

In use, a sample of clean oil is put in holder 4, the flash light is turned on, its rays are adjusted to give a reading for pure oil on the indicator. Then a sample of used engine oil is put in the holder and a test reading taken. The indicator, Fig. 3, is calibrated to show whether the oil needs changing.

I have found it of advantage to relate the flash light and indicator in a way that will be understood from the following considerations. When the batteries and lamp are new and the lamp shield is pushed way out, enough light will be given through a sample of new oil, to work the indicator to its upper stop, where the test shows the oil to be in best condition for use. In this position, a substantial part of the light from the bulb is obstructed by the shield. As the batteries and lamp wear out they will combine to give less light. But in my arrangement such loss of light can be compensated for by gradually drawing back the shield. In the commercial form of flash light shown the shield is used to make a spot or flood light. I make use of this feature in my combination to relate the quantity of light to the top or "good" reading of the indicator or, in other words, to set the apparatus to a standard for testing and before the test.

The apparatus is built with the plan of increasing oil sales at public filling stations by giving the public an accurate scientific test. The utility for this purpose will be illustrated by the following example. The filling station attendant, having sold gasoline that the customer called for, asks the privilege of testing the engine oil. With the testing tool in his hand, he shows it to the customer, before the test, just to illustrate what he is doing. The tool looks very much like a flash light but with the indicator dial for its end face. He puts in a sample holder of fresh oil and shows the customer how that shows "good" oil. Then he takes a sample from the engine, puts it in the same, or preferably a spare holder, and tests that in the same way and shows the indicator reading to the customer. When it tests "good" there is a certainty in the customer's mind that his oil is all right. If it tests "poor" there is also a certainty that he should change, for two reasons. The tool makes the test impartially and without human judgment. It shows the facts. The customer can see that the oil is dirty by looking at it through the sample holder. If he wants he can himself use the flash light (it is readily removable at the bayonet joint) and use that to shine through the oil from one side while it is visually inspected from the opposite side. The sample holder rests flat on collar 2 for this purpose. In a great many cases the tested oil will show that it does not need changing but it will soon need to be changed. The tendency will be for the customer to stop by for the test again when he estimates his possible need. As soon as the customer knows of the service he will naturally depend on it for oil checking purposes. And the oil will be sold to him at the stations having the tool for testing.

While I am aware that more elaborate instruments have been proposed for testing used engine oil at filling stations, I disclose my tool as one having substantially greater utility at less cost and more convenience for filling station service. It is clear that certain details of my structure can be readily varied, as for example the form of my sample holder, without departing or changing the spirit of the present invention. I point out the particular features of my invention in the following claims.

I claim:

1. An instrument of the kind described comprising a casing containing at one end an ammeter with its reading dial exposed as the cover at that end, means at the other end to mount a hand-sized flash light casing with dry batteries, bulb and switch, a photo-electric cell spaced from the two ends of the casing, a readily removable double windowed partition for the casing adapted to hold a film of oil between the windows and a side opening in the casing through which the said partition can be admitted and removed to and from partition position in the casing between that end of the casing for mounting said flash light and the said photo-electric cell.

2. In a testing instrument of the kind which employs light rays passed through a test sample and measured by their effect on a photo-electric cell indicated on a gauge, the combination of a hand-sized casing, a gauge forming with its dial one end of said casing, means at the other end to admit a predetermined source of light to shine axially of the casing from the top portion thereof and be hooded thereby, a photo-electric cell mounted in the bottom portion of the casing above the gauge and in line to receive the hooded light rays and connected to said gauge, a side opening in said casing located between the top and bottom portions, means on the casing adjacent said opening to accurately position a holder for a test sample between the end of said casing for admitting said light source and said photo-electric cell, and a holder for the sample adapted for insertion and removal to and from the casing through said side opening and while in the casing to act as a partition at the level of the side opening which is then closed.

3. An electrical testing instrument of the kind described comprising in combination a casing formed as an accessory attachment for the front end of a hand-sized flash light such as commonly used with dry batteries as a self-contained source

of light, said casing acting as a hood for the flash light, a gauge, a photo-electric cell connected to the gauge, and a sample holder all arranged and mounted in and on said casing, an opening in the casing to remove and insert the sample holder without disturbing any other part of the instrument and a window in the casing through which the gauge may be read, the whole being adapted to be carried for use with and attached to a standard form of hand-sized flash light from which the light is hooded and used for the testing instrument.

4. The combination in a testing instrument of the kind described a hand-sized self-contained flash light having in one casing dry cells, lamp, reflector and switches, a second casing containing a sample holder, a photo-electric cell and a gauge to indicate the amount of light passing through a sample to the electric cell, the face of said gauge showing through an opening of the casing, and means joining said casings into a composite instrument so that the light from the flash light casing is hooded by the second casing and used for the operation in testing a sample therein, the whole instrument being handled with substantially the same convenience as a hand-sized flash light.

5. The combination of a casing having therein a photo-electric cell and a gauge the indicator of which shows from outside the casing to measure the light on the cell within the casing, means to hold a test sample of material in the casing only through which light in the casing can reach the cell, means to mount a lamp in the casing, a second casing containing dry cells, switches, and a lamp, all in the form of a self-contained ordinary hand-sized flash light, said lamp mounting means in the first casing being adapted to take the second casing and mount it with its lamp for use with the elements of the first casing, the latter appearing as a hooded attachment for the flash light casing and constructed to be carried about with the flash light and of a size to be conveniently held and manipulated while carried entirely by hand so that the combination is a hand-sized instrument in the same sense as a hand-sized flash light is.

6. In a testing instrument of the kind described the combination of a casing containing an ammeter, electric cell and liquid sample holder, the casing having an opening in line with the sample holder and electric cell for directing light through the former to the latter without outside interference, and a flash light having dry cells and lamp with its forward end inserted within the casing through said opening to supply the light, the casing and flash light being combined as a complete self-contained portable testing tool.

7. The structure of claim 6 in combination with means in the flash light structure to manually vary the intensity of the light when the lamp is lighted.

8. The combination of a flash light and attachment means therefor to make an electric cell testing tool, said flash light consisting in the known form of casing having in or on it a reflector, a lamp, a shield for adjusting lamp and reflector to give "spot" or "flood" light service, an "on" and "off" switch, and adjusting means for the shield and said attachment means consisting in a casing for containing and directing all light from the lamp, an electric cell within the casing, an ammeter in the casing for measuring action in the cell, and a test sample holder adapted for insertion to and removal from the casing, the parts being arranged for the flash light to shine through the sample in the holder to the cell, and for the intensity of the light to be adjusted by the lamp shield in setting the instrument for test and to compensate for flash light wear, the whole combination conveniently serving as a hand tool for scientific testing purposes.

JOSEPH A. LOGAN.