July 21, 1936. J. A. LOGAN 2,048,128

LIQUID FILM HOLDER AND SPRAYING DEVICE

Filed June 7, 1934

Fig. 1.

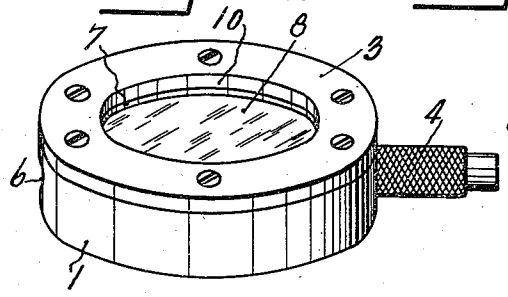


Fig. 3.

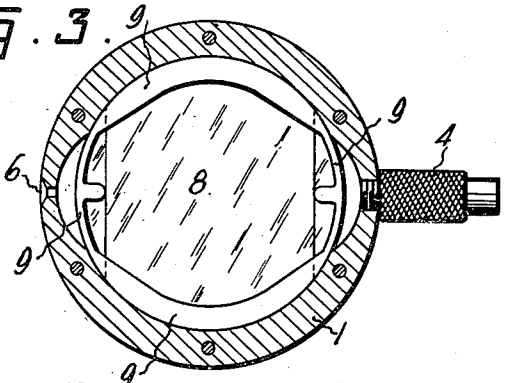


Fig. 2.

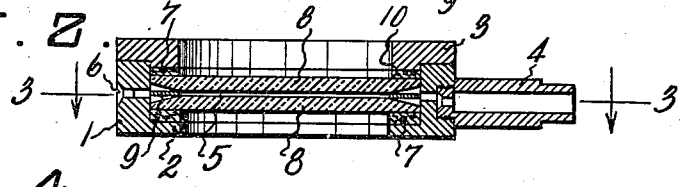


Fig. 4.

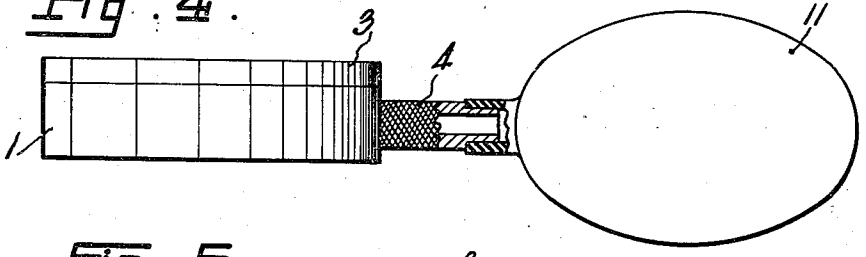


Fig. 5.

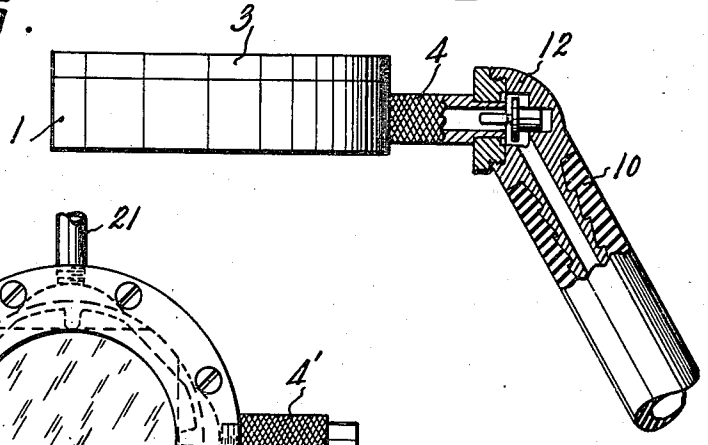
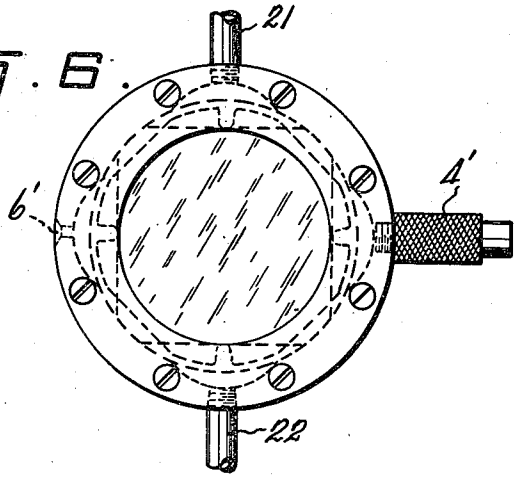


Fig. 6.



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LIQUID FILM HOLDER AND SPRAYING DEVICE

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Application June 7, 1934, Serial No. 729,356

4 Claims. (Cl. 88—14)

This invention relates to an improved hand-sized tool for forming and holding a liquid film, for example of oil, for making a test. It is also utilized as a liquid spraying tool. Other objects will appear in the detailed description of a preferred embodiment.

The structure shown is planned primarily for use at a public filling station where it is now customary for an attendant to sample the oil from an automobile crank case, to see if it needs changing. There are a good many ways to do this and to make the test of the sample. My improved structure can be used in a good many ways, some of which I will refer to.

I plan to provide an improved structure to form the test sample in a film that can be visually examined as to its sediment content. The structure is so made that it can be conveniently used to advantage either with or without a lamp or in a scientific electric testing machine such for example as shown in my copending application Serial No. 728,055, filed May 29, 1934. Its additional purpose of acting as a liquid spraying tool will be made clear after its use as a tool for test sampling purposes is described.

In the accompanying drawing,

Fig. 1 shows in perspective my improved tool just as the attendant would handle it;

Fig. 2 shows a section through the film holder taken in the plane of its oppositely disposed inlet and outlet ports;

Fig. 3 is a sectional view on line 3—3 of Fig. 2;

Fig. 4 shows the tool connected to a hand pump means or bulb which I plan to use for obtaining the sample from the engine casing and forcing the sample of oil into the film frame;

Fig. 5 indicates my structure of Fig. 1 attached to the ordinary air pressure hose of a filling station which I use to both empty and clean the film container; and

Fig. 6 is a view of my sample holder modified into a spraying tool.

Referring to Fig. 2, the film container shown consists in a ring 1, with an inturned shelf 2, an annular cover plate 3, radial handle 4 having a central bore to connect with the film space 5, an oppositely disposed outlet 6 also connected to film space 5, gaskets 7, windows 8, and window spacer 9.

The assembly is made by placing bottom gasket 7 on shelf 2, inserting windows 8 with the ring-shaped spacer 9 at their edges so as to space the glasses a film distance apart, determined by the thickness of 9. Or the windows may be spaced as shown in copending application filed March 30, 1934, Serial No. 718,218. Cover plate 3, as in Fig. 1, is screwed (or otherwise fastened) in place with the screw heads flush. The inwardly directed flange 10 of plate 3 bears on the assembly which is tightened down for the film distance to be determined by the thickness of the flat metal ring 9 forming spacers 9. The space between the windows 8 adjacent the inlet and outlet openings to the film space is widened a bit, as indicated in the sectional view Fig. 2.

In one use, the rubber bulb 11 (shown conventionally) sucks used oil up from an automobile crank case through any inserted tube through any suitable joint to the bulb. This operation is not indicated in the drawing. The bulb 11 is disconnected and the outlet of bulb 11 is fitted at the end of handle 4, see Fig. 4. By squeezing the bulb the oil sample is forced through the handle bore to film space 5. It fills the latter as air is expelled through opening 6. When filled, the container is handled by 4. And the film can be examined through the windows 8 by the attendant's eye. It can be easily shown to the customer. It can be placed flat against the lens of a flashlight so that all the light can shine through the sample film, The container is made for such uses. And it can also be used as the sample holder of the electric tester instrument of my aforesaid copending case. Thus it is a most convenient tool for the casual test which may be sufficient when the oil is either very good or very bad; for a better test by examining the film with all the light of a flash light shining through; and for an extremely accurate and scientific test by an electric cell testing instrument, as shown in my copending case. In all these tests the film forming instrument and sample holder, both for preparing and testing, is distinctly a hand tool of simple character for easy manipulation and use in front of the customer, to make the right impression.

When the test has been made it is desirable before using the container again to clean it. I have discovered that a structure such as shown can be cleaned between successive tests (even of very dirty oil) by blowing the windows clean with the air pressure hose, indicated at 10 in Fig. 5, ordinarily used at filling stations for pumping up tires. Having discovered this, I made the handle 4 so as to fit on the customary nozzle 12 of the air hose just as if handle 4 were a tire valve. When through with the test, I apply the handle 4 to the nozzle of the air hose, as indicated in Fig. 5, and the air pressure from 10 not only blows out the oil in the film space 5, but the same operation cleans the windows.

The surprising thing about this cleaning operation is the fact that there is enough scouring movement of the air over all the interior surfaces of the windows when spaced a film distance apart, to wipe the windows sufficiently to clean the glass. I anticipated that the air would get rid of the main body of the oil, but it was a surprising discovery that the glass windows themselves were

wiped clean of oil and that I did not need to finally clean the glass as a separate operation. This fact appeared after I built the structure substantially as described and blew out the oil preparatory to taking the apparatus apart for an inside window cleaning before the next test. Prior to that I cleaned the glass windows without expecting or noticing that it could be avoided. It was my actual experiments that made the glass cleaning function appear as an unanticipated discovery. The current of air from the end of nozzle 4, which must go through the film space 5 (a very thin film) from the inlet to the diametrically opposed outlet, has an action all over the interior glass surfaces that is of great advantage in the environment where the hand tool is to be used. By careful test I found that the windows did not need to be disassembled from their film spaced position until many successive tests were made. That is to say, the air cleaning is sufficient for the major number of tests and this is a great advantage and improvement over prior known oil sample holders, in the quick work desirable at filling stations.

I believe the cleaning action is due to the fact that the passage of air under pressure from inlet to outlet of the container, sets up a most efficient operation of picking up and spraying the oil. The oil leaves the outlet 6 in a remarkably fine sort of spray. This is apparently caused by the fact that the oil in the container is held by the glass windows in the form of a very thin film, for example .005 of an inch thick. And when the air stream is directed from the inlet to the diametrically opposed outlet, its velocity in that stream (with a maximum velocity at the outlet) sucks the very thin oil film into the air stream with power enough to give a very thorough cleaning action. This is evidenced by the extremely fine division of the oil as it emerges with the air in mist form.

I have had considerable experience in devices for spraying oil and so far as I know my improved sample container when cleaned as I have described gives a better spraying operation (where a fine mist spray is desired, as in oil burners) than known devices having anywhere near the same simplicity of construction and low cost of manufacture. It is, for example, common practice in oil burner construction to provide a rotating spraying device operable at extremely high speed by an electric motor, to get a good spray for oil burning purposes. My very simple structure has utility as a spraying device and at very low cost considering the improvement in the nature of the oil spray.

With this feature in mind I am disclosing a new and useful spraying device for oil, water, or other liquids. It has been discovered by me due to my experiments and observation in the cleaning of my oil sample holder.

In Fig. 6 I show the same instrument as in Fig. 1 except that I have added pipes 21 and 22 (one alone may be sufficient) at diametrically opposite points for the continued admission of oil (or other liquid) to the film space 5, as an air connection with 4' directs air under high pressure towards outlet 6'.

The mode of operation of this device as a sprayer (referring to Fig. 6) consists in admitting the liquid through its supply pipes 21 and 22 under sufficient pressure to make it form into the very thin film determined by the window spacing and in driving air under pressure across the film space between the air inlet and outlet. This operation is continued as long as the sprayed liquid is wanted. Its commercial application is in the arts generally where spraying devices of simple form and high efficiency in the division of the liquid are desired. It is particularly desirable in oil burner work and in spraying water for air conditioning purposes, as well as for cleaning the windows of the sample holding tool.

Having disclosed my improvements, I claim:

1. A device for the purpose described comprising two interfitting annular frame members, two circular glass panes positioned a film distance apart and secured within and between said frame members to form therewith a film receiving chamber, an inlet opening through one of the frame members substantially in the plane of the chamber, an outlet opening through the last named frame member positioned diametrically opposite the inlet opening, the inner faces of the edge portions of the glass panes being beveled over a segmental area adjacent the inlet and outlet openings, and a hose coupling device extending outwardly from said frame and connected to one of said openings, said coupling device being in the form of a handle for the manual manipulation of the device.

2. A device for the purpose described comprising two interfitting annular frame members, two circular glass panes secured within and between said frame members, an annular spacer member positioned between said panes to space the latter a film distance apart and form a film receiving chamber between the plates within the frame, an inlet opening through one of the frame members substantially in the plane of the chamber, and an outlet opening through the last named frame member positioned diametrically opposite the inlet opening, the inner faces of the glass panes, the spacer member and the frame walls all being cut away adjacent said inlet and outlet openings.

3. A device for the purpose described comprising two interfitting annular frame members, two circular glass panes secured within and between said frame members, an annular spacer member positioned between said panes to space the latter a film distance apart and form a film receiving chamber between the plates within the frame, an inlet opening through one of the frame members substantially in the plane of the chamber, an outlet opening through the last named frame member positioned diametrically opposite the inlet opening, the inner faces of the glass panes, the spacer member and the frame walls all being cut away adjacent said inlet and outlet openings, and a hose coupling device extending outwardly from said frame and connected to one of said openings.

4. A device for the purpose described comprising two annular frame members, two circular glass panes, spaced a film distance apart, secured within and between said frame members to form within the frame a circular film receiving chamber, an inlet opening through the frame in substantially the plane of the chamber, and an outlet opening through the frame positioned diametrically opposite and aligned with the inlet opening, the inner faces of the edge portions of the glass panes being beveled over a segmental area adjacent the inlet and outlet openings.

JOSEPH A. LOGAN.