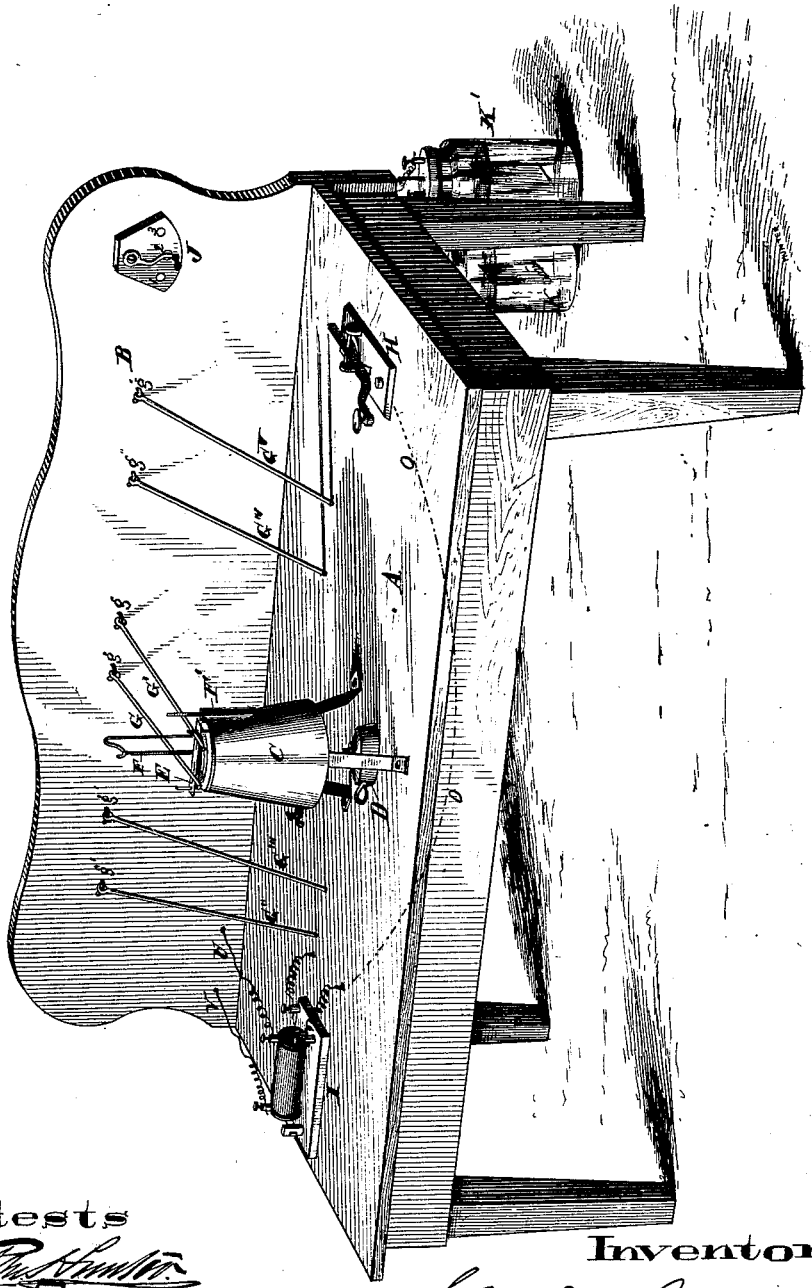
2 Sheets—Sheet 1.

G. M. SAYBOLT.

Electric Oil-Tester.

No. 218,066. Patented July 29, 1879.

Fig. 1



Attests

Henry V. Buckley

Inventor

Geo. M. Saybolt

per George E. Buckley

atty.

2 Sheets—Sheet 2.

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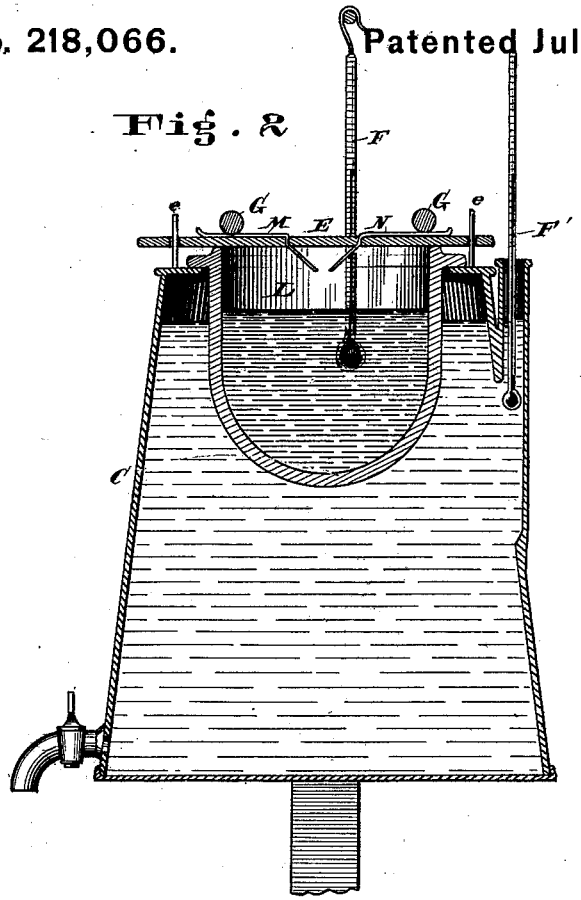
Fig. 2



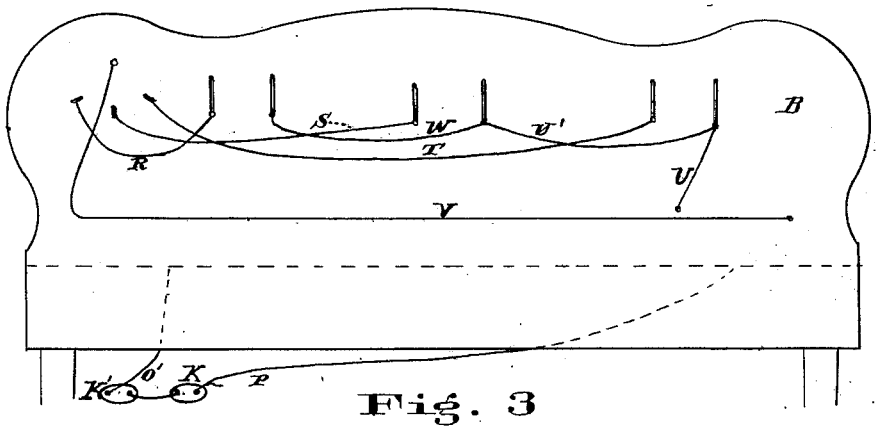


Fig. 3

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UNITED STATES PATENT OFFICE.

GEORGE M. SAYBOLT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO LOCKWOOD BROTHERS & HOLLY, OF NEW YORK, N. Y.

IMPROVEMENT IN ELECTRIC OIL-TESTERS.

Specification forming part of Letters Patent No. **218,066**, dated July 29, 1879; application filed April 14, 1879.

To all whom it may concern:

Be it known that I, GEORGE M. SAYBOLT, of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Oil-Testers; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawings, making part hereof.

The nature of my invention will be fully shown in the following specification and claims.

In order to enable others skilled in the art to make and use the same, I will describe its construction and mode of operation.

In the drawings, Figure 1 is a perspective view of my apparatus; Fig. 2, a cross-sectional view of the reservoir-bath and the oil-cup; Fig. 3, a rear view, showing one arrangement of the wires leading from the battery to the cup.

A is a table to support the apparatus; B, a back to the same, sustaining the electrical conducting-wires; C, the reservoir to contain water for heating the oil-cup; D, a lamp for heating the water in reservoir C; E, a small bar or platform (made of hard rubber, in practice) to sustain the pivoted ends G G of the conducting-wires; F, a thermometer, to indicate the heat of the oil. G G′ G″ G‴ G^{iv} G^{v} are the pivoted ends of the conducting-wires; H, a key; I, an induction-coil; J, a switch. K K′ are the batteries. L is an oil-cup, held suspended in the reservoir or bath C. *g g′ g″* are the points at which the conductor ends of wires G G′ G″, &c., are pivoted to the main wires. M and N are the two electric points (positive and negative) for producing the spark. They pass, respectively, from the pivoted ends G G′ through the non-conducting rubber bar E, almost meeting beneath it, and immediately above the surface of the oil in cup L. O P R S T U U′ V W are wires leading from the battery to the coil I and wires G G′ G″ G‴ G^{iv} G^{v}.

The operation is as follows: The reservoir C is first partially (nearly wholly) filled with hot water at a temperature of about 100° Fahrenheit. The oil to be tested is then placed in cup L, which is nearly filled. Now, as I wish to test the oil in that particular cup to ascertain its fire-test, I turn the switch-handle J to the middle point, 2. The pivoted ends G G″ G^{iv} are connected with the induction-coil by wires W, U′, and U, and the induction-coil is connected with the battery-jar K by means of wire P. The jars of the battery are connected by a wire between them. The switch-pivot is connected with the induction-coil by means of wire V. The wire O passes from the induction-coil to the key H. This key is also connected with the battery-jar K′ by means of wire O′. The circuit between wires O and O′ is broken by the key when the latter is open, and the circuit is closed when the key is shut. Now, the points 1, 2, and 3 of the switch J are connected with pivoted ends G‴ G′ G^{v}, respectively, by the wires S, T, and R, respectively, the wire V being attached to the pivot of switch J, so that as the handle of switch J is moved to any one of points 1, 2, or 3, a current of electricity shoots through that point and the wires connected with it. Now, the battery K K′ being in operation, and it being desired to apply a spark at intervals to the cup L to ascertain its fire-test, the switch J is, as mentioned above and as shown in the drawings, turned to point 2, which completes a circuit from the pivot of the switch to the point 2. When the cup L, filled with oil, is placed in the bath of water in reservoir C, the said water being at 100° Fahrenheit, the oil will rapidly rise in temperature to nearly or about 94° Fahrenheit, and this may possibly be the temperature at which it will burn, so it is tested at that temperature. The thermometer F will indicate its temperature, as the bulb of this thermometer rests in the oil, as shown in Fig. 2. I now close the circuit of my electrical apparatus by touching and bearing down upon key H, which causes a spark to flash between the points M and N, Fig. 2. As a vapor or gas is constantly rising from the surface of the oil as it is heated, the spark will set fire to or flash off this gas. If the oil is at such a temperature that it will burn in contact with fire, this flash will set fire to the oil, and the temperature at which this burning occurs will be its fire-test. If it does not burn at this test, the lamp D is lighted, which heats the water, (whose temperature is determined by the thermometer F′,) and the water in turn

heats up the oil. As the oil becomes more highly heated, the sparks from points M N are repeated until the vapor or gaseous flashes set fire to it, when the temperature is immediately noted upon thermometer F, and the fire-test is thus determined.

As the wires G G′ are connected with cup L and reservoir C, so wires G″ G‴ and wires G^{iv} and G^{v} may be connected with other cups and reservoirs, electric communication with which can be established by means of switch J and its points 1, 2, and 3 in the same manner as is above described with regard to cup L, and the number of points 1, 2, and 3 and cups L and reservoir C may be increased to any desired extent, the whole being managed by a single operator stationed at the key H. As each cup increases in heat he can continuously apply his fire-test, thus determining the test of each cup of oil in succession.

It will be noticed that my cup L has its cylindrical portion or body carried up above the surrounding flange or rim, upon which it rests in reservoir C. This construction is to prevent any water which may be upon the top of reservoir C from running into the cup; to facilitate measuring the quantity of oil which I wish to place in the cup, as I generally fill my cup to a point much higher than shown in the drawings, in fact nearly up to the upper edge of the cup; and it also prevents the oil, from capillary attraction, working up onto the greasy rim or flange.

I purpose applying for Letters Patent upon this construction of cup in a separate application, as also upon the conical shape of my reservoir shown in Fig. 2, which shows the frustum of a cone.

I do not limit myself to the precise form of apparatus shown, as any one skilled in the art can see that it is capable of much variation.

Instead of the reservoir shown at C, a hot-air chamber may be set between the water and the cup L, or a hot-air chamber may be used alone; but in the latter case the heat would not be so uniform as when one of the other methods above described is used.

All these methods are equivalent modes of obtaining the same result—viz., the heating of the oil.

My apparatus is applicable to petroleum and all kinds of oils, and to the products of petroleum, naphtha, and analogous liquids or fluids.

The cups in which oil is tested, as described above, are very small, and, from their slight bulk, the oil is easily susceptible to the influences of whatever in the shape of fire, flame, or heat is brought near to it.

By the old process of waving a flame over the surface of the oil to ignite the vapor, that surface was undoubtedly heated up; and as it is well known that the heated particles of oil will remain at the top, it follows that the temperature at the top of the oil was greater than that at the bottom, and really greater than the temperature indicated by the thermometer; and as the oil would ignite at its test-heat at the surface, it would catch fire at a temperature not indicated, and the test would be really valueless. Again, the approach of the large flame would not only heat the surface of the oil, but would heat the vapors also, so that they would flash more readily and sooner than was desired. In fact, the flame used to test the oil was a heat-producing agent in itself, and so rendered the test comparatively valueless because of heating the oil at the surface, while the bulb of the thermometer is sunk into the body of the oil.

By my invention an electric spark is flashed through the vapor at intervals, and with such rapidity as to have no practical influence upon the oil itself. This is the great advantage of my invention over previous methods, while at the same time the rapidity and ease with which one man can make these tests also recommend it.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination with the cup L and reservoir C of an oil fire-tester, an electrical apparatus so arranged that an electrical spark from the apparatus flashes the vapor of the oil, whereby the fire-test of the latter is determined, substantially as described.

2. In combination with the cup L and reservoir C of an oil fire-tester, an electrical apparatus so arranged that an electrical spark from the apparatus flashes the vapor of the oil, whereby the fire-test of the latter is determined, and a switch, J, and key H, whereby two or more cups of oil heating at the same time may be tested successively by simply turning the switch and operating the key, substantially as described.

GEO. M. SAYBOLT.

Witnesses:
GEORGE E. BUCKLEY,
HENRY V. BUCKLEY.