F. S. PEASE.

Apparatus for Testing Oil by Electricity.

No. 226,187

Patented April 6, 1880.

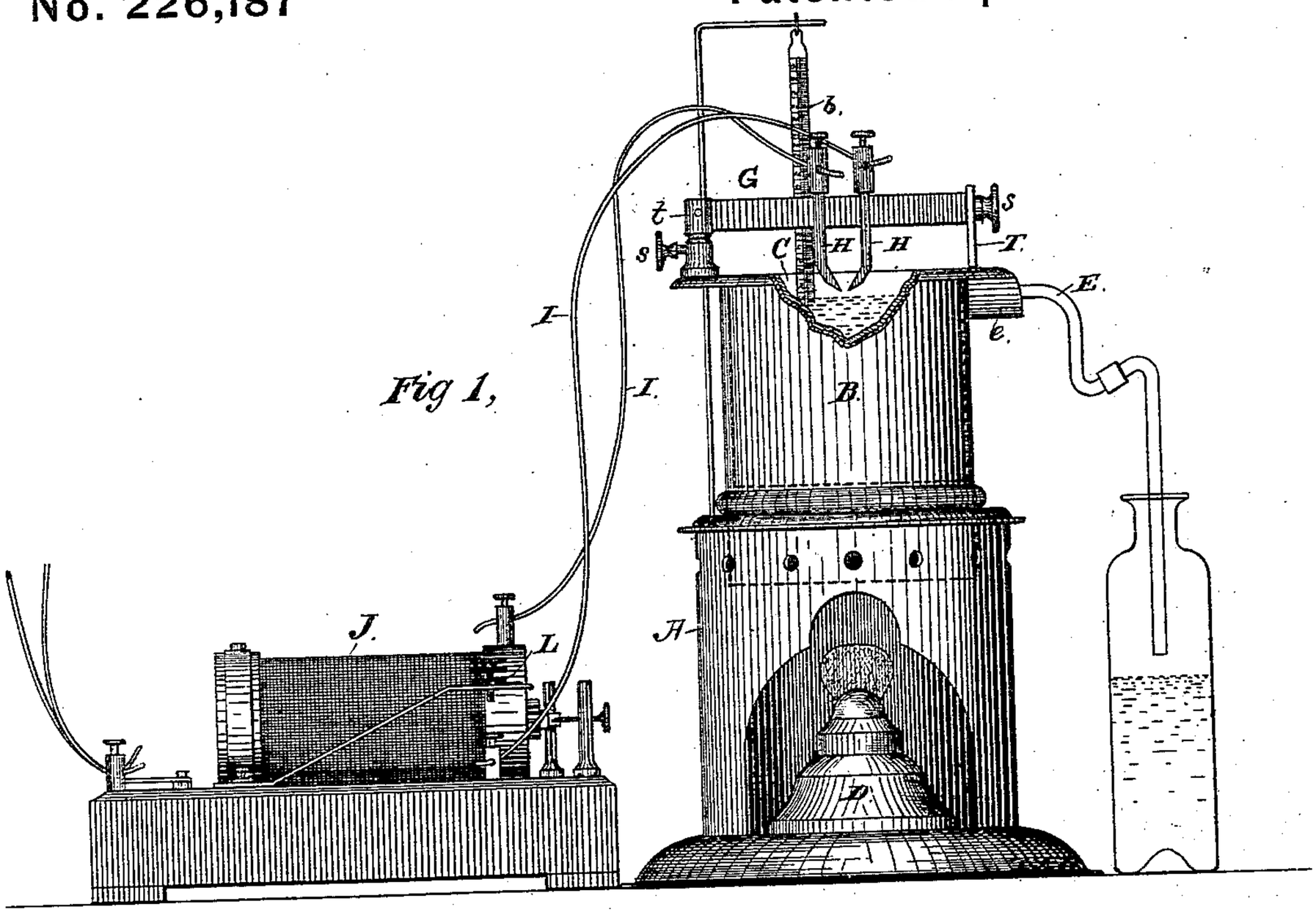

Fig 1,

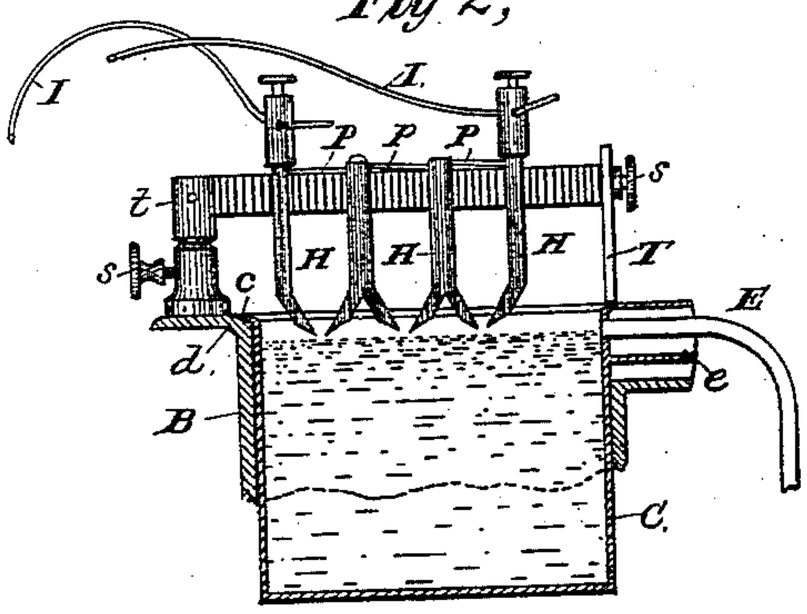

Fig 2,

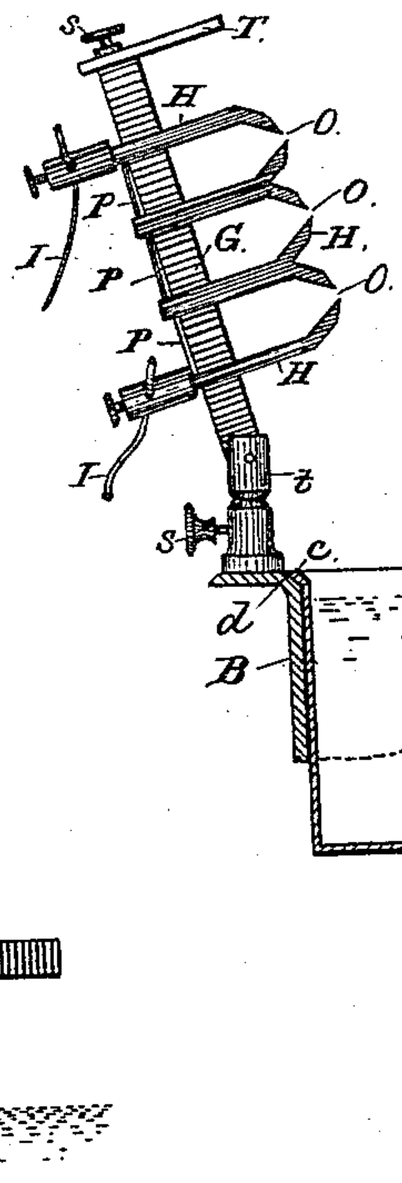

Fig 3,

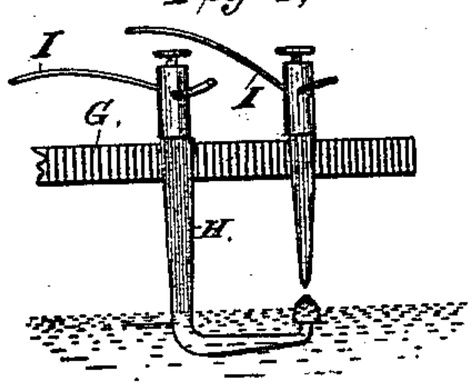

Fig 4,

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UNITED STATES PATENT OFFICE.

FRANCIS S. PEASE, OF BUFFALO, NEW YORK.

APPARATUS FOR TESTING OIL BY ELECTRICITY.

SPECIFICATION forming part of Letters Patent No. 226,187, dated April 6, 1880.

Application filed October 14, 1879.

To all whom it may concern:

Be it known that I, FRANCIS S. PEASE, of Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Apparatus for Testing Oil by Electricity, of which the following is a specification.

This invention relates to apparatus for testing oil by means of electricity; and it consists in a pedestal or heating-chamber supporting a water-bath, an oil-cup supported within said water-bath, an adjustable bridge of non-conducting material adapted to rest across the top of the oil-cup, and carrying one or more poles or plates, which are connected at their upper ends, by means of suitable wires, to an electricity-generator.

To the upper part of the oil-cup is secured an overflow-pipe, which is either of ordinary construction or trapped to prevent the passage therethrough of hydrocarbon vapor, and is surrounded at its upper portion by a casing to protect it from direct heat from the water-bath.

In the accompanying drawings, Figure 1 represents an elevation of the apparatus when connected to an induction-coil, the bridge carrying two poles for the production of a single spark. Fig. 2 represents the bridge with three poles, and having brakes to regulate emission and division of sparks. Fig. 3 represents the bridge in elevated position to permit the removal of the oil-cup. Fig. 4 represents a portion of the bridge carrying two poles, one being placed in contact with the oil, with its point projecting upward toward the downwardly-projecting point of the other pole, for the purpose of producing a perpendicular spark.

A represents a hollow pedestal to receive and support the oil-testing apparatus, hereinafter described. An opening is formed in one side of this pedestal, through which a lamp, D, may be introduced for the purpose of heating the water in the water-bath.

B represents the water-bath, which fits into an orifice in the top of the pedestal A. C is the oil-cup, which fits into the water-bath, and is supported therein by an outwardly-flaring rim, *c*, which rests on a similar rim, *d*, extending from the water-bath. *b* represents a thermometer for testing the oil.

E is an overflow-pipe connected with the oil-cup at the proper distance from the top edge. This pipe is about one-eighth of an inch in diameter, and any additional oil in the cup will run off through this pipe, and thereby keep a uniform height in the cup. The overflow-pipe E is either of ordinary construction or is bent to form a trap, and is fastened at the required distance—say one-fourth of an inch—from the top edge of the oil-cup. Around this pipe, at its upper end, is a casing, *e*, which is fastened to the oil-cup so as to leave an air-space of about a quarter of an inch all around the upper end of the pipe, and projecting so as to clear the water-bath, the sides of which are cut to fit this case. The object of this case or air-chamber around the overflow-pipe is to protect the pipe from direct heat from the water-bath.

The trap, being partly full of oil, will prevent the hydrocarbon vapor, which is heavier than the atmosphere, from passing off through the pipe. This pipe also allows for the expansion of the oil under heat, the extra amount passing off, thereby keeping a relative height in the cup.

G is a bridge, made of hard rubber or any suitable non-conducting material, arranged with a hinge or slide, so that it can be turned perpendicularly and horizontally back and forth out of the way, as in Fig. 3, when the oil-cup is to be removed. On the bridge G are placed two or more metallic plates or poles, H H. The poles are sufficiently far apart to allow a spark to pass from one to the other, their points extending down and near the surface of the oil or fluid. To the top of these poles or plates are connected wires I I from the induction-coil J, which is operated by a battery of any suitable construction. I prefer to use the bichromate battery, as I have found it to be very convenient, as the zinc electrode may be readily removed when not in use.

L represents a key, to connect the circuit and send the spark through the two or more poles or plates H H over the oil.

Figs. 2 and 3 represent a bridge, on which are placed three poles, by which one, two, or three sparks can be sent over the surface of the oil at the same time.

P P P represent three brakes or switches, by which, when left open, as shown, three sparks

are made at the three points O O O at the same time. If the middle key or switch is closed, there will be a spark at each of the two outside poles. If the two outside switches are closed and the middle one left open, one spark will be given forth at the point of the central pole only.

A leg, T, on the end of the bridge, rests on the cup to support the bridge at one end and to steady and keep the points at a proper distance from the cup and oil. The bridge is supported at the other end by an upright, *t*, secured to the top of the water-bath, and the bridge G and leg T are capable of vertical adjustment to or from the top of the oil-cup C by means of set-screws *s*.

The object of the induction-coil is to keep up a steady and uniform spark or power, which is given off at the points of ignition over the oil when required. The power from the coil is regulated by an armature thereon.

Hydrocarbon vapor, being heavier than the atmosphere, rolls over the surface of the oil and avoids contact with anything like a metal independent of the oil and not in moist contact with it.

In order to bring the vapor in contact with the electrical poles, (refined petroleum being a non-conductor,) one pole is placed in the oil or in contact with it, as shown in Fig. 4, with the point projecting just above the surface, the end of the point being in the form of a small cone, or it may be formed out of a simple wire. This brings the pole in moist contact with the oil and vapor. The other pole is arranged on the bridge, so that its downwardly-projecting point shall project directly over the upwardly-projecting point of the pole in contact with the oil. By this arrangement of poles the spark is perpendicular to, instead of horizontal with, the surface of the oil, thereby producing a fine and very close test, always alike for the same oil.

The operation is as follows: The water-bath B being filled with water to the proper height, the cup C is placed therein and the bridge G is turned down horizontally over the cup. The oil or fluid to be tested is then poured into the cup C until it overflows through the overflow-pipe E, and thereby obtains a uniform height. The thermometer *b* is hung in the oil, and the lamp D is lighted and placed below the water-bath. The electrical bridge being placed in its position over the oil-bath, and the connection of the poles being made with the induction-coil and battery, the apparatus is ready to work.

When the thermometer indicates the proper point to test, the key L is pressed, which closes the circuit and sends the spark through the poles H H, directly over the oil. If there is sufficient vapor, it will flash. This can be repeated until the point of ignition is obtained, the thermometer registering the same.

When the fluid is to be changed for another test, the bridge, with its poles H, is removed or turned back, as in Fig. 3, which allows the oil-cup C to be removed and replaced at will.

The overflow-pipe E will take off all the expansion of the liquid and keep it at the same height to the point of ignition, as before mentioned.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. One or more electrical poles, H, having switches P arranged on a movable and adjustable bridge, in combination with an oil-bath of an oil-testing apparatus, as and for the purpose described.

2. The combination of a vertically-adjustable and swinging bridge of non-conducting material, one or more electrical poles attached thereto, and an induction-coil and battery, for the purpose described.

3. The combination of an electrical pole placed in direct contact with the oil, the point projecting above the oil-surface, and an electrical-pole point arranged vertically above the pole, projecting from and in contact with the oil, for the purpose described.

4. The combination of an electrical-pole plate placed in direct contact with the oil, and having a conical point arranged to project above the surface of the oil, and an electrical-pole plate having a downwardly-projecting point arranged vertically above the conical point, for producing a perpendicular spark, substantially as described.

5. The combination of an oil cup or bath, having casing *e* secured at one end thereof, and an overflow-pipe embraced at its upper end by said casing *e*, as and for the purpose described.

6. A casing, *e*, secured at one end to the oil-cup C, and projecting outwardly therefrom to protect the upper end of the overflow-pipe from heat, substantially as set forth.

7. The combination, with an oil-bath, of a trapped overflow-pipe, substantially as and for the purposes described.

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