2 Sheets—Sheet 1.

S. S. MANN.

Device for Testing Illuminating Fluids.

No. 204,235. **Patented May 28, 1878.**

Fig. 1.

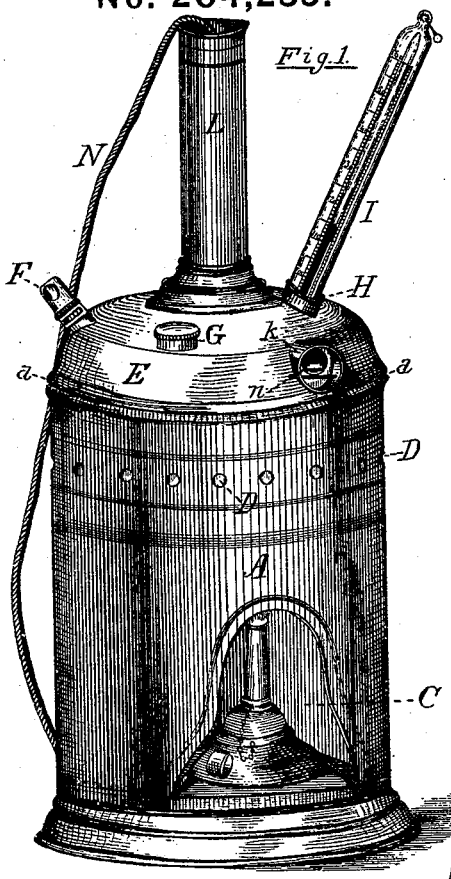


Fig. 2.

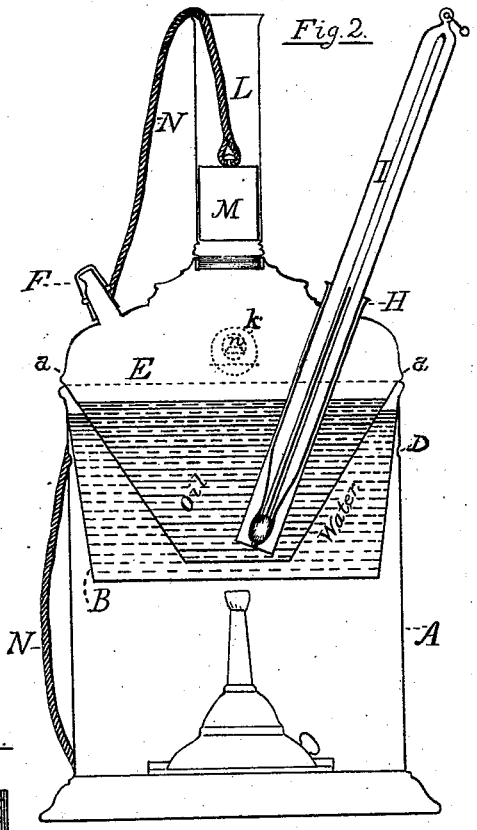
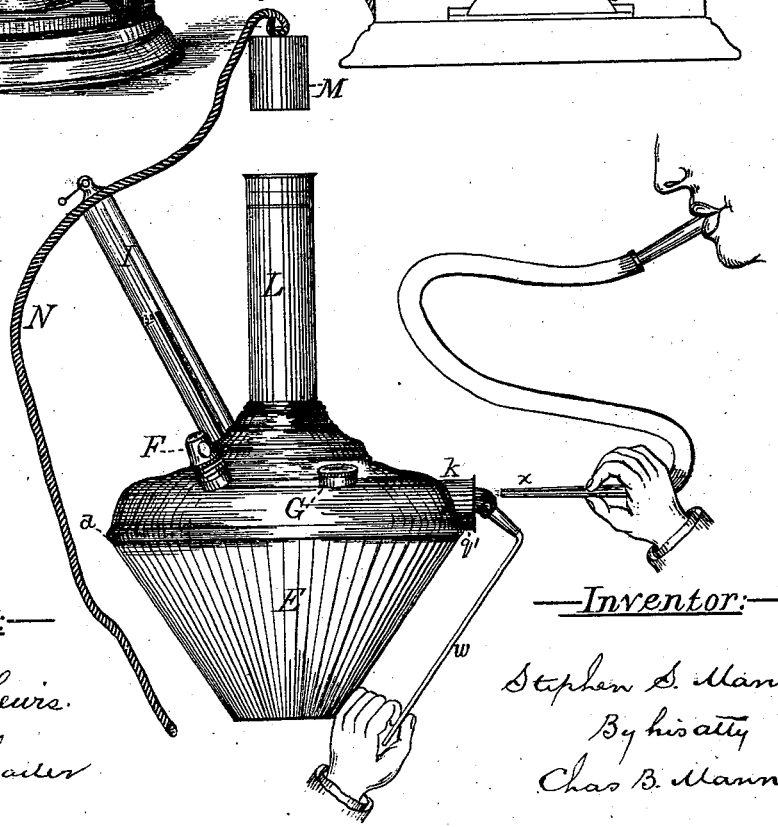


Fig. 3.



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Device for Testing Illuminating Fluids.

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Fig. 4.

Fig. 5.

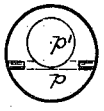


Fig. 6.

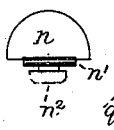


Fig. 7.

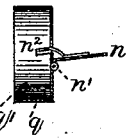


Fig. 8.

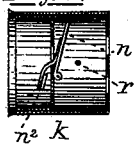


Fig. 9.

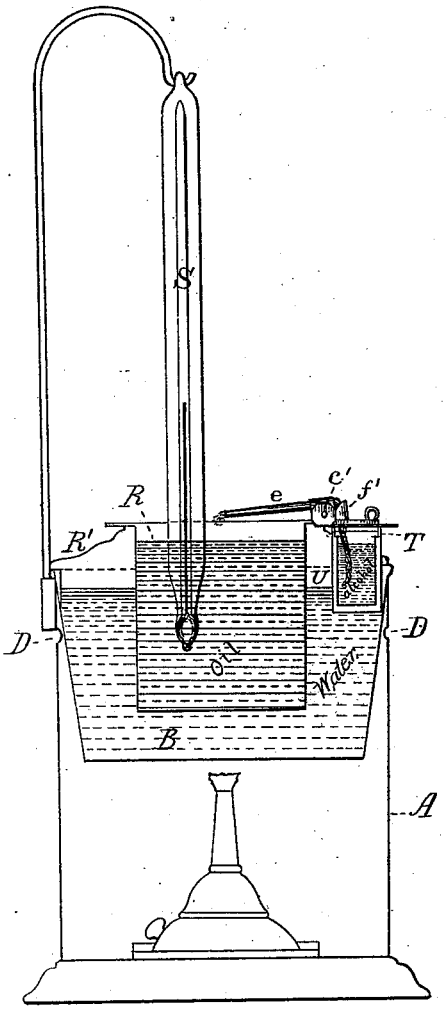


Fig. 12.

Fig. 11.

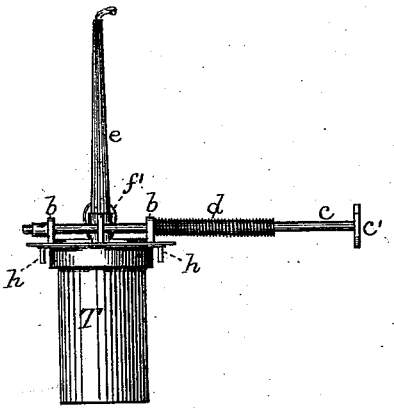
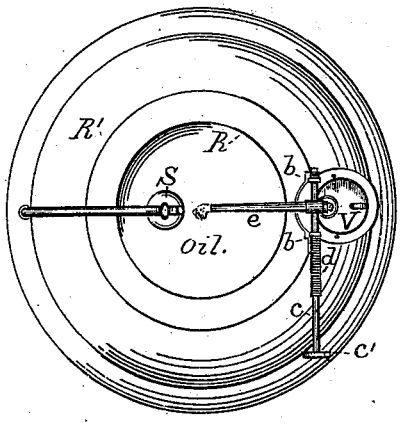


Fig. 10.



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UNITED STATES PATENT OFFICE.

STEPHEN S. MANN, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN DEVICES FOR TESTING ILLUMINATING FLUIDS.

Specification forming part of Letters Patent No. **204,235**, dated May 28, 1878; application filed May 2, 1878.

To all whom it may concern:

Be it known that I, STEPHEN S. MANN, of Baltimore, in the county of Baltimore and State of Maryland, have invented a new and useful Improvement in Oil-Testing Apparatus, of which the following is a specification:

My invention relates to improved apparatus for testing hydrocarbon fluids, by means of which may be readily and accurately shown the degree of temperature at which any specimen of oil will produce vapor in quantity sufficient to make an explosion, and also the temperature at which the oil will ignite, commonly known as the "fire test."

While the fact is known that the products of petroleum having a fire-test of 110° and upward produce a vapor when burnt in lamps at a temperature 25° to 40° below the fire-test, and at this comparately low temperature form an explosive mixture, making a lamp containing a low grade of oil a dangerous thing to use, this danger is not generally realized or appreciated as it should be. There is felt, therefore, a need for an apparatus by which can be given a practical demonstration of a forcible explosion, whereby persons can be made to realize the danger of using the lower grades of hydrocarbon fluids. There is a further need, in connection with an oil-testing apparatus, for a device for applying the jet of flame with uniform precision over the surface of the oil or fluid to be tested, in order that the results of repeated tests may be uniformly accurate. The present invention, therefore, is intended to provide this desideratum.

My invention will first be described in connection with the accompanying drawing, and then distinctly pointed out in claims.

Figure 1 is a view, in perspective, of that part of my apparatus designed to show the explosive test. Fig. 2 is a diagram of same, showing the construction. Fig. 3 is a view showing the method of making the explosive test. Figs. 4, 5, 6, 7, and 8, Sheet 2, are views, in detail, of one form of valve. Fig. 9 is a diagram of apparatus as employed for ascertaining the igniting-temperature. Fig. 10 is a top view of same. Fig. 11 is a view, on an enlarged scale, of the device for applying the jet of flame. Fig. 12 is a perspective view of cover to alcohol-vessel.

The letter A represents the case, in the top of which is suspended a receptacle, B, which constitutes an ordinary water-bath. In the space below the receptacle a spirit-lamp is placed through an opening, C, in the case.

D in the upper portion of case represents outlets to provide a draft for the lamp. E is the oil-receiver—a closed vessel—and constitutes that part of my apparatus analogous to the metal oil-fount of an ordinary lamp. The projecting portion *a* of this oil-receiver is supported on the rim of the case. For convenience, though not essential, the top of the oil-receiver is provided with a screw-cap, G, for filling, and a tight-closing nozzle, F, through which the oil may be turned out. The receiver is also provided with a tube, H, which enters through the top and extends to near the bottom. The lower end of this tube is closed, while the upper end is open to permit the insertion of a thermometer, I.

In an opening in the top of the receiver, preferably in the center, a tube, L, is secured, both ends being open.

M is a projectile, made of any suitable material, admitting of slight compression. Various materials are adapted to this use, but I prefer rubber.

The projectile is preferably elongated, as shown in Fig. 3, and in cross-section of shape and size to fit the tube tolerably tight. To prevent the loss of the projectile when it is forced from the tube, as hereinafter explained, the cord N is attached. Through the upper portion of the receiver is inserted a short tube, *k*. In the present example this tube is round, but it may be made, with as good advantage, square, in cross-section. A valve, *n*, fitted in this tube and opening inwardly, is arranged to close by the slightest pressure from within. This valve may be constructed in different ways, and serve the same purpose equally as well as the one here shown, (see Fig. 4,) which is an end view, showing the valve closed. A circular plate, *p*, having a hole, *p'*, constitutes the valve-seat. (See Fig. 5.) The valve *n* is a semicircular plate, and is hinged in an ordinary manner (shown at n^1) to the valve-seat. Attached on the other side of the hinge part of valve is a weighted projection, n^2, which is on the outer side when

the valve is closed. This weighted projection serves the double purpose of holding the valve, when closed, tightly to its seat, and of a handle by which the valve, when open, may be closed from the outside. The valve-seat *p* is secured to a short section of tube, *q*, which is of a size to fit snugly within the outer end of tube *k*, to which it is secured by a pin, *q'*, passing through both tubes. Thus secured, the valve is firmly held in place, but may be readily removed by a withdrawal of the pin. A pin, *r*, is secured across the tube *k*, back of the valve, and serves to support the valve, when open, at an angle above the horizontal of about forty-five degrees.

The letter R represents an open oil-cup, having a flange, R', to fit in the rim of the case A. A thermometer, S, is suspended so that the bulb will be well immersed in the oil. At one side of the instrument is secured a spirit-receptacle, T, which, in the present instance, is inserted in a pocket, U, depending from the top of flange R'. The pocket is large enough to afford a space all around between it and the alcohol-receptacle, which is suspended at the upper rim. The top flange of the spirit-receptacle is provided with two upward-extending ears, *b*, which afford bearings for a horizontal shaft, *c*, having a button, *c'*, on the end, for facility of turning. A spiral spring, *d*, is wound around the shaft and the outer end secured thereto, the inner end being secured to the ear *b*. A tapering wick-tube, *e*, is secured by the larger end to the shaft between the ears, and when at rest stands in a vertical position, but may be turned down to a horizontal position by catching hold of the button *c'*, upon releasing which the spring will immediately raise the tapering tube to a vertical position again. The small end of the tapering tube, in practice, has an opening of about sixteen wire-gage. The spirit-receptacle is adjusted and held to its position by two depending pins or lugs, *h*, which fit into holes in the flange or top of the apparatus, but it may be held in any other manner. The top of the spirit-receptacle is provided with a cover, V, having on one side a circular opening, *f*, with a slot through the rim, the aforesaid opening being provided with an upward-projecting hood, *f'*. This hood fits around the tapering tube, *e*, as shown, and serves to guide the wick back into the alcohol-receptacle. The cover is also provided with a small knob or ring, by which it may readily be removed.

The operation of my tester will now be described.

To ascertain the "fire-test" the apparatus is employed as shown in Fig. 9. The small jet of flame on the tapering wick-tube *e* is applied over the oil by turning shaft *c* at regular intervals, in a manner readily understood by persons familiar with testing oil, affording the advantage of exact uniformity as to distance of the flame from the surface of the fluid.

Having ascertained the fire-test, or the fire-test being known, the explosion-test is made in the following manner: There should be sufficient oil to fill the receiver about half-full. The water should be heated only to about 30° below the burning-point or fire-test of the oil, already known. While the oil is acquiring the degree of heat indicated all the inlets in the receiver should remain open, and when the proper temperature is reached the collection of vapor that may then be in the receiver should be dissipated or blown out, which may be thoroughly done by means of a flexible rubber bulb having a small tube, through which air is forced into the receiver, expelling the vapors, or it may be done in any other manner. The openings are now all closed, the projectile M is pushed down the tube L, the temperature of the oil is carefully maintained by noting the thermometer I as it stands in the tube H, and a sufficient time must now be allowed for the formation of the explosive mixture in the receiver. The time required for this varies as the oil is lighter or heavier. With an oil having a fire-test of 110° eight minutes are found to be requisite, while if the oil is of a heavy grade, such as 175° or more, a greater time is required. For convenience of operation a schedule showing time required for oils of different grades may be arranged, which would serve as a guide; but I do not consider it essential to give such a schedule in full here.

When the requisite time has elapsed to bring it into proper condition the valve is pushed open and a lighted match, or, preferably, the small lighted torch W, which is a small piece of pumice-stone secured in a metallic handle and saturated with alcohol, is placed before it, the flame from which is blown through the valve by means of the small tube *x*, one end of which is held in the mouth. If the explosive mixture is present an explosion instantly follows with a loud detonation, forcing the projectile out. The thermometer will indicate the temperature, thus giving the explosive test.

Having described my invention, I claim and desire to secure by Letters Patent—

1. The oil-receiver E, provided with the thermometer-tube H and projectile-tube L, and a valve arranged to be closed by pressure from within, substantially as set forth.

2. In an oil-testing apparatus, the combination, with the oil-receiver E, provided with the tube L and a valve to be closed by pressure from within, of a projectile, N, made of any suitable material admitting of slight compression, as and for the purpose specified.

3. The combination, in an oil-testing apparatus, of case A, having the water-receptacle B, below which is placed a lamp, oil-receiver E, having a tube, L, and a valve to be closed

by pressure from within, and a projectile to fit the tube, all substantially as specified.

4. In an oil-testing apparatus, the stationary alcohol-receptacle T, to which is attached the horizontal shaft *c*, turning in suitable bearings and having a spiral spring, *d*, wound around and secured thereto, and the tapering wick-tube *e* secured to the shaft, substantially as shown and described.

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