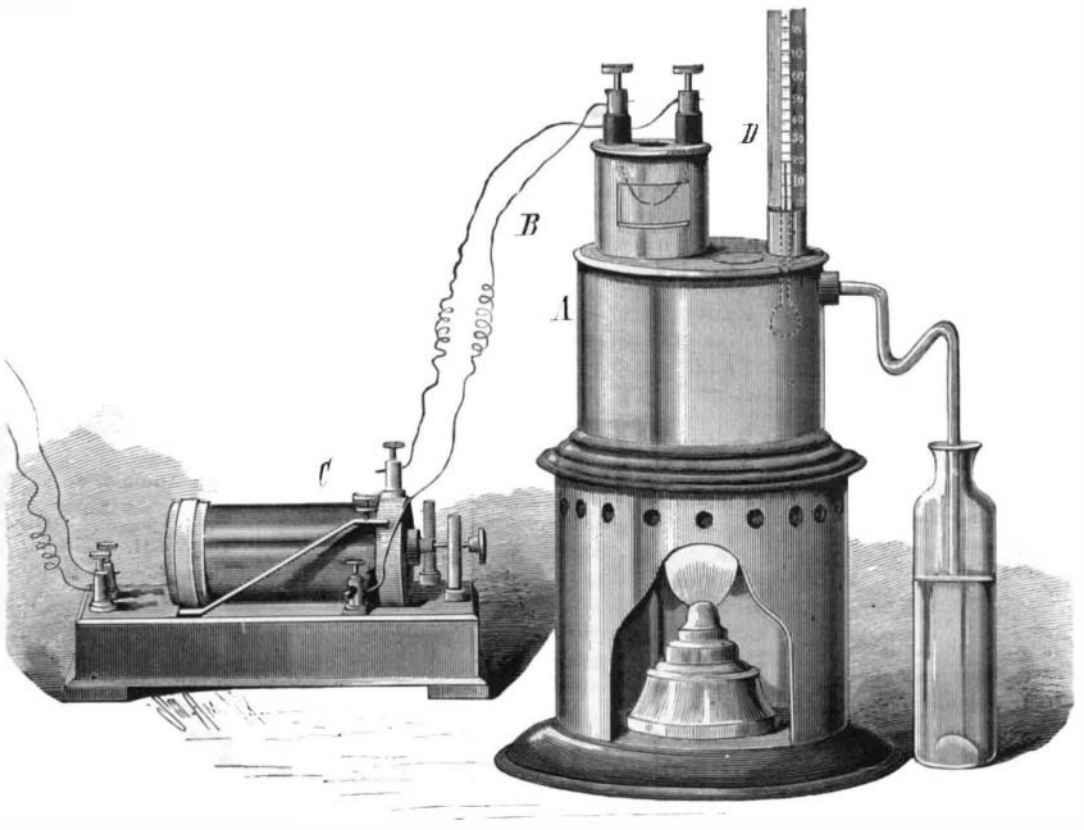
NEW OIL-TESTING APPARATUS.

The annexed engraving represents a new oil-testing device, recently patented by Mr. F. S. Pease, of Buffalo, N. Y., and designed for testing petroleum oils by electricity. A water bath, A, supported by a heating chamber, contains a cup for receiving oil, above which there is a dome, B, provided with two insulated binding posts, from which two or more electrodes project downward. These electrodes are provided with switches, by which one, two, or three sparks can be given at different points, and twenty or more changes can be made. The binding posts at the top of the dome are connected with the terminals of the secondary wire of an induction coil, C. A thermometer, D, is inserted in the top of the device to indicate the temperature of the oil, and an overflow pipe leads from the side of the oil cup near the top, and has a slight bend or trap formed in it to prevent the escape of vapors driven from the oil, while it admits of the overflow of the oil in case of its expansion, and always keeps the oil at a uniform height. The induction coil furnishes a constant means of igniting the vapor driven off from the oil, without the admission of air.

The ordinary closed and open test now in general use cannot be called absolutely correct, owing to the variations in expansion, the uncertainty in the application of the fire to the oil, there being no standard established as to the amount of fire to be applied or the point at which the vapor is to be ignited, the application of the point of light to the oil being optional with the operator. The new electrical test obviates all these difficulties, and secures tests which are always the same, and absolutely correct to a fraction of a degree. It determines the expansion of the oil, accounts for, corrects, and measures it; also prevents the escape of the hydrocarbon vapor, and regulates and keeps the oil at a fixed height and exact distance to the point of combustion, things never before accomplished. The electrodes are so arranged as to detect the vapor in its minimum quantity, and at any point relative to the surface of oil, and the igniting points being always at a determined distance from the oil. In testing refined oil the ordinary quantity used for the oil bath is about 3¼ fluid ounces, equal to 91·14 grammes; and properly refined, that is, an unmixed oil, when the distillation cut off at 52° Baumé, with a yield of, say 17 to 20 per cent, with a flash of 150° to 152° and fire test of 160° Fah., and market gravity of 45° to 46° Baumé, and real specific gravity of 800; such an oil, heated to its igniting point, expands four grammes, consequently the surface of the oil and vapor in the ordinary open or closed test approaches the fire at every degree of increase in the heat, and at its igniting point is 0·32 to 0·48 centimeter nearer than at the commencement of the test. No provision has ever before been made to compensate for this source of error.



PEASE'S OIL-TESTING APPARATUS.

In high test oils the amount of the hydrocarbon vapor is small, and is developed in detached quantities up to the point of combustion, and not of sufficient quantity to cover the oil test surface, and its tendency or attraction is to the moist sides of the oil bath; and when the test is usually made the vapor ignites at the side of the cup first, travels the entire circumference of the oil bath before flashing over the surface, while the center surface of the oil is comparatively free.

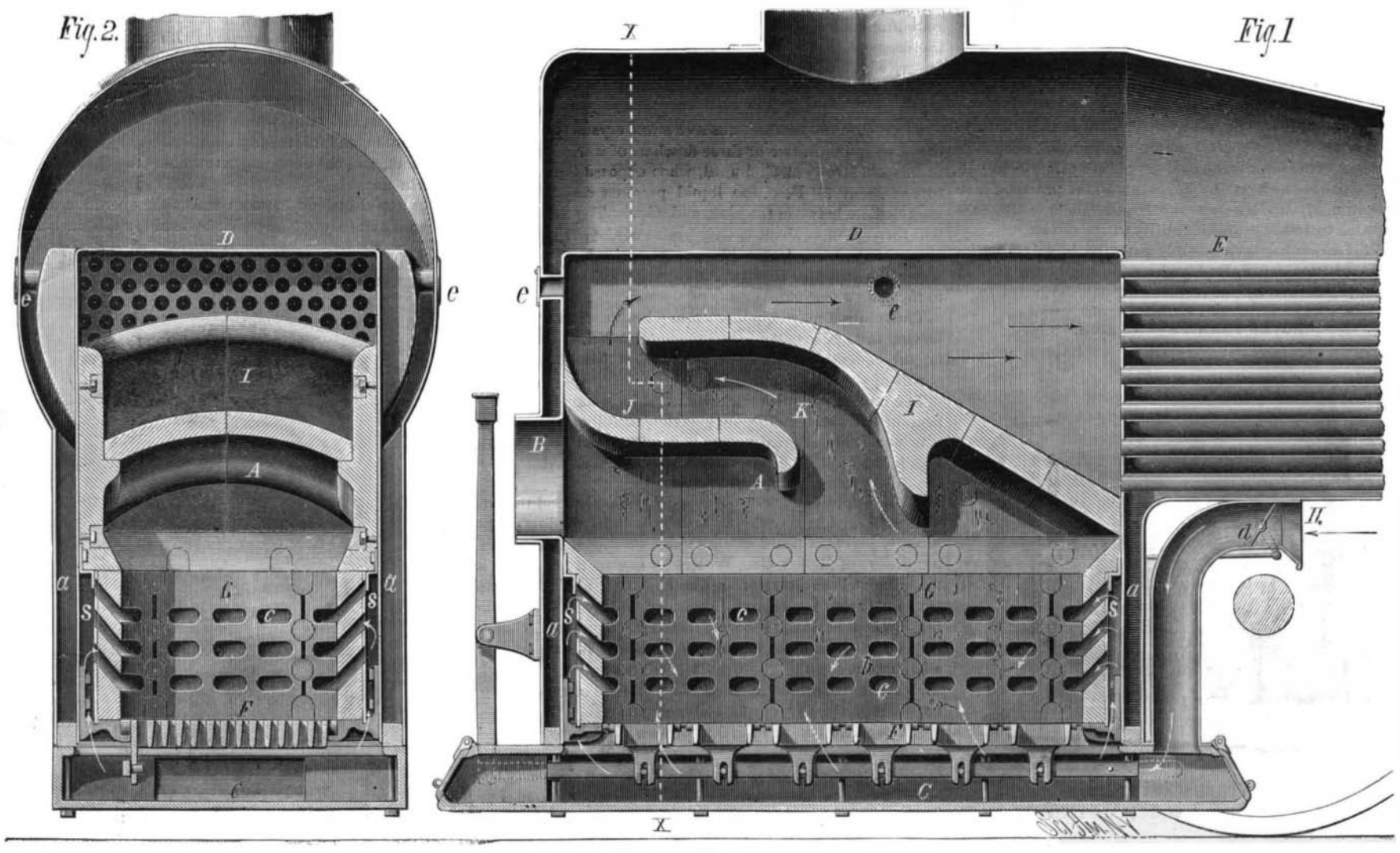
In low test oils the vapor is disengaged at every degree of increase in heat, making them more or less dangerous, and it only requires the half of one per cent of this vapor to make oils dangerous. Professor Chandler, of Columbia College, New York city, reports "that not one of seventy-eight samples selected at random throughout cities may be called safe."

Mr. Pease finds that refined petroleum oil is a good, if not a perfect, non-conductor of electricity; that by adjusting the two poles to a 0·32 of a centimeter apart, and placing them in the oil, a discharge from a powerful induction coil will not go through the oil, but will discharge between the two poles out of the oil, which are 1·92 of a centimeter apart. This fact enabled Mr. Pease to adjust and arrange a test to a minimum by arranging a pole in contact with the oil, with its point projecting upward toward a downwardly projecting point of the other pole, a moist surface of sufficient size being provided for the vapor. By this arrangement the vapor is detected, and explodes at the surface center of the oil bath as well as at other points, the spark being perpendicular to or from the oil. A horizontal discharge of sparks from the electrodes is a severe test, making a difference of one or more degrees for or against the oil. Mr. Pease's ingenuity has been displayed in a great many ways for the past 30 years, but it may be questioned whether his mechanical skill has ever better expressed itself than in the device referred to.

IMPROVED HOT-BLAST BOILER FURNACE.

In the minds of those conversant with the subject, no doubt exists as to the enormous waste going on in the majority of boiler furnaces in use to-day, and it is demonstrable that in many instances the better and even the greater part of the fuel goes out of the smoke stack unconsumed, and therefore unutilized. This is especially the case in the class of boilers used on locomotives and steamships, everything being sacrificed to compactness. Certain fundamental principles are involved in the combustion of fuel which seem to have been overlooked by inventors generally, and if not overlooked, the remedy for the evil results attending the non-observance of these principles seems to have been wanting. It is well known that boiler furnaces, as ordinarily arranged, are little else than gas retorts generating carbonic acid gas, carbonic oxide, and carbureted hydrogen: these gases under the conditions usually met in boiler furnaces are entirely wasted.

Carbonic acid is as incombustible as water, but if another portion of carbon be added or a portion of oxygen be withdrawn, carbonic oxide is formed, which, under the proper conditions, may be utilized and rendered a source of profit



PIKE'S HOT-BLAST BOILER FURNACE.