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DISTILLATION TESTING APPARATUS

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Fig. 1

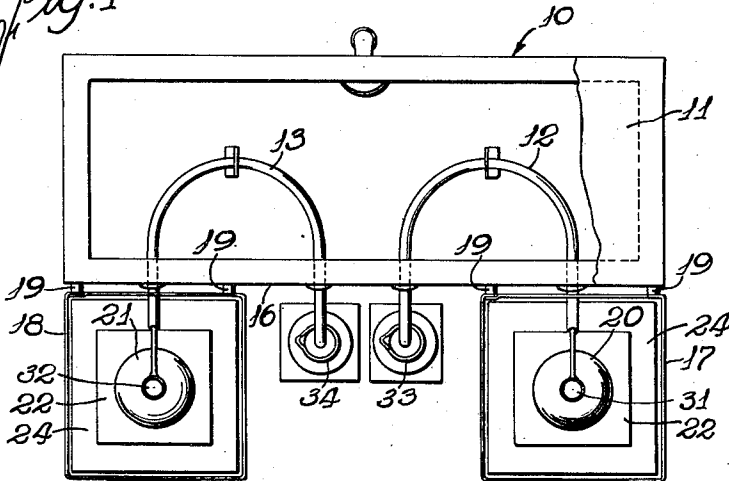
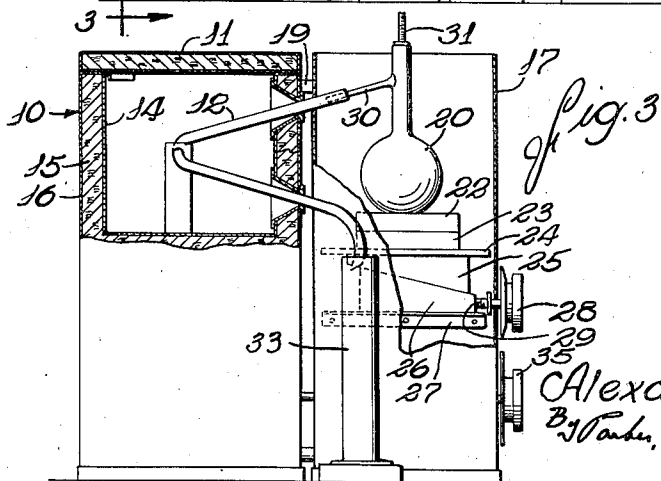
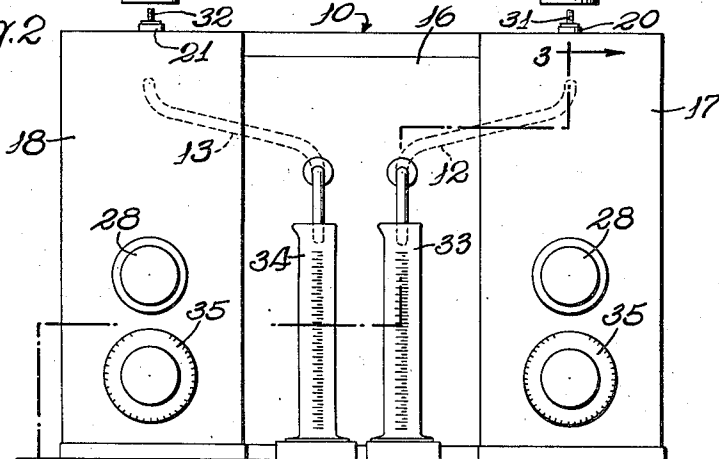


Fig. 2



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DISTILLATION TESTING APPARATUS

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4 Claims. (Cl. 23-253)

The present invention relates to improvements in distillation apparatus such as is used, for example, in making fractional distillation tests on petroleum.

5 The primary object of the invention is to provide an improved distillation testing apparatus which is extremely compact in form, can be readily utilized in making up a wide variety of multiple unit installations, and in which readings can readily be taken from a plurality of instruments included in the device substantially simultaneously, thereby materially increasing the efficiency of operation and the precision of the results obtained.

10 Further objects and advantages of the invention will become apparent as the following description proceeds, taken in connection with the accompanying drawing in which:

15 Figure 1 is a plan view of a distillation testing apparatus embodying the invention.

Fig. 2 is a front elevation of the apparatus of Fig. 1.

Fig. 3 is an end elevation of the apparatus, partly in section along the line 3-3 in Fig. 3.

25 For purposes of exemplification the invention has been disclosed herein as embodied in a distillation testing apparatus particularly suited to the making of petroleum distillation tests in accordance with A. S. T. M. standards. Various changes may, however, be made in the apparatus as may be required, for example, for a particular type of test. Accordingly, even though one particular embodiment of the invention has been shown and described in some detail, there is no intention to thereby limit the invention to such embodiment, but, on the other hand, the appended claims are intended to cover all modifications and alternative constructions falling within the spirit and scope of the invention.

40 The exemplary apparatus (Fig. 1) constitutes what may be termed a "double-unit," since even though it comprises a single unitary structure or unit, provision is made in this unit for simultaneously running independent fractional distillation tests on two different samples of liquid. The double-unit shown includes a generally rectangular condenser tank 10 having a removable cover 11. Ice or other suitable refrigerating medium is furnished to the condenser to cool the vapor supplied, in a manner hereinafter described to the single turn condenser coils or tubes 12 and 13 located within the condenser tank. The tank 10 has a metal liner 14 (Fig. 3) covered with suitable thermal insulation 15, such as cork, and an outer metal casing 16.

Projecting from the opposite ends of the flat front wall of the condenser casing are two rectangular shields or casings 17 and 18 fixed to the condenser by studs 19. These shields may be made of sheet metal such as stainless steel and are generally tubular in form with open upper ends. Within the shields 17 and 18 are mounted respectively, vaporization flasks 20 and 21 as well as suitable heating units for the same. The arrangement of parts in each of the shields is identical and, accordingly, a description of one will suffice for both.

The flask 20 in the shield 17 (Fig. 3) is mounted on an apertured refractory block 22 resting on an insulated electrical resistance heating unit 23. This heating unit is, in turn, carried on a rectangular thermal insulating board 24 resting on the upper one of a cooperating pair of wedge blocks 25 and 26. The edges of the board 24 are guided for vertical movement by the side walls of the shield 17, and vertical adjustment of the flask 20 is accomplished by moving the lower wedge block 26 longitudinally in or out. This lower wedge block is slidably mounted on a pair of bracket type rails 27 secured to the inner side walls of the shield 17. To move the wedge block 26 in or out, and thus adjust the height of the flask 20, a knob 28 is provided at the front of the shield 17 and is fixed on the end of a shaft 29 threaded in a tapped hole in the end of the wedge block. Thus, by rotating the knob 28 the wedge block 26 can be moved in or out and the vertical position of the flask 20 adjusted with nicety. This adjustment is desirable in order to bring an outlet spout 30 on the flask into proper registry with the inlet end of the condenser tube 12. Variations in glassware will cause the location of the outlet spout 30 to be somewhat different on successive flasks used in the apparatus.

The tops of the flasks 20 and 21 extend through the open upper ends of the respective shields 17 and 18 (Fig. 2). In the mouths of the flasks are mounted thermometers 31 and 32, respectively, so that they are in plain sight from the front or the apparatus. These thermometers indicate the temperature of the liquid being distilled, a factor which is extremely critical in a fractional distillation test and must be accurately checked during the progress of the test.

To facilitate virtually simultaneous observation of the temperature of the liquid being distilled and the quantity of distillate produced, the instruments for indicating both these data are arranged substantially side by side or, in other words, in a single line of vision from the front

of the device. The temperature of the liquid is, as heretofore noted, shown by the thermometers 31 and 32. The distillate produced is, on the other hand, discharged in collecting receptacles shown in the form of graduates 33 and 34 (Fig. 3). These graduates are arranged at the front of the apparatus between the shields 17 and 18 and in close proximity to the thermometers 31 and 32. Consequently, an operator very easily can observe both the temperature indicated by the thermometer 31 and the amount of distillate accumulated in the graduate 33. And, without any particular difficulty, he can also observe at substantially the same time the thermometer 32 and graduate 34. Consequently, all essential physical factors of the test can be watched with no discomfort to the operator so that chances for error are virtually eliminated and accuracy promoted.

In order to accomplish the relative location of the flask thermometers and graduates noted above both ends of each of the condenser tubes 12 and 13 are arranged to project substantially side by side through the front wall of the condenser 10. For this purpose the tubes are made generally U-shaped in form (Fig. 1) so that the necessary length and inclination of the tubing is accommodated in a minimum of space. Also, by virtue of this arrangement a very compact instrumentality is achieved with a minimum overall length.

In the operation of the apparatus described samples of liquid petroleum to be tested are placed in the flasks 20 and 21. By turning the knobs 28 the heights of the flasks are adjusted so that their outlet spouts fit properly in the inlet ends of the respective condenser tubes 12 and 13. The contents of the flasks are heated by the heating units 23, the temperature being regulated through the medium of a control device (not shown) actuated by manual adjustment knobs 35 on the front faces of the shields 17 and 18. The vapor rising in the flasks is discharged into the respective condenser tubes 12 and 13 where it is cooled by the refrigerating medium of the condenser 10 and the distillate thus formed flows into the respective graduates 33 and 34. The operator observes the temperatures within the flasks, as indicated by the thermometers 31 and 32, as well as the quantities of distillate produced at various temperatures all in accordance with the usual fractional distillation testing procedure. Throughout the course of the test, accurate observation and recording of the temperatures and quantities of distillate are made possible by the juxtaposition of the instrumentalities of the device which must be observed and the heat control regulating knobs 35. It should be further noted that all of the instrumentalities of the apparatus can be readily manipulated from the front of the unit so that no time is lost either while running a test or in setting up the apparatus for a new test.

With the unit type of construction illustrated any number of these units may be provided in, for example, end-to-end or back-to-back alignment, as the layout of a particular laboratory requires. The unit type of construction gives a wide choice of arrangements and on the other hand, the double-unit construction shown makes it possible for a single operator to maintain a scrupulously accurate check on the progress of a maximum number of tests.

I claim as my invention:

1. A distillation testing apparatus comprising, in combination, a condenser embodying an elongated casing with a flat front wall, two shields disposed forwardly of said casing wall at opposite ends thereof and spaced a short distance apart, each of said shields having therein a flask adapted to contain the liquid sample to be distilled and means for applying heat to the flask, a thermometer projecting upwardly from each of the flasks above the tops of the respective shields, two graduated distillate receptacles disposed forwardly of the condenser front wall and between said shields in the same general line of vision as said thermometers, and individual condenser tubes supported within the condenser casing and arranged with their inlet ends projecting forwardly into said shields for connection with said flasks and with their outlet ends projecting forwardly to said receptacles.

2. A distillation testing apparatus comprising, in combination, a condenser embodying an elongated casing with a flat front wall, two shields disposed forwardly of said casing wall at opposite ends thereof and spaced a short distance apart, each of said shields having therein a flask adapted to contain the liquid sample to be distilled and means for applying heat to the flask, individual regulating devices for each of said heating means including manual operating knobs located on the fronts of the respective shields, a thermometer projecting upwardly from each of the flasks above the tops of the respective shields, two graduated distillate receptacles disposed forwardly of the condenser front wall and between said shields in the same general line of vision as said thermometers, and individual U-shaped condenser tubes supported within the condenser casing and arranged with their inlet ends projecting forwardly into said shields for connection with said flasks and with their outlet ends projecting forwardly to said receptacles.

3. A distillation apparatus comprising, in combination, a condenser embodying a casing having a flat front wall, a shield disposed forwardly of said condenser casing wall adjacent one end thereof, a flask supported in the upper portion of said shield and arranged to contain the liquid to be distilled, means within the shield for applying heat to the flask, a thermometer projecting upwardly from the flask above the top of the shield, a receptacle for the distillate disposed forwardly of the condenser and at one side of said shield in position to be viewed from the front of the apparatus virtually simultaneously with said thermometer, and a condenser tube disposed within said condenser casing and having its inlet end projecting forwardly therefrom into said shield for connection with said flask and its outlet end projecting forwardly to said receptacle.

4. A distillation testing apparatus comprising, in combination, a distillation flask adapted to contain a liquid to be distilled, a graduated receptacle, a shield adapted to receive said flask, a thermometer projecting upwardly from said flask, said receptacle and shield being disposed side by side in laterally spaced relation, a condenser casing for a cooling medium disposed rearwardly of said receptacle and shield, and a U-shaped condenser tube supported in inclined position within the condenser casing and arranged with its upper inlet end projecting forwardly into said shield and with its lower outlet end projecting forwardly to the receptacle.

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