

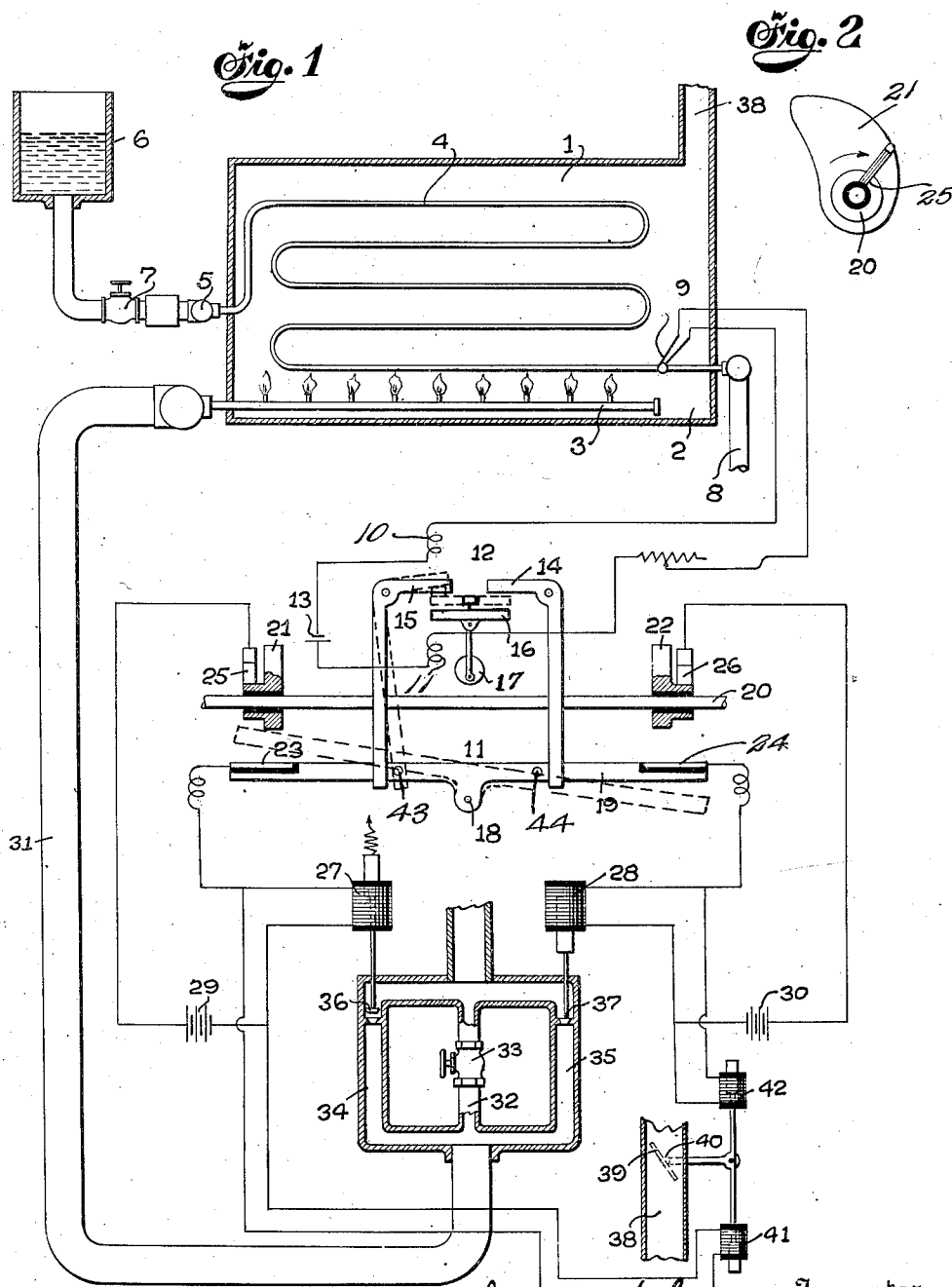
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METHOD OF TREATMENT OF HYDROCARBONS

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METHOD OF TREATMENT OF HYDROCARBONS

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My invention in its broader aspects has to do with the treatment of liquid hydrocarbons, as for instance by cracking to convert higher boiling point constituents to lower boiling point constituents, and provides means whereby the process is carried on at a substantially constant rate of flow of the liquid hydrocarbons through the still and at a substantially constant temperature at a predetermined point of the still, the fuel supply to heat the still being regulated in accordance with temperature variations of said predetermined point.

My invention also involves the provision of means whereby the regulation of the fuel supply may be easily, quickly and positively accomplished by means of apparatus of a simple character, adapted to continuous operation without likelihood of derangement.

My said apparatus, generally speaking, comprises means responsive to variations in temperature of a given point of the still, as for instance, the thermo-couple of a pyrometer, and means to translate the temperature variations into movement adapted to actuate the regulating apparatus.

In the drawings I have shown:

In Figure 1 a diagrammatic illustration of a still and regulating apparatus containing my invention.

In Figure 2 a detail view of a portion of the regulating apparatus.

It will be understood that these drawings are purely diagrammatic in character and that I do not intend to confine myself to any of the specific details illustrated or described in the following specification, since, obviously they may be greatly varied without departing from the spirit of my invention.

I have shown at 1 a pipe still, which may be of any suitable conventional form, provided with a furnace 2 which is heated by means of a fluid burner, such for instance as oil burner 3, which may also be of any suitable conventional form. In practice the number and arrangement of the coils 4 may be greatly varied, the arrangement illustrated being a purely diagrammatic showing. The coil 4 is supplied with the hydrocarbons to be treated through a meter 5 supplied with hydrocar-

bon from a suitable storage tank 6, through a hand or automatic valve 7. Valve 7 may be of any suitable type, adapted to maintain a substantially constant rate of flow of the hydrocarbons to be treated to the coil 4. The coil 4 discharges into a pipe 8, which is connected to a condenser or other apparatus suitable for the separation of the liquid from the volatile constituents, or such other apparatus as the process with which the furnace is used may render necessary.

Located adjacent the outlet of the coil 4 is the pyrometric thermo-couple 9, which is connected to a galvanometer, shown diagrammatically, by the coils 10 and 11, the needle 12 and a standard cell 13, in the manner well known in the art. Pivotally mounted within the range of movement of the galvanometer needle 12, are the bell cranks 14 and 15. On the opposite side of the needle 12 is located a chopper 16 actuated by any suitable mechanism, illustrated diagrammatically at 17, to cause the chopper to be brought into contact with the needle, and the needle in turn with the bell cranks 14 or 15, depending upon the direction in which it is deflected. Power to move the bell cranks 14 and 15 is therefore taken from the mechanism 17 and not from the galvanometer needle; the galvanometer needle simply determining the selection of the bell cranks 14 and 15 and their extent of movement, since it will be obvious that a greater deflection of the needle for a given throw of the chopper will produce a greater movement of the bell cranks.

Pivotally mounted, as at 18, is a bar 19, carrying studs 43 and 44 with which the depending arms of the bell cranks 14 and 15 are adapted to cooperate to cause deflection of the bar 19 from its normal position, in which it is illustrated, by rotation about the pivot 18. It will be evident that the extent of the deflection of bar 19 from its normal position would be dependent upon the extent of movement of the bell cranks 14 and 15 which in turn depend upon the deflection of the needle 12 of the galvanometer.

Located adjacent to the bar 19 is a restoring mechanism which comprises a constantly rotating shaft 20, upon which are mounted cams

21 and 22, which may have the general form shown in Fig. 2. Said cams are adapted in their rotation to strike the elevated ends of bar 19 and restore the bar to the position illustrated in Fig. 1. Cams 21 and 22 are insulated from shaft 20 and the portions of the bar 19 with which they contact comprise insulated contact pieces 23 and 24. Contact pieces 23 and 24 and cams 21 and 22, by means of brushes 25 and 26, are connected to solenoids 27 and 28 and to batteries, or other suitable source of current, 29 and 30.

Fuel is supplied to the burners 3 by means of fuel supply pipe 31 from a suitable source of fuel supply (not shown). It will be understood that my device is applicable to various kinds of fuel, but that I have shown it in connection with a fluid fuel, such as oil or gas. Fuel supply pipe 31 is connected to supply line 32, which, by means of valve 33, is given a fixed predetermined opening somewhat less than the normal requirements of the burner. In addition to the line 32 there are two auxiliary lines 34 and 35 which are respectively controlled by valves 36 and 37. These valves may be of any suitable form, such as the poppet valves illustrated, and are operated by means of the solenoids 27 and 28 respectively. In the normal position of the apparatus as illustrated, valve 36 is open, thus allowing the fuel to pass through the auxiliary line 34 and the valve 37 is closed shutting off the auxiliary line 35. The amount of fuel flowing through the normally open valve 36 plus that flowing through valve 33 therefore constitutes the normal fuel supply.

If desired, means may be provided for regulating the draft of the furnace in response to temperature variations affecting the pyrometric thermo-couple, and means for obtaining such regulation is diagrammatically illustrated in Fig. 1, in which 38 may be taken to be the stack of the furnace, 39 a damper pivotally mounted at 40, which damper is moved by means of the solenoids 41 and 42. Solenoids 41 and 42 are connected either in series or in parallel (the parallel arrangement being illustrated) with solenoids 27 and 28, and thus operate simultaneously therewith. A normal opening corresponding to the normal fuel flow is given the damper. It will be noted that when solenoid 41 is energized the damper is closed, and when solenoid 42 is energized the damper is opened. The operation of my improved apparatus is briefly as follows:

The rate of flow of hydrocarbon to the furnace having been adjusted by means of the valve 7 and being maintained substantially constant, and the temperature of the furnace being regulated by means of valve 33 to produce a suitable temperature of the hydrocarbons or their vapors at the outlet, as evidenced by the thermo-couple 9, any variation in the temperature at the outlet of the still

will cause a deflection of the galvanometer needle 12; thus for instance, an increase in the temperature will cause a deflection such as that illustrated in the drawings, and movement of the chopper 16 will cause bell crank 15 to raise bar 19 at its left hand end. The cam 21 will thus in its rotation be brought into contact with contact 23, owing to the shape of the cam. Since the deflection of the bar 19 is a function of the deflection of the needle 12, it is evident that the duration of the regulation due to the contact of cam 21 and contact 23 will be a function of the deflection of the needle 12, that is to say, of the extent of the departure of the temperature at the outlet of the still from normal. Cam 21 and contact 23 close the circuit through solenoid 27, energizing same and causing valve 36 to close, thereby decreasing the amount of fuel supplied to the burner. The regulation is therefore accomplished by a series of puffs of decreasing duration as the temperature approaches normal. Similarly a decrease in still temperature below normal will cause a deflection of the galvanometer needle 12 to the right causing a raising of the right hand end of the bar 19 and the energization of solenoid 28 and a consequent opening of the valve 37 to supply more fuel to the burners.

If the damper regulation illustrated is used, the energizing of the circuit through solenoid 27 will also energize solenoid 41 thus shutting the damper and the energizing of the circuit through solenoid 28 will energize solenoid 42 opening the damper.

It will be evident that when the deflection is to the left as illustrated only the solenoids 41 and 27 are energized, and that no effect is produced upon the solenoids 28 and 42, and that vice-versa, if the temperature is too low, and the deflection of the needle is therefore to the right, solenoids 28 and 42 alone will be energized.

What I claim is:

1. The method of treating hydrocarbon oils which comprises passing such oils through a pipe still at a substantially uniform rate of flow, supplying a normal quantity of fuel to heat the still to a desired normal temperature at a selected point therein, varying the flow of the current in an electrical circuit responsively to variations from the normal temperature at such point, and automatically adding to or subtracting from the normal quantity of fuel in accordance with the variations in current flow to provide a maximum supernormal quantity of fuel simultaneously with maximum subnormal temperature and a minimum supernormal quantity of fuel simultaneously with minimum subnormal temperature and vice versa as to subnormal supply in the case of supernormal temperature, whereby the temperature of the oil is maintained substantially constant.

2. The method of treating hydrocarbon oils which comprises passing such oils through a pipe still at a substantially uniform rate of flow, supplying a normal quantity of fuel to heat the still to a desired normal temperature at a selected point therein, varying the flow of the current in an electrical circuit responsively to variations from the normal temperature at such point, and automatically increasing the total quantity of fuel in accordance with the variations in current flow proportionately as the temperature decreases from normal, while similarly decreasing the total quantity of fuel as the temperature increases toward normal, whereby the normal quantity of fuel again obtains at the normal temperature, and vice versa with an increase in the temperature from normal.
3. The method of treating hydrocarbon oils which comprises passing such oils through a pipe still at a substantially uniform rate of flow, supplying to the still a predetermined quantity of fuel which is designed to maintain the oil substantially at the desired temperature at a selected point, automatically correcting this quantity of fuel at predetermined recurrent intervals in response to changes from the desired temperature, and effecting a return to the predetermined quantity of fuel after the application of each correction.
4. The method of treating hydrocarbon oils which comprises passing such oils through a pipe still at a substantially uniform rate of flow, supplying fuel to heat the still, automatically applying, at predetermined recurrent intervals, corrections to the quantity of fuel supplied to the still to maintain a predetermined temperature at a selected point therein, and regulating the duration of the application of each correction in proportion to the extent to which the temperature at the selected point has departed from the predetermined temperature at the time of making that correction.
5. The method of treating hydrocarbon oils which comprises passing such oils through a pipe still at a substantially uniform rate of flow, supplying fuel to heat the still, and automatically applying, at predetermined recurrent intervals, corrections to the quantity of fuel supplied to the still to maintain a predetermined temperature at a selected point therein, each of which corrections is proportionate to the extent of the departure of the temperature at the selected point from the predetermined temperature at the time of making that correction.
6. In the method of treating hydrocarbon oils comprising passing such oils through a pipe still at a substantially uniform rate of flow, supplying fuel to heat the still, applying, at predetermined recurrent intervals, corrections to the quantity of fuel supplied to the still to maintain a predetermined temperature at a selected point therein, the step which consists in automatically predetermining the quantity of each fuel correction from the condition of the temperature with respect to the desired temperature at the time the correction is instituted.
7. The method for the continuous treatment of hydrocarbon oils in a system comprising a pipe still, comprising passing such oils through the still at a substantially uniform rate of flow, supplying to the still an amount of fuel suitable to maintain a desired temperature at a selected point therein, permitting the system to become stabilized with respect to the fuel supply, and when the temperature departs from the desired range, automatically adding to or subtracting from this amount of fuel at predetermined recurrent intervals in predetermined amounts designed to restore the system to an equilibrium at the desired temperature.
8. The method of treating hydrocarbon oils which comprises passing such oils through a pipe still at a substantially uniform rate of flow, supplying to the still a predetermined amount of fuel which is designed to maintain the oil substantially at the desired temperature at a selected point, and when a disturbing factor causes the temperature to depart from that desired, applying discontinuous corrections at predetermined recurrent intervals, each of which corrections is proportioned to the extent of departure of the temperature from that desired.
- In testimony whereof, I have signed my name to this specification this 2nd day of August, 1922.
- LUIS DE FLOREZ.