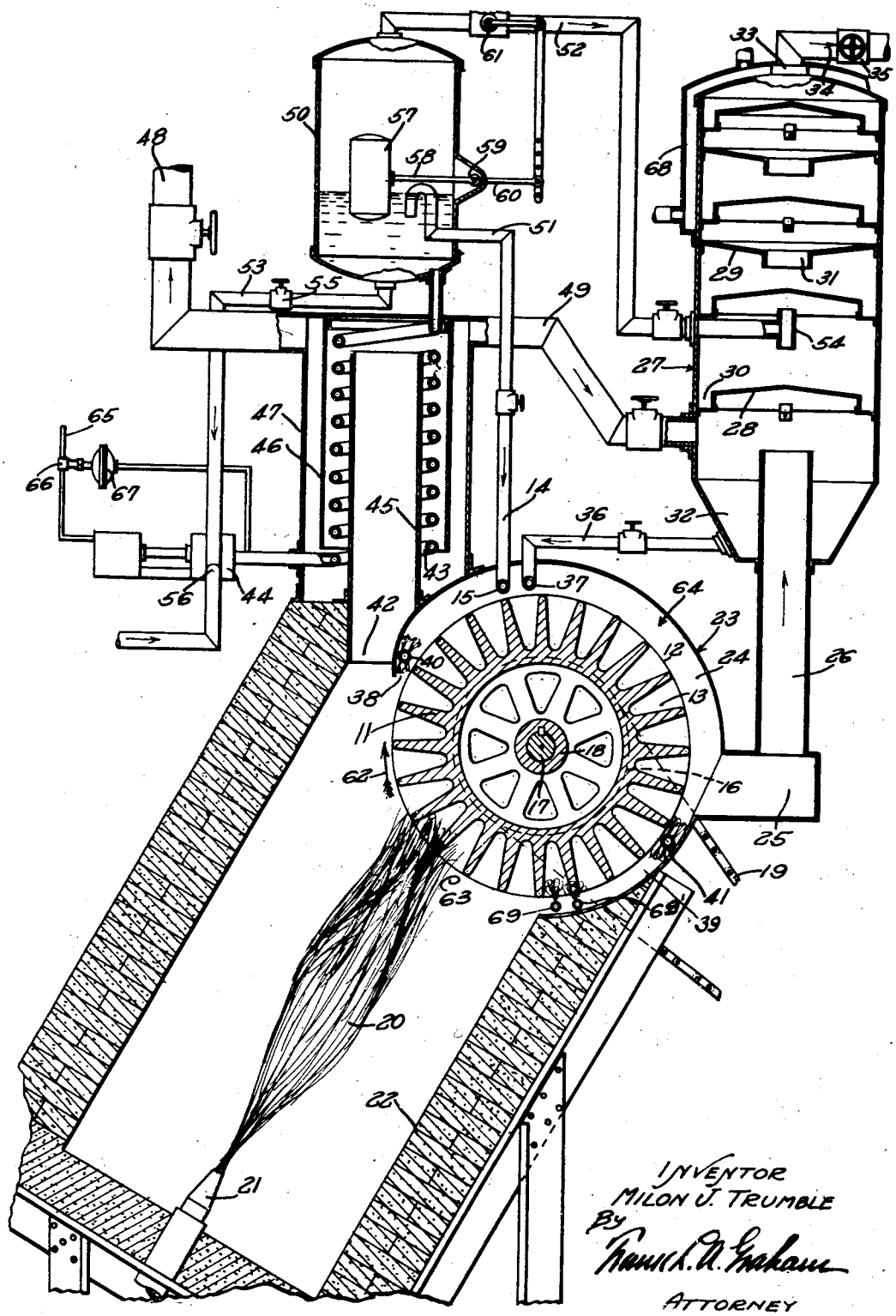
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OIL CRACKING MEANS AND METHOD

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## OIL-CRACKING MEANS AND METHOD.

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My present invention relates particularly to oil cracking means and methods in which some use is made of a movable member, such as a rotor, formed of refractory material and intermittently or continuously advanced; and, in preferred embodiments of my invention, this rotor, or its equivalent, may be so mounted, relatively to a furnace providing a heat-receiving zone therefor, and relatively to a pipe or pipes terminating in an enclosure by which a vapor-evolving or cracking zone is defined, that, incidentally to the discontinuous or continuous advance of said rotor, or its equivalent, successive peripheral portions thereof may first be heated to a comparatively high temperature, in said heat-receiving zone, and may thereafter impart their heat to the oil fed thereto, in said cracking or vapor-evolving zone; and, in preferred embodiments of my invention, means may be provided whereby jets of an incombustible fluid, such as steam, may be used in separating the mentioned zones.

It is a further object of this invention to provide, in an organization of the general character referred to, means whereby any deposits formed on a continuously advancing rotor, or its equivalent may be burned therefrom, with an incidental evolution of heat, at some point in the rotation or cyclical movement of said rotor, or its equivalent; and, in preferred embodiments of my invention, the desired heating effects being obtained by the projecting of a flame against said rotor, or its equivalent, means may be provided for a utilization of the residual heat of resultant flue gases in the preheating of the oil fed.

Other objects of my invention, in preferred embodiments of which I may employ a rotor to which a flame is upwardly projected, at one point in its travel, and to which oil may be downwardly fed at another point in its travel, and from which vapors may be laterally withdrawn into a dephlegmator (said dephlegmator being optionally provided with means for the delivery thereto of vapors evolved incidentally to the mentioned preheating, and/or with means for the return of a condensed fraction to said rotor, or its equivanent) may be best appreciated from the following description of an illustrative embodiment of said invention, taken in connection with the appended claims and the accompanying drawing, in which

The figure, somewhat diagrammatic, is a vertical section with parts shown in elevation, and with parts broken away.

Referring to the details of that specific embodiment of my invention, chosen for purposes of illustration, 11 is a movably mounted member shown as a mere rotor. This rotor may be provided with end flanges 12 and with concavities or "pockets" 13,—the latter serving to increase the surface of said rotor and optionally also for the momentary retention of quantities of oil delivered thereto, as by means of a feed pipe 14, shown as terminating in a perforated outlet member 15, extending longitudinally of said rotor.

In order that the successive peripheral portions of the rotor 11, or its equivalent (which may be rotated by means such as a sprocket wheel 16, on a shaft 17, which may be keyed to a hub or concentric tubular member 18, integral or otherwise rigidly connected with said rotor, and may be advanced by means such as a sprocket chain 19, engaging the sprocket wheel 16, or its equivalent) may be heated to a comparatively high temperature (such as a temperature of 2000° F., more or less) I may use means such as a flame 20, projected, as by means of a burner 21, within a furnace 22,—which may be constructed of fire brick or other refractory material and is shown as disposed, in large part, below the axis of the rotor 11, or its equivalent.

To collect and withdraw cracked products and/or other vapors resulting from an intermittent or continuous feed of oil through the pipe 14, or its equivalent, I may employ means such as a housing member 23,—shown as extending over the top of the rotor 11, and as spaced therefrom by a passage 24 sufficient to permit an escape of vapors through an outlet 25, shown as lateral, and into a pipe 26, shown as leading to a dephlegmator 27. This dephlegmator may contain plates 28 and 29, or their equivalents, shown as respectively providing peripheral passages 30 and central passages 31, to produce a baffling effect favorable to a dropping of heavier products into a settling compartment 32,—lighter vapors and gases being permitted to exit through, for example, a top opening 33 and a pipe 34—shown as provided with a valve 35, for optional use in operating under pressure. A limited fractionating being effected by means of the general character described, the heavier fraction which collects in the settling compartment 32 may, if desired, be

returned to the mentioned cracking zone by means such as a valved pipe 36, shown as terminating in a perforated outlet member 37, disposed parallel with the mentioned oil feed member 15.

In order to check undesired movements of either flue gases or evolved vapors through clearance passages 38 and 39, at the respective ends of the housing member 23, which may be regarded as defining the mentioned cracking and vaporizing zones, or for other effects, I may provide, in or near said clearance passages, means (such as perforated pipes 40, 41) for the delivery of an incombustible fluid, such as steam,—to provide what I may term "fluid curtains" at the respective ends of said cracking or vaporizing zone; and, in order to utilize residual heat in flue gases escaping, by means such as a passage 42, from the furnace 20, I may, for example, position a coil 43 (through which the oil to be treated may be advanced, as from a pump 44) around a pipe 45, communicating with the mentioned passage 42; and I may optionally surround the coil 43, or its equivalent, with an intermediate pipe 46,—the latter being, in turn, optionally surrounded by an outer pipe 47, shown as communicating with both a valved stack 48 and with a valved alternative outlet pipe 49, communicating with the interior of the dephlegmator 27.

Instead of connecting the outlet end of the preheating coil 43, or its equivalent, directly with the oil feed pipe 14, or its equivalent, I may interpose between the pipes referred to a separating chamber 50, shown as provided not only with a valved lateral overflow outlet 51, connected with the oil feed pipe 14, but also with a vapor outlet 52 and a bottom outlet 53,—said vapor outlet being shown as terminating, at an intermediate level, in a T 54 within dephlegmator 27, and said bottom outlet 53 being shown as valved at 55 and as connected with a pipe 56 leading into the mentioned pump 44; and in order, if desired, to render the escape of vapors through the pipe 52, or its equivalent, dependent upon the level or character of the liquid in the bottom of the vapor chamber 50, this chamber may be provided with a float 57 (on an arm 58) connected with a horizontal pivot 59 in such manner as to impart movement to an external arm 60, and thereby to control a valve 61, in the vapor pipe 52, or its equivalent; and it will be appreciated that, generally speaking, the described pump and valves are so positioned as to permit the entire apparatus to be operated, if desired, at a predetermined pressure considerably above normal. To facilitate adjustment, a link 61′ may be adjustably connected with valve 61 and/or arm 60.

That is to say, flame being continuously projected (as, inward and upward) by means such as the burner 21 (which may be supplied with a combustible mixture under any desired pressure) and the rotor 11, or its equivalent, being advanced, at a moderate velocity, in (for example) the direction of the arrow 62, successive peripheral portions of said rotor (or an equivalent moving member having an extensive surface and adapted to receive the oil to be cracked) may be heated, in a lower or heat-receiving zone 63, to any desired high temperature, such as a temperature between 1000° F., and 2500° F., and then carried through an oil-receiving or vaporizing or cracking zone 64,—vapors being carried to and through dephlegmator 27, in the described manner, and optionally associated therein with vapors collected (as by what I may term a "topping" step) from the separating chamber 50. Any desired heavier fraction of the fed and preheated oil in the chamber 50′ may be returned to and through pump 44 by way of pipe 53; and such residue as may accumulate in the bottom of the dephlegmator 27 may be returned by way of pipe 36 for retreatment in the described manner. It will be obvious that, by suitably adjusting the described valves and operating the mentioned pump (whose steam supply, through a pipe 65 may be controlled by an automatic valve 66, responsive to movements of a plunger or diaphragm member 67, exposed to the pressure that may be maintained within, for example the separating chamber 50) an elevated pressure may, if desired be maintained throughout all parts of the described apparatus.

The upper portion of the dephlegmator 27 being shown as surrounded by a water jacket 68 to cool the same, and provision being made for an optional heating of an intermediate part of said dephlegmator by the introduction of flue gases thereto, it will be appreciated that the described organization permits of a fairly close regulation of the fractionating effect of the dephlegamator 27; and it is an important merit of the described cracking organization, comprising a rotor, or the like, against which a flame is directly projected, that it makes possible not only a continuous removal, from said rotor or its equivalent, of any deposit formed thereon (in order that new quantities of the oil fed may come into direct contact with the material of said rotor, or its equivalent,—optionally formed of a catalytic materials, such as, for example, a nickel-containing steel or alloy) but a utilization of the heat produced by such burning, for a cracking effect.

Depending upon the character of the crude or other oil to be treated and upon the character of the "gasoline" or other products desired, an interior pressure of (say) ten pounds and temperatures of about 800° F., in the oil sprayer 15, and about 1400°

F., in the cracking zone, may be continuously maintained. Superheated steam, introduced through pipes 40, 41, or elsewhere, may have a hydrogenating as well as a "curtaining" effect; to aid in burning carbonaceous deposits from the rotor 11, or its equivalent, or in reducing oxides formed thereon, an oxidizing and/or a reducing gas may be continuously or intermittently introduced through additional pipes such as are indicated at 69 and 69'; and all exposed hot parts may be provided with any desired heat insulation, not shown.

Although I have herein described a single complete embodiment of my invention, suggesting alternative modes of operation, it will be appreciated, not only that various features of my invention might be independently employed, but also that numerous modifications might be made by those skilled in the art to which this case relates, without the slightest departure from the spirit and scope of my invention, as the same is indicated above and in the following claims.

I claim as my invention:

1. A process of cracking petroleum oils which comprises: advancing successive portions of a movable member repeatedly through a heat-receiving zone and then through an oil-receiving and vapor-evolving zone; projecting flame thereon in said heating zone; delivering oil thereto in said receiving zone; and collecting the evolved vapors from said last mentioned zone,—said flame and said oil successively contacting with identical portions of the surface of said member.

2. A process of the general character defined in claim 1 in which jets of an incombustible fluid are interposed as curtains between said zones.

3. A process of the general character defined in claim 1 in which light vapors are permitted to escape from preheated oil in advance of its contact with said movable member.

4. A process of the general character defined in claim 1 in which said oils are fed into pockets in a movable member which has the form of a rotor.

5. A process of the general character defined in claim 1 in which vapors produced in said heat-receiving zone are led through a dephlegmator from which a condensed fraction is returned toward said movable member.

6. A process of the general character defined in claim 1 in which vapors produced in said heat zone are led through a dephlegmator from which a condensed fraction is returned toward said movable member and into which vapors from preheated oil are separately delivered.

7. A process of the general character defined in claim 1 in which carbon deposits formed on said movable member in one of the mentioned zones be burned therefrom in another zone.

8. In an organization for the cracking of petroleum oils; a rotatably mounted member provided with means for repeatedly advancing successive portions of one surface thereof through a heat-receiving zone and through an oil-receiving zone; means for projecting a flame and for feeding oil onto said surface; and means for burning deposits from said surface in said heating zone.

9. An oil cracking organization comprising: a cyclically advancing movable member; means for heating the same by a flame projected thereto at one point in its cyclical movement; means for feeding oil to the previously flamed surface at another point in its advance; means for withdrawing evolved products therefrom; and means for fractionating said products and returning a heavier portion thereof toward said movable member.

10. An oil cracking organization comprising: a cyclically advancing movable member; means for projecting a flame toward a moving surface thereof; means for feeding oil to the previously flamed surface at another point in its advance; means for withdrawing evolved products therefrom; means for fractionating said products and returning a heavier portion thereof toward said movable member; and means whereby the described means may be caused to operate under a pressure above atmospheric.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 3rd day of December, 1925.

MILON J. TRUMBLE.