

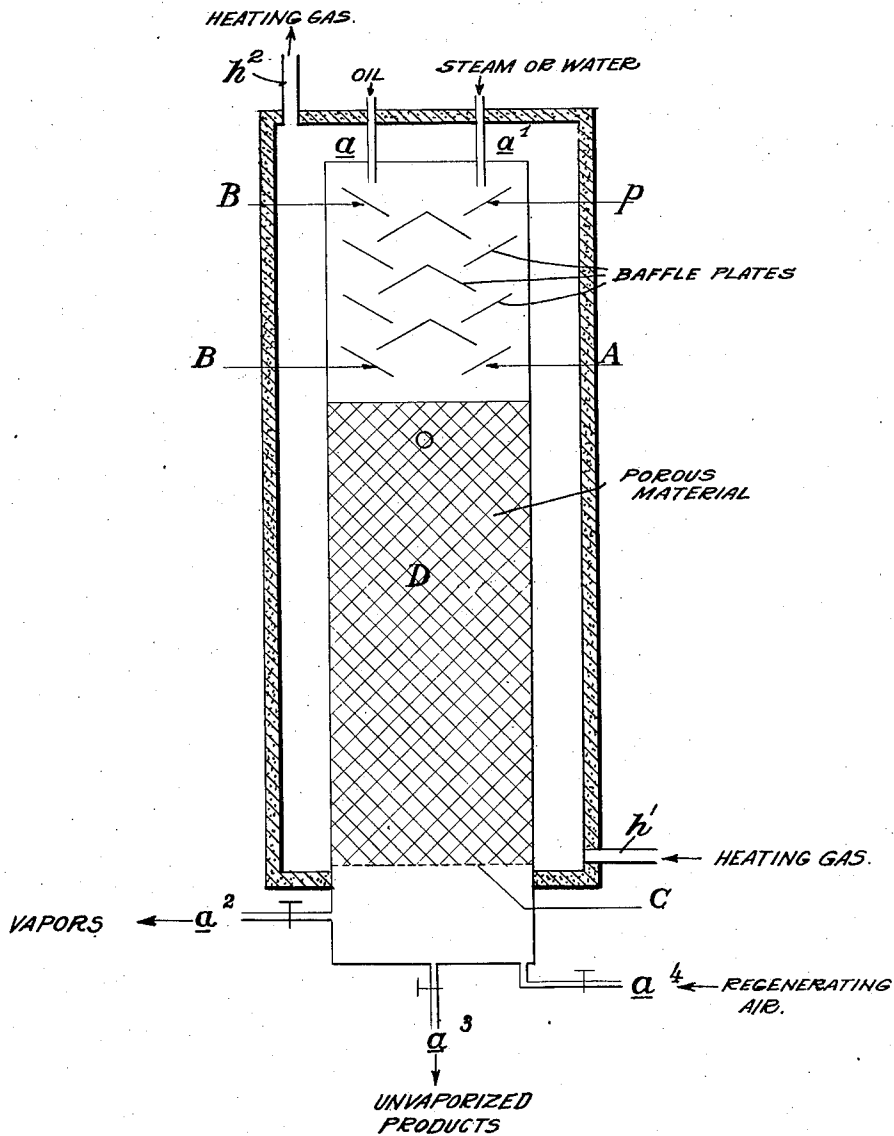
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VAPORIZATION OF HEAVY HYDROCARBONS

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UNITED STATES PATENT OFFICE

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VAPORIZATION OF HEAVY HYDROCARBONS

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This invention relates to an apparatus for the vaporization of liquid or pasty heavy hydrocarbons, with a view to their subsequent conversion into light hydrocarbons or the like.

It is known that the vaporization of oils cannot be effected without giving rise to a deposition of coke and solid residues, and that provision is necessary for ensuring the periodical elimination of such deposits and residues, which can be effected advantageously by combustion by means of a current of air driven through the vaporizing apparatus.

The vaporization has been hitherto effected preferably with baffle plates located in the vaporizer, or with the apparatus furnished with elements such as Raschig rings.

Applicant has observed that this means ill suits regeneration by combustion, the deposits acquiring, at the end of a normal period of employment of the apparatus, too large a bulk, and that it is convenient, in order to avoid such compact deposits, to select for the solid material constituting the baffles, bodies of great porosity. However, experience has demonstrated to the applicant that similar bodies such as ceramic, calcareous and like materials are rapidly put out of action in the vicinity of the inlet, where they are encountered by still very liquid oil; they become deeply impregnated with such oil and no longer act exclusively by their superficial layers.

According to the invention, vaporization is effected by bringing the oils into contact, in an initial zone of the apparatus, with plates or other similar baffles where they commence to vaporize without any considerable deposition, then the vaporization of the oils, which have become less fluid, is continued and completed on a bed of porous substances where deposition occurs in a very subdivided form which permits their subsequent perfect elimination by combustion by means of a current of air or oxygen.

The accompanying drawing illustrates by way of example, in diagrammatic sectional elevation, an apparatus embodying the invention.

In this drawing:—

A is a closed metal vessel, provided on top with a pipe a for the admission of the oil to be vaporized, and in some cases with a pipe a^1 for the admission of steam or water. A mixture of water and oil could alternatively be admitted by a pipe in common. At suitable levels beneath the closed top, the vessel contains a series of inclined plates B arranged as baffles. Up to a suitable height, porous bodies D, in the form of small pellets, small tubes or rings, or the like, formed of clay, chine clay, kieselguhr, or the like, are heaped on a perforated or apertured base or grid C. At its lower portion the apparatus is provided with a pipe a^2 for the outlet of vapours, and a pipe a^3 for the removal of unvaporized products, as well as a pipe a^4 for the admission of air or other suitable agent for the regeneration, by combustion, of the encrusted contact substances.

Oil admitted at a , preferably at the same time as water in addition is admitted at a^1 , vaporizes partially as well as such water, on flow over the baffle plates B. Then it arrives, in a conveniently reduced fluid state, on to the porous substance D, where it thus can vaporize without being able to impregnate such substance. The vapours escape by a^2 , whence they are conducted away for utilization elsewhere in an apparatus, which may be for example a group of purifiers and catalytic reaction chambers, for the conversion of such vapours into light hydrocarbons. During the operation, the products, which it is not desired to vaporize are allowed to flow by a^3 , which products are variable at will in accordance with the rate of supply by a and a^1 and the capacity of the vaporizer.

At the end of a period of time, variable according to the nature of the products treated, regeneration is effected in the known manner, for example by the admission of air or in some cases air and steam, by a^4 .

It is obvious that the vaporizing apparatus may have any appropriate shape, such as cylindrical, prismatic or annular, and that it may be heated in any suitable manner, for example, by location thereof within a stove or brick structure S to which heating gas is

supplied at h' and from which it escapes at h^2 . The hot gases, if desired, may be utilized for vaporizing the added water which can be arranged to circulate in a coil, which, in the case of an annular vessel, may be located in the annular space enclosed by the annulus.

The vaporizing apparatus is adapted to function normally at atmospheric pressure. The temperature which is maintained within the vessel A, and the proportionate amounts of oil and water, or steam, admitted thereto, obviously will vary with the nature and composition of the oils to be vaporized. By way of example, however, it may be stated that for treating Venezuelan gas-oil a temperature of about 450° C. should be maintained in the vaporizer, the proportion of water or steam added with the oil being approximately 5%.

The oil to be vaporized, alone or mixed, may obviously be oil derived from the distillation of any carbonaceous materials (lignites, shales, peats, coal or the like) and previously condensed.

Claims:

1. Apparatus for the vaporization of heavy hydrocarbons comprising a vessel having in one portion thereof a series of separated baffle plates and in another portion thereof a mass of porous material, means for heating said vessel externally, means for conducting hydrocarbons to be vaporized to said vessel and for evacuating the same therefrom, said hydrocarbons passing first through said baffle plates and then through said porous material, and means for conducting regenerating gases to said vessel.

2. Apparatus for the vaporization of heavy hydrocarbons comprising a vessel having an inlet portion including a series of inclined metallic baffle plates and having adjacent said inlet portion a mass of porous material, means for heating said vessel and the contained baffle plates and porous material, means for conducting hydrocarbons to be vaporized to said inlet portion whereby said hydrocarbons pass first through said baffles and then through said porous material, means for evacuating said hydrocarbons from said vessel, and means for conducting regenerating gases to said vessel, said heating means comprising a chamber surrounding said vessel and means for supplying a heating medium to said chamber.

3. Apparatus for the vaporization of heavy hydrocarbons comprising a vessel adapted to be traversed by hydrocarbons to be vaporized and having adjacent its inlet end a plurality of baffle plates and adjacent thereto a mass of porous material, means for heating said vessel externally, and means for conducting hydrocarbons to and evacuating the same from said vessel.

4. Apparatus for the vaporization of

heavy hydrocarbons comprising a vessel adapted to be traversed by hydrocarbons to be vaporized, said vessel having a plurality of inclined baffles in its upper portion, a support in the lower portion of said vessel, a mass of porous material on said support, means for heating said vessel and said baffles and porous material, means for conducting hydrocarbons to the upper portion of said vessel, and means for evacuating hydrocarbons from the lower portion of said vessel, said heating means comprising a stove surrounding said vessel.

5. Apparatus of the class described comprising a vessel adapted to be traversed by hydrocarbons to be vaporized, said vessel having in its upper portion a plurality of baffles, a support in the lower portion of said vessel, a mass of porous material resting on said support, said support providing an outlet chamber below said porous material, means for heating said vessel externally, means for conducting hydrocarbons to be vaporized to the upper portion of said vessel, means for evacuating hydrocarbons from said outlet chamber, and means for conducting regenerating gases to said outlet chamber.

6. Apparatus for the vaporization of heavy hydrocarbons comprising a vessel having an inlet portion containing a series of inclined baffles, a central portion adjacent said inlet portion containing a mass of porous material, an outlet portion adjacent said central portion, means for supplying liquid hydrocarbons to be vaporized to said inlet portion, means for evacuating both vaporized and unvaporized hydrocarbons from said outlet portion, and means for heating said vessel externally.

In testimony whereof I have signed this specification.

ALFRED JOSEPH.