Patented July 23, 1929. 1,721,728

UNITED STATES PATENT OFFICE.

JOHN COLLINS CLANCY, OF ASBURY PARK, NEW JERSEY.

PROCESS OF TREATING HYDROCARBONS.

No Drawing. Application filed August 10, 1926. Serial No. 128,514.

In my application Serial No. 586,029 filed September 2nd, 1922 entitled Process of cracking oils, I described a process for cracking oils catalytically, while incidental to such operation, means were provided for preventing poisoning of the metal catalyst by sulphur present in the oil being treated.

The present case is in part a continuation of my said application as it is based, in part, upon disclosures made therein.

The herein described process, in one of its aspects, concerns the production of lighter hydrocarbon from heavier hydrocarbons; the type or class of agents preferably employed for the effecting of the reaction which yields the desired product, having a dual function, in that such an agent behaves catalytically and also as a desulphurizing agent.

I have discovered, as indicated in my said application Serial No. 586,029, that fusible cyanids, such, for example, as sodium cyanid, possess the valuable property of desulphurizing hydrocarbon material, such as hydrocarbon oils and the vapors thereof, without introducing difficultly removable impurities into said oils or liquid products resulting from the cracking or distillation of such hydrocarbon material with a molten cyanid reagent; the operation being preferably conducted at a temperature sufficient to maintain the cyanid reagent in the molten phase.

This renders it possible to successfully treat both light and high gravity high sulphur oils, and also hydrocarbon material such as naphthalene, anthracene, etc., and vulcanized rubber, etc., which are solid at ordinary temperature but liquid under the reaction conditions in question, to remove the sulphur therefrom to any extent desired; the treated oil or hydrocarbon material being cracked or not depending upon the temperature employed.

When cracking is to be effected the cyanid reagent is maintained at, for example, 400° C. to 600° C., and even higher. Pure sodium cyanid becomes molten around 600° C., and by providing a mixture of the same, with, for example, sodium thiocyanate or sodium formate, potassium formate, or the like, the eutectic point of the cynaid mixture or desulphurizing reagent, may be made as low as, for example, 200° C. or 350° C.

When cracking of the heavier oils into lighter hydrocarbons (gaseous as well as liquid) is effected,—the cyanid reagent or desulphurizing mixture, acts catalytically to promote the reaction as soon as the proper temperature is attained; this latter of course, depending upon the nature of the oil or hydrocarbon material to be cracked.

To effect the desulphurizing operation, one passes the hydrocarbon material to be treated, through or suitably into contact with a molten body or mass, comprising the cyanid containing agent; whereupon the sulphur present is promptly abstracted, with consequent formation of alkali metal thiocyanate and desulphurization of the hydrocarbon. The latter if not to be cracked, is removed from the sphere of the reaction in any suitable manner, as by simple distillation or by separating it in the liquid condition from the molten cyanid reagent, by difference of specific gravity similar to the method of removing the unvaporized hydrocarbons from the molten cyanid, as described in my said application Serial No. 586,029.

It will be understood, of course, that the better and more extended the contact and duration of the same, between the fused mass and the hydrocarbon to be treated,—the more nearly perfect the results obtained.

As previously stated, when cracking of a hydrocarbon is to be effected, a suitable temperature is employed, and the cyanid or mixture containing the same, or its equivalent, then acts not alone to desulphurize the hydrocarbon, but further to facilitate the cracking and distillation of the same; in such case no metal catalyst being required,—although it may be used in conjunction with the cyanid under the operating conditions, as described in my said application Serial No. 586,029.

I may add that while an alkali metal thiocyanate obviously will not act, by itself, as a desulphurizing reagent; it nevertheless behaves catalytically in the cracking operation; as does also the alkali formate when used in conjunction with the alkali metal cyanid, in the eutectic mixture.

I claim:

1. The process of cracking hydrocarbons, which comprises subjecting a hydrocarbon to be treated, to the action of a reagent comprising a molten mixture of alkali metal cyanide and alkali metal formate, said reagent being maintained at a cracking temperature.

2. The process of cracking hydrocarbons, which comprises subjecting a hydrocarbon oil, while in vaporous condition, to the catalytic action of a reagent comprising a molten

body containing alkali metal cyanide and alkali metal formate, said reagent being maintained at a cracking temperature.

3. The process of cracking hydrocarbon material which comprises vaporizing said material and causing the hydrocarbon vapors to contact with a mass of a molten mixture of sodium cyanide and sodium formate maintained at a cracking temperature.

4. The process of cracking hydrocarbon oils which comprises, subjecting such an oil to vaporizing conditions, but without causing substantial cracking thereof and contacting the hydrocarbon vapor produced with a molten body containing an alkali metal cyanide and an alkali metal formate maintained at a cracking temperature.

5. The process of producing hydrocarbons of low boiling points from hydrocarbons of higher boiling points, which consists in passing the vapors of the hydrocarbons of higher boiling points through a mixture of molten sodium cyanide and sodium formate.

Signed at Asbury Park, in the county of Monmouth and State of New Jersey, this 9th day of August A. D. 1926.

JOHN COLLINS CLANCY.