[Second Edition.]

PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

A Process for the Manufacture and Production of Hydrocarbons.

We, I. G. FARBENINDUSTRIE AKTIENGESELLSCHAFT, of Frankfort-on-Main, Germany, a corporation organized according to German laws, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

We have found that hydrocarbons mainly liquid, but sometimes associated with those in a gaseous or solid form, can be produced by heating metal carbonyls, such as those of iron, cobalt, nickel or molybdenum, in the presence of a smaller amount of hydrogen than is theoretically required for the production of methane according to the equation $Me(CO)_n + 3nH_2 = Me + nCh_4 + nH_2O$ where Me stands for metal, to a temperature sufficient to decompose the carbonyl with separation of the metal. The carbonyls, preferably in the state of vapour, are mixed with hydrogen and passed, for example, through a heated chamber. The deposited metal, which is mostly in a very finely divided state, is separated from the gas in suitable chambers, by filters, electrical precipitators or similar means. The hydrocarbons which are liquid at ordinary temperature, and any solid hydrocarbons formed, may be separated from the gas by cooling, under pressure if necessary, or by solid adsorbents such as active silica, or by scrubbing with suitable solvents. If any hydrocarbons of higher boiling point are formed, some portion of them may, in certain circumstances, be adsorbed by the metal resulting from the decomposition of the carbonyl, and may be recovered therefrom by heating, evacuation or extraction. Instead of the individual carbonyls, we may use mixtures of different carbonyls and the hydrogen may be replaced by gases containing the same, especially those containing carbon monoxide, such for example as water gas, or by steam or mixtures containing the same. Substances facilitating or influencing the production of hydrocarbons whether catalytically or otherwise, such as finely divided copper, and alkaline substances, for example alkali metal hydroxides or alkali metal carbonates, or substances facilitating the decomposition of the carbonyl, such for example, as solid materials in a fine state of division, such as finely divided iron, or substances influencing both reactions, for example ammonia, may also be advantageously added.

The temperature must be chosen more or less high depending on the nature of the carbonyl used and that of the hydrocarbons which it is desired to obtain as the main product. It may also be advisable to effect the decomposition under diminished or increased pressure. The formation of the hydrocarbons may also be influenced by modifying the ratio of carbonyl vapour to hydrogen and if desired carbon monoxide. Thus if less hydrogen is employed, higher molecular hydrocarbons will be obtained than when more hydrogen is present.

The deposited metal may either be used over again for the production of carbonyl, or it may be utilized for other purposes.

EXAMPLE.

Iron carbonyl vapour and hydrogen, in the proportion of 1 kilogram of carbonyl to 400 litres of hydrogen, are admitted into the upper end of a shaft furnace which is externally heated to 240° Centigrade. The resulting fine iron powder is separated in dust chambers, and the issuing gas is freed from contained hydrocarbons by passing it through a layer of active silica. The hydrocarbons are recovered from the silica by treatment with steam and condensation, and may be used for example as a readily volatilizable liquid fuel. A considerable quantity of less volatile hydrocarbons may be recovered from the iron powder by heating.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is :—

1. A process for the manufacture and production of mainly liquid hydrocarbons in which metal carbonyls are heated, in the presence of a smaller amount of hydrogen or gases containing the same than is theoretically required for the pro-

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duction of methane or in the presence of steam, to a temperature sufficient to decompose the carbonyls, and if required, in the presence of catalytically acting substances.

2. A method of carrying out the process as claimed in Claim 1, characterised by the use of gases which contain carbon monoxide in addition to hydrogen.

3. A method of carrying out the process as claimed in Claims 1 and 2, characterised by the use of mixtures of metal carbonyls with one another, or with other substances influencing the formation of hydrocarbons, such as finely divided copper, and alkaline substances, for example alkali metal hydroxides or alkali metal carbonates.

4. The production of hydrocarbons substantially as described in the foregoing example.

5. Hydrocarbons when prepared in accordance with the preceding claiming clauses.

Dated this 2nd day of May, 1927.
JOHNSONS & WILLCOX,
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W.C. 2,
Agents.

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