[Second Edition.]

PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Improvements in the Catalytic Production of Hydrocarbons from Oxides of Carbon and Hydrogen.

I, JAMES YATE JOHNSON, a British subject, of 47, Lincoln's Inn Fields, in the County of London, Gentlemen, do hereby declare the nature of this invention (which has been communicated to me from abroad by I. G. Farbenindustrie Aktiengesellschaft, of Frankfort-on-Main, Germany, a joint stock company organized under the laws of Germany) and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The formation of gaseous, liquid and solid hydrocarbons from oxides of carbon and hydrogen, or gases splitting off hydrogen, in the presence of a catalyst is accompanied by a considerable disengagement of heat, which has the disadvantage of greatly increasing the temperature of the reacting gas mixture and of the catalyst and thereby often gives rise to secondary reactions, such as the deposition of carbon, whereby the catalyst is soon rendered inactive. Moreover, since excessive temperatures modify the state of equilibrium very unfavourably with regard to the formation of the desired product, it is impossible, in working on a commercial scale, to obtain a large output, for example of high-grade methane, by a single passage of the gases over the catalyst.

My foreign correspondents have now found that this objection can be overcome, and the heat resulting from the reaction be advantageously utilised, by connecting the reaction chamber with a generator of high-pressure steam in such a way as to effect an exchange of heat between them. This may be effected for example by arranging the catalyst in tubes mounted in a high-pressure boiler, or by arranging tubular steam generators in the contact chamber, or by similar means. The heat exchange between the contact chamber and the steam generator may also be allowed to proceed in an indirect manner, by arranging, for example, both the steam generator and the set of tubes containing the catalyst in a bath of fused metal.

The steam is preferably produced at or slightly below such a pressure as corresponds to the temperature at which the catalyst acts most efficiently.

The following example will further illustrate how the invention may be carried out in practice, reference being had to the accompanying diagrammatic drawing which illustrates one form of apparatus suitable for carrying out the invention, but the invention is not restricted thereto.

EXAMPLE.

Use is made of a steam boiler, in which steam is generated at a pressure of 17 atmospheres, corresponding to a temperature of 205° Centigrade. In this boiler there are arranged a number of tubes A containing the catalyst, for example, an activated nickel catalyst. A mixture of carbon monoxide and hydrogen is introduced at B and passed over the catalyst, the resulting gas mixture leaving the apparatus at C. The heat generated by the reaction serves for the production of steam of 17 atmospheres pressure which is led off at D. In this manner, the production of methane, for example, may be carried on without any interruption by reason of over-heating or through stoppage of the catalytic action as the result of excessive cooling. E indicates the gauge glass of the boiler, F the connection to the safety-valve and G the inlet for the supply of water to the boiler. The inlet G may also serve for the introduction for example of superheated steam

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or hot gases in order to obtain the necessary temperature for starting the reaction.

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

1. A process for the catalytic production of hydrocarbons from oxides of carbon and hydrogen, or gases splitting off hydrogen, consisting in connecting the contact chamber with a generator of high pressure steam in such a way that an exchange of heat is effected between them.

2. A method for the catalytic production of hydrocarbons from oxides of carbon and hydrogen substantially as described in the foregoing example with reference to the accompanying drawing.

Dated this 30th day of May, 1927.

JOHNSONS & WILLCOX,
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Agents.

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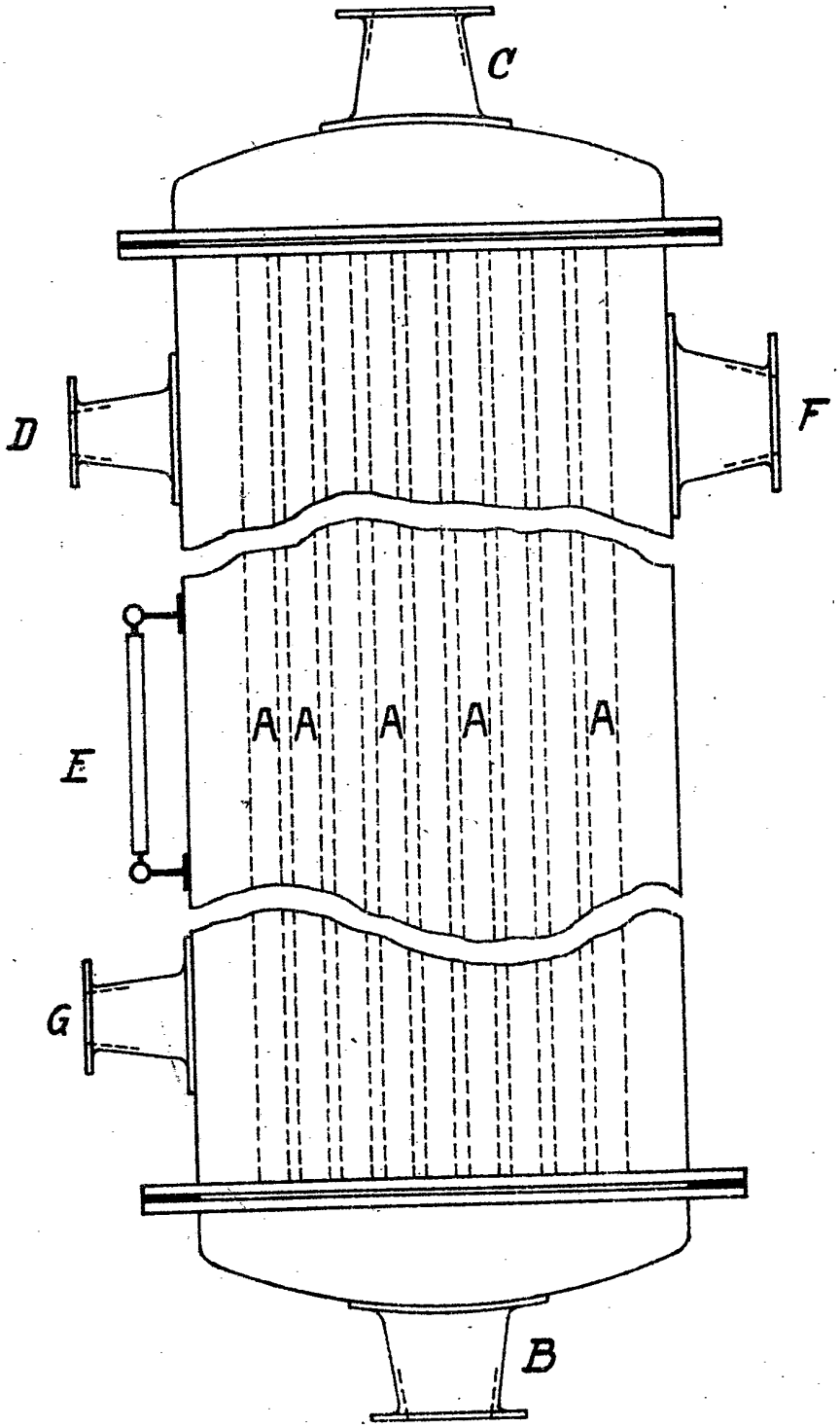
2nd Edition



[This Drawing is a full-size reproduction of the Original]

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