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2983

COMPLETE SPECIFICATION.

Improvements relating to the Production of Gaseous and Liquid Fuels.

We, RUHRCHEMIE AKTIENGESELLSCHAFT, of Sterkrade-Holten, Germany, a Body Corporate organised according to the laws of the German State, 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:—

In the treatment of solid fuels for the production of gases suitable for gas supply, the usual object hitherto has been to obtain as high a yield of gas as possible and at the same time to work up the residual products such as ammoniacal liquor, ammonia, tar and pitch in the most useful manner. The treatment of the solid fuels was not, however, directed to an increased yield of the products resulting from gasification by curtailing the yield of gas. On the contrary it was usual to adapt or adjust the mode of treatment of the solid fuels to the particular maximum gas yield required at the moment.

The present process renders it possible to produce gases that are suitable for gas supply from solid fuels in such a manner that the volume of the gas and also the quantities of the compounds or mixtures of compounds simultaneously produced and likewise capable of being used as fuels can be widely varied relatively to each other, and that thus the most suitable mode of treatment can be employed according to the character of the solid fuels used.

The process according to the invention is carried out in the following manner:— Coal or other solid carbonaceous fuels are gasified in water gas generators, if necessary continuously, in the presence of oxygen or combustion air which has been enriched with oxygen. The resulting gases, which contain carbon monoxide and hydrogen, are subjected after purification to a known process for the synthesis of benzine, for example, by passage of the gases at ordinary or high pressures and high temperatures over catalytic contact substances. In addition to liquid benzine hydrocarbons, which can be recovered from the gas by known processes, there are formed by this treatment volatile aliphatic hydrocarbons, including methane. The degree of concentration of these hydrocarbons may if necessary be regulated by eliminating the undesired gaseous constituents, by interposing a gas decomposing apparatus likewise operating according to a known process; such for example, as a gas decomposing plant for applying the Concordia-Linde-Bronn process. The gases of the desired hydrocarbon concentration are now subjected to a short heat treatment at temperatures above 1000° C. for a period not exceeding one second according to the process of Patent No. 316,126. In this process, by the conversion of a portion of the methane into solid or liquid aromatic hydrocarbons, preferably of the benzene series, a gas is produced at the same time which has the following typical composition: carbon dioxide, 0.0%; heavy hydrocarbons 3.4%; oxygen 0.2%; carbon monoxide 1.0%; hydrogen 65.3%; methane 26.2% and nitrogen 3.5%. Such a gas corresponds completely to a very good normal illuminating gas. Thus, by the primary use of the gasification of solid carbonaceous fuels in the water-gas generator, the secondary conversion of the resulting gases into methane or gases containing methane, (with the simultaneous recovery of benzine), and the subsequent conversion of these methane-containing gases, which may be concentrated (with the simultaneous production of benzene and other aromatic hydrocarbons) it is possible to transform solid carbonaceous fuels completely into high grade illuminating gas in a continuous operation.

The process described also affords the possibility of producing anti-knock liquid fuels. For this purpose the benzine hydrocarbons which are recovered in the second stage of the process from the gases which contain carbon monoxide and hydrogen are combined with the benzol hydrocarbons obtained in the third stage of the process. As the crude materials for the synthesis of benzine must be very pure, the benzine and benzol hydrocarbons resulting from the present process are especially suitable by reason of their high degree of purity. The fuel obtained by

mixing the benzine and benzol hydrocarbons is therefore a highly efficient and powerful anti-knock fuel.

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 recovering from solid fuels gases suitable for gas-supply services, with complete utilisation of the solid fuels, characterised in that the solid fuels are first converted into water gas, from which by known processes, and with the simultaneous recovery of benzine hydrocarbons if desired, methane-containing gases are produced, which are converted into illuminating gas by being heated once or a number of times for a short period to temperatures above 1000° C. according to the process of Patent No. 316,126 after previous concentration, if necessary, and with the simultaneous recovery of benzol hydrocarbons and other aromatic hydrocarbons.

2. A process according to Claim 1, involving the simultaneous production of an anti-knock liquid fuel, characterised in that, starting from the mixture of gases containing carbon monoxide and hydrogen obtained from solid fuels, this mixture is subjected first to a benzine synthesising process and after recovery of the condensible aliphatic hydrocarbons, the residual gas which contains the incondensible aliphatic hydrocarbons is subjected to heat treatment for a short period once or repeatedly at temperatures above 1000° C. according to the process of Patent No. 316,126, for the recovery of benzol hydrocarbons which are washed out of the gas by known methods and added to the benzine primarily obtained, after previous purification if necessary, for the purpose of obtaining an anti-knock motor fuel.

Dated this 27th day of January, 1930.

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