Patented Dec. 2, 1930 1,783,757

UNITED STATES PATENT OFFICE

HANS ADOLF VON STADEN AND ANTON HOEHN, OF NEUROESSEN, GERMANY, ASSIGNORS TO I. G. FARBENINDUSTRIE AKTIENGESELLSCHAFT, OF FRANKFORT-ON-THE-MAIN, GERMANY, A CORPORATION OF GERMANY

DEHYDRATION OF MOIST FUELS

No Drawing. Application filed October 23, 1928, Serial No. 314,535, and in Germany December 14, 1927.

This invention is an improvement in the process described and claimed in the copending application for Letters Patent, Ser. No. 207,561, filed July 21st, 1927, for the elimination of water from moist carbonaceous materials, such as varieties of coal, tars, mineral oils, peat, wood and the like, by subjecting them in the form of a fluid mass to temperatures above 200° C. and to pressure, in such a way that the water is practically all separated out in the liquid form, the partial pressure of the water vapor being so adjusted that the water remains liquid. Where solid fuels are employed these are finely ground and mixed with liquid carbonaceous materials in order to bring the said fuels into the form of the aforesaid fluid mass.

We have now found that the water may be eliminated in the liquid form from moist solid carbonaceous materials in the state of a fluid mass, even at temperatures which are below 200° C., though above about 100° C., if the pressure be allowed to operate for a sufficient time. Temperatures of from about 130° to 160° C. are usually employed, the pressures employed being then from 3 to 6 atmospheres. According to this manner of working 90 per cent for example of the water in solid fuels can be driven out in a single operation, provided that the said fuels be ground sufficiently fine, intimately mixed with liquid fuels, and exposed to pressure for an adequate time. In some cases the elimination of the water may be considerably accelerated or improved by the addition of salts and other substances such as aniline, brown coal tar oils, which contain creosote and the like.

The pressure may be low, for example 2 or 5 atmospheres, in particular when low temperatures are employed, but in some cases it will prove advantageous to employ higher pressures, for example 10, 20, 50 or even more atmospheres.

If the dehydrated products are to be subjected to hydrogenation under pressure it is advisable to provide for no substantial cooling taking place between the dehydration and the pressure hydrogenation processes, and as a rule the pressure is not released intermediately.

The process as a rule, for example in the dehydration of solid fuel such as coal proceeds in such a manner that the water contained in the coal passes into the oil which is mixed with the said coal at the commencement of the heating operation and forms an emulsion therewith. This emulsion of oil and water separates as the temperature and the pressure increases into an aqueous and an oily layer whereby the oil now adhering to the coal prevents the water from returning into the said coal on cooling.

A particular advantage of the process herein described consists in the fact that the consumption of energy is only small as well as in the possibility of effecting the dehydration in a low pressure apparatus.

The following example will further illustrate the nature of the said invention which however is not limited thereto.

Example

5 kilograms of raw brown coal with 50 per cent of moisture and 5 kilograms of anhydrous tar are mixed together, ground fine in a ball mill and heated to 150° C. in an autoclave, and are maintained at this temperature for some time, the pressure adjusting itself to about 5 atmospheres according to the vapor tension of the water. On the pressure in the apparatus being relieved, more than 90 per cent of the water separates out above the mixture of coil and tar.

What we claim is:—

1. The process of dehydrating moist solid fuels, which comprises heating a mixture of raw brown coal and tar to a temperature of about 150° C. under a pressure of about 5 atmospheres and separating the water in the liquid state.

2. The process of dehydrating moist solid carbonaceous materials which comprises mixing the same with a liquid carbonaceous material and heating the mixture in the state of a fluid mass to temperatures ranging between about 100° and 200° C. under pressure, the partial pressure of the water vapour being so adjusted that the water present is separated practically completely in the liquid form.

3. The process of dehydrating moist solid carbonaceous materials which comprises mixing the same with a liquid carbonaceous material and heating the mixture in the state of a fluid mass to temperatures ranging between about 130° and 160° C. and under pressures ranging between about 3 and 6 atmospheres, the partial pressure of the water vapour being so adjusted that the water present is separated practically completely in the liquid form.

4. The process of dehydrating moist solid carbonaceous materials which comprises heating a mixture of the said materials with tar to a temperature of between about 130° and 160° C. and under pressures ranging between about 3 and 6 atmospheres, the partial pressure of the water vapour being so adjusted that the water present is separated practically completely in the liquid form.

In testimony whereof we have hereunto set our hands.

HANS ADOLF von STADEN.
ANTON HOEHN.