

UNITED STATES PATENT OFFICE

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MANUFACTURE OF ACTIVATED CARBON

No Drawing. Application filed February 27, 1923, Serial No. 257,540, and in Austria March 3, 1927.

It is known to manufacture activated carbon by mixing pulverized carbon-containing materials with suitable binders, by molding them afterwards and by carbonizing at low temperature the briquets thus obtained and by activating them in a known manner, for instance by the action of steam at high temperatures (U. S. A. Patent No. 1,497,543).

This process seemed originally of great importance as it was hoped to be able to use by its means, independently of the valuable raw materials such as for instance charcoal, also inferior materials (peat, brown coal, etc.). It has been found, however, that briquets manufactured by the process mentioned, presented the same or even greater difficulties to activating than those of the activation of large pieces of coal in which, at the moment when the surface portions have been suitably activated, the interior still remains practically inactive, and at the moment when the interior has been activated, the burning away or oxidation on the surface has already made great progress. The increased difficulties offered by the above-mentioned process, will become intelligible if it is considered that the raw materials (peat, brown coal) which are softer in themselves, are compressed by the pressure in the briquetting machine to a mass with capillary ducts of the smallest diameter.

The invention has for its object completely to eliminate the serious difficulties of the above-mentioned process. This problem is solved in an unexpectedly simple manner by employing for the purpose of activating, a briquetted raw material which has a heterogeneous structure consisting of micro-capillaries and macro-capillaries, or in which such a structure is produced during the process of activating. In such a material which, in addition to the micro-capillaries which form the basis of all activated carbon and more particularly of all compressed carbons, is traversed by a system of capillaries of greater diameters (macro-capillaries) the time required for the activation is reduced to an extraordinary degree. The macro-capillaries afford to the activating gases an extraordinarily quick and efficient admission to all the

portions of the carbon, so that the activation becomes a perfectly homogeneous one. By the new process it is therefore possible to obtain within relatively a very short time a perfectly homogeneously activated carbon of the highest degree of activity.

The heterogeneous capillary structure can be of course produced in the briquetting mass in any suitable manner, for instance by a purely mechanical process, say by pulling or drawing the briquetting mass to thin filaments which are subsequently woven together etc. A particularly suitable process consists however in forming a briquetting mass with the addition of animal hairs or other natural or artificial fibrous materials such as for instance cotton, silk, artificial silk or other organic substances which on being heated, produce in the mass hollow spaces, whereupon the briquets made from this mass are dried, carbonized and activated in a known manner.

For the formation of macro-capillaries substances are particularly suitable which, such as for instance animal hairs, possess capillaries already. In the same way however any other organic substances can be used, more particularly substances of animal origin, which on being heated or submitted to dry distillation, produce hollow spaces in the mass by becoming gasified.

In view of the large number of substances available for the purpose in question, it must be left to the expert to select the most suitable ones.

Example.—Carbon-containing material (for instance charcoal) is finely pulverized and mixed in a known manner with a binding medium such as tar or pitch, with the addition of animal hairs in the approximate proportion of 0.5–2.0% by weight. The quantity of these additional substances can vary at will, according as it is desired to produce a greater or smaller number of macro-capillaries in the mass.

The mass obtained in that way is thereupon molded in briquetting machines, carbonized and activated for instance by means of steam at a high temperature in a known manner.

In place of the steam activation process chemical activation processes can be used, the advantages of the existing macro-capillaries still being retained.

5 The activated pieces discharged from the kiln, are characterized by the fact that they posses a heterogeneous capillary system, that is to say that in addition to the system of micro-capillaries, they have a number of microscopically visible macro-capillaries. The
10 pieces discharged from the kiln, can be used unaltered in smaller or larger pieces, or after a further treatment such as for instance pulverizing, washing etc.

15 Activated carbons manufactured by this process have a higher degree of activity and therefore a greater action in adsorption and in the subsequent expulsion of the adsorbed substances. A particular technical and economical advantage is that raw materials such
20 as for instance waste coal etc., which hitherto could not be used for the manufacture of highly activated carbon, can be used with the new process with great success for such purpose.
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We claim:

1. The process for the production of activated carbon which comprises forming filamentary passages in agglomerated finely divided carbonaceous material and thereafter
30 treating the carbonaceous material to produce active carbon.

2. The process for the production of activated carbon which comprises forming a mixture comprising finely divided carbonaceous material and a filamentary material decomposable by heat, forming briquets from said mixture and thereafter carbonizing and activating it.
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40 3. The process for the production of activated carbon which comprises activating agglomerated masses formed from a mixture comprising finely divided carbonaceous material, a binding agent and filamentary material decomposable by heat.
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4. The process for the production of activated carbon which comprises forming a mixture comprising finely divided carbonaceous material and animal hair into briquets, carbonizing said briquets and thereafter activating them.
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5. The process for the production of activated carbon which comprises agglomerating finely divided carbonaceous material and filamentary material decomposable by heat, heating the agglomerate to decompose the filamentary material and treating the carbonaceous material in the agglomerate to produce active carbon.
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60 6. The process for the production of activated carbon which comprises agglomerating finely divided carbon into a mass having veiny macro-capillaries therein and thereafter treating the mass to activate the carbon.

65 7. Activated carbon having macro-capil-

laries traversing the same as veins, said macro-capillaries being of such a size as to be microscopically visible.

In testimony whereof we affix our signatures.

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