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COKING PROCESS AND PRODUCT.

No Drawing.

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To all whom it may concern:

Be it known that I, FREDERICK W. SPERR, Jr., a citizen of the United States, residing in Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Coking Processes and Products, of which the following is a specification.

This invention relates generally to the coking of liquefiable bituminous materials, for the production of low ash coke from such material in a manner which substantially eliminates excessive intumescence and ebullition of the material during the coking process. A main object of the invention is to prepare from pitch, or other liquefiable bituminous materials, a residue of higher melting point than the original material, which residue may be charged directly into a coke oven retort of any ordinary type and coked.

Although the invention is especially applicable to the treatment of pitch, it may readily be applied to other liquefiable bituminous materials, and it will be understood that the invention is not limited to the specific process nor to the specific application herein described as an illustrative example.

In carrying out the invention, a proportion of coal tar pitch, or other liquefiable bituminous material, is treated with a solvent to remove the more fusible constituents of the material, i. e., those substances which boil and intumesce excessively, when ordinary pitch, or other untreated bituminous material, is charged into a coke oven retort. From the solution of this solvent and the fusible or excessively intumescent and ebullient constituent material, there remains, after separation from the adhering liquid, a solid residue, which, in appearance, somewhat resembles ordinary bituminous coal; this solid residue contains the less fusible constituents, which are insoluble in the solvent, and, being of a higher melting point and more infusible than the original or untreated material, is substantially non-foaming and non-ebullient. The residue may then be charged into a coke oven retort of ordinary type and subjected to a coking heat for the proper length of time necessary to produce coke. By the employment of a such a residue, in a coke oven retort, the coking process is carried on effi-

ciently, without the usual troubles encountered in the coking of ordinary untreated pitch and other liquefiable bituminous materials, which when subjected to the high temperatures necessary for coking, frequently boil and intumesce violently. This foaming and excessive intumescence of pitch materials in coke ovens results in a mechanical loss of a large proportion of the coke and produces conditions in the oven or retort, which seriously interfere with the closures and outlets of the oven or retort. Moreover, the coke resulting from the solid residue, produced as above stated, will be a highly homogeneous product of low ash content and of the highest grade of pitch coke.

One advantageous application of the above stated discovery is as follows:

A proportion of hard pitch may be mixed with a suitable proportion, for example a substantially equal proportion, of a solvent, such as kerosene and boiled for two or three hours, the temperature being kept at or about the boiling point of the solvent. Next the solid residue is removed from the solution of kerosene and the more fusible constituents of the pitch, and is then preferably heated or steamed to free this from any adhering particles of kerosene. The residue may finally be charged into a coke oven retort and coked; preferably, the solvent is recovered by distillation and used again.

Instead of employing kerosene as a solvent for pitch or other liquefiable bituminous materials, any one or several in combination of a great variety of solvents, preferably of an organic nature, may be used. In addition to kerosene, suggested solvents are gasoline, crude petroleum, benzol, solvent naphtha, turpentine, etc. Other solvents will also suggest themselves, to those skilled in the art, for carrying out the essential purpose of producing a residue of higher melting point than the original bituminous material and substantially non-intumescent and non-ebullient when subjected to coking heat. Mixtures of solvents have proven advantageous, for example, 75% kerosene and 25% of solvent naphtha.

The above described process may be developed in a large variety of ways. For example, pitch or other bituminous material may be first treated with a solvent, such as

carbon bisulphide, which dissolves nearly all of the pitch. The resulting solution may then be treated with a solvent like kerosene, for example, in which the less fusible constituents of the material are insoluble, to separate these less fusible constituents from the more fusible constituents. The less fusible constituents will be precipitated as a residue which when separated from the solution and freed from adherent liquid will have substantially the properties above set forth. This residue may subsequently be coked.

Again, if desired, the pitch or bituminous material may be subjected to different periods of extraction or to several successive extractions, using a fresh solvent each time. In this way, the amount and character of the constituents extracted may be controlled and residues containing more or less of the fusible constituents of the original material may be produced.

The extracted constituents of the pitch or other bituminous materials contain valuable by-products which may be recovered and applied to various industrial purposes.

The processes of the invention may be practiced in various ways, other than the particular embodiment that has been described for purposes of illustration, and still be within the scope and subject matter of the claims hereinafter made.

I claim:

1. In a process of coking liquefiable bituminous materials; treating a liquefiable bituminous material with a solvent to extract only the more readily fusible constituents of such material and thereby forming a solid residue containing the less fusible constituents of such material; and subjecting the residue thus formed to a coking heat; substantially as specified.

2. In a process of coking liquefiable bituminous materials; treating a liquefiable bituminous material with a solvent, while maintaining a temperature equal to the boiling point of the solvent, to extract only the more readily fusible constituents of the material and thereby forming a solid residue which contains the less fusible constituents of the material; and subjecting the residue thus formed to a coking heat; substantially as specified.

3. In a process of coking liquefiable bituminous materials; treating a liquefiable bituminous material with a solvent to extract the foaming intumescent and ebullient constituents of such material and thereby forming a solid residue; and subjecting the solid residue thus formed to a coking heat; substantially as specified.

4. In a process of coking liquefiable bituminous materials; treating a liquefiable bituminous material with a solvent, while maintaining a temperature equal to the boiling

point of the solvent, to extract the foaming intumescent and ebullient constituents from such material and thereby forming a solid residue, and subjecting the solid residue thus formed to a coking heat; substantially as specified.

5. In a process of coking liquefiable bituminous materials; treating a liquefiable bituminous material with a solvent, while maintaining a temperature equal to the boiling point of the solvent, to extract the foaming intumescent and ebullient constituents from such material and thereby forming a substantially non-foaming and non-ebullient solid residue, and subjecting the residue thus formed to a coking heat; substantially as specified.

6. In a pitch coking process: treating pitch with a solvent to remove only the more readily fusible constituents from the pitch and thereby forming a solid residue containing the less fusible constituents; and subjecting the residue thus formed to a coking heat; substantially as specified.

7. In a pitch coking process: treating pitch with a solvent, while maintaining a temperature equal to the boiling point of the solvent, to remove only the more readily fusible constituents from the pitch and thereby forming a solid residue which contains the less fusible constituents of the pitch; and subjecting the residue thus formed to a coking heat; substantially as specified.

8. In a pitch coking process: treating pitch with kerosene to remove only the more readily fusible constituents from the pitch and thereby forming a solid residue which contains the less fusible constituents of the pitch; and subjecting the residue thus formed to a coking heat; substantially as specified.

9. In a pitch coking process: treating pitch with kerosene, while maintaining a temperature equal to the boiling point of the kerosene; to remove only the more readily fusible constituents from the pitch and thereby forming a solid residue which contains the less fusible constituents of the pitch; and subjecting the residue thus formed to a coking heat; substantially as specified.

10. In a process of coking liquefiable bituminous materials; subjecting a liquefiable bituminous material to the action of a solvent to form a residue of higher melting point than the original material; separating the residue from the solution resulting from the solvent action; and subjecting the thus separated residue to a coking heat; substantially as specified.

11. In a process of coking liquefiable bituminous materials; subjecting a liquefiable bituminous material to the action of a solvent to form a residue of higher melting point

than the original material; separating the residue from the solution resulting from the solvent action; heating said residue to free it from solvent; and subjecting the residue thus formed to a coking heat; substantially as specified.

12. In a process of coking liquefiable bituminous materials; subjecting a liquefiable bituminous material to the action of a solvent to form a residue of higher melting point than the original material; separating the residue from the solution resulting from the solvent action; steaming said residue to free it from solvent; and subjecting the residue thus formed to a coking heat; substantially as specified.

13. In a coking process for treating cokable liquefiable bituminous materials; subjecting a liquefiable bituminous material to the action of a solvent, while maintaining a temperature equal to the boiling point of the solvent, to extract only the more readily fusible constituents from the material, and thereby forming a solid cokable residue which contains the less fusible constituents of the material; and separating the solid residue thus formed from the solution; substantially as specified.

14. In a pitch coking process: treating pitch with a mixture of about 75% kerosene and about 25% solvent naphtha, and thereby forming a solid residue which contains the less fusible constituents of the pitch; and subjecting the residue thus formed to a coking heat; substantially as specified.

15. In a process of treating pitch: removing from the pitch only its more readily fusible constituents by treatment with a solvent, thereby leaving a residue that contains only the non-foaming less fusible constituents of the pitch; and subjecting said residue to coking heating; substantially as specified.

16. In a process of treating pitch: removing from the pitch only its more readily fusible constituents by treatment with a solvent and heat, thereby leaving a residue that contains only the non-foaming less fusible constituents of the pitch; and subjecting said residue to coking heating; substantially as specified.

17. In a process of treating pitch: removing from the pitch only its more readily fusible constituents by treatment with a solvent, thereby leaving a residue that contains only the non-foaming less fusible constituents of the pitch; substantially as specified.

18. In a process of treating liquefiable bituminous material: removing from such material only its more readily fusible constituents by treatment with a solvent, thereby leaving a residue that contains only the non-

foaming less fusible constituents of the material; and subjecting such residue to coking heating; substantially as specified.

19. As a new product, a solid substantially non-foaming and non-ebullient pitch residue, manufactured from pitch from which the intumescent and ebullient constituents have been removed by solvent action, and of a higher melting point than untreated pitch.

20. As a new product, a solid substantially non-foaming pitch residue manufactured from pitch by removing from the latter its more fusible constituents.

21. As a new product, a solid substantially non-foaming and non-ebullient pitch residue, manufactured from pitch by subjecting pitch to solvent action and heat to remove the foaming intumescent and ebullient constituents from the pitch, and of a higher melting point than untreated pitch.

22. As a new product, a solid substantially non-foaming and non-ebullient pitch residue, manufactured from pitch by subjecting pitch to the action of kerosene to remove the intumescent and ebullient constituents from the pitch, and of a higher melting point than untreated pitch.

23. As a new product, a solid substantially non-foaming and non-ebullient pitch residue, manufactured from pitch by subjecting pitch to the action of kerosene and heat to remove the intumescent and ebullient constituents from the pitch, and of a higher melting point than untreated pitch.

24. As a new product, a solid substantially non-foaming and non-ebullient pitch residue, manufactured from pitch by subjecting pitch to the action of kerosene and a temperature equal to the boiling point of the kerosene to remove the intumescent and ebullient constituents from the pitch, and of a higher melting point than untreated pitch.

25. As a new product, the solid, substantially non-foaming and non-ebullient pitch residue that is substantially insoluble in solvents which dissolve the more fusible constituents of pitch.

26. As a new product, the solid, substantially non-foaming and non-ebullient pitch residue that is substantially insoluble in kerosene.

27. In the coking of a solid derivative of coal tar, a process which consists in treating the said derivative with a solvent to take up the more ebullient constituents of said derivative, and then separating from each other the said solvent and the solid residue of said derivative, and then subjecting said residue to a coking heat and fusing and coking the same with less foaming than would take place without such preliminary separation of said more ebullient constituents.

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