UNITED STATES PATENT OFFICE.

FLETCHER B. HOLMES, OF WOODBURY, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO E. I. DU PONT DE NEMOURS AND COMPANY, A CORPORATION OF DELAWARE.

PROCESS OF OBTAINING AROMATIC HYDROCARBONS.

1,276,219. Specification of Letters Patent. Patented Aug. 20, 1918.

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To all whom it may concern:

Be it known that I, FLETCHER B. HOLMES, of Woodbury, in the county of Gloucester and in the State of New Jersey, have invented a certain new and useful Improvement in Processes of Obtaining Aromatic Hydrocarbons, and do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to a process for obtaining aromatic hydrocarbons from a solution or mixture of such hydrocarbons with other products, as for example, petroleum products. More particularly, however, it relates to a process in which gasolene containing varying percentages of aromatic hydrocarbons is separated so as to obtain one product having a much larger percentage of aromatic hydrocarbons than the original gasolene, and another product containing a much smaller percentage of such hydrocarbons than in the original gasolene.

Petroleum obtained from certain sources contains appreciable percentages of aromatic hydrocarbons, and such aromatic hydrocarbons are present in the fraction thereof known as gasolene obtained by distillation. Such aromatic hydrocarbons are also present in the gasolene obtained from petroleum products by special means, as by treatment at higher temperatures and pressures. It is well known, however, that it is difficult to concentrate a diluted solution of the aromatic hydrocarbons and gasolene by fractional distillation, as the aromatic hydrocarbons begin to distil at temperatures far below their actual boiling points, and furthermore, continue to distil together with the gasolene at temperatures far above their boiling points.

The object of my invention is to provide a practical and an effective method of separating the aromatic hydrocarbons from such petroleum products, thus avoiding the difficulties found in the separation as pointed out above.

I have discovered that if the petroleum products containing percentages of aromatic hydrocarbons are treated with a solvent, as for example a non-volatile solvent, having a different solvent action upon the aromatic hydrocarbons than upon the paraffin hydrocarbons contained in the products, a separation of the aromatic hydrocarbons from the remaining constituents of the petroleum products can be readily obtained, that is to say, by obtaining a separation of the original petroleum products into two parts, one containing a much larger percentage of the aromatic hydrocarbons, and another part containing a much smaller percentage of aromatic hydrocarbons than in the original petroleum products. I have furthermore discovered that this separation can be very effectively carried out by the use of a nitro-compound, or a mixture of nitro-compounds, especially substances consisting substantially of nitro-bodies of a higher degree of nitration than the mono-nitro-compounds.

While my invention is capable of being carried out in many different ways, for the purpose of illustration I shall describe only one way in which my invention may be carried out.

I may proceed as follows: Gasolene containing a small percentage of aromatic hydrocarbons is mixed in any suitable manner with an equal weight of the nitro-compound product known as "liquid di-nitrotoluol". This mixture is then allowed to stand until it separates into two layers. The lower layer is comprised mainly of "liquid di-nitrotoluol" together with a quantity of gasolene and aromatic hydrocarbons. The upper layer is comprised mainly of gasolene with small percentages of aromatic hydrocarbons together with a small amount of "liquid di-nitrotoluol". The two layers are then separated and separately distilled so as to separate the nitro-compound from the gasolene and hydrocarbons. Preferably the distillation is carried out at a reduced pressure, or by the injection of a current of steam or inert gas through the liquid, as the separation from the nitro-compound may be more readily effected in this manner. A distillate will thus be recovered from the lower layer having the higher percentage of aromatic hydrocarbons, while the distillate obtained from the upper layer will contain a lower percentage of the aromatic hydrocarbons. Each of the distillates may then be treated with fresh "liquid di-nitrotoluol" which has been previously used for treating a gasolene still poorer in aromatic hydrocarbons than the distillate to be treated therewith, and the treatment in this manner may be repeated until a distillate is attained on the one hand

which contains the greater part of the aromatic hydrocarbons originally contained in the gasolene, and another distillate is attained on the other hand, containing only a very small percentage of aromatic hydrocarbons. It will be understood, of course, that the nitro-compound may be repeatedly used in the manner above described.

While I have described my process above as being carried out by the application of "liquid di-nitrotoluol" as a solvent suitable for the separation of the constituents in the petroleum products, other nitro-compounds and nitro-compound mixtures can be used equally well. It is also to be understood that the process may be modified, if desired, in such a way as to carry it on continuously. It is also to be understood that where I have referred to a non-volatile solvent, I mean a solvent having a boiling point higher than 150 degrees centigrade. Solvents having a high boiling point may be much more readily separated from gasolene or aromatic hydrocarbons.

While I have described my invention above in detail, I wish it to be understood that many changes may be made therein without departing from the spirit of my invention.

Furthermore, in the claims I have referred to an aromatic nitrocompound, but I mean to include thereby either a single such compound or a mixture of such compounds.

I claim:

1. The process which comprises treating a petroleum product containing aromatic hydrocarbons with an aromatic nitro-compound of such a nature as will separate the petroleum product into a part containing a higher percentage and a part containing a lower percentage of aromatic hydrocarbons than in the said petroleum product.

2. The process which comprises treating a petroleum product containing aromatic hydrocarbons with an aromatic nitro-compound of a higher degree of nitration than the mono-nitro-compound of such a nature as will separate the petroleum product into a part containing a higher percentage and a part containing a lower percentage of aromatic hydrocarbons than in the said petroleum product.

3. The process which comprises treating a petroleum product containing aromatic hydrocarbons with a liquid aromatic nitro-compound so as to separate the petroleum product into a part containing a higher percentage and a part containing a lower percentage of aromatic hydrocarbons than in the said petroleum product.

4. The process which comprises treating a petroleum product containing aromatic hydrocarbons with a liquid aromatic nitro-compound of a higher degree of nitration than the mono-nitro-compound so as to separate the petroleum product into a part containing a higher percentage and a part containing a lower percentage of aromatic hydrocarbons than in the said petroleum product.

5. The process which comprises treating a gasolene containing aromatic hydrocarbons with an aromatic nitro-compound of such a nature as will separate the gasolene into a part containing a higher percentage and a part containing a lower percentage of aromatic hydrocarbons than in the said gasolene.

6. The process which comprises treating a gasolene containing aromatic hydrocarbons with an aromatic nitro-compound of a higher degree of nitration than the mono-nitro-compound of such a nature as will separate the gasolene into a part containing a higher percentage and a part containing a lower percentage of aromatic hydrocarbons than in the said gasolene.

7. The process which comprises treating a gasolene containing aromatic hydrocarbons with a liquid aromatic nitro-compound so as to separate the gasolene into a part containing a higher percentage and a part containing a lower percentage of aromatic hydrocarbons than in the said gasolene.

8. The process which comprises treating a gasolene containing aromatic hydrocarbons with a liquid aromatic nitro-compound of a higher degree of nitration than the mono-nitro-compound so as to separate the gasolene into a part containing a higher percentage and a part containing a lower percentage of aromatic hydrocarbons than in the said gasolene.

In testimony that I claim the foregoing I have hereunto set my hand.

FLETCHER B. HOLMES.

Witnesses:

A. M. COMEY,

W. R. MOWBRAY, Jr.