

UNITED STATES PATENT OFFICE.

PAUL SABATIER AND ALPHONSE MAILHE, OF TOULOUSE, FRANCE, ASSIGNORS TO
SOCIÉTÉ DES RAFFINERIES CATALYTIQUES DES PETROLES ET HYDROCARBURES,
OF PARIS, FRANCE.

MANUFACTURE OF LIGHT HYDROCARBONS OR THE LIKE.

1,124,333.

Specification of Letters Patent.

Patented Jan. 12, 1915.

No Drawing.

Application filed March 31, 1914. Serial No. 828,643.

To all whom it may concern:

Be it known that we, PAUL SABATIER, of Allées des Zephyrs, Toulouse, France, and ALPHONSE MAILHE, of Rue Lafayette, Toulouse, France, have invented an Improved Manufacture of Light Hydrocarbons or the like, which is fully set forth in the following specification.

This invention relates to a process for the manufacture of petroleum ethers and petrol or light hydrocarbon products, starting either from lamp oils or heavy petroleum oils, or from paraffins, or from hydrocarbons or hydrocarbon products obtained from tar, schists or similar products, or extracts of lignites, peat or wood, or from hydrocarbons obtained from resins or from similar products.

This process is divided into two main stages.

First stage: The vapors coming from solid or liquid hydrocarbons to be treated, are directed against wires or metal blades rendered incandescent by an electric current of any kind. The wires can be arranged as a spiral, straight, as a net-work, or disposed in any desired manner. The liquid to be converted, or its vapor, is brought into contact with them either alone, or mixed with hydrogen or any gas rich in hydrogen. Wires of various metals can be employed, either platinum, or metals of the platinum series, or of alloys of metals of the said series, or wires of nickel or of the metals of the same series, such as iron, copper, cobalt, or wires of tantalum or any wires that can be rendered incandescent by an electric current of any kind, or wires covered with catalyzing metals or oxids, such as oxids of thorium, zirconium, uranium, titanum acid or mixtures of the said oxids; the said oxids can be heated by a wire of any shape by employing an electric current; or metal shavings such as iron, nickel, cobalt, copper, etc., can be used heated by means of a wire of any shape by means of an electric current. The temperature of the wires is raised by the passage of electric current from 300° to the dark or bright red. The dissociation of hydrocarbon products into more volatile hydrocarbon products is the more complete,

the greater the length of contact of the wires, or the surface of the catalyzing metals, or catalyzing oxids heated by wires through which electric current is passing. The output of volatile liquid products and of gas is the greater, the higher the temperature. At the outlet of the apparatus in which the hydrocarbon products, lamp oils, heavy petroleum oils, paraffins, etc., have been exposed to the catalytic action of wires, net work, etc., or of catalyzing metals and oxids heated by wires through which an electric current is passing, powerful condensing apparatus will cool the products of the reaction, which comprise: 1. Hydrocarbon gases mixed with hydrogen, which can be utilized either directly for heating and lighting, or for explosion engines, or as compressed gases for lighting or for any other purpose such as the manufacture of hydrogen by destructive distillation. 2. Liquid hydrocarbons distilling below 150°, containing non-saturated oxidizable hydrocarbons which are treated in the second stage. 3. Liquid hydrocarbons distilling between 150° and 300°, which can be either mixed again with the original raw material, in order to be submitted to a new treatment, or submitted to the action of the second stage in order to render them suitable for lighting purposes. 4. Liquid or solid products which do not distil under 300°, and which must be mixed again with the original raw material, in order to be submitted to a new treatment. 5. Solid carbon substances which are separated.

Second stage: The liquids which are volatile under 150°, as well as those which distil between 150° and 300°, are constituted for the greater part by non-saturated oxidizable hydrocarbons which can be utilized immediately for explosion engines, lighting, etc., or converted into saturated hydrocarbons which are practically non-oxidizable in the air, by direct hydrogenation of their vapors by means of divided nickel or similar metals. But in order to carry out this second stage, hydrogenation can be obtained by using, in place of divided nickel or similar metals referred to in the above process, a nickel wire, blade or tube arranged in the

form of a spiral, net work, or in any other form and heated to a temperature between 200 and 350° by the passage of a suitably regulated electric current of any kind; or
 5 a wire, blade or tube of other catalyzing metals, such as cobalt, copper, iron, platinum, or metals of the platinum series, etc., also arranged in the form of a spiral, net-work, etc., and heated in the same way by
 10 an electric current; or divided nickel or one of the preceding metals in a divided state, such as copper, cobalt, iron, obtained by the reduction of their oxids; platinum in its various forms, or metals of the platinum
 15 series in their different forms which are heated to a temperature between 200 and 350° by a wire, blade, tube or net-work of wires of any desired shape and kind, through which a regulated electric current
 20 passes.

We claim—

1. The process of converting crude petroleum, heavy petroleum oils, lamp oils or other hydrocarbons, into hydrocarbons
 25 distilling below 300°, which consists in passing the vapors of the hydrocarbons to be treated over a substance capable of conducting electricity and of producing catalytic action, while maintaining said substance at
 30 a temperature varying from 300° to dark red and bright red by the passage of an electric current.

2. The process of converting crude petroleum, heavy petroleum oils, lamp oils or
 35 other hydrocarbons, into hydrocarbons distilling below 300°, which consists in passing the vapors of the hydrocarbons to be treated over a metallic substance capable of conducting electricity and of producing catalytic
 40 lytic action, while maintaining said substance at a temperature varying from 300° to dark red and bright red by the passage of an electric current.

3. The process of converting crude petroleum, heavy petroleum oils, lamp oils or
 45 other hydrocarbons into hydrocarbons distilling below 300°, which consists in passing the vapors of the hydrocarbons to be treated over metals or alloys of metals of the nickel series, while maintained at a temperature
 50 varying from 300° to dark red and to bright red by the passage of an electric current.

4. The process of converting crude petroleum, heavy petroleum oils, lamp oils or
 55 other hydrocarbons into hydrocarbons below 300°, which consists in passing the vapors of the hydrocarbons to be treated over a metallic body capable of conducting electricity and covered with catalyzing metals, while
 60 maintained at a temperature varying from 300° to dark red and to bright red by the passage of an electric current.

5. The process of converting crude petroleum, heavy petroleum oils, lamp oils or

other hydrocarbons into hydrocarbons, distilling below 300°, which consists in passing the vapors of the hydrocarbons to be treated, over catalyzing metals in a state of division
 70 in contact with a substance capable of conducting electricity and maintained at a temperature varying from 300° to dark red and to bright red, by the passage of an electric current.

6. The process of converting crude petroleum, heavy petroleum oils, lamp oils or
 75 other hydrocarbons into hydrocarbons distilling below 300°, which consists in passing the vapors of the petroleum hydrocarbons to be treated, mixed with hydrogen or gases
 80 rich in hydrogen, over a substance capable of conducting electricity and producing catalytic action, while maintained at a temperature varying from 300° to dark red and bright red, by the passage of an electric
 85 current.

7. The process of converting crude petroleum, heavy petroleum oils, lamp oils or
 other hydrocarbons into hydrocarbons distilling below 300°, which consists in passing
 90 the vapors of the hydrocarbons to be treated over a substance capable of conducting electricity and producing catalytic action, while maintained at a temperature varying from 300° to dark red and to bright red, by the
 95 passage of an electric current, and in converting the products obtained into saturated hydrocarbons practically inoxidizable by hydrogenation in the presence of metallic
 100 substances capable of electricity and producing catalytic action, raised to a temperature from 200° to 350° by the passage of an electric current.

8. The process of converting crude petroleum, heavy petroleum oils, lamp oils or
 105 other hydrocarbons into hydrocarbons distilling below 300°, which consists in passing the vapors of the hydrocarbons to be treated, over substances capable of conducting electricity and producing catalytic action, while
 110 maintained at a temperature varying from 300° to dark red and to bright red, by the passage of an electric current, and in transforming the products obtained, into saturated hydrocarbons practically inoxidizable
 115 by hydrogenation in the presence of catalyzing metals in a state of division heated from 200° to 350° by substances capable of conducting electricity, through which an electric
 120 current is passed.

9. A process of converting crude petroleum, heavy petroleum oils, lamp oils or
 other hydrocarbons into hydrocarbons distilling below 300°, which consists in passing
 125 the vapors of the hydrocarbons to be treated, mixed with hydrogen or gases rich in hydrogen, over substances capable of conducting electricity and producing catalytic action, while maintained at a temperature varying
 130 from 300° to dark red and to bright red, by

the passage of an electric current, and in transforming the products obtained into saturated hydrocarbons practically oxidizable by hydrogenation in the presence of substances raised to a temperature of 200° to 350° by the passage of an electric current.

specification in the presence of two subscribing witnesses.

PAUL SABATIER.
ALPHONSE MAILHE.

Witnesses:

W. P. SHOCKLEY,
CH. PREFOT.

In testimony whereof we have signed this