UNITED STATES PATENT OFFICE.

L. ATWOOD AND W. ATWOOD, OF WALTHAM, MASSACHUSETTS.

IMPROVEMENT IN PREPARING OIL FROM BITUMENS.

Specification forming part of Letters Patent No. **15,506**, dated August 12, 1856.

To all whom it may concern:

Be it known that we, LUTHER ATWOOD and WILLIAM ATWOOD, both of Waltham, in the county of Middlesex and Commonwealth of Massachusetts, chemists, have invented or discovered an Improvement in the Mode of Preparing Oil from Bitumens; and we do hereby declare that the following is a true and exact description of the same.

The improvement we have made relates to the production from the various solid bitumens of oils having highly unctuous qualities and high boiling-points, which enables us to use them alone or with other oils for lubricating machinery.

Combustible oils and such as entered into the composition of varnishes have long been obtained from the solid bitumens; but oils of an oleaginous consistency adapted to diminishing friction have not, so far as we are aware, been produced from these bodies. We find the bitumens called "Trinidad pitch" and "Barbadoes tar" to belong to one class of bodies, inasmuch as the result of their proximate decomposition is so nearly the same that our processes apply to them both. They, however, differ from the fluid petroleums, as they do from the cannels, chemically, and to adapt the products from the solid bitumens to our uses we adopt processes essentially different at the different steps taken. Our experiments prove that the bitumens may, like the cannels, be divided into two classes. In one we place all those which decompose in distillation so as to produce paraffine, and in the other class those which do not produce paraffine.

Omitting all consideration of the class producing paraffine in distillation, we take as the basis matter of our improved oil crude products arising from the destructive distillation at high temperatures of such bitumens as afford a dense non-crystalline product. The articles known as "Trinidad pitch," and "tar of Barbadoes" are examples of this class of bodies, while Rangoon tar and Seneca oil belong to another class. The fluids produced in rapidly breaking up this first class of substances by heat contain no paraffine, or at most only traces of this substance, which then unites with the light oils. They yield a heavy tar as a final result of distillation and leave a dense coke. This heavy tar treated by chemical agents, as by our processes, becomes converted mostly into a fluid oil distinct in characters from any known body, and highly valuable as a lubricator. This oil is doubtless an isomeric condition of paraffine and the body yielding coup oil. It is, like the improved paraffine and coup oil, a fixed oil, (comparatively speaking,) having a boiling-point as high as 600° Fahrenheit, resisting cold without depositing solid matter of any kind, and having an intermediate specific gravity of 0.920 to 0.940 at 60° Fahrenheit. Unlike the bodies of oily character heretofore known, it is perfectly neutral, and is quite indifferent to chemical agents possessing a unity of physical constitution.

Our processes, which we proceed to describe, will enable any one skilled in the art of manipulating oils to produce the product sought for as a result in a pure state.

We take the crude bitumen of Trinidad or Barbadoes, or any bitumen which does not yield paraffine, and wash away all dirty matter, and dry as far as is possible the raw material. These bitumens, when heated, produce much watery vapor, which, distending the mass, causes it to flow and bubble, so as to prevent ordinary distillation. Having introduced the bitumen into an iron still provided with a suitable condenser, we apply a regulated heat and distill all the matter which is volatile. The crude product from the bitumen placed in another still is submitted to a quick fire until the temperature in the fluid contained in the still is 500° Fahrenheit. The receiver being changed, we urge the fire and collect all that comes over below 850° Fahrenheit. This distillate placed in a lead agitator, for every one hundred gallons we add one hundred and eighty pounds of oil of vitriol, (sulphurid acid 66° Baumé,) and agitate the whole strongly, allowing the temperature to rise as high as 100° Fahrenheit.

After the subsidence of the acid the oil must be removed to another agitator, and there be treated with six gallons caustic soda solution at 36° Baumé, and by means of a steam-coil the soda solution must be made to boil, water being supplied as it evaporates, for one hour. When the foul soda solution has been withdrawn and the oil has cooled to 100° Fahren-

heit, five pounds of manganate or permanganate of potash or soda in two gallons of water must be added and well agitated with the oil. The material thus purified must be again distilled from a clean still, the products boiling from 600° to 850° Fahrenheit being collected, or until they become a brown fluid as they cool. It will be observed in this distillation that nearly all the oily matter which rises has a fixed boiling-point—about 750° Fahrenheit—and that very little of the fluids having low boiling-points remains.

The final purification of the distillate is effected by agitating one hundred gallons with one hundred pounds of oil of vitriol, as before. After the removal of the acid the oil must be treated with one-sixteenth of its volume of caustic soda solution at 36° Baumé. By washing away the soda with water and subjecting the oil to jets of steam for half an hour all traces of soap-like compounds can be removed. The oil, after being exposed for some days to the sun's rays, loses a trace of water and becomes transparent and brilliant, when it is fit for use.

These steps of our processes and proportions of acids and alkaline solutions will remove extraneous bodies and their derivatives from the distillates of the bitumens which do not yield paraffine. They are used in the large proportions named for the purpose of completely abstracting creosote, naphthaline, pyretine, and a peculiar smoke-oil, which form, step by step, with the production of the neutral oil, which we finally obtain in a pure state. It will be observed that the proportions of chemical agents are such as are adapted to the class of bitumens named.

We consider the steps of our processes as bearing some resemblance to the operations on fats, when by previous treatment of these with sulphuric acid, sulphoglycerine acid is formed and washed away, and the oil in distillation does not then afford acroleine, as it would do were glycerine present in the oil; but the bituminous crude distillates contain several bodies which decompose into volatile odorous oils, and they must be all removed before a uniform oil can be obtained.

It is well known that solid bitumens have been used to produce light naphthas by distillation and the residuums for cements. Heavy acid oils have also been known as products of their decomposition.

We disclaim the production of such bodies, and confine ourselves to the use, as the basis of our manufacture, of only such bitumens as do not produce paraffine, which we decompose by the aid of high temperatures conjoined with chemical agents, so as to obtain a nearly colorless and odorless oil, boiling above 600° Fahrenheit, remaining fluid at 32° Fahrenheit, and having a density as high as 0.900, which the above-described processes will produce. We do not claim these processes, although they are the result of a large experience.

What we claim, and desire to secure by Letters Patent, is—

The manufacture and use of the oil having the characters described from bitumens which do not yield paraffine by distillation.

LUTHUR ATWOOD.
WM. ATWOOD.

Witnesses:
JAMES W. ROLLINS,
W. H. L. SMITH.