

UNITED STATES PATENT OFFICE.

ABRAHAM GESNER, OF WILLIAMSBURG, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO NORTH AMERICAN KEROSENE GAS LIGHT COMPANY.

IMPROVEMENT IN PROCESSES FOR MAKING KEROSENE.

Specification forming part of Letters Patent No. **12,612**, dated March 27, 1855.

To all whom it may concern:

Be it known that I, ABRAHAM GESNER, late of the city and county of New York, now of Williamsburg, in the county of Kings and State of New York, have invented and discovered a new and useful manufacture or composition of matter, being a new liquid hydrocarbon, which I denominate "Kerosene." I obtain this product from petroleum, maltha or soft mineral pitch, asphaltum, bitumen, or bituminous and asphaltic rocks, and shales by dry distillation, and subsequent treatment with powerful reagents and redistillation.

This process, which will presently be described, yields kerosene of three different qualities or proofs, each of which, in my opinion, is a mixture in certain proportions of a spirituous, light, and highly volatile and inflammable liquid with an oily, heavy, and less volatile and inflammable liquid. I have not succeeded in completely separating these liquids in the manufacture, and I see no practically useful object to be gained by doing so. Neither have I ascertained the exact proportions in which the two liquids are mixed; but I suppose the lightest fluid, which I denominate "A" kerosene, to be composed of two parts, by measure, or equivalent proportions of the heavy and eight of the light fluid. Its specific gravity is .750, water being 1, and it boils at 150° Fahrenheit. It is not a solvent of such gums as I have tried to dissolve in it, among which I may mention india-rubber. Sixty-five parts, by measure, of alcohol of specific gravity .844, at a temperature of 60° Fahrenheit, will dissolve thirty-five parts, by measure, of this liquid. By itself the "A" kerosene is highly volatile and inflammable, so much so that even in cold winter weather a good light is produced by forcing a current of atmospheric air through it, circulating the same in pipes, and burning it in jets like gas.

The second, or medium-proof fluid, I call "B" kerosene, and suppose it to be composed of four parts or equivalents of the heavy and six of the light fluid. Its specific gravity is .775 and its boiling-point 250° Fahrenheit. It is not a solvent of gums, but will soften them very slightly. Seventy-five parts of alcohol of specific gravity .844, at a temperature of 60°

Fahrenheit, will dissolve twenty-five parts of this liquid. By itself the "B" kerosene is moderately volatile and inflammable, but will not, like the "A," yield a good light by having a current of air passed through it and burned.

The third, or low-proof fluid, I call "C" kerosene, and suppose it to be composed of six parts or equivalents of the heavy and four of the light liquid. Unlike the "A" and "B," the heavy liquid preponderates in and gives character to the "C" kerosene. Its specific gravity is .800 and its boiling-point is 350° Fahrenheit. Unlike "A" and "B," it is not soluble in alcohol, but is a good solvent of gums, as india-rubber dissolves in it readily. It is not very volatile or inflammable; but in an Argand lamp with a button over the wick it burns with a brilliant white light, without smoke or the naphthalous odor so offensive in many hydrocarbons having some resemblance to this, but possessing very different properties. As burning-fluids for the purpose of artificial illumination, these are highly useful and economical, either separately, mixed together, or "A" and "B" mixed with alcohol. The "C" kerosene has also proved very good as a lubricant for machinery where it has been tried; but, being a new and almost untried thing, the kerosene doubtless has very numerous uses besides its adaptation to illumination and lubrication that will soon be discovered after it is manufactured on the large scale and put into the market as an article of trade. Moreover, as the rocks whence the kerosene is most abundantly obtained are widely disseminated and the deposits of them are of almost unlimited extent, an immense mass of hitherto useless matter will by means of this invention be rendered available for the uses of mankind as a cheap and convenient substitute for illuminating purposes for the oils and fats, which are yearly increasing in scarcity and price.

The process and apparatus I employ in producing the kerosene I will now proceed to describe, premising that I do not confine myself to any particular form or arrangement of apparatus, but intend to use whatever may prove most convenient in any given case.

The first part of the process consists in sub-

mitting the raw material to dry distillation at the lowest temperature at which the kerosene will volatilize, care being taken not to raise the temperature so long as tolerably rapid evaporation continues, and the heat must not in any case be raised above 800° Fahrenheit, as the heat if raised to the slightest perceptible red in daylight would be so high as to defeat the whole object of the process, for a greatly-increased production of gas would take place and the liquid produced would be naphtha instead of kerosene. Whatever gas may be generated I employ for illuminating purposes in the ordinary manner, and also as fuel for heating the still. For this dry distillation I have used large cast-iron retorts set in suitable furnaces for the evaporation and metal pipes or chambers surrounded by water for the condensation of the vapor. The liquid products of this distillation are heavy tar and water or ammoniacal liquor, which lie at the bottom of the receiver, and a lighter liquid, which floats above them. The heavy liquids and the light are separated by drawing off one or the other into another vessel by means of a cock, siphon, or otherwise. The heavy liquids may be utilized or disposed of advantageously; but they have no further connection with this process, and therefore I shall not here describe the manner in which I propose to utilize them. The light liquid is then submitted to redistillation, at the lowest possible heat, in a common still and condenser. The product of this redistillation is a light volatile liquid, which accumulates in the receiver, and a heavy tarry residuum left in the still, and which may be added to the heavy liquid impurities of the first distillate. The light liquid is transferred from the receiver to a suitable vessel or vat and mixed thoroughly with from five to ten per cent. of strong sulphuric, nitric, or muriatic acid, according to the quantity of tar present. Seven per cent. is about the average quantity required; but any quantity is useful. I have enumerated three acids; but I give the preference to sulphuric, although either of the others will answer very well. I also mix with the liquid from one to three per cent. of peroxide of manganese, according to the turbidness of the liquid, about two per cent. being the average quantity required. It has the effect of facilitating greatly the precipitation of certain of the impurities which the liquid contains; but, although useful, I do not deem it essential. After these substances have been thoroughly mixed with the liquid by agitation it is allowed to stand from twelve to twenty-four hours without being disturbed, in order that the impurities may subside. The light supernatant liquid is now separated from the impurities, both solid and liquid, that have settled at the bottom of the tank by drawing off either the one or the other into a separate vessel. I next mix the distillate with about two per cent., by weight, of powdered and

freshly-calcined lime. The latter, by its powerful affinity for water, will absorb it thoroughly from the liquid hydrocarbon, which always at this stage of the process contains it in greater or less quantity. Lime by its alkaline properties will also neutralize any acid in the liquid. After the lime has been thoroughly mixed with the liquid by stirring, the mixture is again distilled, care being taken to raise the heat gradually and slowly first to about 160° Fahrenheit, where it is kept by regulating the damper until all the vapor has passed over into the receiver that the liquid will yield at this temperature. This product or distillate is the "A" kerosene, and is drawn off from the receiver into an appropriate vessel. The heat is now raised by again drawing the damper to about 260° Fahrenheit, when vapors will again rise and be condensed in the receiver. As soon as the distillate ceases to flow at this temperature it is drawn off from the receiver into a separate vessel, and it constitutes the "B" kerosene. The heat of the still is now raised to about 360° Fahrenheit, when vapors will again rise and condense in the receiver. As soon as the distillate ceases to run at this temperature the process is complete. This last product is the "C" kerosene.

The quantity of lime I have mentioned is the quantity I have found sufficient in all cases; but any quantity less than ten per cent. would be useful. The lime as an alkali appears to exert a specific influence or effect, which is indispensable to the good quality of the product. Neither soda nor potash can produce this effect in any form in which I have tried them, and I have made special and numerous efforts to replace the lime with these alkalies.

To deprive the liquid of water by freshly-calcined lime is important, because, as I have discovered, water is highly injurious to the process and product, even in very small quantities, as it causes carbonic acid to pass over with the distillates, giving to them a creosotic odor, which is extremely offensive. It is one of the great and peculiar advantages of my process that the fluids which it produces have no disagreeable odor.

I claim—

The process herein described for extracting the liquid hydrocarbons, which I have denominated "kerosene," from asphaltum, bitumen, asphaltic and bituminous rocks and shales, petroleum, and maltha by subjecting any of these substances to dry distillation, rectifying the distillate by treating it with acid and freshly-calcined lime, and then submitting it to redistillation, as herein set forth.

In testimony whereof I have hereunto subscribed my name.

ABRAHAM GESNER.

Witnesses:

PETER HANNAY,
P. H. WATSON.