

# UNITED STATES PATENT OFFICE.

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SCOTLAND.

## IMPROVEMENT IN THE MANUFACTURE OF ILLUMINATING-GAS.

Specification forming part of Letters Patent No. **107,848**, dated September 27, 1870.

*To all whom it may concern:*

Be it known that we, WILLIAM YOUNG, manager of the chemical works, Magdalen Bridge, in the county of Mid-Lothian, and PETER BRASH, of Leith, in same county, Scotland, soap, candle, and oil manufacturer, subjects of the Queen of Great Britain, have invented or discovered new and useful Improvements in the Manufacture of Illuminating-Gas; and we, the said WILLIAM YOUNG and PETER BRASH, do hereby declare the nature of the said invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement thereof—that is to say:

This invention has for its object the manufacture of illuminating-gas from certain residual products from the refining of paraffine and such like hydrocarbon oils. In the refining of these oils they are alternately treated with acids and alkalis. For this purpose the oils are placed in agitating-vessels and strong acid added, (sulphuric in preference.) The whole is then well stirred or mixed, so as to bring the acid and oils into contact. On allowing the mixed oil and acid to stand, the acid and the impurities settle to the bottom and appear as a thick tar, which is drawn off. The remaining oils are then well washed with water and treated with caustic soda in the same way as with the acid, which also in a similar manner removes impurities in the form of tar. The mixed refuse products (acid or alkaline tars) are at present a great nuisance to the oil-refiners, and have not, as far as we know, been applied to any useful purpose in the arts. Our invention has for its object the application of these tars to the manufacture of illuminating-gas. To prepare them for this purpose the acid tar is placed in a suitable vessel (by preference lined with lead) and boiled up with open steam. The condensed water from the steam combines with the acid and sinks to the bottom, and is drawn off. The alkaline tar is then run in and the whole of the tars again boiled up. In this way any acid that may be present is neutralized and leaves the tars in a purified state floating on the surface of the solution of salts, alkali, and other matters. (The alkali may be recovered by evaporation.) The purified tar can now be used for gas-making by mixing it

with small coal, as hereinafter described, or by running it into the retorts after the charge of coal has been introduced; but it does not do so well to run it into the retorts in this state, as it is apt to choke up the running-in pipe with carbonaceous matter. To obviate this we distill the tar. We prefer removing the more volatile portions of the distillate, by which it becomes perfectly safe for storage and transit. When this tar-oil is used alone for the manufacture of gas iron retorts are preferable to clay, being less porous and better conductors of heat, and the distilled tar-oil is used in preference. When the retorts are kept at a moderate gas-making heat and the oil delivered in a continuous stream a large volume of highly-illuminating gas is produced. This temperature suffices to convert the oil into permanent gas, but is not sufficiently high to decarbonize the gas to any great extent. In gas-works where clay retorts are wrought at high heats the best commercial results will be obtained when the gases from the coal and oil are brought in contact at the instant of decomposition. This can be accomplished by running the oil into the retorts during the distillation of the charge of coal or by intimately mixing the coal and oil before charging. We prefer common household or splint coal for the purpose of this patent. The coal should be pulverized or in the state known as "dross" or "slack," and the oil may be advantageously mixed in the proportion of thirty gallons per ton of coal; but the proportion may be either less or more, according to the quality of gas desired. The oil, in this case may be used in its undistilled state. The oil, when used alone or with coal, gives a permanent gas, different in this respect from gas produced from a mixture of coal and shale oils. The oil is almost entirely free from sulphur, so that its purification is exceedingly easy. In place of using coal as the mixing material, any substance giving a large yield of poor gas—such as peat, sawdust, or spent bark—will answer the purpose. Either the acid or alkaline tar may be used separately, if desired; but the acid and alkali by preference are first removed from them. The acid tar may be prepared by adding to it common salt in such quantity that the sulphuric acid may all be converted into sulphate of soda. The hydrochloric acid produced escapes dur-

ing the boiling, which is conducted in the manner already described. The alkaline tar may be prepared by simply boiling it with steam in the manner described and adding common salt, allowing it to stand, when the tarry matter separates and floats on the surface. It is, however, better and more economical to mix the acid and alkaline tars and treat them together.

Having thus described the nature of our said invention and the manner of performing the same, we would have it understood that what we claim is—

1. The manufacture of illuminating-gas, as herein described, from the tar or tars resulting from the purification of paraffine and such like hydrocarbon oil.

2. The manufacture of illuminating-gas, as

herein described, from the acid and alkaline tars resulting from the purification of paraffine and such like hydrocarbon oil, mixed together and treated substantially as set forth.

3. The manufacture of illuminating-gas, as herein described, from a compound of coal or other substance yielding gas of low illuminating-power and the tar or tars resulting from the purification of paraffine or such like hydrocarbon oil.

WILLIAM YOUNG.  
PETER BRASH.

Witnesses:

WM. LOWSAN,

ALEXR. CLARK,

*Both of No. 55 Constitution Street, Leith.*