

# UNITED STATES PATENT OFFICE.

JOHN ALFRED STEPHAN, OF WORCESTER, ENGLAND.

## IMPROVEMENT IN PROCESSES FOR MANUFACTURING GAS.

Specification forming part of Letters Patent No. **209,304**, dated October 22, 1878; application filed March 23, 1878; patented in England, November 20, 1877.

*To all whom it may concern:*

Be it known that I, JOHN ALFRED STEPHAN, of Worcester, in the county of Worcester and Kingdom of England, have invented a new and useful Process for the Manufacture of Carbureted-Hydrogen Gas, which process is fully set forth in the following specification.

The invention relates to an improved process of manufacturing gas for heating and illuminating purposes from sewage.

It consists in vaporizing the sewage in a suitable boiler, subjecting the steam to the action of highly-heated metallic plates, by which it is decomposed and the hydrogen liberated, subjecting the resultant gas to the action of highly-heated carbonate of lime or limestone, which is thereby decomposed, giving off its carbonic acid, and finally subjecting the mixed gases to the action of highly-heated substances containing or saturated with hydrocarbons, by which means olefiant gas is produced, which is partially decomposed by the carbonic acid, forming carbonic-oxide gas, increasing the volume of the inflammable gas, and imparting to the mixed gas the proper amount of carbon to bring the same up to the proper illuminating standard.

In carrying out my invention the sewage is placed in a suitable boiler connected with one end of a retort, the two being located in a furnace, by means of which they may be simultaneously heated.

The retort at the end connected with the boiler is fitted with a honeycombed chamber formed of a mass of closely-packed metal or perforated metallic disks or tubes, of iron or steel, the central portion of said retort being packed with any suitable earthy carbonate, such as limestone, for instance, which is preferably secured in a wire cage to facilitate its insertion and removal. The other end of said retort is packed with a substance rich in hydrocarbon, which may consist of bones, chalk saturated with petroleum, coal, coal-dust, saw-dust, creosote, or the solid matter left in the boiler after the water has been evaporated from the sewage.

The steam, on passing through the retort, is decomposed by the heated metallic surfaces, the oxygen combining with the same and forming an oxide, while the hydrogen is liberated and passes on through the heated limestone. The carbonic acid given off by the limestone commingles with the hydrogen gas, and passes with it through the incandescent mass of carbonaceous material, combining with the olefiant gas, being generated by heat from said carbonaceous material, forming an illuminating-gas. The said olefiant gas is partially decomposed by the carbonic-acid gas uniting with one equivalent of carbon of said olefiant gas, forming carbonic oxide—an inflammable gas which increases the volume of the mixed inflammable gases, while the undecomposed olefiant gas serves to impart the proper amount of carbon to said inflammable gases to bring the same up to the proper illuminating standard.

The rear end of the retort is provided with an exit-pipe leading to a condenser, which is connected with a gas-holder, in which the gas is stored for use.

The residuals from the retort include soda-ash and lime, which may be used for commercial purposes, while in the condenser the residuals include an abundant supply of ammoniacal liquor, tar, and a lubricating-grease, besides other products.

What I claim is—

The process herein described for producing illuminating-gas, the same consisting in vaporizing the sewage, decomposing the steam thereof by hot metallic surfaces, charging the resulting hydrogen gas with carbonic-acid gas by passing it through heated carbonates, and finally converting the carbonic acid into carbonic oxide, and at the same time enriching the gas by passing the same through heated hydrocarbons, substantially as set forth.

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Witnesses:

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