

*Ferdinand King*  
*Improved Gas Generator.*

117645

PATENTED AUG 1 1871

Fig. 1.

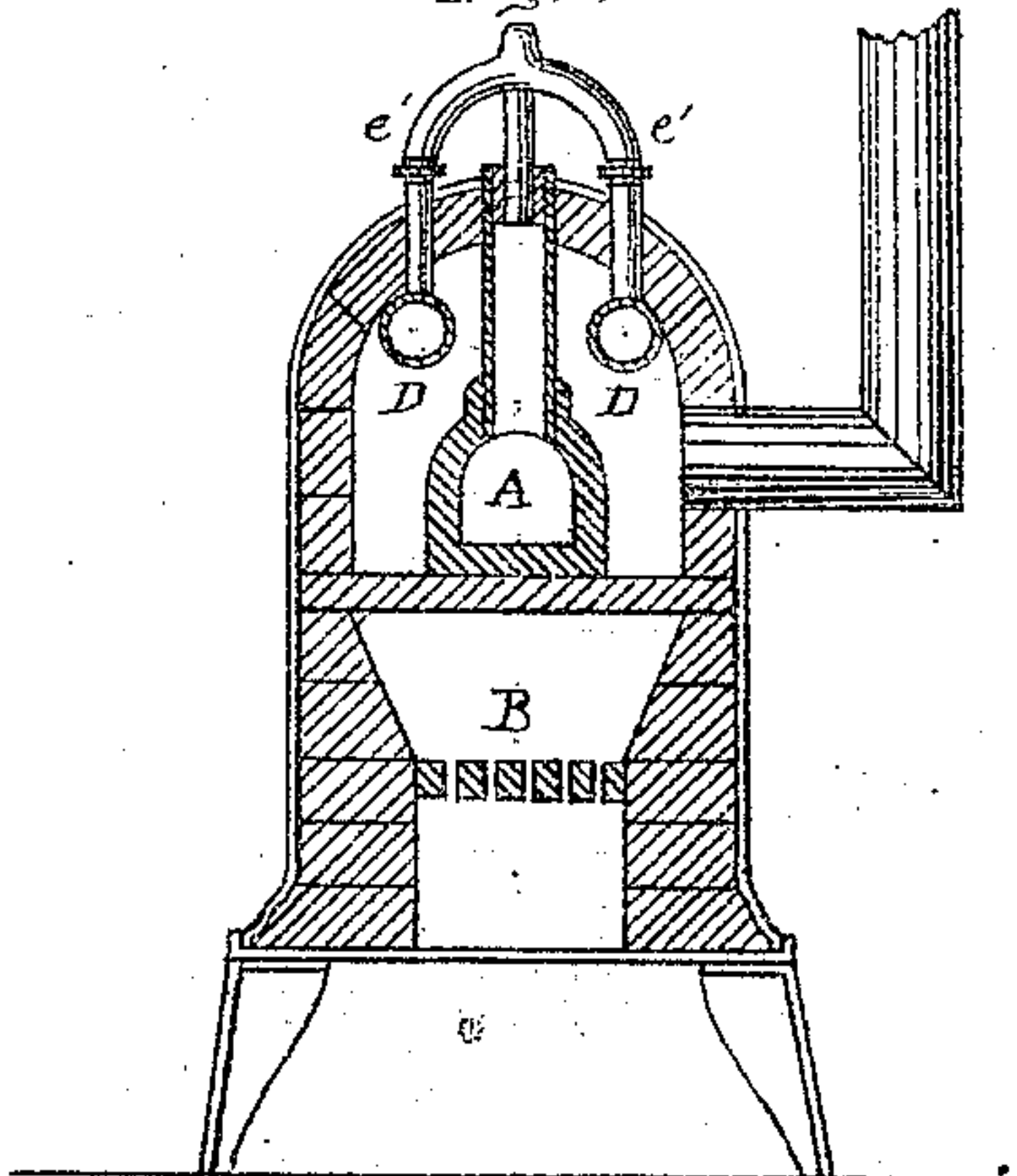
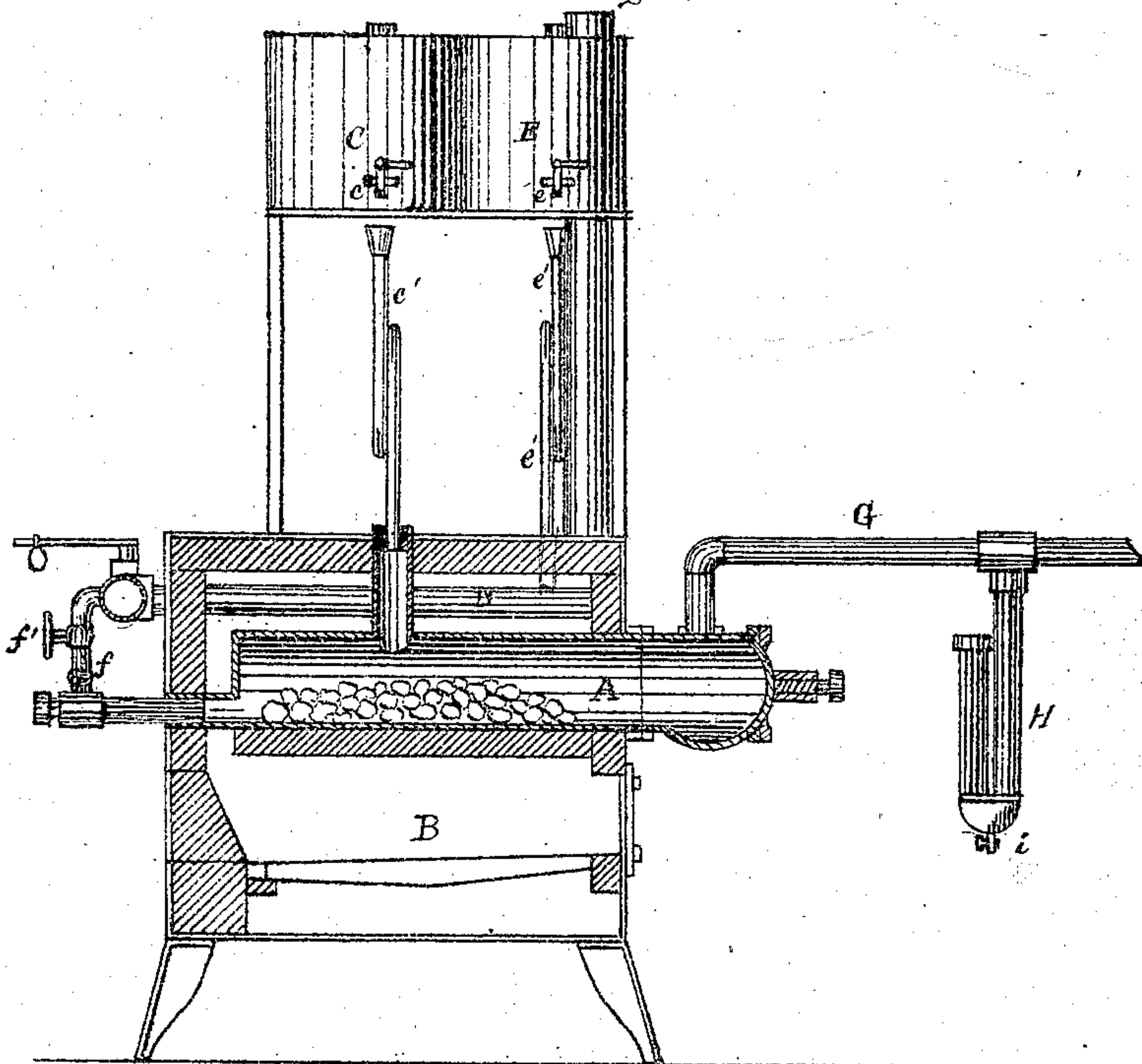


Fig. 2.



Witnesses.

*W. L. Coombe*  
*Chas. L. Coombe.*

Inventor.

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# UNITED STATES PATENT OFFICE.

FERDINAND KING, OF WASHINGTON, DISTRICT OF COLUMBIA.

## IMPROVEMENT IN THE MANUFACTURE OF ILLUMINATING-GASES.

Specification forming part of Letters Patent No. 117,645, dated August 1, 1871.

*To all whom it may concern:*

Be it known that I, FERDINAND KING, of Washington, in the county of Washington and District of Columbia, have invented a new and useful Improvement in the Manufacture of Illuminating-Gas from Liquid Hydrocarbons; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawing making part of this specification.

This invention consists in certain improvements upon an invention for which I obtained Letters Patent of the United States, bearing date the 11th of February, 1868, and which were reissued July 4, 1871. This invention relates to an improved process for manufacturing carbureted hydrogen gas from the various liquid hydrocarbons, such as dissolved coal-tar, resin or asphaltum, oils, petroleum, &c., and it also relates to an improved apparatus for carrying said process into effect. My process consists in directing a current of pure hydrogen, mixed with steam, through an elongated retort heated red hot, in which the liquid hydrocarbon is being vaporized and decomposed, so that said current will carry the heavy carbureted hydrogen gas formed by the decomposition of the liquid hydrocarbon to the forward and cooler end of the retort, where the hydrogen combines with the surplus carbon of the heavy gas, forming an additional quantity of illuminating-gas, and preventing the deposit of solid carbon in the retort or pipes, the steam acting mechanically to force the gases through the retort.

My improved apparatus is represented by the annexed drawing, in which Figure 1 is a cross-section of the generator, and Fig. 2 a vertical longitudinal section of the generator and hydrocarbon and water-reservoirs.

A is a cast-iron retort charged with coke, broken limestone, bricks, or similar material, (coke being preferable, however,) and so placed in the furnace B as to become intensely heated. C is a reservoir for containing the liquid hydrocarbon, the flow of which is regulated by the cock *c*, and *c'* is a pipe with funnel-shaped mouth for conducting the liquid hydrocarbon into the retort A. D D represent two small cylinders, of wrought-iron or other suitable metal, containing wrought-iron turnings or equivalent material, and are so placed in the flues of the furnace that said cylinders and their contents will be kept at

a red heat. E is a water-reservoir, from which water is conducted through a regulating-cock, *e*, and a branch-pipe, *e' e'*, drop by drop or very slowly into the cylinders D D, where it is instantly evaporated and a portion of its oxygen taken up by the hot iron. The hydrogen thus set free and the remaining superheated steam pass from the cylinders D D through a pipe, *f*, into the back end of the retort A, the flow and pressure being regulated by a cock, *f'*, while the liquid hydrocarbon from reservoir C is slowly dripping into said retort at the same time. The exit-pipe G, through which the gas escapes from the retort, being much larger than the steam-induction pipe *f*, very little pressure is created in the retort, and the hot smoke and carbureted hydrogen, into which the liquid hydrocarbon is transformed by the heat, are forced rapidly toward the forward and cooler end of the retort, where the hydrogen combines with the surplus carbon, forming an additional quantity of illuminating-gas and preventing a deposit of solid carbon in the retort. It is believed that, under these circumstances, the hydrogen takes up equal equivalents of carbon, thus forming olefiant gas. It is essential that the exit-pipe G be large enough to cause the steam and gas to pass freely and rapidly through the retort and onto the receiver to prevent solid deposits in the retort and pipes and undue pressure in the retort. The eduction-pipe G leads to an ordinary washer, from which the gas is conducted to a receiver or holder. These latter, being of the ordinary construction, need no description and are not shown in the drawing. H is a trap connected with the exit-pipe G between the retort and the washer, in which the uncombined constituents, including impurities of the substances used, are condensed and precipitated in a liquid form, and from which they may be drawn off through a cock, *i*, and returned to the reservoir C.

I do not limit myself to the precise construction of my apparatus herein described, as it is manifest its form and construction may be greatly varied without changing its principles of operation. For instance, instead of two steam-cylinders, D D, there may be but one, or more than two. They may be made in other forms than cylindrical, and the steam, instead of being generated in them, may be generated elsewhere and passed through them.



What I claim as my invention, and desire to secure by Letters Patent, is—

1. The process of manufacturing illuminating-gas by passing a current of pure hydrogen and steam through a red-hot retort in which heavy carbureted gas is being generated from a liquid hydrocarbon, substantially as herein described and illustrated.

2. The retort A, containing coke or equivalent material, with an induction-pipe for introducing liquid hydrocarbon into the same, and the steam-cylinders D D (one or more) containing iron turnings or equivalent material, so combined with a furnace that the said retort and steam-cylinders,

with their contents, will be kept at a red heat, and so constructed, arranged, and connected that steam from said cylinders, after passing over or through the iron turnings or equivalent material therein, and becoming partially decomposed, shall be conducted into one end of the retort and forced rapidly through the same, while the liquid hydrocarbon is at the same time being introduced into the same retort, substantially as described.

FERDINAND KING.

Witnesses:

JOS. L. COOMBS,

CHAS. L. COOMBS.