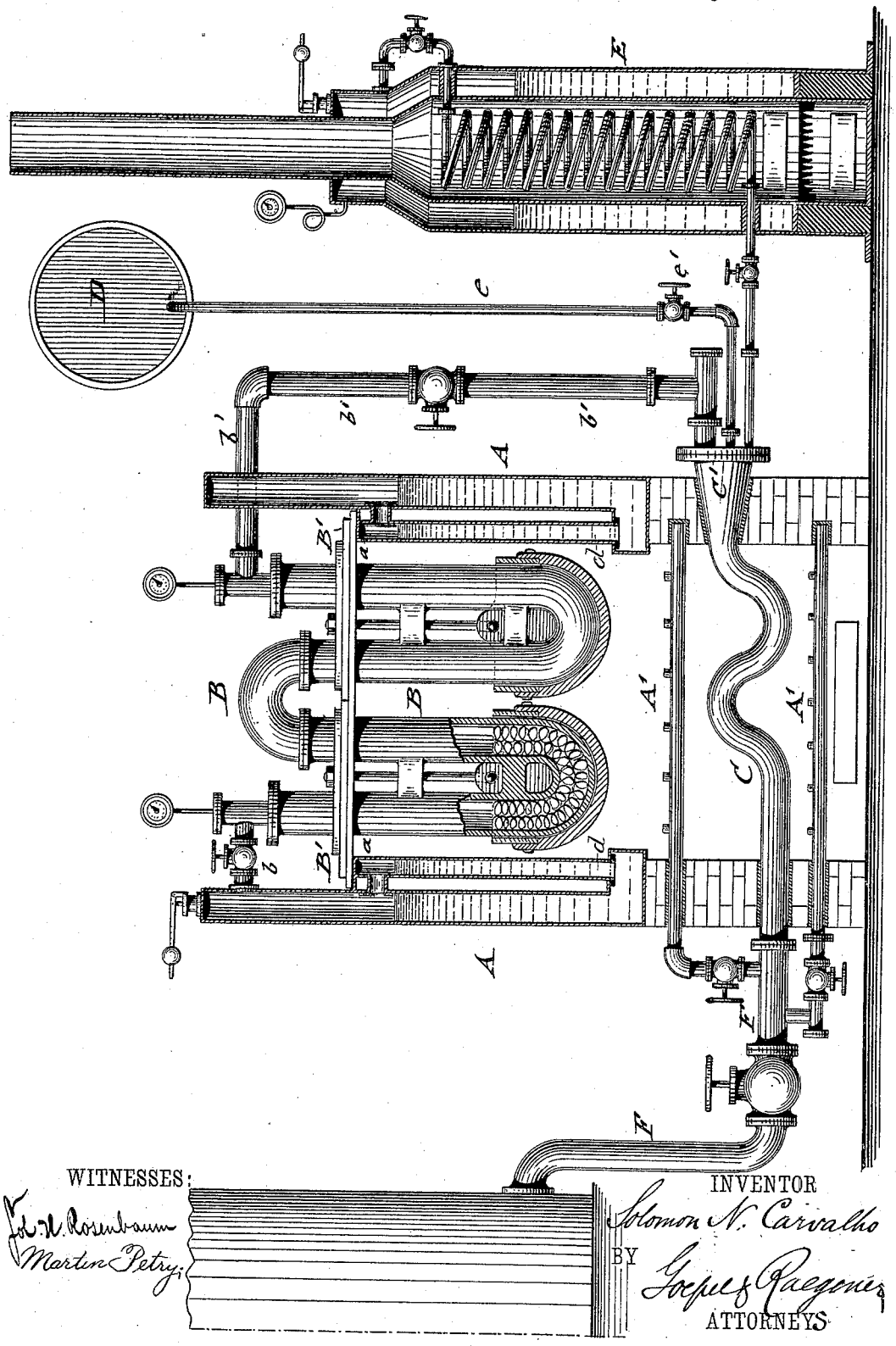
(No Model.)

S. N. CARVALHO.

APPARATUS FOR GENERATING HEATING GAS.

No. 301,092. Patented July 1, 1884.



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SOLOMON N. CARVALHO, OF NEW YORK, N. Y.

APPARATUS FOR GENERATING HEATING-GAS.

SPECIFICATION forming part of Letters Patent No. 301,092, dated July 1, 1884.

Application filed August 29, 1883. (No model.)

To all whom it may concern:

Be it known that I, SOLOMON N. CARVALHO, of the city, county, and State of New York, have invented certain new and useful Improvements in Apparatus for Generating Heating-Gas, of which the following is a specification.

This invention is designed to furnish an improved generator for supplying heating-gas for blast-furnaces, steam and marine boilers, and other metallurgical and industrial purposes, in which superheated steam is employed to vaporize petroleum or other hydrocarbon oils and convert them into a gas of a high heating capacity.

The invention consists of a suitable steam-generator and superheater, of which the latter is connected to a retort, to which petroleum or other hydrocarbon is supplied and vaporized by the superheated steam and kept at a high temperature by auxiliary vapor-burners supplied with gas from the gas-main, by which burners also the steam required for the working of the apparatus is generated and superheated, as will appear more fully hereinafter, and finally be pointed out in the claim.

The accompanying drawing represents a sectional elevation of my improved apparatus for generating heating-gas from superheated steam and petroleum.

Referring to the drawing, A represents an upright double-walled steam-boiler, of cylindrical, oblong, or other suitable shape. The boiler A is supported on a foundation of brick, and incloses an open space, at the lower part of which a series of auxiliary vapor-burners, A′, are arranged, that serve to heat up the boiler A and a superheater, B, that is supported by a horizontal plate, B′, on an interior flange, *a*, of the boiler. The superheating apparatus may be of any approved construction; but I prefer to use the superheater heretofore patented to me under date of November 15, 1881, No. 249,502. This superheating apparatus B is connected at one end to the upper part of the steam-boiler A by a valved steam-pipe, *b*, and by a valved conducting-pipe, *b′*, with the flaring mouth C′ of the retort C, that is arranged at the lower part of the space inclosed by the boiler A and its foundation. The boiler A is further provided with a series of upright steam-pipes, *d*, that extend from the base of the boiler to the supporting-plate B′ of the superheater B, said pipes being connected at their upper ends by lateral pipes with the boiler A, so that the steam generated therein can pass to the upper part of the boiler A. The retorts of the superheater B are filled with spiral copper wires that prevent the decomposition of the steam, while the outside of the same is covered by cast-iron protecting-jackets, as will appear more fully in the patent hereinbefore referred to.

A petroleum-tank, D, is connected by a valved pipe, *e*, to the flaring mouth C′ of the retorts C, so as to supply a regulated quantity of petroleum or other hydrocarbon oil by means of the stop-cock *e′*. The mouth of the retort is further connected to an auxiliary upright steam-boiler, E, that is used for starting the apparatus, and is provided with an interior steam-superheating coil, or other means for superheating the steam, which is then conducted to the retort C. This auxiliary boiler is intended only to be used when the gas-generating apparatus is to be started, and until the steam in the boiler A and superheater B is superheated to at least 1,000°, after which the auxiliary boiler is discontinued and the steam supplied from the boiler A and superheater B to the retort. The shape of the retort is preferably S or serpentine shape. It is connected at its discharge end with a valved main, F, that conducts the gas to a blast-furnace, boiler, or other place of use. The auxiliary gas-pipes A′, that supply the vapor-burners of the boiler, superheater, and retort, branch off from the main F into the fire-place of the steam-boiler A, and are arranged so as to supply the required degree of heat to the boiler, superheater, and retort. As soon as gas is generated in the retort C, the burners are lighted, whereby the regular operation of the boiler A and superheater B is induced and kept up. The hydrocarbon oil is at the same time vaporized in the retort by the superheated steam and prevented from condensing by the heat of the burners, so as to form a non-conducting layer of coke in the retort, which would be detrimental to the proper working of the retorts. The retort may also be filled with spiral copper wire, for the purpose of promoting

vaporization, especially when hydrocarbon oils of higher specific gravity are used. By thus combining the superheated steam with the hydrocarbon vapors, and keeping the vapors formed thereby at a sufficiently high temperature, the mixture is converted into a heating-gas that is applicable to a number of purposes in the industrial arts.

In case one or more of the retorts are worn out by use, they can be readily replaced by disconnecting the couplings from the worn section and inserting a new retort. The gases of combustion may be drawn off through a pipe applied to the supporting-plate of the superheater or by a suitable smoke-pipe.

By arranging the steam-boiler in the manner described, the heat radiated by the gas-burners or other source of heat, which would otherwise be lost, is utilized directly and economically for generating the steam required for running the apparatus.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

In an apparatus for generating heating-gas, the combination of an upright inclosing-boiler having interior steam-tubes, a superheater supported by a covering-plate in the space inclosed by said boiler, and connected to the steam-space of the same, a vaporizing retort or retorts located below the superheater and boiler, and connected by valved pipes with the superheater, and a tank for supplying hydrocarbon oil, a series of vapor-burners arranged below the boiler and superheater, and a second series of vapor-burners arranged below the retort or retorts, both series of vapor-burners being connected to the gas-conducting main leading from the retort or retorts to the point of use, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

SOLOMON N. CARVALHO.

Witnesses:
PAUL GOEPEL,
SIDNEY MANN.