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PATENTED OCT. 11, 1904.

C. H. CLAUDEL.
APPARATUS FOR THE MANUFACTURE OF GAS.

APPLICATION FILED MAY 25, 1903.

NO MODEL.

Fig. 1.

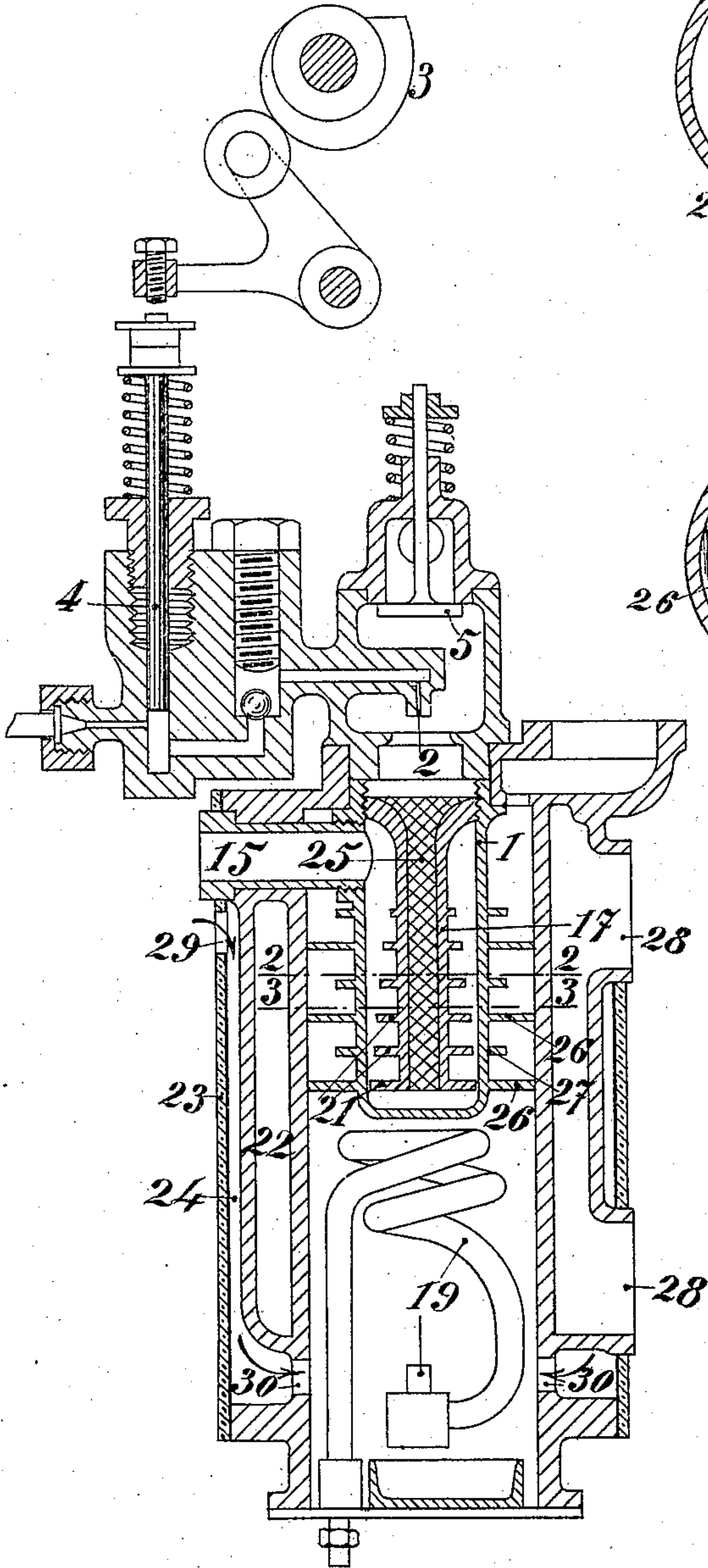


Fig. 2.

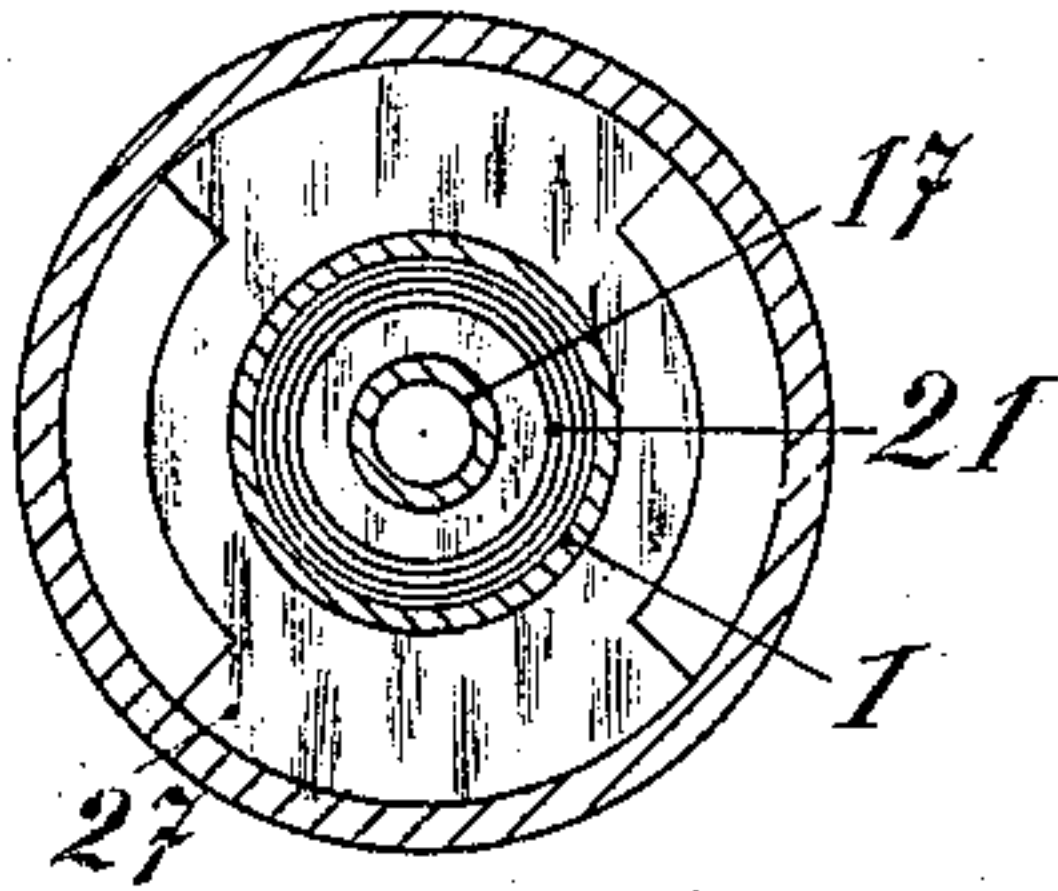
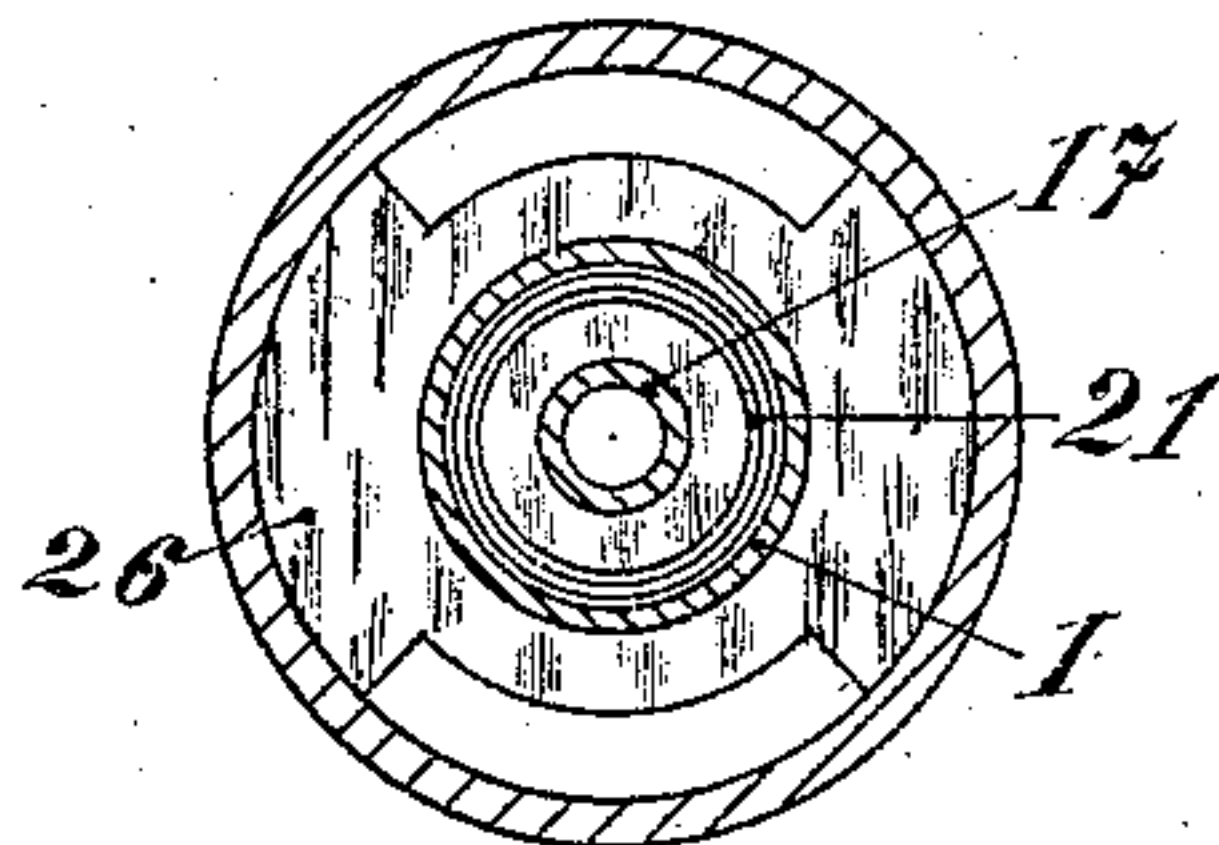


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE MANUFACTURE OF GAS.

SPECIFICATION forming part of Letters Patent No. 772,131, dated October 11, 1904.

Application filed May 25, 1903. Serial No. 158,633. (No model.)

To all whom it may concern:

Be it known that I, CHARLES HENRI CLAUDEL, engineer, a citizen of the Republic of France, residing at 25 Rue Nationale, Argenteuil, in the Republic of France, have invented an Improved Apparatus for the Gasification of Combustible Liquids, of which the following is a specification.

This invention relates to an apparatus adapted for effecting the gasification of combustible liquids—such as petroleums, alcohols, and the like—by heating these liquids to a sufficiently high temperature, preferably after they have been mixed with steam or carbonic acid or with mixtures of these two fluids or with burnt gases of any suitable kind for the purpose of avoiding the recomposition of the dissociated hydrocarbons and deposits of coke.

The apparatus comprises a single retort, into which the combustible liquid is injected in a practically continuous manner through a very fine nozzle, upon leaving which it becomes pulverized and mixes with steam, carbonic acid, or burnt gases—such as the exhaust-gases from explosion or combustion motors, blast-furnace gases, lime-kiln gases, or the like—for the purpose indicated above. The retort is arranged in such a manner that the mixture is heated progressively therein up to complete vaporization, after which it is projected perpendicularly against the flat wall of the retort, which is very highly heated. Dissociation is thus insured by the intimate contact of the vapors with the wall, which contact is facilitated owing to the fact that the gaseous current is caused to spread and suddenly change its direction. The mixture then traverses the last portion of the retort, which is raised to a high temperature and is constructed in such a manner that the gaseous current is there submitted to a series of contractions, whereby its flow is retarded and the intimacy of the contact of the gas with the heated walls increased.

An apparatus for carrying the invention into effect is represented in the accompanying drawings by way of example.

Figure 1 is a vertical section through the

apparatus. Figs. 2 and 3 are horizontal sections on the lines 2 2 and 3 3 of Fig. 1, respectively.

In the drawings, 2 is a capillary ajutage or nozzle through which the combustible liquid is injected into the retort 1. This liquid may be supplied to the ajutage in any convenient manner—for example, by means of a pump, such as 4, the piston of which is operated by a rotary cam 3, which is of such a form that the forcing period is long and the suction period very short, so that almost continuous injection is obtained. Upon reaching the retort the combustible liquid becomes pulverized and mixes with the exhaust-gases or the like admitted by the valve 5. The mixture descends in the central tubular portion 17, which is moderately heated and in which the combustible liquid becomes vaporized. Upon leaving the vaporizing-tube 17 the mixture becomes broken up upon the highly-heated bottom of the retort and is caused to change its direction in order to rise in the annular portion of the retort, which is at a high temperature. The wings 21, formed externally upon the tube 17, then cause the gaseous current to contract a number of times, and consequently insure a relatively slow flow of the gas and its perfect contact with the walls of the retort in such a manner that the gasification is complete when the gases reach the outlet 15. The lower wing is the largest, and consequently gives rise to the greatest loss of charge. It follows from this that the mineral portions and the tarry matters, or those which have remained liquid, are able to separate from the fixed gases and become deposited upon the upper surface of this wing. The products thus deposited being highly heated complete their dissociation, so that finally there remain upon the lower wing only the non-gasifiable mineral portions.

In the central vaporizing-tube 17 there is preferably arranged infusible wire 25 or other similar material forming an open-work baffle-filling, the purpose of which is to increase the vaporization-surface and prevent any drops of liquid combustible from falling upon the

bottom of the retort. In this manner the well-known phenomenon of calefaction, which would prevent dissociation, is avoided.

As filling material for the central vaporizer 5 carboniferous substances, such as broken coke, may advantageously be employed. In this case by sufficiently increasing the quantity of burnt gases, of carbonic anhydrid, or of steam admitted through the valve 5 there is ob- 10 tained, owing to the conversion of the coke into oxid of carbid, a combustible gas rich in this oxid, and the apparatus then constitutes a mixed coke and petroleum gas generator.

The retort 1 is heated by means of a fur- 15 nace arranged beneath it and in the present case constituted by a petroleum-lamp 19. The retort is arranged in such a manner as to obtain the best possible result from the heat generated. To this end it is provided externally 20 with wings 26 and 27, arranged bafflewise, which impart a movement of rotation to the hot gases of the furnace which pass over them while rising around the retort. This latter and the furnace are inclosed in a double cast- 25 iron envelop 22, in the annular portion of which steam, carbonic acid, or burnt gases are caused to circulate before they reach the valve 5. These gases (or steam) enter the double envelop through one of the two pipes 28 and 30 leave it by the other. A covering 23, which 30 is as good an insulator as possible and which is preferably constituted by thin sheet-metal covered with asbestos-board, surrounds the double envelop and diminishes the loss of heat 35 by radiation. Between this covering and the double envelop is formed an annular space 24, in which air supplied from outside through orifices, such as 29, circulates, as indicated by the arrows, before reaching the furnace 40 through the orifices 30. This air is therefore hot when it reaches the furnace 19, the flame of which is consequently very hot.

The apparatus illustrated in the drawings is adapted for use in connection with a gas or 45 petroleum motor, in which case the cam 3 will be operated by suitable connections with any convenient part of the motor and the space above the valve 5 will be connected with the exhaust-port of the motor, so that said valve 50 will open automatically during the exhaust. In other cases these parts may be operated in any convenient manner.

The gas obtained from my apparatus is a combustible mixture of hydrocarbon gases, 55 hydrogen, carbon monoxid, carbon dioxid, and nitrogen and can be employed for heating or lighting purposes or to supply a gas-motor, in which latter case the apparatus may be used to supply the fuel for the motor from 60 which it receives burnt gases through the valve 5, thus forming in connection with the motor a complete and isolated power unit.

The method of gasifying combustible liq- 65 uids which is or may be involved in the operation of the apparatus above described is not

claimed herein, being described and claimed in another application for United States Letters Patent filed by me on the same date herewith, Serial No. 158,632.

What I claim, and desire to secure by Let- 70 ters Patent of the United States, is—

1. An apparatus for the gasification of combustible liquids, comprising a vertical retort, means for heating said retort; a tubular part or vaporizer arranged in the axis of the retort 75 and terminating at a certain distance from the bottom of the same; means for conducting the pulverized combustible liquid to the upper portion of this central part, a series of independent baffles located in the annular 80 space between the central tube and the wall of the retort and arranged to divide said annular space into separate portions communicating in series by restricted openings, and a gas-outlet at the upper portion of the annular 85 space, substantially as described above and for the purpose specified.

2. An apparatus for the gasification of combustible liquids, comprising a vertical retort, means for heating said retort, a tubular part 90 or vaporizer arranged in the axis of the retort and terminating at a certain distance from the bottom of this latter, means for conducting the pulverized combustible liquid and also the gases such as carbonic acid, steam or 95 burnt gases to the upper portion of this central portion, a series of independent baffles located in the annular space between the central tube and the wall of the retort and arranged to divide said annular space into sepa- 100 rate portions communicating in series by restricted openings, and a gas-outlet at the upper portion of the annular part; substantially as described above and for the purpose specified. 105

3. An apparatus for the gasification of combustible liquids, comprising a vertical retort, means for heating said retort, a tubular part or vaporizer arranged in the axis of the re- 110 tort and terminating at a certain distance from the bottom of this latter, an open-work baffle-filling of infusible material contained in the central tubular portion, means for conducting the pulverized combustible liquid into the upper portion of the central part, a series 115 of independent baffles located in the annular space between the central tube and the wall of the retort and arranged to divide said annular space into separate portions communicating in series by restricted openings, and a 120 gas-outlet at the upper portion of the annular space; substantially as described above and for the purpose specified.

4. An apparatus for the gasification of combustible liquids, comprising a vertical retort, 125 means for heating said retort, a tubular part or vaporizer arranged in the axis of the retort and terminating at a certain distance from the bottom of this latter, an open-work, baffle-filling of infusible material contained in 130

the central tubular part, means for conducting to the upper part of this central portion the pulverized combustible liquid and the gases such as carbonic acid, steam, or burnt
 5 gases, a series of independent baffles located in the annular space between the central tube and the wall of the retort and arranged to divide said annular space into separate portions communicating in series by restricted open-
 10 ings, and a gas-outlet at the upper portion of the annular space; substantially as described above and for the purpose specified.

5. An apparatus for the gasification of combustible liquids, comprising a vertical retort,
 15 means for heating said retort, a tubular part or vaporizer arranged in the axis of this retort and terminating at a certain distance from the bottom of this latter; an open-work, baffle-
 20 filling, constituted by pieces of coke, contained in the central tubular part, means for conducting to the upper portion of this central part the pulverized combustible liquid and also
 25 gases such as carbonic acid, steam or burnt gases, a series of independent baffles located in the annular space between the central tube and the wall of the retort and arranged to divide said annular space into separate portions communicating in series by restricted open-
 30 ings, and a gas-outlet at the upper portion of the annular space, substantially as described above and for the purpose specified.

6. An apparatus for the gasification of combustible liquids, comprising a vertical retort, a tubular part or vaporizer arranged in the
 35 axis of the retort and terminating at a certain distance from the bottom of this latter means for conducting into the upper portion of this central part the pulverized combustible liquid and also gases such as carbonic acid, steam, or
 40 burnt gases, baffles arranged in the annular space comprised between the central tube and the wall of the retort in order to form re-

stricted sections, a gas-outlet at the upper part of the annular space, a furnace arranged below the retort, a double envelop with ad- 45 mission and discharge pipes surrounding the furnace and the retort; and a smoke-conduit provided with baffles formed between the retort and the double envelop; the whole substantially as described above and for the pur- 50 pose specified.

7. An apparatus for the gasification of combustible liquids, comprising a vertical retort, a tubular part or vaporizer arranged in the axis of the retort and terminating at a certain 55 distance from the bottom of this latter, means for conducting to the upper portion of this central part the pulverized combustible liquid and also gases such as carbonic acid, steam or 60 burnt gases, baffles arranged in the annular space comprised between the central tube and the wall of the retort in order to form restricted sections, a gas-outlet at the upper part of the annular space, a furnace arranged below the retort, a double envelop with ad- 65 mission and discharge pipes surrounding the furnace and the retort, a smoke-conduit provided with baffles formed between the retort and the double envelop, an insulating-cover- 70 ing, with air admission at its upper portion, surrounding the double envelop and leaving around it an annular passage, and orifices formed at the lower portion of the double envelop for the admission into the furnace of 75 the air which has circulated in the said annular passage, the whole substantially as described above and for the purpose specified.

In testimony whereof I have hereunto set my hand, in presence of two subscribing witnesses, this 2d day of May, 1903.

CHARLES HENRI CLAUDEL.

Witnesses:

J. ALLISON BOWEN,

HENRI AUGUSTE BERTIN.