

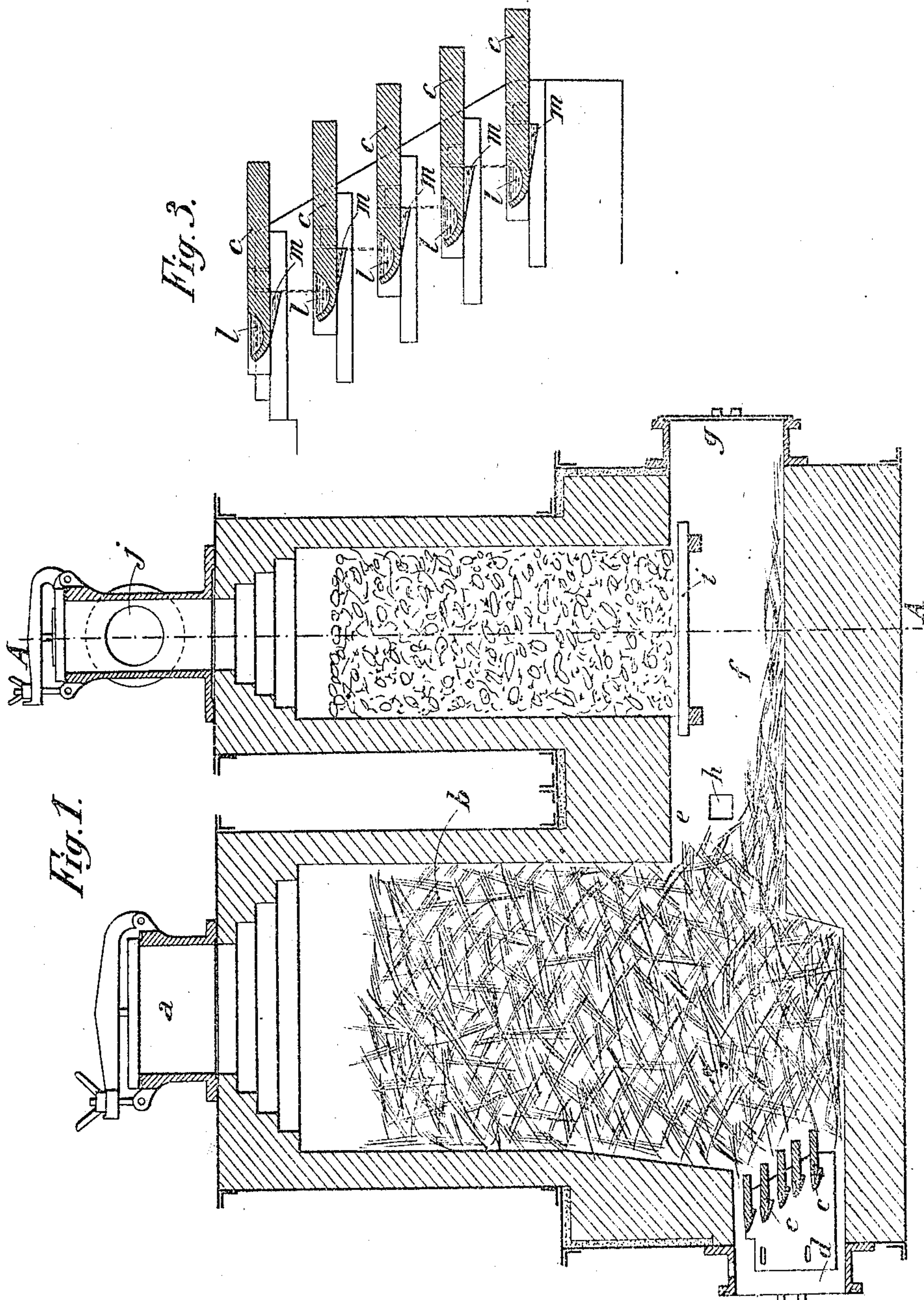
No. 837,121.

PATENTED NOV. 27, 1906.

H. RICHE.
GAS PRODUCER.

APPLICATION FILED AUG. 14, 1905.

2 SHEETS—SHEET 1.



Witnesses,

H. B. Keeler

C. D. Kessler

Inventor

Henri Riche

By

James L. Norris

Atty.

No. 837,121.

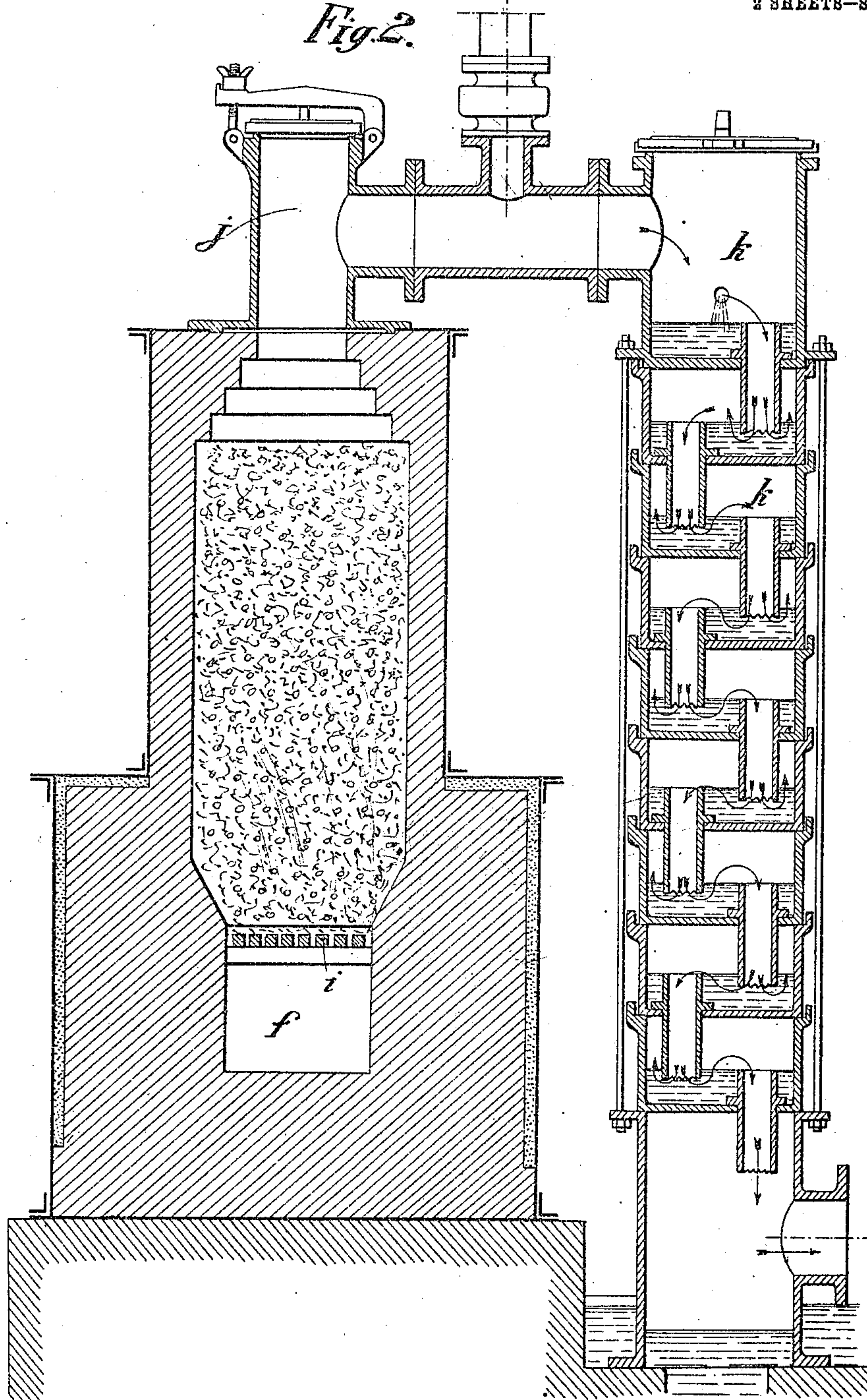
PATENTED NOV. 27, 1906.

H. RICHE.
GAS PRODUCER.

APPLICATION FILED AUG. 14, 1906.

2 SHEETS—SHEET 2.

Fig. 2.



Witnesses:

J. B. Keefe

C. D. Foster

Inventor

Henri Riche

James H. Norris

Atty.

UNITED STATES PATENT OFFICE.

HENRI RICHÉ, OF PARIS, FRANCE.

GAS-PRODUCER.

No. 837,121.

Specification of Letters Patent.

Patented Nov. 27, 1900.

Application filed August 14, 1905. Serial No. 274,164.

To all whom it may concern:

Be it known that I, HENRI RICHÉ, engineer, a citizen of the French Republic, residing at Paris, France, have invented certain new and useful Improvements in Mixed-Gas Producers, of which the following is a specification.

This invention has for its object to provide a producer for the manufacture of mixed gas, which producer permits of successfully using for this purpose light fuel, such as straw, hay, bagasse, and the like.

The main improvements forming the object of this invention are:

First, a considerable enlargement of the dimensions of the charge-column, and especially of its horizontal cross-section, so that very light fuel can easily descend into the furnace without sticking anywhere. This enlargement of the horizontal cross-section has, furthermore, the advantage that a larger amount of fuel may be charged into the furnace despite the light weight of the fuel. It results therefrom that the gas is produced with great regularity and that the apparatus can be charged intermittently at sufficiently long intervals of time.

Second, a considerable increase in the section and length of the intermediate chamber which separates the furnace proper from the purifying-column. This advantage is especially secured by causing the purifying-column to rest on an iron grate, which arrangement renders the intermediate chamber easily accessible for cleaning purposes.

In the accompanying drawings, Figure 1 shows a longitudinal section of a gas-producer provided with the improvements in accordance with the invention. Fig. 2 is another vertical section on line A A of Fig. 1, and Fig. 3 is on a larger scale a vertical section of the grate.

The charging of the raw light fuel to be utilized is effected at *a* at the upper part of a column or hopper which surmounts the furnace. This charging is done either continuously and mechanically by means of a suitable charging device, or it is done intermittently in the form of finely-chopped parts or of bundles of suitable size. The fresh fuel falls by its weight on account of the enlarged section of the shaft *b*, and gradually descends toward the furnace proper, which consists of

stepped grates *c*, hereinafter described. These grates are supported by slabs bolted to the vertical sides of the fire-door *d*, arranged in the base of the producer. The air blown or drawn in through this door maintains the combustion of the fuel, and the gases produced pass in a horizontal direction from *c* to *e* through a considerable mass of ignited fuel, are reduced, and become susceptible of utilization. There remains now only to purify the gases. On reaching *e* the gases enter the intermediate chamber *f*, the large cross-section of which reduces considerably their velocity, so that the dust and ashes contained in the gases are deposited in this chamber and may be removed therefrom through the door *g* when the apparatus is not working. The gases freed of dust and ashes are afterward purified by the known process, which consists in igniting additional air through an opening *h* and allowing the gases to pass through a purifying-column consisting of a column of incandescent coke supported by the grate *i*. The gases move in an upward direction through this purifying-column and escape through the cast-iron head *j* into the gas-washer *k*, through which they circulate in a downward direction with the water or other suitable liquid used to wash them. This water or this other suitable liquid is to be as hot as possible, and for this purpose is supplied to the washer after it has been used in cooling the jackets of the motors. The gases flow downward with the water or other suitable liquid, passing successively through the various trays and bubbling through the water, so that the bubbles are altered in shape and caused to change their direction several times before reaching the bottom of the washer. The various layers of the water or other suitable liquid act also as hydraulic seals when the producer is not working and prevent gas from flowing back into the producer.

The combustible gas obtained with the air passing horizontally from the grate *c* to the chamber *f* through the fuel which descends gradually in the shaft *b* is a raw gas containing uncondensable combustible parts and vapors of tar or of compound hydrogen carbids which, if they were condensed subsequently in the pipes or apparatus working with these gases—gas-engines, for instance—

would rapidly render the use of these apparatus impossible. The air blown through *h* has not for its object to burn completely the gas. The amount of air blown through *h* is moderate, and the most combustible parts of the gas only burn. It is known that the hydrogen carbids are the most combustible parts of the gas. The combustion of the hydrogen carbids is even not complete. A great proportion of lampblack and of pulverulent carbon is deposited, a great part of which is carried by the gas through the grate *i* and through the column of coke. The gas, which was very hot after having passed through the fuel by which it is produced, is further heated by the hereinbefore-described partial combustion. In consequence the column of coke is rendered incandescent, and is maintained in such a state by the passage of the gas, which is sufficiently hot for allowing the reduction of the little portion of carbonic acid gas which it contains through the pulverulent carbon which is produced by the partial combustion of the gas which has been obtained in the chamber *f* by blowing under a relatively great pressure in a free space air through *h*. The column of coke is thus maintained incandescent and ends the destruction of the vapors of tar or of hydrogen carbids, which in consequence of the friction of the changing of direction and of section are brought into contact with the hot walls and obliged to distil.

It must be understood that the carbon produced by the combustion of the hydrogen carbids is in a sufficient proportion for reducing the small amount of carbonic acid which remains in the gas after its formation. The coke of the column has no chemical action. Its action is more a physical one and also a mechanical one, as the dust is completely stopped by the passage of the gas at a wittle speed upwardly through this column. In consequence the production of gas is obtained from *c* to *e*. Its purification begins by the blowing of a limited amount of air through *h*, which burns only the hydrogen of the hydrogen carbids contained in the gas. The purification is continued in the column of coke, first, by the prolonged contact between the lampblack produced and the carbonic acid of the gas and by the distillation of the vesicles of tar coming into contact with the incandescent coke; second, by the mechanical action of the column of coke forming a dry scrubber which retains the dust drawn along by the gas by the repeated shocks of the dust against the pieces of coke. As there is no consumption of coke, or a very insignificant consumption, devices for the introduction of new coke and for the withdrawal of the ashes are not necessary.

The grate *c* is constituted by cast-iron

grate-bars, which are very wide and flat and have formed on their outer edges channels or troughs *l*, Fig. 3. Under these troughs the bars have cast on them ribs *m*, which are so shaped that the liquid overflowing from one of the channels is caused by capillary action to flow into the trough of the bar below, and so on from bar to bar downward. The liquid is thus heated not only by radiation, but also (and chiefly) by the conduction of the bars, and the evaporation is so proportioned as to correspond to the work to be supplied by the apparatus.

When ordinary straw is used, the amount of natural moisture contained therein being that which corresponds to the best output of the producer, no water is caused to flow on the grate-bars. When dry straw is used, the temperature of the furnace would be too high. Water is then supplied to the grate-bars, and the evaporation and decomposition of water lower the temperature of the furnace to the degree of heat which is most suitable for the efficient working and preservation of the producer. Lastly, if the straw be very damp the temperature of the furnace will be too low, and the gases may not be sufficiently combustible. In this case, instead of water, petroleum or residues from the treatment of petroleum or any other oil may be supplied to the grate-bars. The partial combustion of these oils increases the temperature and enriches the gases, thereby promoting the reduction of the carbon dioxide and aqueous vapor and also adding to the mass of gases a considerable proportion of stable distilled-off hydrocarbons.

Having thus described and ascertained the nature of my invention and in what manner the same may be performed, I declare that what I claim is—

1. An apparatus for the manufacture of mixed gas, a producer embodying a charge-column of enlarged cross-sectional area, a charging-head at the upper part of said column, a grate at the lower part of said column, a combustion-chamber extending at an angle with respect to the producer, a purifying-column arranged above and communicating with said combustion-chamber, air-inlets in said combustion-chamber between the charge-column and the purifying-column, a gas-washer, and a conduit for establishing communication between the top of said purifying-column and said gas-washer.

2. An apparatus for the manufacture of mixed gas comprising a producer embodying a charge-column of enlarged cross-sectional area, a step-like grate at the base of said charge-column and provided with troughs, a charging-head for said charge-column, a combustion-chamber extending laterally from the charge-column, a purifying-column

arranged over and communicating with said combustion-chamber, air-inlets for the combustion-chamber interposed between the purifying-column and the charge-column, a
5 conduit at the top of said purifying-column, and a gas-washer communicating with said conduit.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HENRI RICHE.

Witnesses:

EMILE KLOTZ,
PAUL BLUM.