

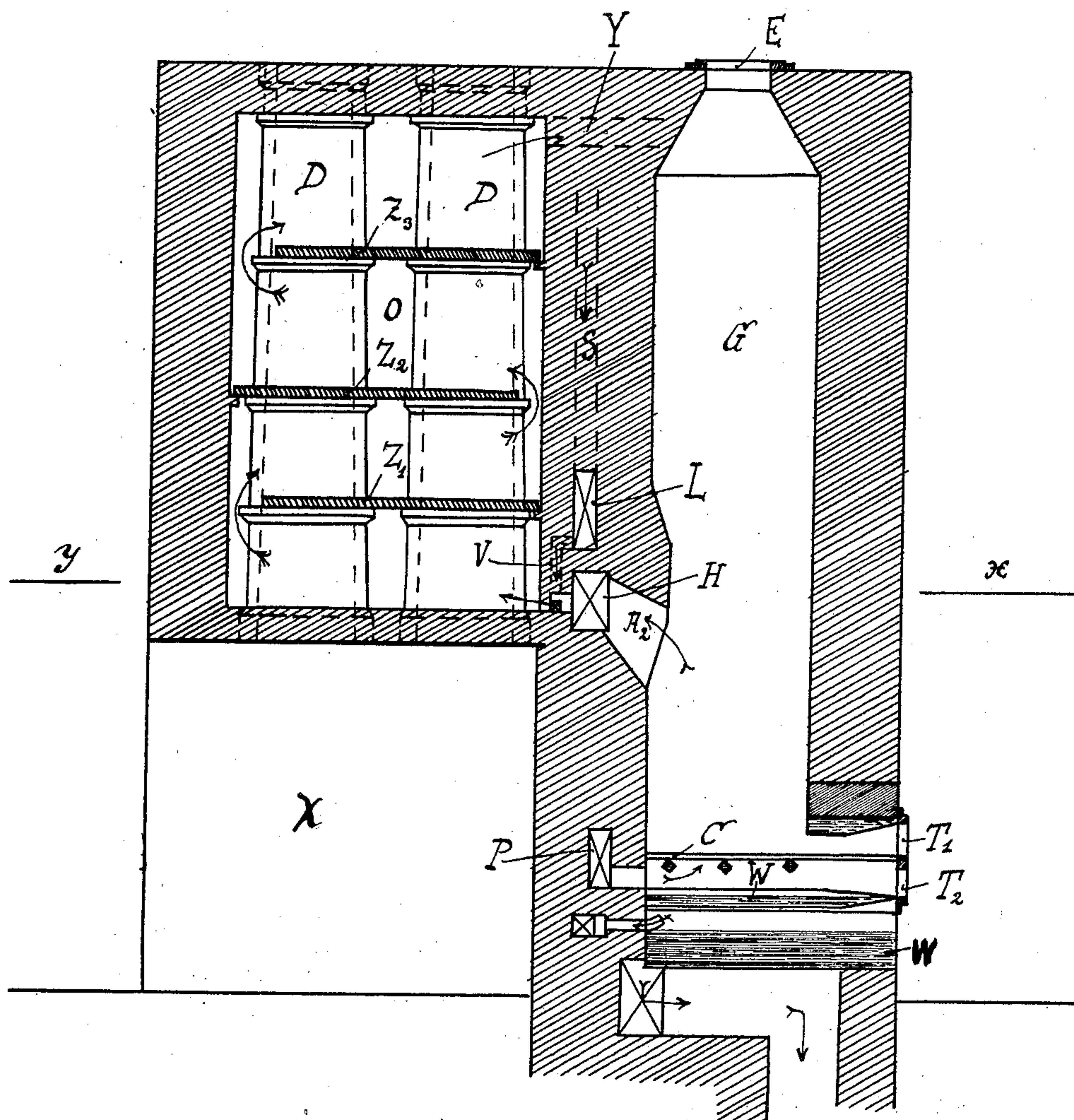
No. 822,246.

PATENTED JUNE 5, 1906.

J. BUEB.
GAS PRODUCING APPARATUS.
APPLICATION FILED AUG. 18, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



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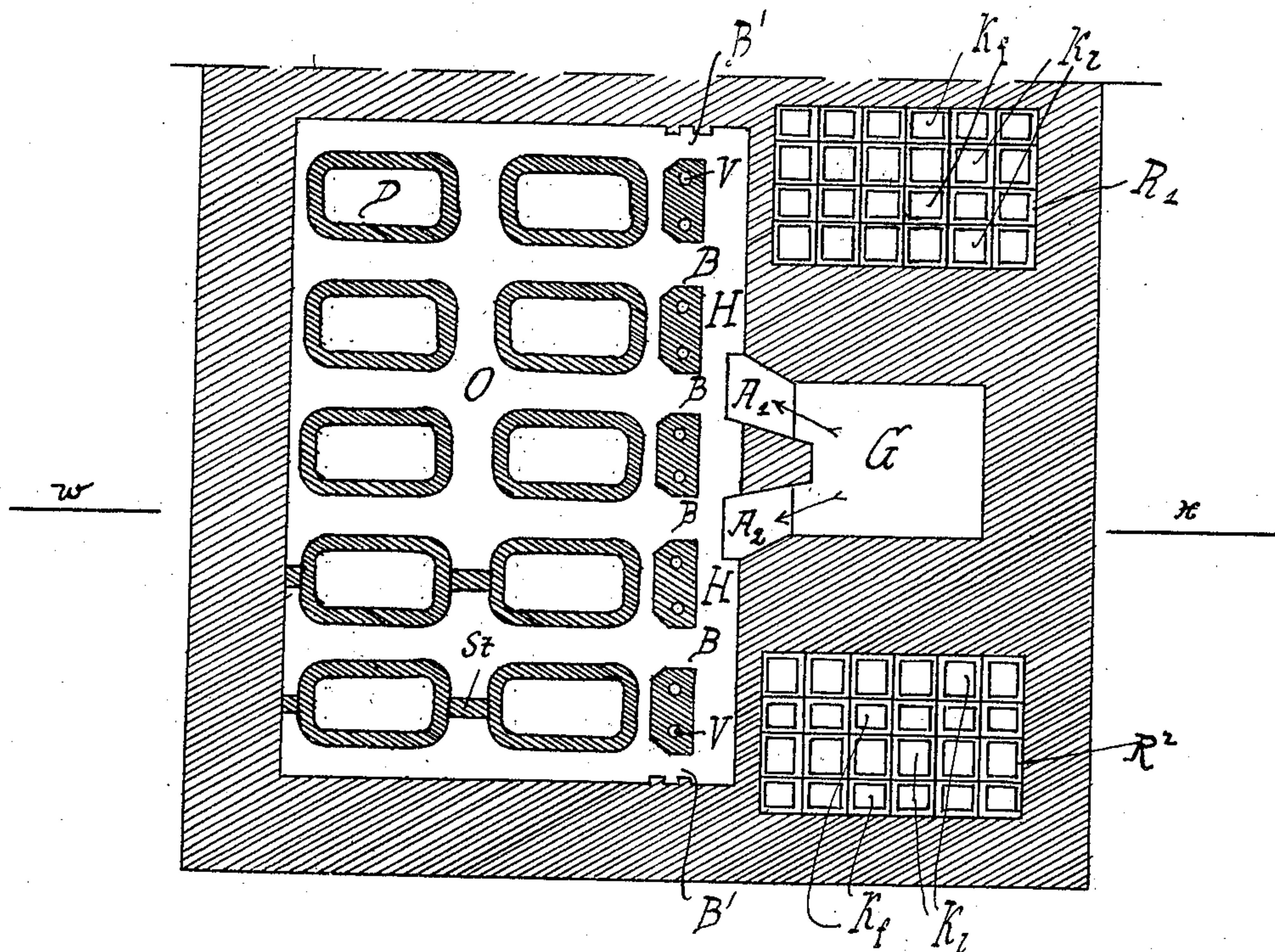
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3 SHEETS—SHEET 2.

Fig. 2.



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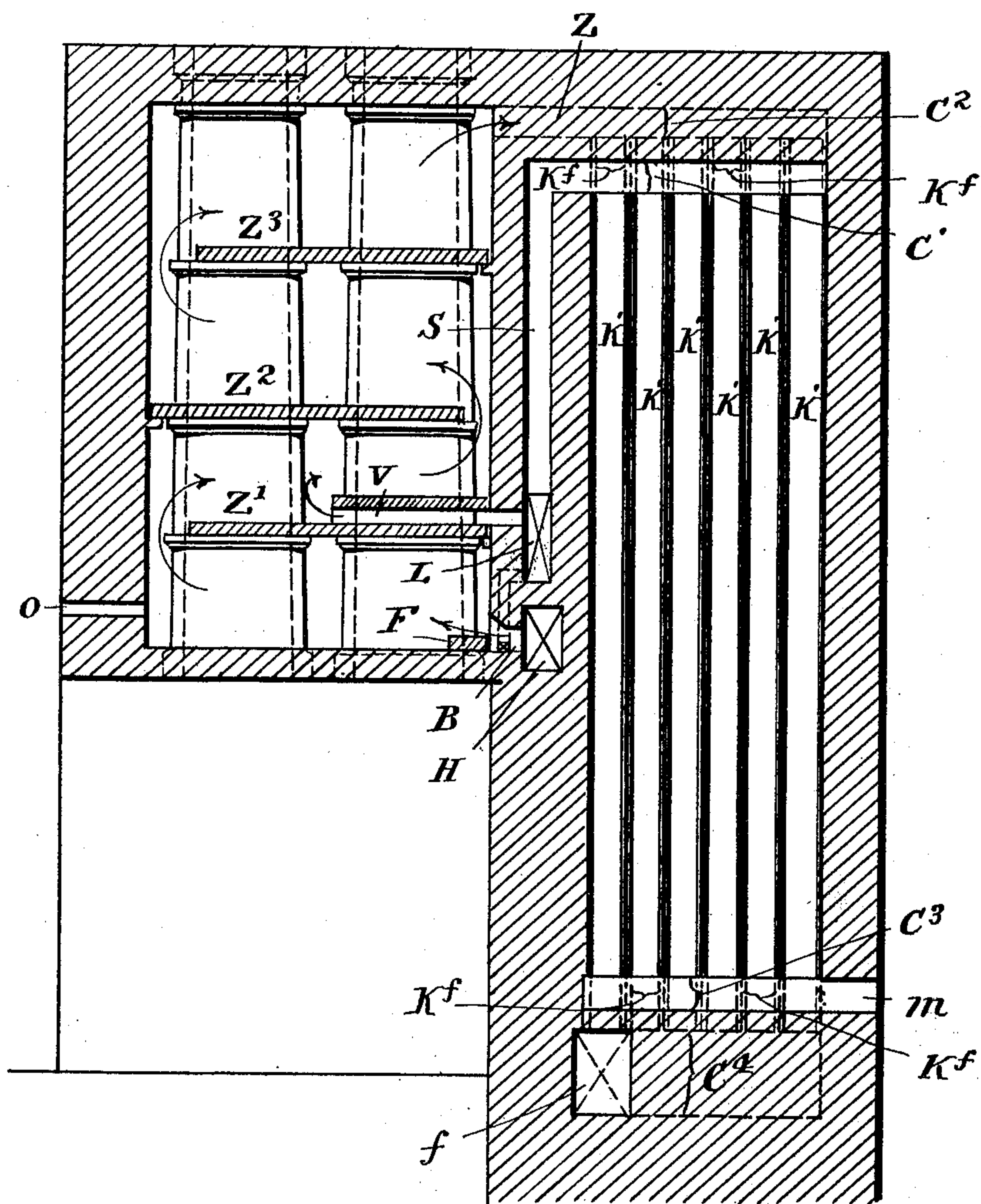
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3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

JULIUS BUEB, OF DESSAU, GERMANY.

GAS-PRODUCING APPARATUS.

No. 822,246.

Specification of Letters Patent.

Patented June 5, 1906.

Application filed August 18, 1905. Serial No. 274,719.

To all whom it may concern:

Be it known that I, JULIUS BUEB, a subject of the German Emperor, and a resident of Dessau, Germany, have invented certain new and useful Improvements in Gas-Producing Apparatus, of which the following is a specification.

In my application for a United States Patent of February 6, 1904, Serial No. 192,428, I have described an improved method of distilling coal in a battery of vertical retorts whereby gas entirely free from naphthalene and also liquid tar are at once obtained, while the number of apparatuses and the labor required for the manufacture of such products are reduced. With such a battery of vertical retorts it is necessary that the several retorts be so heated that their temperatures are alike and that they uniformly decrease from the bottom to the top of the retorts. It was, however, difficult to fulfil this condition in an easy and exact manner, which is absolutely necessary, as otherwise the advantages and effects of the said method are not realized, so that the gas-producing apparatus with vertical retorts is thereby rendered unable to compete with the usual gas-producing apparatuses with horizontal or inclined retorts. I have tried various constructions of gas-producing apparatuses, but I found that it was impossible to heat in the required manner the several retorts in an oven comprising, say, ten or twelve vertical retorts by means of a free fire or by means of a stream of fire-gases conducted in long flues, as in the ordinary gas-producing apparatuses with horizontal or inclined retorts. Either the several retorts were not all heated in the same manner or some of them were not heated properly and in the prescribed way. Some of the retorts were heated too strongly and others too weakly, or the retorts were the hottest at the top instead of at the bottom. It was not advisable to imitate certain known coke-ovens and to divide the oven-space of the gas-producing apparatus by means of vertical partition-walls into as many compartments as there are vertical retorts, so that each compartment would contain a single retort. In this case not only the consumption of fuel in the furnaces might be expected to be excessively large, but also the space required for the oven would be considerably increased, and the beams under the bottom of the oven would require to be stronger than hitherto.

My invention relates to improvements in gas-producing apparatuses with vertical retorts whereby the above-mentioned condition is satisfied, since each single retort or each series of retorts in tandem is heated by two separate currents of fire-gases entering the oven at its bottom, either between a side of the oven and the retort or series of retorts or between two neighboring single retorts or two series of retorts, which currents of fire-gases are conducted in several superposed horizontal flues in a serpentine line.

I will now proceed to describe my invention with reference to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section through a gas-producing apparatus on the line *w x* in Fig. 2, and Fig. 2 is a horizontal section through the same on the line *y x* in Fig. 1. Fig. 3 is a vertical section of the apparatus, taken on a plane extending through one of the regenerators.

Similar letters of reference refer to similar parts in all the views.

The gas-producing apparatus shown comprises a rectangular oven *O*, a generator *G*, and two regenerators *R'* and *R''*, the whole being formed of brickwork or the like. Beneath the oven *O* a space *X* is left for the introduction of trucks or wagons intended to receive and to carry off the coke produced. The shaft of the generator *G* is rectangular in cross-section and may be of any suitable construction. Its furnace comprises a fire-door *T'*, a grate *C*, a slack-door *T''*, and a water vessel *W*. A charging-opening *E* with a suitable cover is provided at the top of the shaft for the introduction of the fuel. The generator *G* is preferably placed at about the middle of one side of the oven *O*. Thereby the oven *O* is protected on that side from loss of heat through radiation. On opposite sides of the generator *G* the two regenerators *R'* and *R''* are disposed, each consisting of a plurality of juxtaposed and superposed rectangular open boxes of fireproof clay. In plan the whole apparatus may be substantially square, as shown, and the top faces of the generator, the two regenerators, and the oven are preferably on one and the same level, so as to facilitate the charging of both the generator *G* and the retorts *D D* by means of the same charging apparatus.

Within the rectangular oven *O* several—for example, ten—vertical retorts *D D* may be disposed either in a single row or in two

rows, as shown, parallel to the wall in contact with the generator G. The vertical retorts D D are preferably of rectangular cross-section, as shown, (with rounded-off corners,) and are made to taper upward. Each retort D is cast in one piece, with several (the embodiment of the invention illustrated having three) collars for supporting horizontal partition-walls Z^1 , Z^2 , and Z^3 , which latter are so disposed as to leave at one end openings which alternate with each other, as is clearly shown in Fig. 1. There are no vertical partition-walls within the oven, or at any rate not in the lowermost compartment of the same. Between the narrow sides of the retorts of a row or series and between the outer retort of said row and the adjacent wall of the oven stiffening plates or studs St might be disposed. About on the level of the bottom of the oven O a longitudinal horizontal flue H is formed in the wall between the oven and generator, which flue communicates with the shaft of the generator by two inclined channels A^1 and A^2 and with the oven O by channels B B in line with the spaces between the broad sides of the neighboring retorts D D and by channels $B^1 B^1$, communicating with the spaces between the retorts and the end walls of the oven. The two extreme channels $B^1 B^1$ are made narrower than the intermediate ones B B, which are all made of the same section. If desired, valves or slides F (see Fig. 3) may be disposed in the channels B B^1 for adjusting the areas and for regulating the currents of fire-gases. These valves or slides may be arranged to be adjusted from without in any known manner—as, for instance, by inserting a suitable hook or implement through a passage o (see Fig. 3) in the front wall of the apparatus, which opening may be normally closed by a suitable plug.

In the wall between the generator and oven, either directly above the flue H or above and at one side of that flue, are formed two main air-flues L in the same line, which are connected by vertical channels S with chambers C^1 (see Fig. 3) above the regenerators R^1 and R^2 , which chambers communicate with the rows of vertical air-flues K ℓ K ℓ . Other chambers C^2 above the rows of vertical fire-flues Kf Kf of the two regenerators communicate with the oven O by means of channels Y. Corresponding chambers C^3 beneath the rows of air-flues K ℓ K ℓ are made to communicate with the atmosphere through suitable openings m, while other chambers C^4 beneath the rows of fire-flues Kf Kf communicate with suitable flues f, leading to a chimney or the like. The said two main air-flues L communicate with the channels B B^1 through narrow channels V V, which may terminate either in the top faces or, preferably, in the side faces, as shown, of the channels B B^1 . Their mouths are all given the

same area. Other air-flues P are formed in the brickwork and communicate with both the space beneath the grate C and with the atmosphere through suitable channels. These flues P and channels should be so arranged as to preliminarily heat the air before it enters the fire.

The gas-producing apparatus is operated as follows: The generator G is charged and fired in the usual manner, hot air being introduced through the air-flues P. The hot fire-gases escape in the direction of the arrows through the two channels A^1 and A^2 , the horizontal flue H, and the several channels B B^1 into the oven O, where they pass in separate horizontal streams between the broad faces of the neighboring retorts D D and between the retorts and end walls of the oven from right to left, then turn upward, pass equally in separate horizontal streams through the space between the partitions Z^1 and Z^2 from left to right to the opening at the inner end of the partition Z^1 , where they turn upward and pass through the space between the partitions Z^2 and Z^3 from right to left, after which they again turn upward and pass through the uppermost space from left to right. They are still very hot on escaping through the channels Y to the chambers above the two regenerators R^1 and R^2 , so that during their downward passage through the flues Kf Kf they give off a great part of their heat to the air passing upward from without through the air-flues K ℓ K ℓ . The air being thus heated passes from the respective chambers above the two regenerators R^1 and R^2 through the channels S, the two main air-flues L, and the narrow channels V V, so that it mixes in the several channels B B^1 with the fire-gases and assists the combustion of the same. The retorts D D are first heated up to a very high temperature and then filled up to the top, or nearly so, with coal while keeping them heated.

The retort is maintained full while continuing the high heat. The effect of the high temperature is to quickly form that portion of the charge in contact with the walls of the retort into a coke, which offers such resistance to the passage of gas that the latter is caused to pass inwardly and up through the cooler central body of the charge, thus preventing it from becoming highly heated and avoiding the production of naphthalene.

With the gas-producing apparatus described it is easy to obtain a uniform heating of all the retorts and in such a manner that their temperatures decrease from the bottom to the top and nearly in the same proportion as their areas. The damper, the valves or slides in the channels B B^1 , and other known devices should be regulated for attaining this result.

Where so preferred, the vertical retorts D D may be disposed in more than two rows, as

shown—say in three or more rows—the more so if the retorts are given a rather square cross-section.

Channels *v* may be arranged between the partitions *Z'* and *Z''*, as shown in Fig. 3, or between the bottom of the oven and the partition *Z'*. The narrow air-channels *V V* may also lead direct to the horizontal flue *H*, if so preferred. In general the gas-producing apparatus may be varied in many respects without departing from the spirit of my invention.

I claim—

1. In a gas-producing apparatus, the combination with an oven rectangular in horizontal cross-section, of two regenerators arranged at one side of the oven, a generator arranged between said regenerators, a plurality of approximately rectangular upwardly-tapering vertical retorts arranged in rows and extending from the bottom to the cover of the oven, a plurality of superposed horizontal partitions within the oven and each separated from one wall of the oven, said openings being alternately at opposite sides of the oven, a horizontal flue in the wall between the generator and oven on substantially the level of the oven-bottom, channels connecting said flue with the generator, means for supplying air preliminarily heated in the regenerators to gases issuing from said flue, the wall between said flue and the oven having a plurality of openings adapted to admit the mixed fire-gases and hot air in separate streams into the oven between the neighboring retorts or between retorts and walls of the oven, and flues for conducting the fire-gases from the uppermost compartment of the oven to the two regenerators, said oven being adapted to conduct the separate streams of fire-gases upward in a serpentine line.

2. In a gas-producing apparatus, the combination with an oven rectangular in horizontal cross-section, of a generator at one side of the oven, two regenerators on opposite sides of the generator, a plurality of approximately rectangular upwardly-tapering vertical retorts arranged in parallel rows extending longitudinally and transversely of the oven and each retort extending from the bottom to the cover of the oven, a plurality of superposed horizontal partition-walls within the oven and each separated at one side from the oven, said openings being alternately at opposite sides of the oven, a horizontal flue in the wall between the generator and the oven on

substantially the level of the oven-bottom, channels for conducting fire-gases from the generator to said horizontal flue, means for mixing the fire-gases with air preliminarily heated in the two regenerators, the wall between said flue and the oven having a plurality of openings adapted to admit the fire-gases mixed with hot air from said flue in separate streams into the oven between the neighboring retorts or between the retorts and the oven-walls, and flues for conducting the fire-gases from the uppermost compartment of the oven to the two regenerators, said oven being adapted to conduct the streams of fire-gases upward in a serpentine line.

3. In a gas-producing apparatus, the combination of an oven rectangular in horizontal cross-section, two regenerators arranged at one side of the oven, a generator arranged between said regenerators, the tops of the oven, regenerators and generator being on the same level, a plurality of substantially rectangular upwardly-tapering vertical retorts arranged in rows extending longitudinally and transversely of the oven and each retort extending from the bottom to the cover of the oven, a plurality of superposed horizontal partition-walls within the oven and each separated at one side from the oven, said openings being alternately on opposite sides of the oven, a horizontal flue in the wall between the generator and oven on substantially the level of the oven-bottom, channels for conducting fire-gases from the generator to said horizontal flue, means for mixing the fire-gases with air preliminarily heated in the two regenerators, the wall between the oven and said horizontal flue having therein a plurality of openings adapted to admit the mixed fire-gases and heated air in separate streams into the oven between the neighboring retorts or between the retorts and the walls of the oven, and flues for conducting the fire-gases from the uppermost compartment of said oven to the two regenerators, said oven being adapted to conduct the separate streams of fire-gas upward in a serpentine line.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JULIUS BUEB.

Witnesses:

FRANZ SCHÄBER,

FRANZ HASSLACHER.