(No Model.)

# A. M. CHAMBERS & T. SMITH.

## COKE OVEN.

No. 459,064. Patented Sept. 8, 1891.

Fig. 1

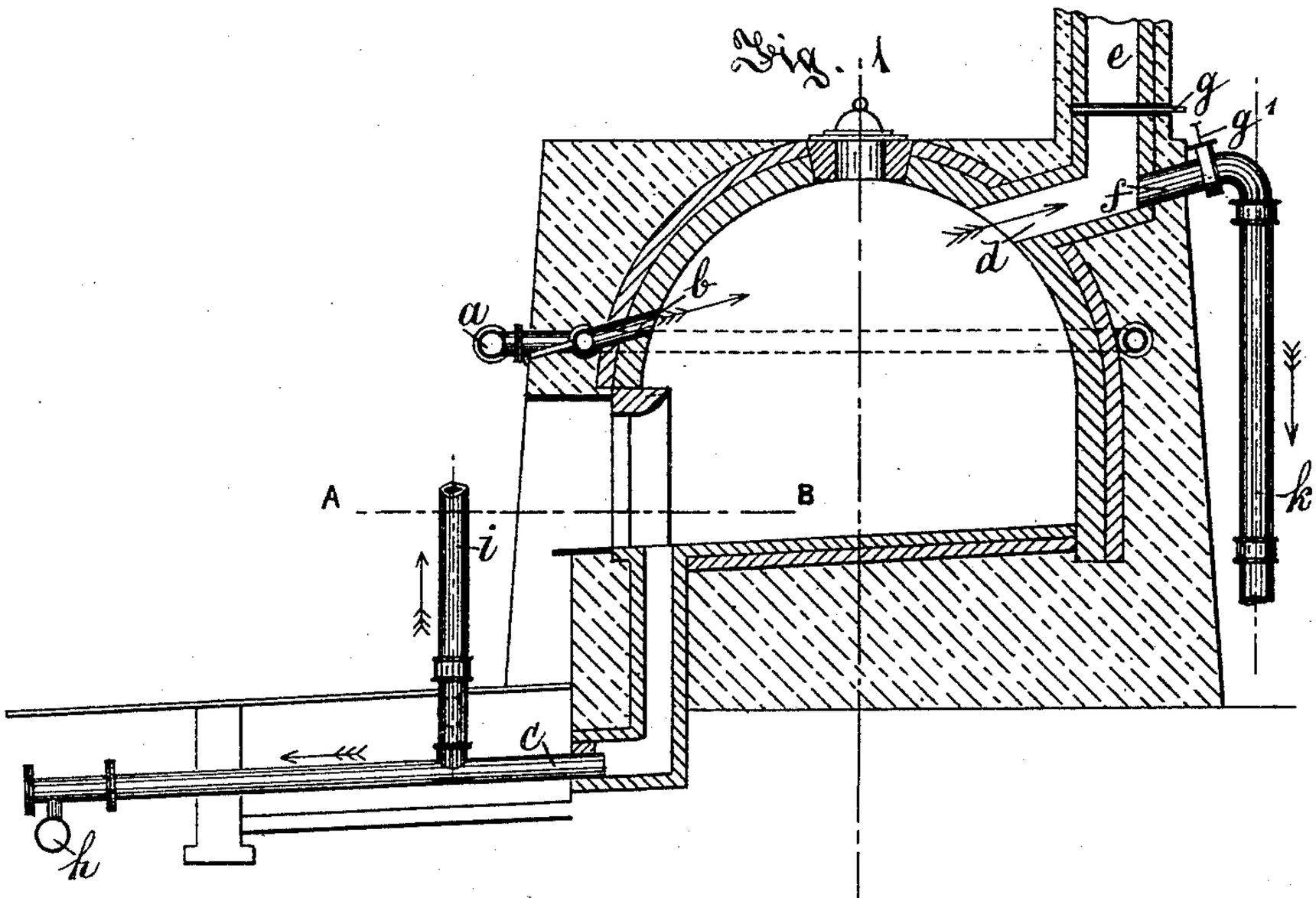
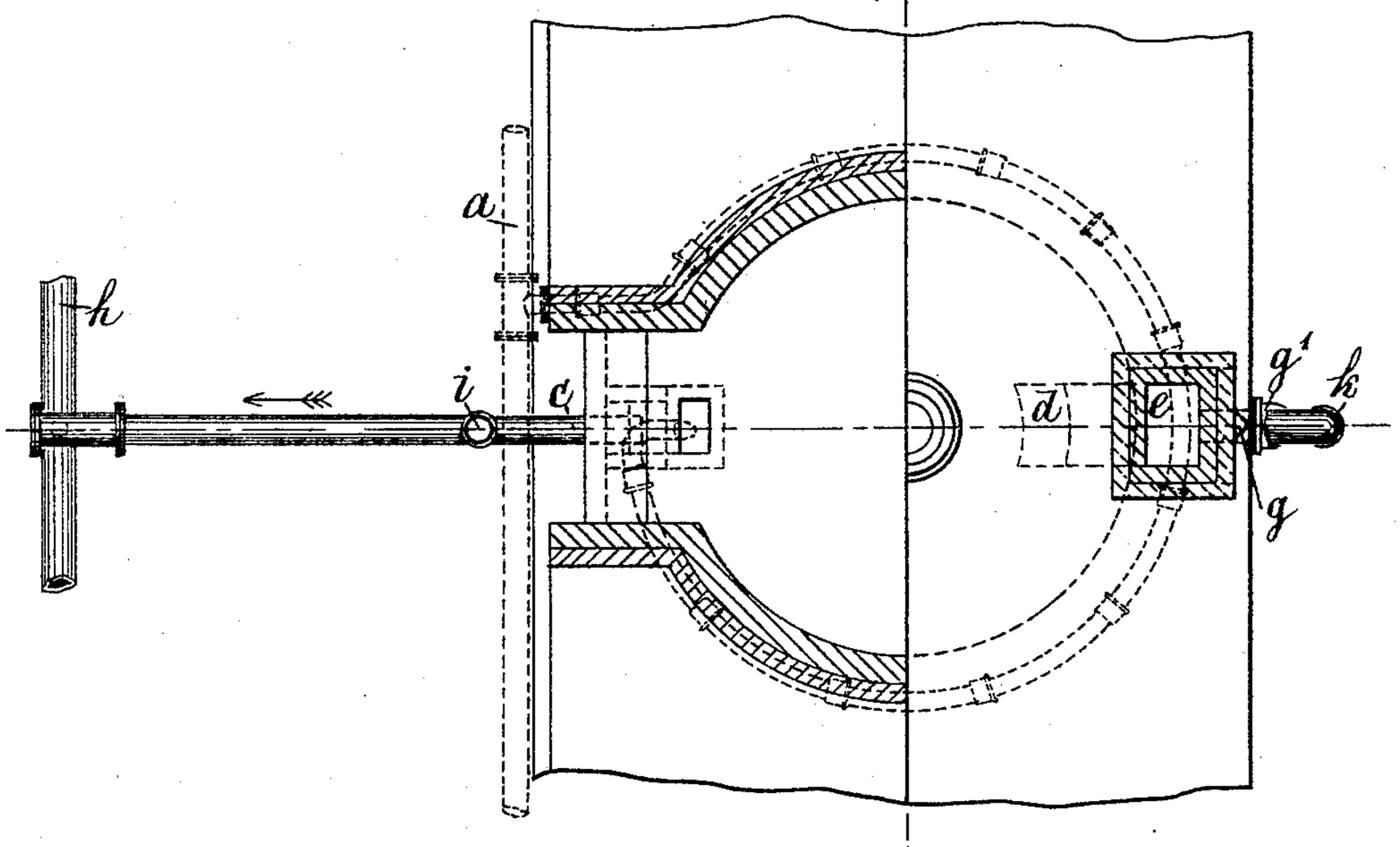



Fig. 2

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# UNITED STATES PATENT OFFICE.

ARTHUR MARSHALL CHAMBERS AND THOMAS SMITH, OF THORNCLIFFE, ENGLAND.

## COKE-OVEN.

SPECIFICATION forming part of Letters Patent No. 459,064, dated September 8, 1891.

Application filed November 18, 1890. Serial No. 371,863. (No model.) Patented in England February 3, 1889, No. 7,424.

*To all whom it may concern:*

Be it known that we, ARTHUR MARSHALL CHAMBERS, colliery proprietor, and THOMAS SMITH, foreman, subjects of the Queen of Great Britain, both residing at Thorncliffe, in the county of York, England, have invented a new and useful Improvement in Coke-Ovens, (for which we have obtained a patent in Great Britain, No. 7,424, bearing date February 3, 1889,) of which the following is a specification.

Our present invention is more especially applicable to the coke-ovens and apparatus connected therewith for which a patent was granted to us dated June 23, 1885, No. 320,627, for a method of coking coal; and it has for its objects further improvements upon such coke-ovens and apparatus connected with them by which the quality of the coke is improved and it is obtained in larger pieces, and the products arising from the coking of the coal are more thoroughly and effectually collected and utilized.

In the specification and drawings of our said former Letters Patent we described and showed a pipe, preferably of fire-clay or other refractory material, arranged round the upper part or crown of the oven, so that it becomes sufficiently highly heated by the heat from the latter, one of the ends of this pipe being brought forward and connected to an air-supply pipe into which air is forced at moderate pressure, and the other end of the pipe after passing round the oven being directed inward through the front wall of the oven and slightly upward, so that the current of heated air forced in is directed upward across the oven. At the front of the oven below the floor is also arranged a pipe inclining downward and leading to condensing apparatus, by which the condensible oils and products are collected and can be utilized, the gas finally passing away and being also utilized, if desired.

In our present invention we not only discharge the volatile and other liquids, vapors, or gases—such as gas, tar, heavy and light hydrocarbon oils, ammoniacal liquors, and other well-known products from the carbonization or coking of coal or other material—into a pipe below the floor of the oven near its front, which pipe communicates with condensing apparatus of any of the ordinary well-known kinds in which they can be cooled and condensed and subsequently removed and utilized, but we also discharge the volatile products of carbonization or coking of the coal or other material through an opening made at the upper part of the back of the oven, which opening is surrounded by a straight or conical pipe of fire-clay, metal lined with fire-clay, or other sufficiently refractory material, which also communicates with condensing apparatus.

In the accompanying drawings, which is an illustration of our invention, Figure 1 is a vertical section through an ordinary bee-hive-shaped coke-oven; and Fig. 2, a plan, the left-hand part of the figure being a section through A B, Fig. 1.

The same letters of reference indicate the same parts in both figures.

*a* is the air-supply pipe; *b*, the pipe slightly inclined upward, through which heated air is admitted into the oven, and *c* the pipe inclining downward from the front of the oven, as described and shown in the specification of our former patent already referred to.

*d* is the opening in the upper part of the back of the oven communicating with a chimney *e* and also with a pipe *f*, which is in connection with condensing apparatus by the pipe *k*.

Sliding valves or regulators are fixed in the chimney *e* and pipe *f*, as shown at *g g'*.

A pipe to receive the oils and liquids is shown at *h*, and a pipe communicating with condensing apparatus at *i*.

By the novel arrangement described and shown, when the current of heated air is forced into the upper part of the coke-oven, as described and shown in the specification of our former patent already referred to, the volatile products of the carbonization or coking of the coal or other material in the oven are discharged partly from the floor of the oven through the pipe *c* and partly through the opening *d*, from which they are conveyed to condensing apparatus by the pipes *f k*, or the volatile products allowed to escape into the atmosphere through the chimney *e*.

By our present invention the whole of the products of combustion have not to be forced

down through the coking coal, but they are partly discharged through the opening *d* in the top of the oven, and the quality of the coke is in this way improved and it can be obtained in larger pieces, while the whole of the products of combustion of coking are collected and can be utilized.

In this method of coking according to our present invention, the gases being taken partly at the bottom and partly at the top of the oven, a uniform heat is obtained throughout the whole mass of the coal from the beginning to the end of the process. By the adjustment of the sliding valves or regulators every advantage can be taken of the more or less rapid evolution, as well as the varying nature and value of the gases and other products of carbonization or coking during the process, while the most inferior classes of coal and slack having any coking qualities whatever can be dealt with and made into a satisfactory coke, and if the slack, even of inferior quality, be ground to the finest powder it can be still dealt with in a satisfactory manner.

What we claim as our invention, and desire to secure by Letters Patent, is—

A coke-oven provided at the top on one side with an outlet-flue *e*, an air-blast pipe discharging into the said oven below said outlet-flue, but on the opposite side of said oven, a tubular outlet *f k*, extending outward and downward from the lower part of said flue, a regulator *g* in said flue above the pipe *f*, and a regulator *g'* in the latter pipe, all substantially as and for the purpose set forth.

In testimony whereof we have hereunto set our hands in the presence of two witnesses.

ARTHUR MARSHALL CHAMBERS.
THOMAS SMITH.

Witnesses:
JOHN SWIFT,
FRANK M. CLARK.