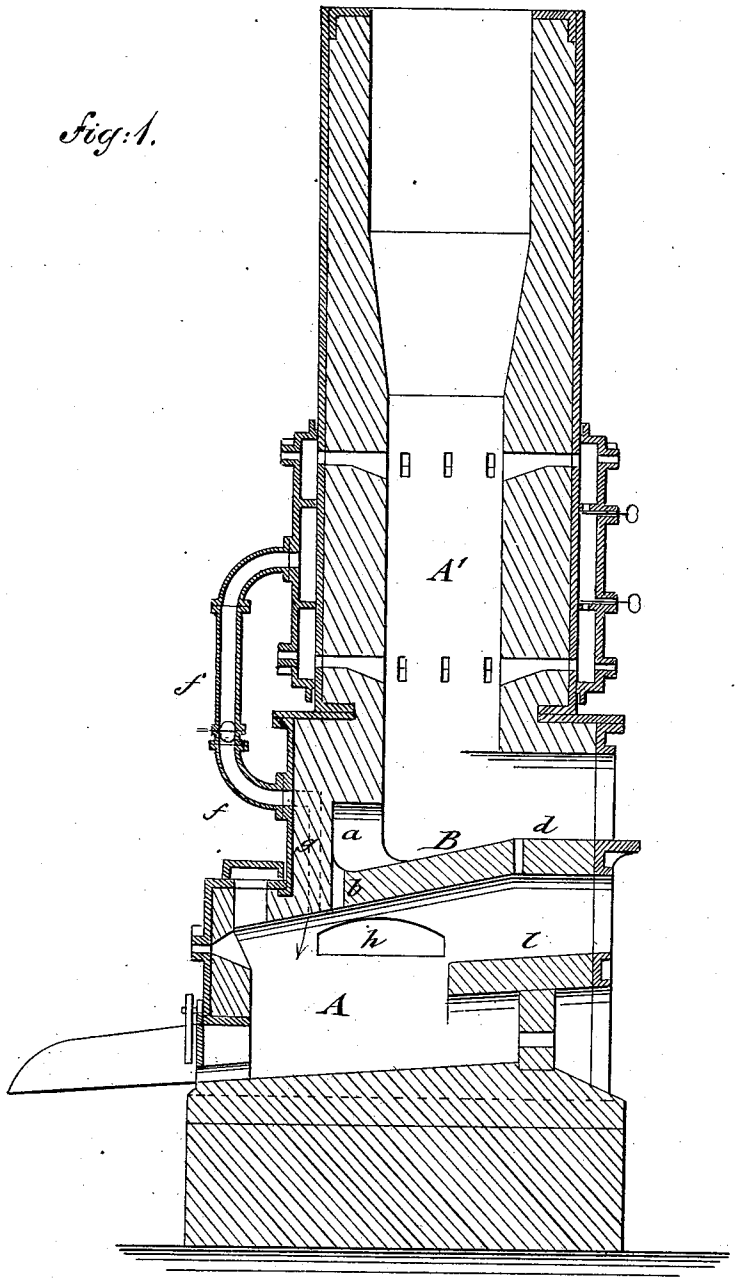
(No Model.) 2 Sheets—Sheet 1.

G. IBRÜGGER.

Cupola Furnace.

No. 240,136. Patented April 12, 1881.

Fig: 1.



WITNESSES:

Carl Karp

Otto Risch

INVENTOR

Gustav Ibrügger

BY Paul Goepel.

ATTORNEY

(No Model.) 2 Sheets—Sheet 2.

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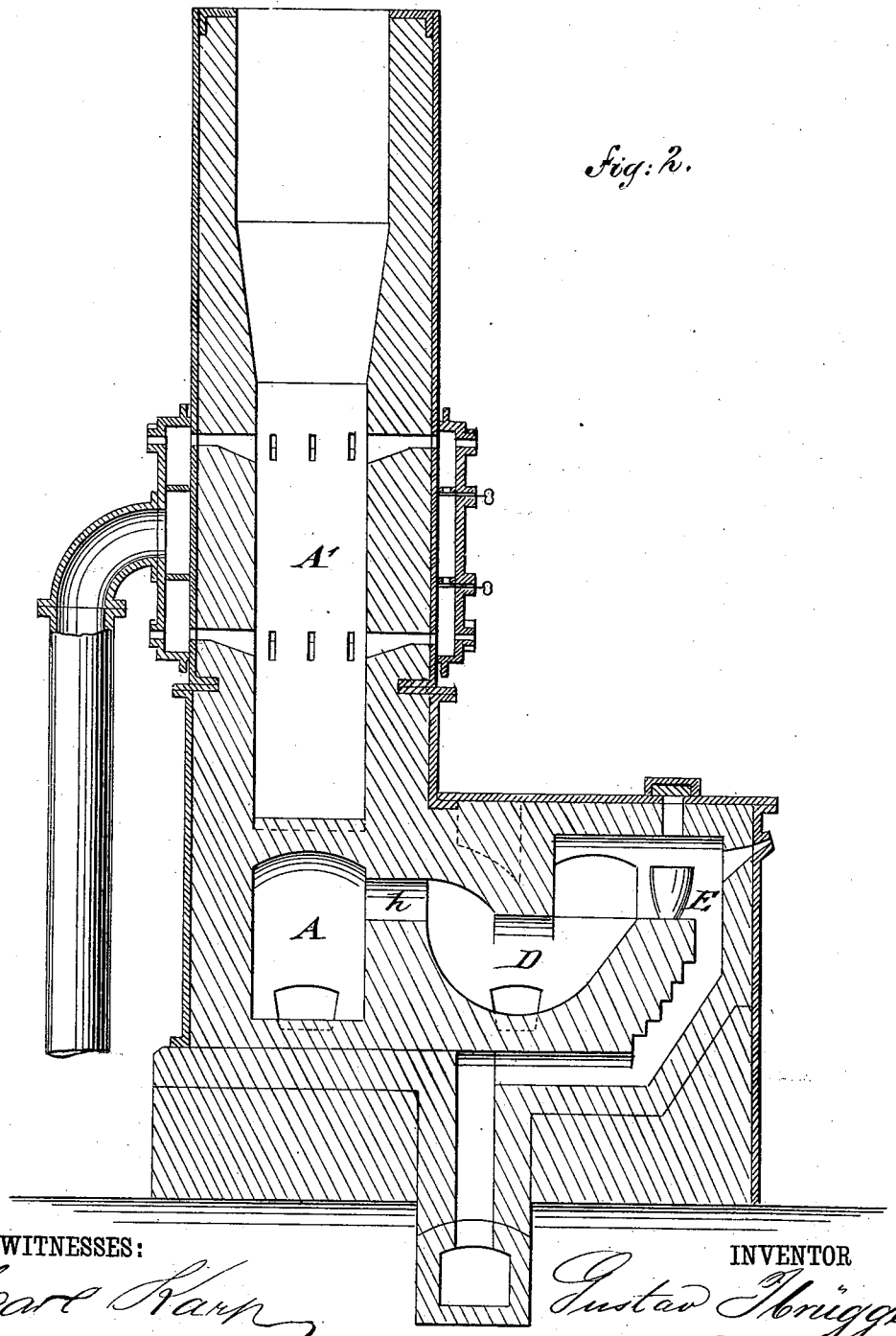
Fig: 2.



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UNITED STATES PATENT OFFICE.

GUSTAV IBRÜGGER, OF NORDEN, PRUSSIA, GERMANY.

CUPOLA-FURNACE.

SPECIFICATION forming part of Letters Patent No. 240,136, dated April 12, 1881.

Application filed May 18, 1880. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV IBRÜGGER, a resident of the city of Norden, in the Kingdom of Prussia, German Empire, have invented Improvements in Cupola-Furnaces, of which the following is a specification.

In a former application for a patent for a cupola-furnace, which has been filed by me under date of March 25, 1880, I have described a cupola-furnace in which a separate collecting trough or well is arranged below the furnace and connected therewith by a central bottom opening or channel, through which the fire-gases are drawn down into the well and there burned, so that the heat of the same can be utilized for melting and uniting wrought-iron with the molten pig-iron from the furnace.

By a number of experiments I have found that the heat generated by the combustion of the gases in the collecting trough or well may be still further utilized for various purposes by conducting them off to the point of use. I have further discovered that it is not absolutely necessary to employ a single bottom opening, but that, on the contrary, better results are obtained when several connecting openings or channels leading from the furnace to the well below the same are used. The relative position of the well to the shaft of the furnace is also immaterial, as it may be either directly below or in front or sidewise of the same, as described.

Instead of conducting the gases of combustion from the shaft of the furnace to the well through the opening through which the melting pig-iron passes, I arrange, besides, separate channels for the escape of the gases, as repeated experiments have demonstrated that a greater number of connecting-channels between the furnace and well prevents the top smoke of the furnace and admits the more perfect ultilization of the fire-gases in the well. As there is no top smoke the furnace can be built considerably higher and charged with a greater quantity of material, so that the capacity of the furnace is greatly increased.

This invention consists more especially of a cupola-furnace which is connected by one or more bottom openings with a collecting trough or well arranged below or in front of the furnace, the well being provided with a discharge-opening, a bridge for supplying the wrought-iron, and a side opening for conducting off the gaseous products of combustion for further use.

In the accompanying drawings, Figures 1 and 2 represent, respectively, a vertical central and a vertical longitudinal section of my improved cupola-furnace, in which similar letters of reference indicate corresponding parts.

A in the drawings represents the collecting trough or well, which in this case forms a chamber in which the combustion of the gases escaping from the shaft of the furnace A′ takes place. This well or combustion-chamber A is either directly below or in front of the furnace proper, it being separated from the latter by an inclined arch, B. At the lowest point of the inclined arch B is a vertical connecting-opening, *b*, which extends from an arched recess or niche, *a*, downward into the well A. The molten pig-iron and the slag pass from this channel *b* into the well A. Besides the connecting-channel *b*, one or more additional channels, *d*, are arranged in the arch B, through which the gases are drawn down into the well A. The hot air required for the proper combustion of the gases in the well A is supplied from the main trunk of the air-blast by a valved tube, *f*, and a connecting-channel, *g*, as shown clearly in Fig. 1.

The well or chamber of combustion, A, is provided with an inclined bottom and an opening, through which the molten metal is drawn off. A side opening, *h*, serves for conducting off the gases of combustion, so that they can be ultized for other purposes, as, for instance, for melting metal in a furnace, D, or in crucibles E, (shown in Fig. 2,) or for heating up air for drying purposes, heating malleable iron preparatory to tempering, and for other suitable purposes. In most cases it is advisable to provide a proper supply of heated air, as the same is more favorable for the combustion of the gases and for a more complete utilization of their heat in the different applications which are made of the same.

In the combustion-chamber A a fire-bridge, *l*, is arranged, upon which the wrought-iron scrap is placed, so as to be properly heated up preparatory to its being fed into the molten pig-iron collected in the well A. The latter

is gradually united with the wrought-iron without impairing the fluidity of the same.

The advantage of this construction of cupola-furnace consists, mainly, in the fact that a continuous working of the same can be substituted for the intermittent working heretofore employed.

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

1. A cupola-furnace having an arched inclined bottom, the latter being provided with a discharge-opening at its lowermost point, and with one or more openings or channels for the fire-gases, in combination with a collecting well or chamber of combustion below or in front of the cupola-furnace, substantially as and for the purpose set forth.

2. The combination of a cupola-furnace having an arched inclined bottom, with a connecting-opening for the metal and one or more openings or channels for the gases of combustion, with a collecting well or chamber of combustion below the furnace, said well being provided with an inclined fire-bridge and a side opening or flue, substantially as specified.

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

GUSTAV IBRÜGGER.

Witnesses:
FRANK C. ZIMMERMAN,
CARL FEHLERT.