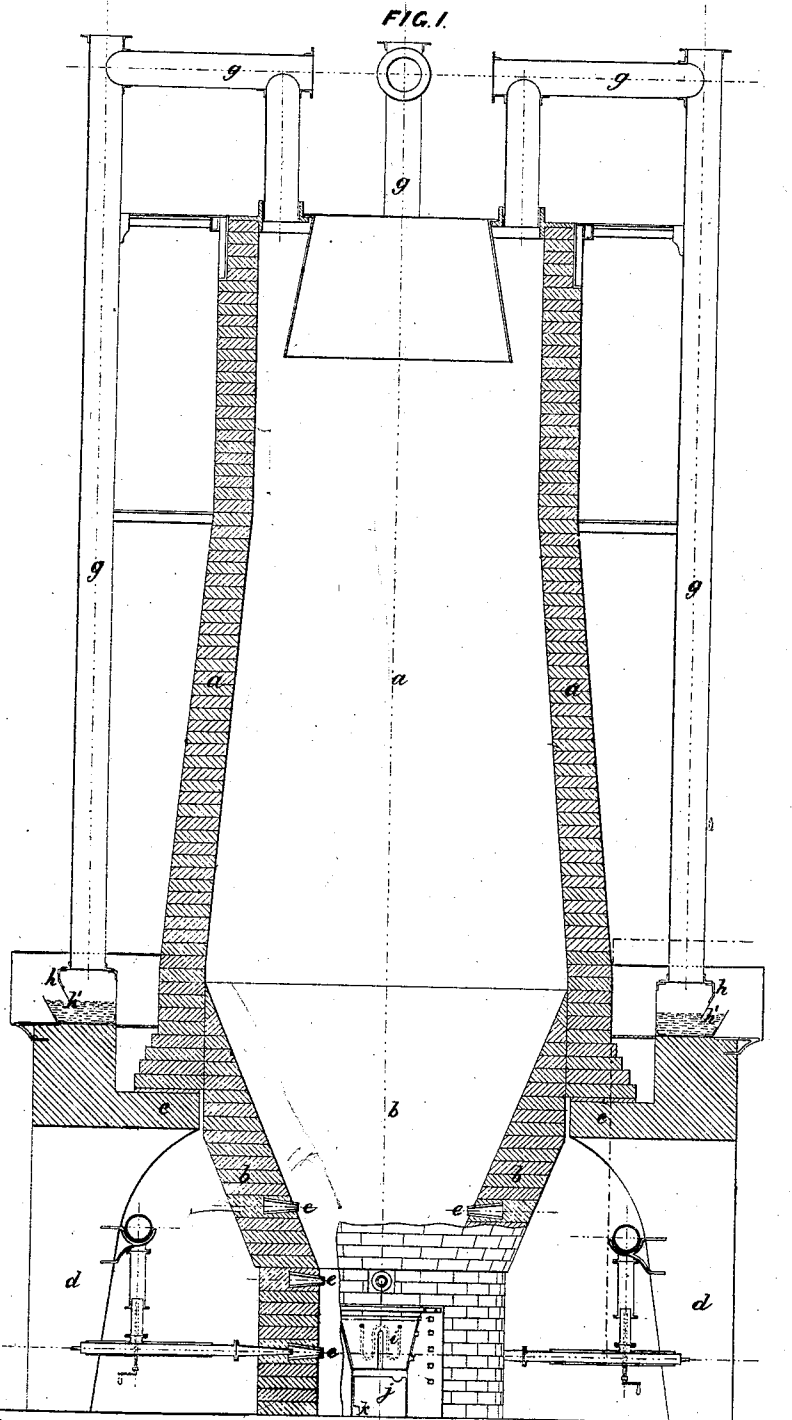


F. BUTTGENBACH.
Blast-Furnaces.

No. 144,829.

Patented Nov. 25, 1873.



Witnesses
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C. A. Dyer.

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FIG. 2.

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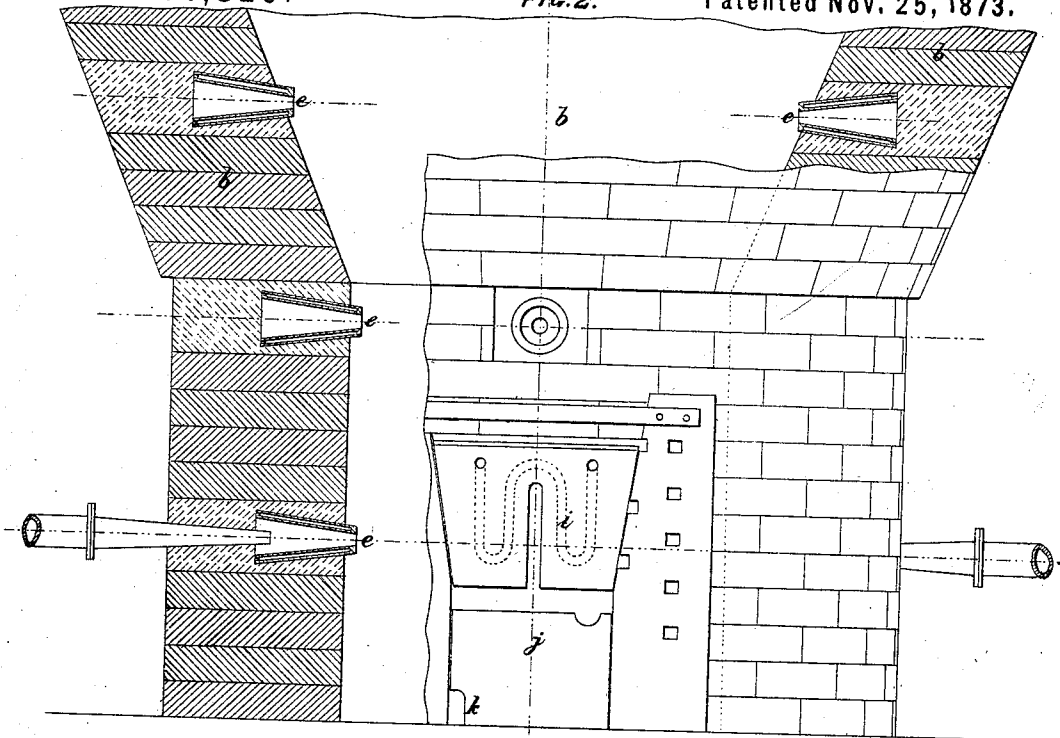
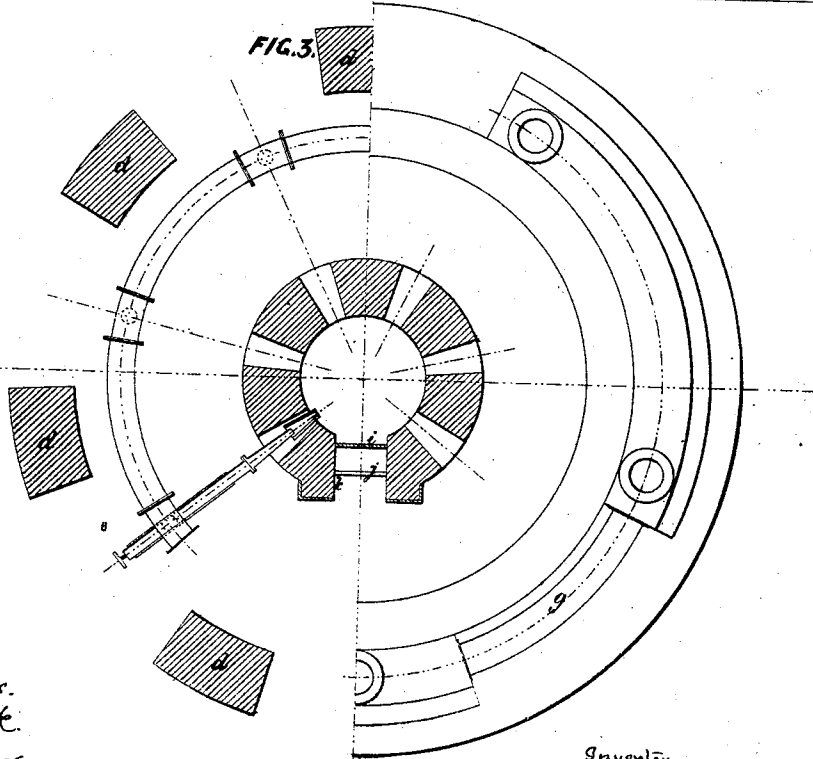


FIG. 3.



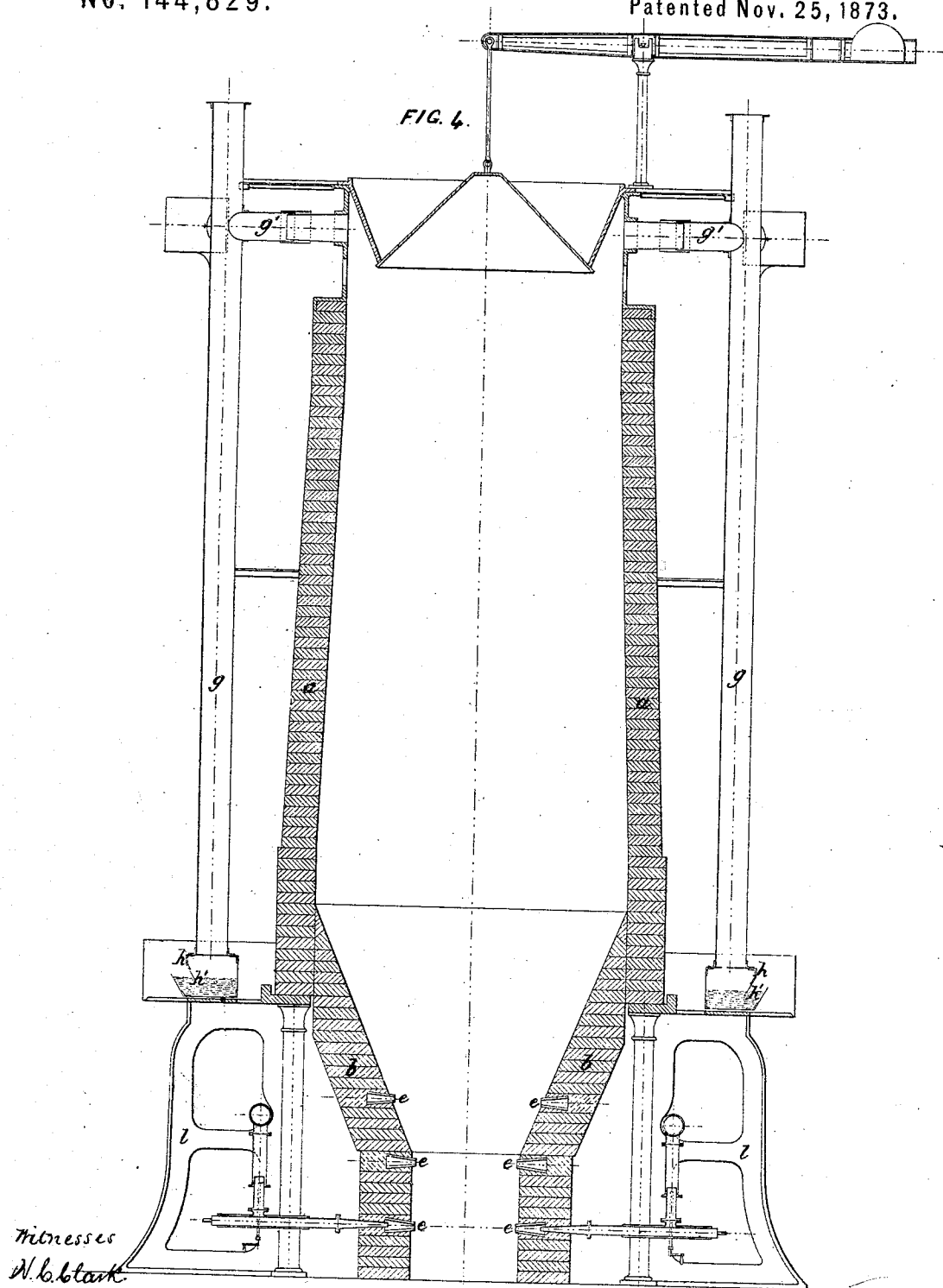
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UNITED STATES PATENT OFFICE.

FRANZ BÜTTGENBACH, OF HEERDT DÜSSELDORF, GERMANY.

IMPROVEMENT IN BLAST-FURNACES.

Specification forming part of Letters Patent No. **144,829**, dated November 25, 1873; application filed May 5, 1873.

To all whom it may concern:

Be it known that I, FRANZ BÜTTGENBACH, of Heerdt Düsseldorf, Germany, have invented certain Improvements in Blast-Furnaces, of which the following is a specification:

The objects of my invention are the reduction of the cost of constructing blast-furnaces, the construction of furnaces more durable than those built according to the ordinary method, and economy in working such furnaces.

The manner in which the said invention is carried into practice is illustrated in the accompanying drawing, in which—

Figure 1 is a vertical central section of my improved furnace. Fig. 2 shows the boshes and parts connected therewith, partly in elevation and partly in vertical section, drawn to an enlarged scale. Fig. 3 is partly a plan and partly a horizontal section of the said furnace. Fig. 4 is a vertical section, illustrating various modifications of the same.

Like letters indicate the same parts throughout the drawing.

In the furnace illustrated in Figs. 1, 2, and 3, the body or stack *a* is made distinct from the boshes *b*, the latter being supported by a ring of brick-work, *c*, carried by brick piers *d*, which have arches turned between them. The stack *a* is a single ring of fire-bricks or fire-clay blocks, which, if desired, may be strengthened by wrought-iron hooping. The boshes *b* are built up to join the stack, as shown in Fig. 1, and they are fitted with water-blocks *e* at suitable intervals. These blocks are preferably cast of the same form as the tuyeres, and of phosphor bronze. They are kept cool by a current of water. The holes in which these water blocks or boxes are inserted are similar to those provided for the insertion of the ordinary tuyeres; and in the event of an accumulation in the hearth of the furnace, the ordinary tuyeres may be removed and inserted in the place of the lower range of water-boxes. The purpose of these water-boxes is to assist in preserving the internal shape of the furnace; and the said boxes may be advantageously applied to old or worn furnaces, the boxes being then inserted in the work-places, and pushed inward as the sides of the furnace are increased

in thickness by the accumulation of slag due to the cooling action of the boxes.

In Fig. 1 the stack *a* is shown provided with apparatus for taking the gases from the center of the mouth. The gases which are collected by this apparatus or otherwise from the stack are, according to my invention, conducted down through gas-tubes *g*, communicating at their lower ends with an annular main, *h*, which surrounds the base of the stack *a*, as shown in Fig. 1. This main is so constructed that on one side (preferably the outer side) it is not closed, except by a hydraulic joint, as shown at *h'*. The main *h* being partially filled with water, this joint is perfectly sealed, so that under ordinary circumstances no gas can escape therefrom; but at the same time the joint gives immediate relief if an explosion in the gas-tubes should occur; and it allows the dust which may accumulate at the bottom of the said main to be readily removed at any time without an escape of gas. The mains leading from the furnace to the boilers or stoves when the gases are utilized may also be similarly constructed.

In the furnace shown in Fig. 1 the platform or staging at the mouth of the furnace is supported by the gas-tubes *g*, the stack being thus left perfectly free to expand or contract; and the said stack may, if necessary, be partially or wholly removed and replaced without interfering with the platform. This improved furnace has a closed breast, formed by inserting a cast-iron plate, *i*, wherein is cast a wrought-iron pipe, through which water is caused to circulate. The plate *i* has a narrow slot extending the greater part of its height, as shown. The edges of this slot are protected by the said water-pipe, which is embedded in the plate parallel to the said edges, as shown by the dotted lines. When the furnace is working, the aforesaid slot is filled with clay, and the slag is drawn off at any desired level by perforating this clay with an iron rod, or in any other convenient manner. The space between the plate *i* and the dam-plate *j* is filled in with loam, which is capable of ready removal in the event of the furnace requiring to be "worked" with bars. The iron is drawn off at *k*, in the usual manner.

In Fig. 4, the stack *a* is supported by cast-iron standards *l*, instead of by brick piers. The top of the stack *a* is fitted with a bell and hopper, and the gases are taken off from the sides. In this case the short horizontal tubes *g'*, which connect the stack with the main gas-tubes *g*, are made with expansion-joints, as shown, doors being provided for cleaning these horizontal tubes, when necessary.

I claim—

1. The water-blocks *e*, corresponding in form

with the tuyeres, and interchangeable with the same, as and for the purpose described.

2. The combination of the cast-iron plate *i*, constructed as described, with the dam-plate *j*, as set forth.

3. The upper gallery or platform of a blast-furnace, supported either entirely or partially by the "down-come" gas pipes or mains *g*.

Witnesses: FR. BÜTTGENBACH.

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