

(No Model.)

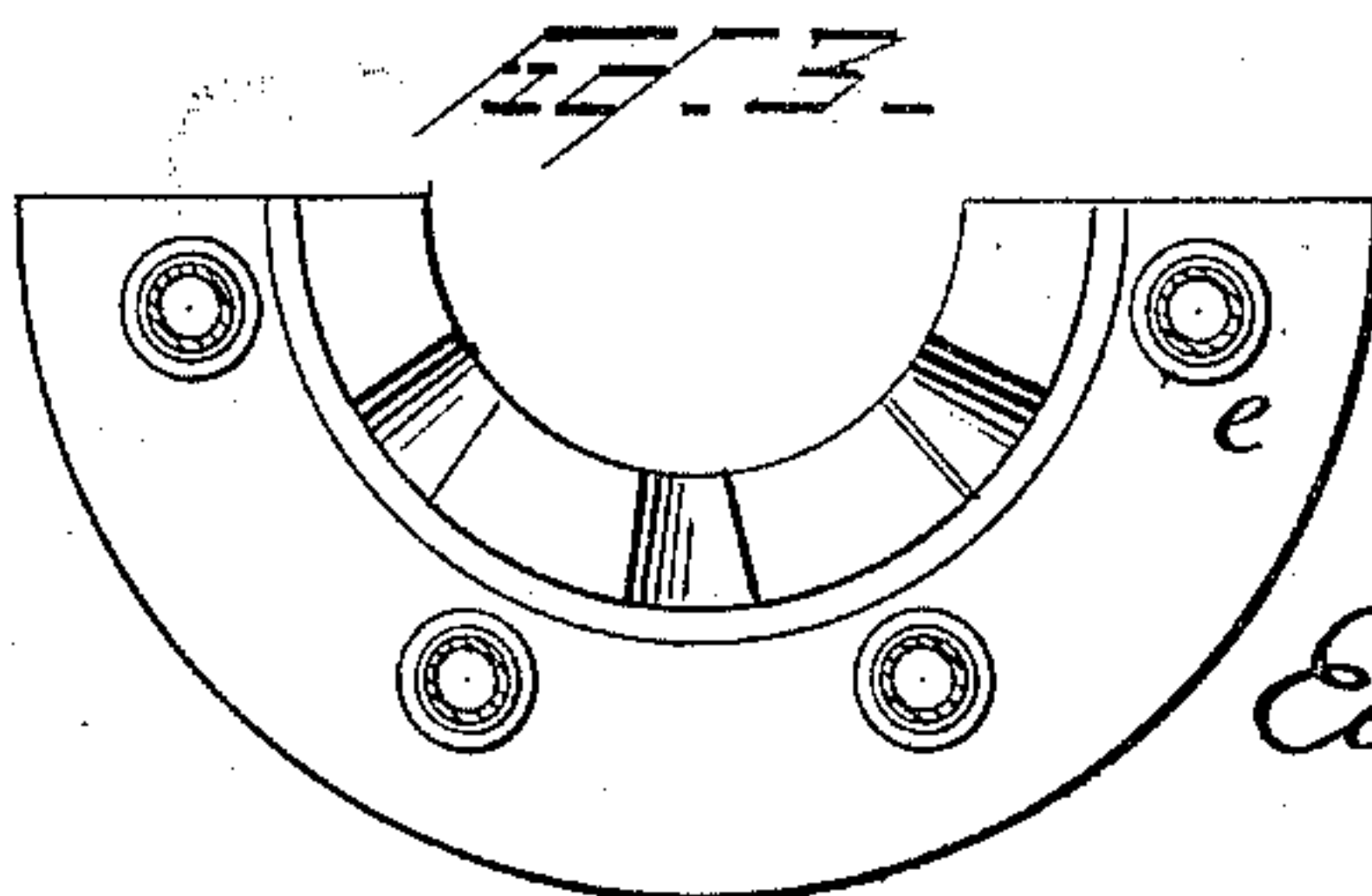
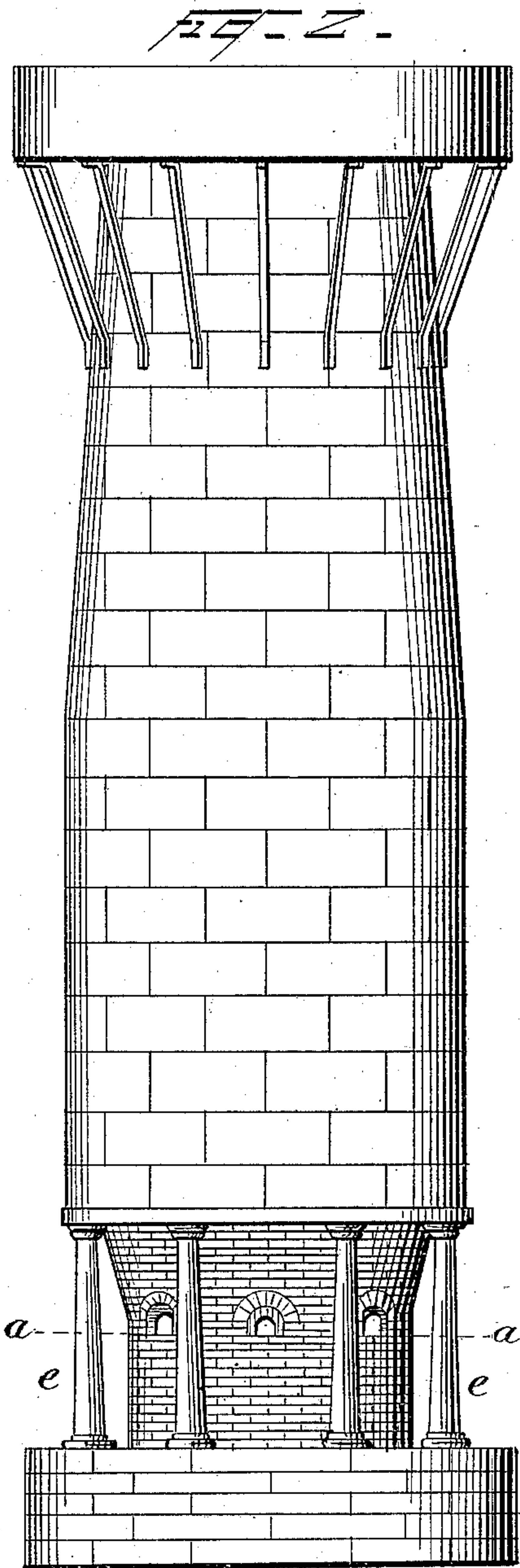
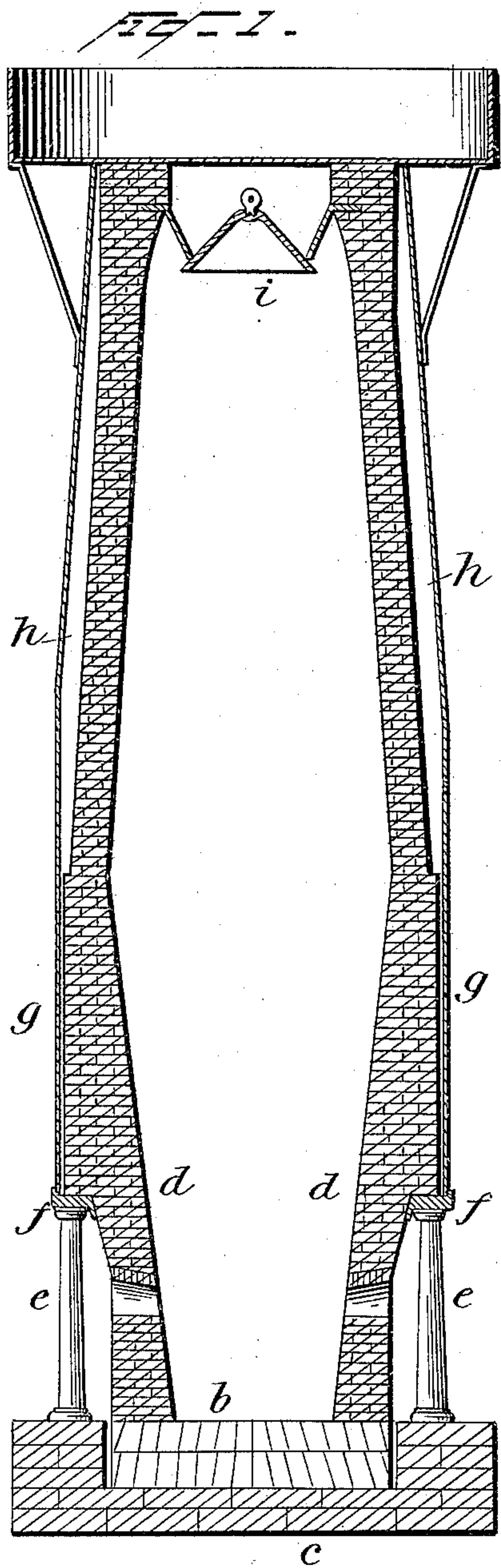
2 Sheets—Sheet 1.

E. A. WHEELER.

BLAST FURNACE.

No. 378,749.

Patented Feb. 28, 1888.



WITNESSES

Horris A. Clark.

Wm. J. Little,

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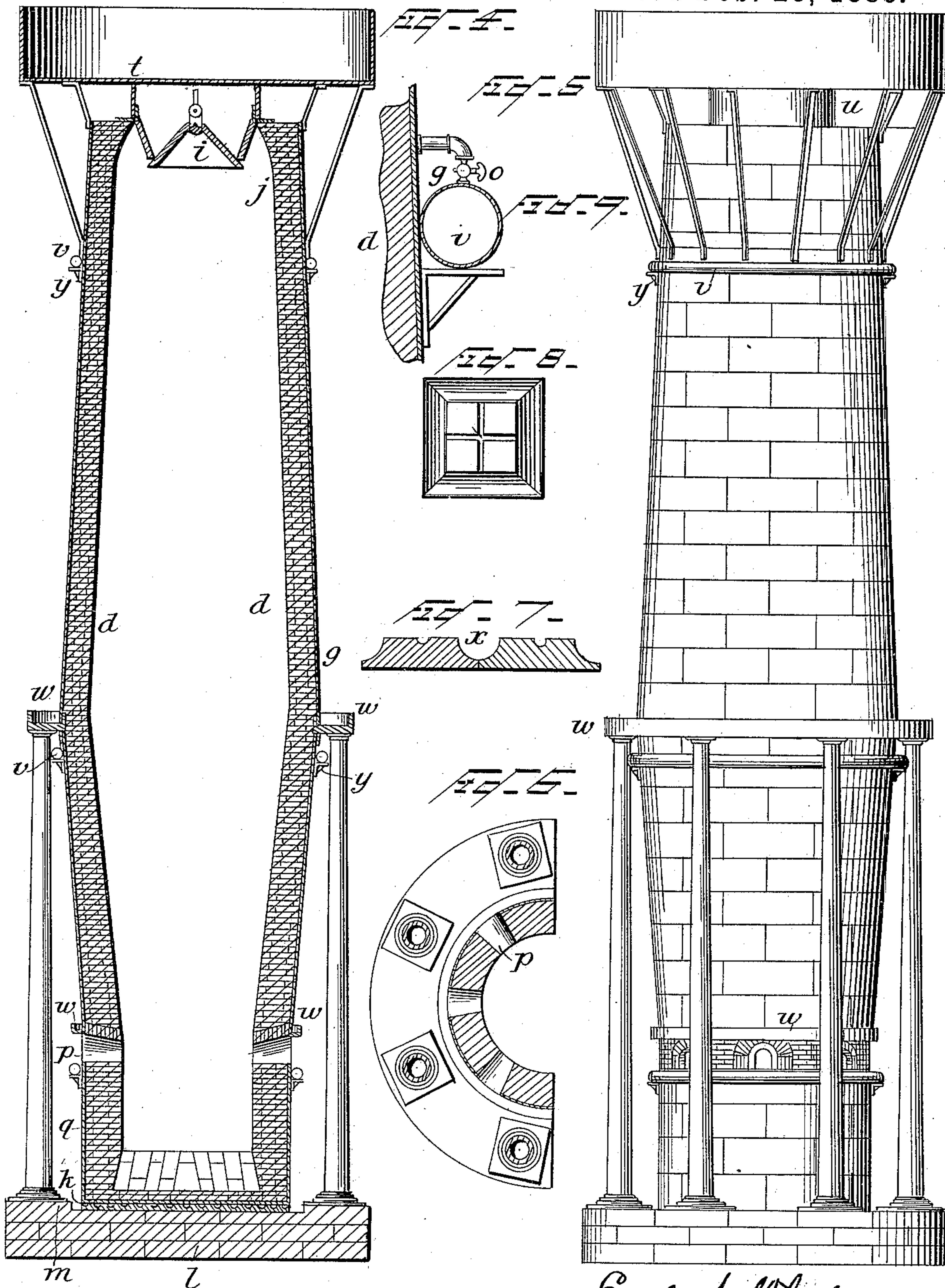
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UNITED STATES PATENT OFFICE.

EARL A. WHEELER, OF SHARON, PENNSYLVANIA.

BLAST-FURNACE.

SPECIFICATION forming part of Letters Patent No. 378,749, dated February 28, 1888.

Application filed February 28, 1887. Serial No. 229,231. (No model.)

To all whom it may concern:

Be it known that I, EARL A. WHEELER, a citizen of the United States, residing at Sharon, in the county of Mercer and State of Pennsylvania, have invented a new and useful Improved Blast-Furnace, of which the following is a specification.

My invention relates to improvements in blast-furnaces, and is fully set forth in the accompanying drawings.

In order that my improvements may be more apparent and better understood, I consider it necessary to show the present mode of constructing blast-furnaces, and which I have represented by Figures 1, 2, and 3, of which the following is a description or explanation:

Fig. 1 is a vertical section through the entire furnace; Fig. 2, an elevation of the furnace complete; Fig. 3, a cross-section through the same on the line *a a*. The furnace is round. Fig. 3 is a section through one-half of the same.

From Fig. 1 it will be observed that the furnace-bottom *b* is laid or started on the stone foundation *c* and that the brick wall or lining *d* is, at the tops of the columns *e e*, increased in thickness by a projection in the same which extends out, over, and upon an iron mantel, *f f*, this increased thickness in the wall or lining *d* at the point named being supposed to increase its durability.

Between the wall or lining *d d* and the iron jacket *g g* is an open space, *h*, which is usually filled in with loose earth or loam, the object of which is to provide for expansion and contraction.

It will also be seen that the hopper *j* is secured in its position by being built into the brick-work of the wall or lining *d d*.

The foregoing description and the drawings referred to are a fair representation of the manner in which blast-furnaces are usually constructed. My improvements are shown by the representation of a furnace built in accordance therewith, as shown, Figs. 4, 5, 6, 7, 8, and 9, which are referred to in the following description: Fig. 4 is a vertical section through the entire furnace. Fig. 5 is an elevation of the furnace complete. Fig. 6 is a horizontal section on the line *J J*, (through one-half of fur-

nace;) Fig. 7, a section of two, and Fig. 8 a top view of one, of the iron bricks of which the foundation or bottom *k* is constructed. Fig. 9 is a section, on an enlarged scale, showing the manner of attaching the small faucets to the spray-pipes. These pipes and faucets are too small for representation on Figs 4 and 5, and for that reason are not shown there.

In building the foundation *l* the outer course of stone, *m m*, is carried up about six inches higher than the center, upon which the furnace-bottom *k* rests. This space, (inside the outer course of stone,) when the furnace is in use, is filled with water, so as to entirely submerge the iron bottom *k*. The bottom *k* is constructed of bricks made of iron, (or any other material that will withstand the action of water,) of the size and shape indicated by Figs. 7 and 8, the said bricks being twelve inches square by three inches thick and having their edges concaved by a circle of two and one-half inches radius, thus leaving the top surface of each brick seven inches square. This surface is again subdivided into four equal parts by means of two grooves, each two inches wide by one inch deep, crossing each other at right angles in the center of each brick, as shown by Fig. 8. The size of these bricks and of their grooves may be varied from the dimensions given, as may be desired. These bricks, when placed together, as shown by Fig. 7, form a bottom with grooves or channels *x*, each two and one-half inches deep by five inches wide, crossing each other at right angles every twelve inches, and between these large grooves or channels are the smaller ones, *z*, one inch deep by two inches wide. This iron bottom *k*, (or foundation,) being submerged in water, must always be cool, and the water circulating through the grooves or channels in the same will also keep the iron furnace-bottom (bottom of the iron jacket *q*) resting upon it cool. Upon this iron foundation or bottom is placed the iron tank or jacket *q*, with an iron bottom. This tank is of the same size or diameter as the furnace-stack. In this tank is laid the furnace-bottom *n*, and the wall or lining *d d* is started, the said wall or lining *d* being carried up of a uniform thickness (in this case twenty-seven inches) to the

top of the tuyere-openings *p p*, and from that point tapered down to twenty-two inches at the top of the iron columns *r r*.

By building the furnace in this manner the increased thickness of the wall or lining *d* and also the iron mantel *f f*, as shown by Fig. 1, are dispensed with, and the furnace-stack is supported by the iron columns *r r*, having their caps riveted to the iron jacket *g g*, as shown by Fig. 4.

The bell-top *i*, instead of being built into the brick-work, as shown by Fig. 1, is constructed as represented by Fig. 4, the brick-work *d* being stopped about two feet below the bottom of the platform *t t*, and the furnace-stack between these points being made smaller and constructed of boiler-iron, as shown by *u*, Fig. 5. The hopper *j* is then riveted to this iron portion of the stack, as shown by Fig. 4. By this means the trouble and inconvenience caused by the brick-work around the bell-top becoming loose and allowing the gas to escape are overcome. It also leaves space enough between the top of the brick-work *d* and the platform *t t* for workmen to climb down and make any repairs that may be necessary around the bell-top *i*.

In Figs. 4 and 5, *v v*, &c., represent spray-pipes, which encircle the iron jacket *g g*, and are supported by means of small iron brackets *y*, as shown by Figs. 4 and 5. These pipes may be either perforated on the under side next to the iron jacket *g* or provided with small cocks or faucets *o*, as indicated by Fig. 9, so that when the pipes are filled with water the water escaping through the perforations or faucets *o* runs down over the surface of the iron jacket *g* and keeps it perfectly cool, thus counteracting the effect of the heat on the brick wall or lining *d*, and renders it much less liable to burn out.

While the water from the spray-pipes *v*, &c., may be let onto the iron jacket *g* through perforations in the pipes or by means of small cocks or faucets, as shown by Fig. 9, I prefer in practice to use the cocks or faucets, for the reason

that by their use the flow of the water can be regulated as may be desired, and for the further reason that the perforations are more liable to become clogged with grass or other substances which may be carried into the spray-pipes through the supply-pipes. (In practice faucets should be about eight inches apart.) These spray-pipes *v*, &c., are to be supplied with water by means of pipes connected with the water-tank, or in any other way that may be desired. The water from the spray-pipes *v*, as it runs down over the iron jacket *g*, is caught by the troughs *w w* and carried off through waste-pipes, as may be desired, that from the lower spray-pipe running down into the space at the bottom of the furnace-stack. By the use of these spray-pipes *v v*, &c., for cooling the iron jacket *g*, as described, the necessity of having the space *h* between the lining *d* and the iron jacket *g* is overcome, and the increased thickness or projection in the lining *d* and the use of the iron mantel *f f* are dispensed with.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a furnace, the combination, with the furnace-jacket *g*, having an iron bottom plate and inclosing the brick walls and bottom of the furnace, of a separate bottom, *k*, composed of grooved plates and having surface water-passages and placed below the iron bottom of the furnace-jacket, substantially as described.

2. In a furnace, the combination of the following elements: a foundation having a raised rim, a channeled bottom, *k*, composed of grooved plates, an iron plate forming the bottom of the furnace jacket and resting on said bottom *k*, and a water-pipe for supplying water to the said passages below the said furnace-jacket, substantially as described.

EARL A. WHEELER.

Witnesses:

JOS. N. MCCLURE,
THOMAS K. WILLSON.