No. 807,951. PATENTED DEC. 19, 1905.

E. P. MATHEWSON.

BLAST FURNACE.

APPLICATION FILED MAY 19, 1905.

4 SHEETS—SHEET 1.

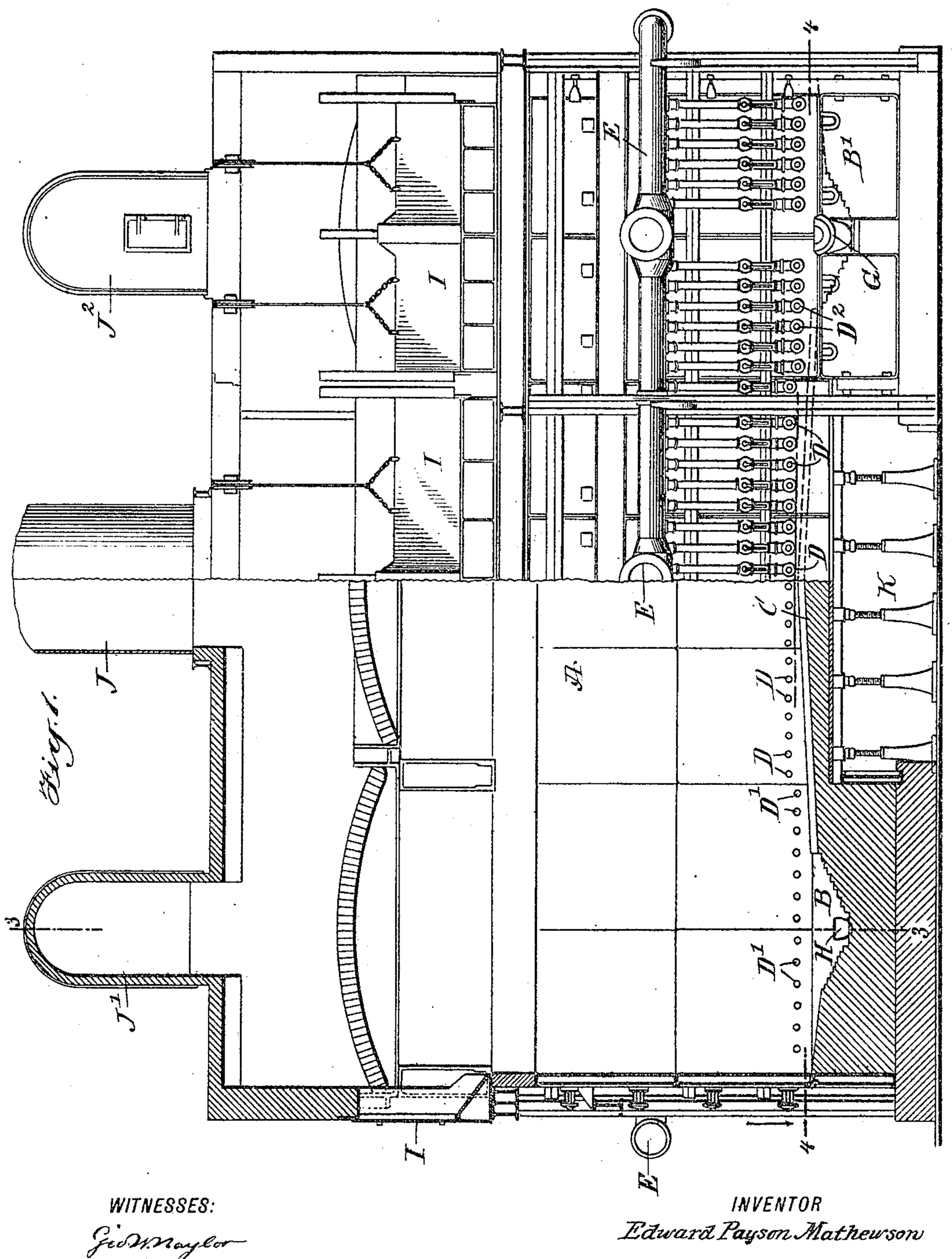

Fig. 1.

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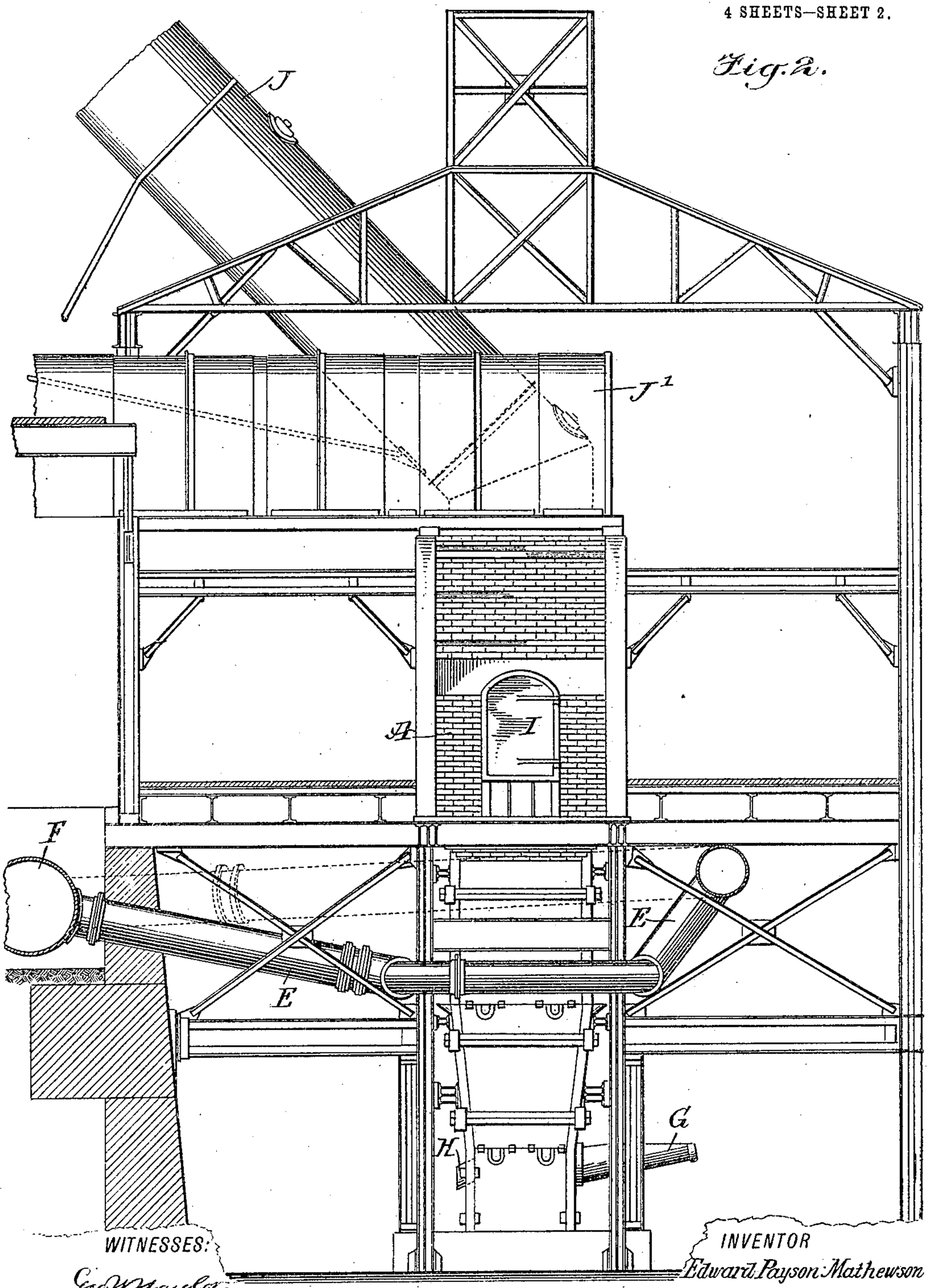
4 SHEETS—SHEET 2.

Fig. 2.



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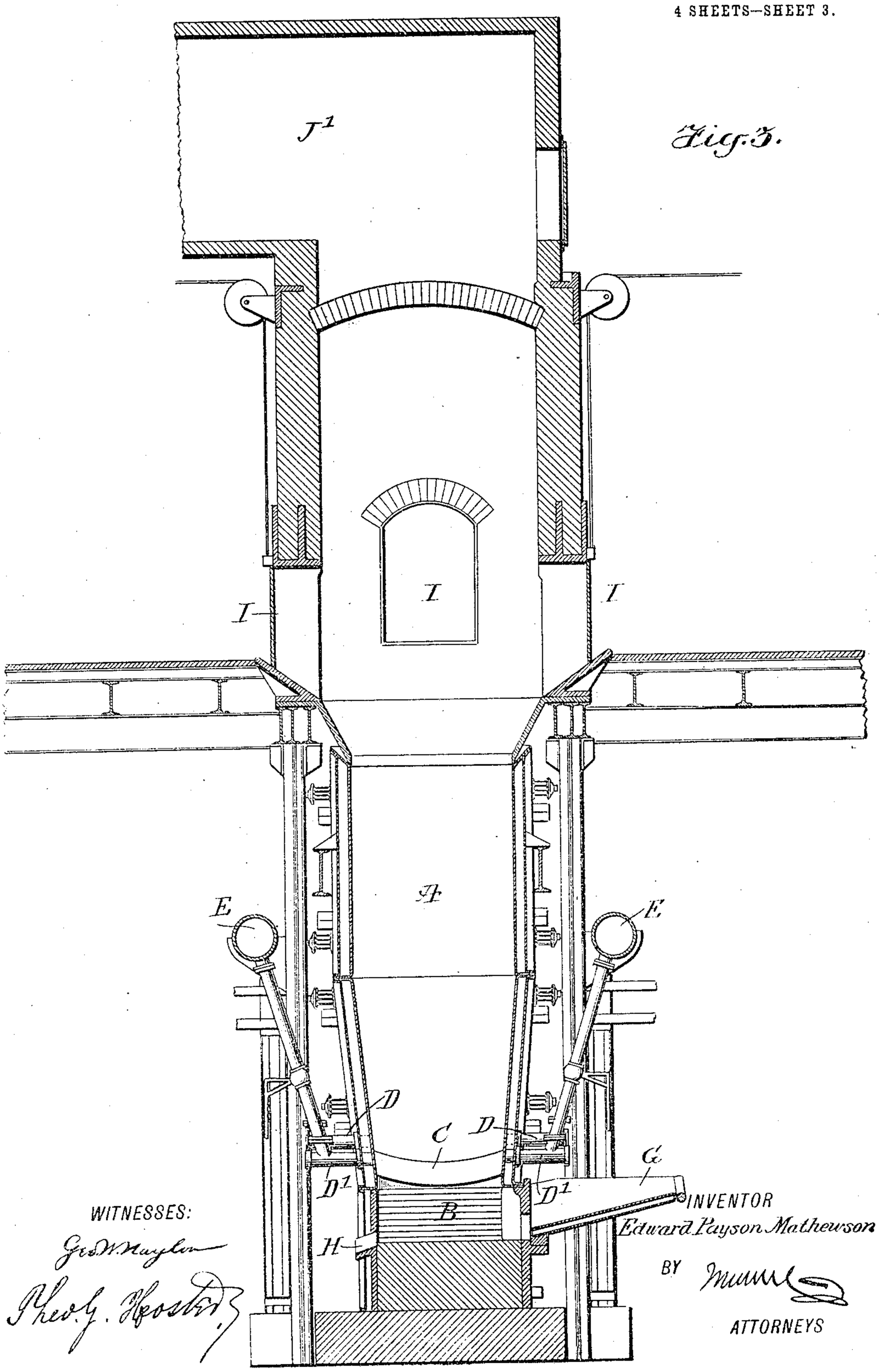
4 SHEETS—SHEET 3.

Fig. 3.



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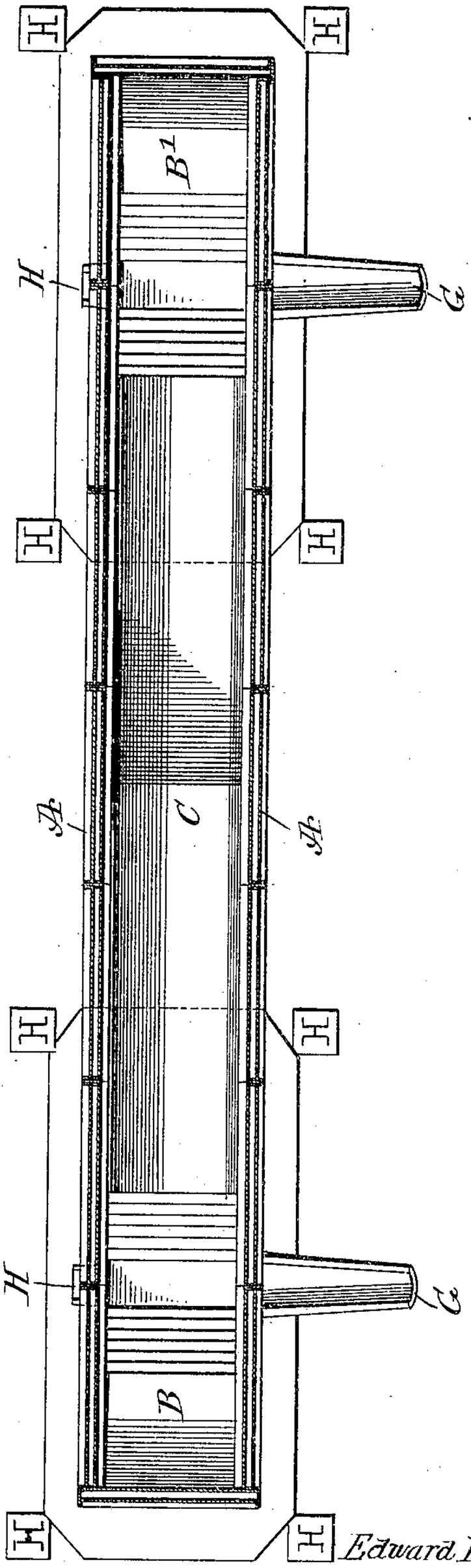

Fig. 4.

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UNITED STATES PATENT OFFICE.

EDWARD PAYSON MATHEWSON, OF ANACONDA, MONTANA.

BLAST-FURNACE.

No. 807,951. Specification of Letters Patent. Patented Dec. 19, 1905.

Application filed May 19, 1905. Serial No. 261,202.

To all whom it may concern:

Be it known that I, EDWARD PAYSON MATHEWSON, a citizen of the United States, and a resident of Anaconda, in the county of Deerlodge and State of Montana, have invented a new and Improved Blast-Furnace, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved blast-furnace arranged to render the working of the furnace exceedingly economical in fuel, labor, and water, to allow treatment of large quantities of material at a time, to insure a quick discharge of the molten metal as soon as the latter reaches the bottom of the shaft, and to prevent incrustation at the sides of the shaft.

A further object of the invention is to allow shutting down of one portion of the furnace for repairs or other purposes and without disturbing the remaining portion, which remains in condition for carrying on the smelting operation.

The invention consists in novel features and parts and combinations of the same, which will be more fully described hereinafter, and pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the improvement, parts being shown in section. Fig. 2 is an end elevation of the improvement and its housing, the latter being shown in section. Fig. 3 is a cross-section of the same on the line 3 3 of Fig. 1, and Fig. 4 is a sectional plan view of the same on the line 4 4 of Fig. 1.

The shaft A of the blast-furnace is of a suitable height and is narrow and long to accommodate a large charge at one time. In the bottom of the shaft A are arranged a plurality of crucibles, as shown, for instance, in Fig. 1, two crucibles B and B′, located at or near the end of the shaft A and spaced a distance from each other. The crucibles B and B′ are depressed in a transverse direction, as plainly shown in Fig. 1, and the portion C of the bottom of the shaft A slants downwardly toward both the depressed crucibles B and B′ from a point located approximately midway between the said crucibles, so that the molten metal in the bottom of the furnace passes to the nearest depressed crucible B or B′.

Sets of twyers D, D′, and D^2 are arranged in the side walls of the shaft A, and the sets of twyers D′ and D^2 open into the shaft A directly above the crucibles B and B′, while the twyers D discharge into the shaft A at points between the said crucibles B and B′, and this set of twyers D is shown as located at a somewhat higher plane than the sets of twyers D′ and D^2 to compensate for the slant in the bottom portion C of the shaft A. I do not, however, limit myself to such location and arrangement of the twyers D. The sets of twyers D, D′, and D^2 are all connected with a supply-pipe E, connected with a main supply F, which in turn receives the air or gas from a compressor employed for forcing the air or gas into the shaft A with the necessary pressure.

The crucibles B and B′ are provided at their front ends with spouts G and at their rear ends with tap-holes H. (See Fig. 3.) The shaft A is provided at its upper portion with charging-doors I, which are preferably located on both sides of the shaft to permit a uniform charging of the shaft throughout its length and width.

From the top of the shaft A lead a plurality of gas-outlets J, J′, and J^2, of which the gas-outlets J′ and J^2 are preferably located directly over the crucibles B and B′, while the gas-outlet J is arranged approximately midway between the outlets J′ and J^2.

The detailed construction of the shaft A is similar to the ones of the ordinary blast-furnace now in use—that is, suitable water-jackets are provided wherever necessary. The bottom portion C of the shaft A is preferably supported by jack-screws K; but other suitable means, such as columns, may be substituted for the jack-screws, the bottom portion being in the main formed by a plate lined on top with a suitable refractory material. The twyers are of any approved construction, and each is provided with suitable closing means to permit of shutting off any one of the twyers or any one set of twyers.

It will be evident from the description that the furnace-floor might be described as being provided with a plurality of spaced transverse ridges, the crucibles being set at points intermediate the ridges and depressed below the crest of the same, and that the edges of the crucibles and the crest of the ridges are connected by a sloping surface. The ridges extend transversely across the entire extent of the shaft.

The operation is as follows: The shaft A is

charged in the usual manner, and when the blast-furnace is in operation the molten metal at the bottom of the shaft A flows to the nearest crucible B or B′, from which the molten metal can be removed by the corresponding spout G. By the arrangement described a large amount of material can be smelted in a given time and with a considerable saving in fuel, labor, and water used in the jackets. Thus in a furnace having two crucibles arranged as described it is possible to smelt as much material as can be smelted in four furnaces of a size corresponding to the part immediately above either of the crucibles B or B′. Consequently this single furnace dispenses with three pairs of end jackets in comparison to the four furnaces required for putting the same tonnage as is put through the single furnace. Hence a great saving in coke and a minor saving in labor and water are had.

In case it is desired to shut down one part of the furnace for repairs or for other purposes the remaining part of the furnace may be kept active to carry on the smelting operation. Thus if it is necessary to change the spout G on the crucible B, for instance, then the molten metal in this crucible can be tapped out at the back through the tap-hole H, and the blast is shut off from this portion of the shaft A by closing the set of twyers D′ and perhaps some of the twyers D adjacent to the twyers D′. After the repairs have been made the closed twyers are again opened to carry on a smelting operation the same as in the rest of the furnace.

A great saving in fuel is had owing to the absence of many end jackets, and great freedom from incrustation at the sides is obtained owing to the fact that the furnace is long and narrow, and hence forms no support for crusts to form of any considerable thickness.

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

1. A blast-furnace comprising a long and narrow shaft having its bottom provided with transverse ridges, a plurality of crucibles within the shaft between the ridges, and at a lower level than said ridges, the crest of the ridges and the edges of the crucible being connected by a sloping surface.

2. A blast-furnace comprising a shaft having its bottom provided with spaced transverse ridges, a plurality of crucibles intermediate the ridges and at a lower level, the edges of the crucibles and the crest of the ridges being connected by a sloping surface.

3. A blast-furnace comprising a shaft having its bottom provided with transverse ridges, a plurality of crucibles intermediate the ridges and depressed therebelow, the bottom of the shaft being inclined from the crest of the ridges to the edges of the crucibles.

4. A blast-furnace, comprising a long and narrow shaft, and a plurality of spaced crucibles arranged within and transversely of the shaft, the bottom of the shaft being inclined upwardly from the edges of the end crucibles to the ends of the shaft, and from the edges of adjacent crucibles to a line transversely of the shaft and intermediate the crucibles.

5. A blast-furnace comprising a shaft having its bottom provided with transverse ridges, a plurality of crucibles intermediate the ridges and depressed therebelow, the bottom of the shaft being inclined from the crest of the ridges to the edges of the crucibles, and twyers for the shaft, the twyer over the crucible being on a lower plane than the twyer between the crucibles.

6. The combination with a blast-furnace having a long and narrow shaft, of a plurality of crucibles depressed transversely of the shaft, the bottom part of the shaft between the ends thereof and the end crucibles and between each of the adjacent crucibles slanting downwardly from a common point to the edges of the crucibles.

7. A blast-furnace comprising a shaft having its bottom provided with transverse ridges, a plurality of crucibles intermediate the ridges and depressed therebelow, the bottom of the shaft being inclined from the edges of the ridges to the edges of the crucibles, and a plurality of gas-outlets from the shaft, one of the gas-outlets being arranged intermediate the crucibles, and the other directly over the crucibles.

8. A blast-furnace comprising a shaft having its bottom provided with transverse ridges, a plurality of crucibles intermediate the ridges and depressed therebelow, the bottom of the shaft being inclined from the crest of the ridges to the edges of the crucibles, twyers discharging into the shaft, a plurality of charging-doors for the shaft, and a spout for each of the crucibles.

9. A blast-furnace comprising a shaft having its bottom provided with transverse ridges, a plurality of crucibles intermediate the ridges and depressed therebelow, the bottom of the shaft being inclined from the crest of the ridges and the edges of the crucibles and a tap-hole for each crucible directly opposite the spout.

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

EDWARD PAYSON MATHEWSON.

Witnesses:
H. R. BURG,
M. MARTIN.