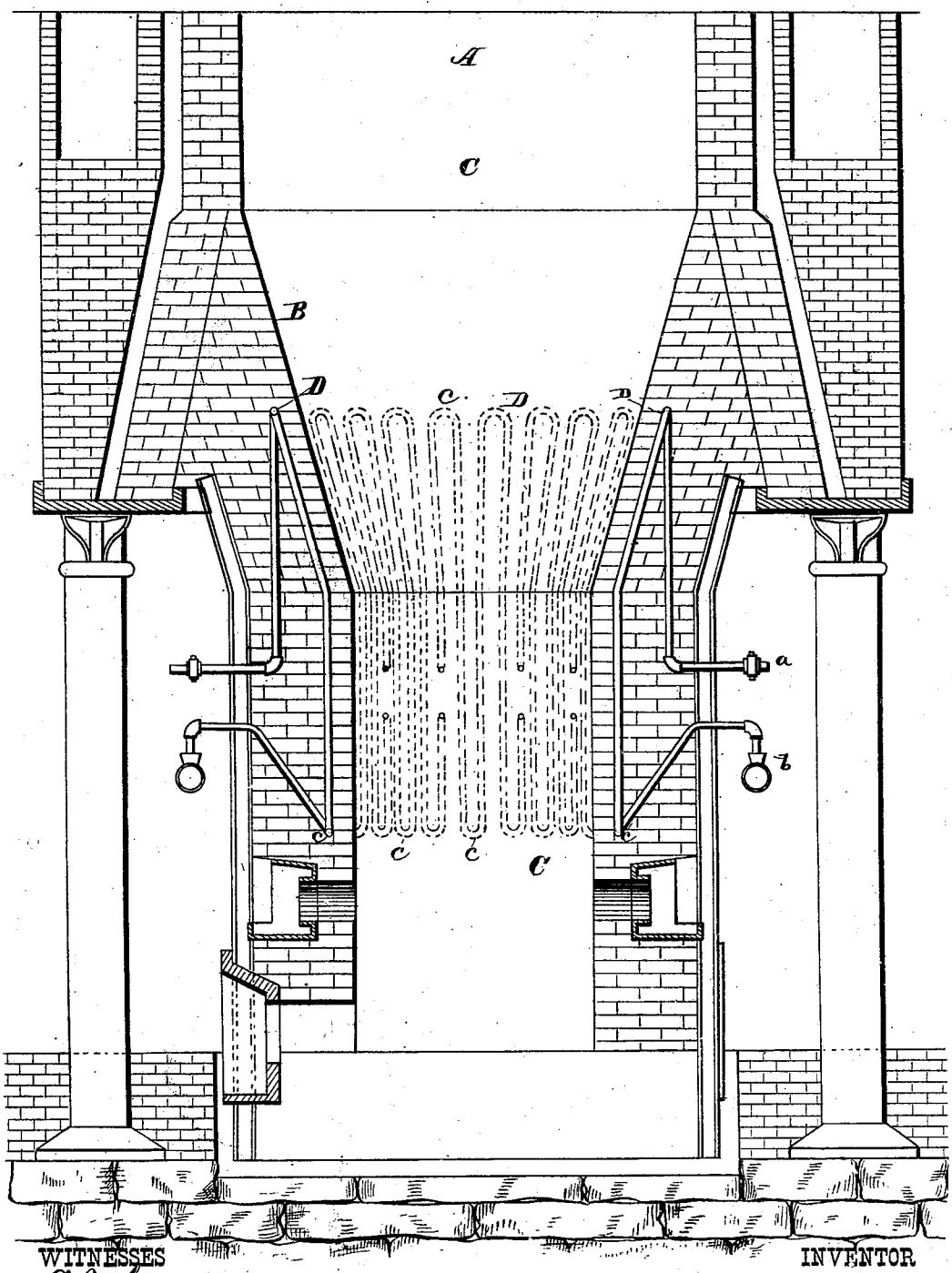
(No Model.)

P. L. WEIMER.

BLAST FURNACE.

No. 244,408. Patented July 19, 1881.



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UNITED STATES PATENT OFFICE.

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BLAST-FURNACE.

SPECIFICATION forming part of Letters Patent No. 244,408, dated July 19, 1881.

Application filed May 13, 1881. (No model.)

To all whom it may concern:

Be it known that I, PETER L. WEIMER, of Lebanon, in the county of Lebanon and State of Pennsylvania, have invented certain new and useful Improvements in Blast-Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawing, which form part of this specification.

My invention relates to an improvement in blast-furnaces.

Heretofore many expedients have been resorted to for preventing the rapid disintegration and cutting away of the walls of blast-furnaces at the bosh and crucible portions thereof, owing to the intense heat to which said walls are subjected. Prior to the introduction of modern blast-furnaces the walls were made of or lined with various kinds of refractory material; but owing to the fact that modern blast-furnaces consume more than twice the amount of fuel in a given time and space than did its predecessor it has been found in practice that walls of refractory material are no longer able to resist the increased heat to which they are subjected; hence various new expedients and devices have been introduced with a view of enabling the blast-furnace walls to effectually withstand the great heat to which they are subjected, and to this end the walls have been formed with an intervening water-space to allow of the introduction of water to cool the walls; also, the walls have been made very thin, so that the air coming in contact therewith should have a cooling effect. Again, several narrow elongated cast-metal sections provided with water-circulating pipes have been located in different horizontal planes in the walls of the crucible of a furnace; also, a water-jacket has been located around the crucible. Again, the arched roof of an open-hearth steel-furnace has been supported by cooling-pipes embedded in the wall and extending transversely across the arch; but many objections have been found to exist against different devices and forms of construction employed to effect the desired result. The defects of several of the forms of construction referred to are obvious, and where cast-iron sections are employed within the walls no adequate provision is made for expansion or contraction, and, further, the water circulating through the pipes located in such sections is not allowed to come in such intimate contact with the walls as is desired to insure the best results.

The object of my invention is to preserve the walls of blast-furnaces against the destructive action of intense heat, and to accomplish this result by the employment of an attachment which will be simple in construction, durable and effective in use, and adapted to be readily renewed at a comparatively small expense whenever desired.

With these ends in view my invention consists, essentially, in providing the bosh and crucible of a blast-furnace with a series of upright or vertical bosh-cooling pipes constructed and arranged in independent sections of naked pipes embedded in the walls of the bosh, whereby a continuous current of water may be maintained through each pipe-section and the furnace-walls be prevented from becoming too highly heated.

My invention further consists in certain features of construction and combinations of parts, as will hereinafter be described, and pointed out in the claims.

The accompanying drawing represents a vertical section of the lower portion of a blast-furnace provided with my improvement.

A represents a blast-furnace, which may be of any desired construction and provided with any desired appliances. As my invention is not confined in its application to any particular construction of blast-furnace, a detailed description of the different parts of the furnace illustrated in the drawing is not deemed necessary.

B represents the bosh of the furnace, and C its crucible.

B represents the sections of the bosh-cooling pipe, each section being furnished with inlet and outlet branches *a b*. The number of cooling-pipe sections employed will depend on the size of the furnace, and will vary from four to fourteen or more sections. Each section is embedded in the wall of the furnace and located nine inches (more or less) from the inner surface of the furnace-wall. The cooling-pipes are arranged vertically in the furnace-wall, extending from any desired point of the crucible upwardly to any desired point of the bosh. Sec-

tions D are preferably formed with one or more return-bends; or, in other words, each section is arranged so as to constitute two or more continuous water-passages, *c*. By this arrangement each one of the sections is made of proper length to insure a ready flow of water throughout the section, and yet the desired result is attained by the employment of the least number of separate sections.

By the employment of several independent sections of pipes embedded in the wall of the furnace, and the sections arranged vertically, substantially in the manner illustrated in the drawing, I attain several important advantages, among which the following may be noted: By making the pipes in vertical sections there is insured sufficient elasticity of the pipes to yield with the walls when expanded and contracted by varying degrees of heat, and thus there is little if any danger of the pipes being fractured when embedded in the furnace-walls, notwithstanding the fact that the latter may be much warped out of position by the heat. Again, by the employment of a series of independent sections having separate inlet and outlet openings a much better and more uniform circulation of water can be obtained than would be the case were the cooling-pipe made in one single continuous piece or length. Further, should one of the sections become impaired in any manner, so as to be unfit for use, it may be readily removed and renewed without disturbing the remaining sections or interfering with the operation of the furnace.

The pipe-sections may be composed of ordinary wrought-iron pipes bent into proper form and embedded in the wall of the furnace, or said sections may be made of cast-iron and coupled together in any desired manner.

It is evident that many slight changes in the construction and relative arrangement of parts might be resorted to without involving a departure from my invention, and hence I would have it understood that I do not restrict myself to the exact construction and arrangement of parts shown and described; but,

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

1. A blast-furnace having two or more naked cooling-pipe sections embedded in the walls of its bosh and arranged vertically therein, substantially as set forth.

2. A blast-furnace having embedded in the walls of its bosh and crucible several independent pipe-sections, each pipe-section being constructed of sufficient length to protect a portion of the bosh and crucible, substantially as set forth.

3. A blast-furnace having a naked pipe (one or more) embedded in the walls of the crucible and boshes, and located in close proximity to the inner face of the wall, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 5th day of May, 1881.

PETER L. WEIMER.

Witnesses:
THEO. HURLEY,
TOBIAS REINOEHL.