(No Model.)

P. L. WEIMER & H. T. EUSTON.

BLAST FURNACE.

No. 326,182. Patented Sept. 15, 1885.

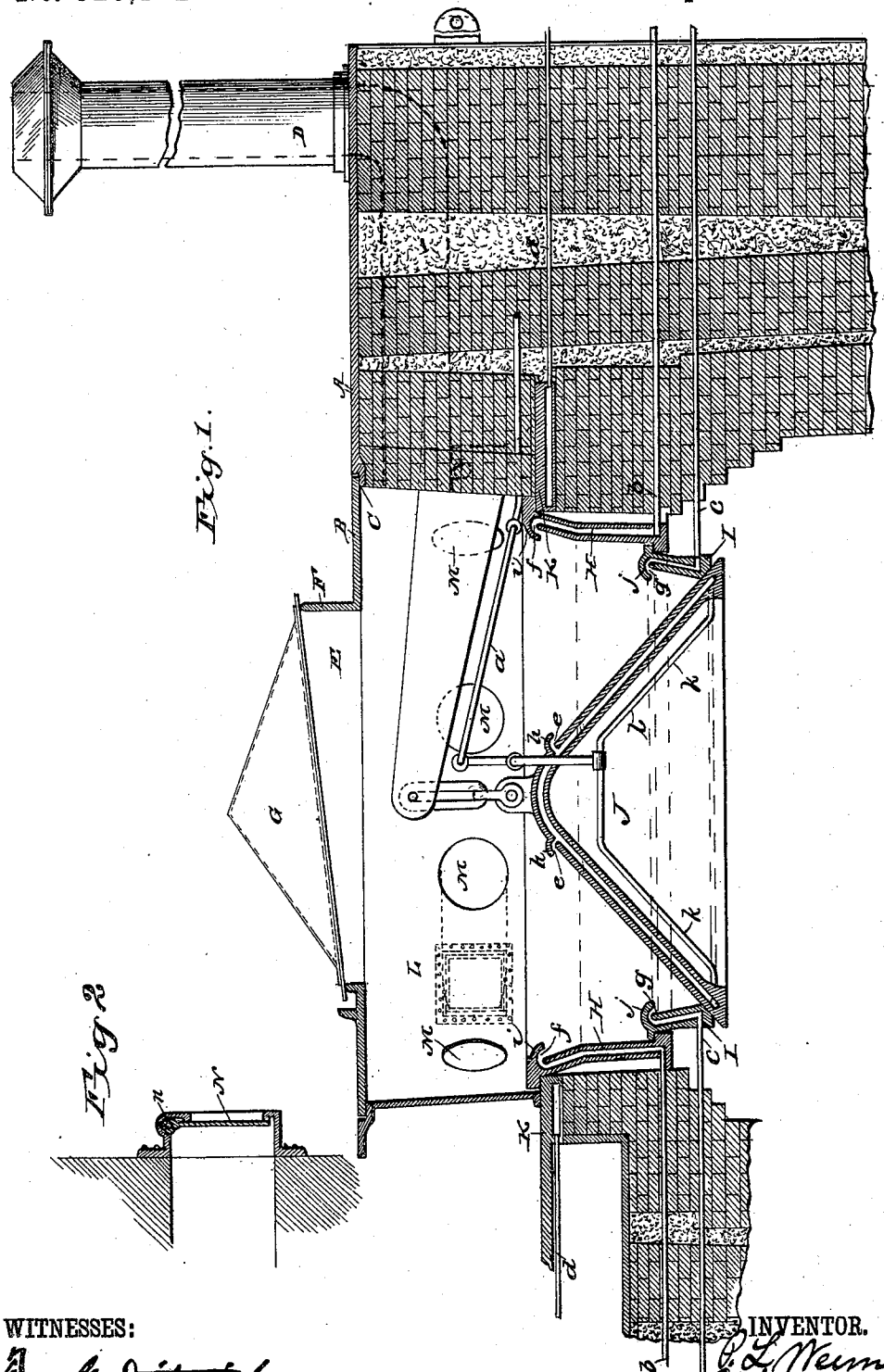


Fig. 1.

Fig. 2.

WITNESSES:

Fred. L. Dieterich.

Jos. A. Ryan

INVENTOR.

P. L. Weimer

H. T. Euston

by Johnston, Reinckel & Dyer

ATTORNEYS.

UNITED STATES PATENT OFFICE.

PETER L. WEIMER AND HENRY T. EUSTON, OF LEBANON, PENNSYLVANIA.

BLAST-FURNACE.

SPECIFICATION forming part of Letters Patent No. 326,182, dated September 15, 1885.

Application filed August 3, 1885. (No model.)

To all whom it may concern:

Be it known that we, PETER L. WEIMER and HENRY T. EUSTON, citizens of the United States, residing at Lebanon, in the county of Lebanon and State of Pennsylvania, have invented certain new and useful Improvements in Blast-Furnaces; and we 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 appertains to make and use the same.

Under the modern system of operating blast-furnaces, by which they are worked to their fullest capacity and under exceedingly high pressure and temperature, the hopper and its appurtenances are subjected to intense heat which is very destructive in its effect.

The object of this invention is to provide means for supplying a cooling medium automatically from the surrounding atmosphere, or under pressure, to the parts of the furnace constituting the hopper or charging-chamber, to reduce the temperature thereof, and thus protect them from the destructive effects of the heat of the furnace.

Our invention, therefore, consists in the construction of a furnace-hopper and the parts immediately related thereto, whereby a cooling medium is circulated through the walls of the several parts.

Our invention also consists in the construction of a ventilating-chamber provided with air-ducts surmounting the hopper, and adapted to supply fresh air to the upper part of the tunnel-head constituting the charging-chamber, and to carry off the air which has been circulated through the several parts comprising said hopper or charging-chamber.

In the accompanying drawings, Figure 1 represents a vertical section of the upper end of a furnace-stack comprising the hopper and its appurtenances. Fig. 2 represents a sectional view of the automatic valve which supplies air to the ventilating-chamber.

Reference being had to the drawings and letters of reference marked thereon, A represents a platform which supports the top plate, B, in an annular rabbet, C, and the stack D. The top plate, B, is provided with an opening, E, surrounded by a vertical flange, F, inclined on the upper end, and provided with a knife-edge forming a bearing-surface for the cover G.

The hopper H, lip-ring I, the charging-bell J, and the seat-ring K, which latter supports the hopper H, are provided with air-chambers formed in the walls of the castings constituting the several parts named, and are supplied with air through pipes *a* leading to the bell, *b b* to the hopper, *c c* to the lip-ring, and *d d* to the seat-ring. The air passing through the chambers of said parts is discharged through openings *e f g*, which are provided with hoods *h i j*, which serve to protect said openings from the falling stock and deflect the air passing through said openings over the inner surface of the castings. The pipe *a*, which supplies air to the bell, is provided with suitable joints, such as are common to steam and gas pipe fittings to accommodate the rising and lowering movements of the bell; and to protect said pipe from being injured by the stock dumped into the hopper it is conducted beneath the beam to which the bell is attached, and, passing down through the bell, is connected to the chamber formed therein by the branches *k l*. The air-supply may be induced by the natural draft of the chimney D, or it may be supplied by a suitable pump.

Instead of conducting air through the hollow castings, the discharge-openings may be omitted and water supplied through one of the pipes and conducted outside of the furnace through the other pipe with which each cooling-chamber is provided; or the several chambers may be connected and the cooling medium circulated through all of them.

Above the hopper H we construct a ventilating-chamber, L, which is provided with a series of air-flues, M, passing through the masonry, which are supplied with inwardly-opening valves N, as shown in Fig. 2, the valves being swung from the top or upper side by hinge-joints *n*. By this means we secure a copious supply of atmospheric air to the hopper or charging-chamber induced by the natural draft of the chimney D, which communicates with the ventilating-chamber L, the air circulating over the surface of the castings and maintaining them at a reduced degree of temperature. The chimney also

serves to carry off the hot air which has passed through the several cooling-chambers and induces the draft of air through said chambers, the air being supplied automatically, when taken from the atmosphere, in quantities varying with the changing temperatures of the several castings through which it is passed.

Heretofore it has been proposed to form a chamber around a small portion of a hopper, the outer surface of the hopper, which is in contact with said chamber, forming one of the walls thereof, and a forced blast of air has been proposed to be supplied thereto. It has also been proposed to form a hollow valve at the bottom of the hopper, separate therefrom and from the charging-bell, for the purpose of distributing the stock evenly in the stack of the furnace and to circulate air under pressure through said hollow valve. These means in practice have proved utterly inadequate to meet the demand for an effective cooling medium, and form no part of our invention.

It will be observed that by our construction the cooling-chambers are formed in the walls of the several castings, and when air is used as the cooling medium, after having been circulated through the cooling-chamber, it is discharged over the outer surface of the inner wall of the hopper, charging-bell, and the lip-ring, thus utilizing all the cooling effects of the air admitted to the cooling-chambers.

Having thus fully described our invention, we claim—

1. A furnace-hopper provided with double walls, a cooling-chamber formed integral therewith and extending throughout the entire hopper, and suitable supply and discharge openings, substantially as described.

2. A furnace-hopper having a chamber formed in the casting between its inner and outer walls, a supply-opening, and a discharge-opening adapted to conduct a cooling medium to the inside of the hopper, substantially as described.

3. A furnace-hopper having a cooling-chamber between its walls, a suitable supply and a discharge opening provided with a protecting-hood, substantially as described.

4. A hollow furnace-hopper provided with means, substantially as described, for admitting a cooling medium thereto and discharging it over the inner surface of the wall of the hopper.

5. A furnace-hopper provided with double walls, a cooling-chamber formed between said walls, a supply-opening to admit a cooling medium, and a discharge-opening provided with a deflecting plate or hood adapted to direct said cooling medium over the inner surface of the wall of the hopper, substantially as described.

6. A furnace-hopper having double walls and provided with a cooling-chamber formed between said walls, in combination with an air-supply and a draft chimney or stack, whereby air is supplied automatically to cool the hopper, substantially as described.

7. A hollow furnace lip-ring adapted to receive a cooling medium, substantially as described.

8. A hollow furnace lip-ring adapted to receive a cooling medium and to discharge it through the inner wall of said ring, substantially as described.

9. A hollow furnace lip-ring adapted to receive a cooling medium, and provided with means, substantially as shown, to discharge it over the inner surface of its wall, as and for the purpose set forth.

10. A furnace lip-ring having a cooling-chamber formed in the casting and a discharge-opening provided with a hood, substantially as described.

11. A furnace lip-ring having a cooling-chamber formed in the casting, in combination with a suitable supply and discharge opening, substantially as described.

12. A furnace lip-ring provided with a cooling-chamber, in combination with an air-supply and a draft chimney or stack, substantially as described.

13. A furnace charging-bell provided with double walls, a chamber formed between said walls and integral therewith, and suitable supply and discharge openings, substantially as described.

14. A hollow furnace charging-bell provided with means, substantially as shown, for admitting a cooling medium and discharging it over the outer surface of the bell.

15. A furnace charging-bell having a cooling-chamber formed in the casting, and a discharge-opening provided with a hood, substantially as shown.

16. A furnace charging-bell having a cooling-chamber formed in the casting, air-inlets at its base, and an outlet near the apex provided with a hood adapted to direct a cooling medium over the inner surface of the bell, substantially as described.

17. A furnace charging-bell having double walls and provided with a cooling-chamber, in combination with an air-supply and a draft chimney or stack, substantially as described.

18. A hollow furnace seat-ring having a cooling-chamber formed in the body thereof, and provided with a suitable air-supply pipe, in combination with a hopper supported by said ring, substantially as described.

19. The combination of a hopper lip-ring and charging-bell provided with chambers adapted to receive a cooling medium, and suitable supply-pipes communicating, respectively, with each chamber, substantially as described.

20. A furnace-stack surmounted by a ventilating-chamber provided with air-inlets and communicating with a stack or chimney, substantially as described.

21. A furnace-stack in combination with a ventilating-chamber having a series of pas-

sages leading to the atmosphere, and provided with automatic air-supply valves, substantially as described.

22. The combination, of a furnace-hopper and its appurtenances, with a ventilating-chamber communicating with the atmosphere, and a chimney or stack, substantially as described.

23. The combination of a hollow hopper, lip-ring, and charging-bell, having cooling-chambers formed therein, suitable air-supply inlets, a ventilating-chamber communicating with the atmosphere, and a draft chimney or stack, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

PETER L. WEIMER.
HENRY T. EUSTON.

Witnesses:
JNO. A. WEIMER,
TOBIAS REINOEHL.