(No Model.) 2 Sheets—Sheet 1.

H. SCHLIMME.

DEVICE FOR MIXING AIR AND GAS FOR FURNACES.

No. 385,072. Patented June 26, 1888.

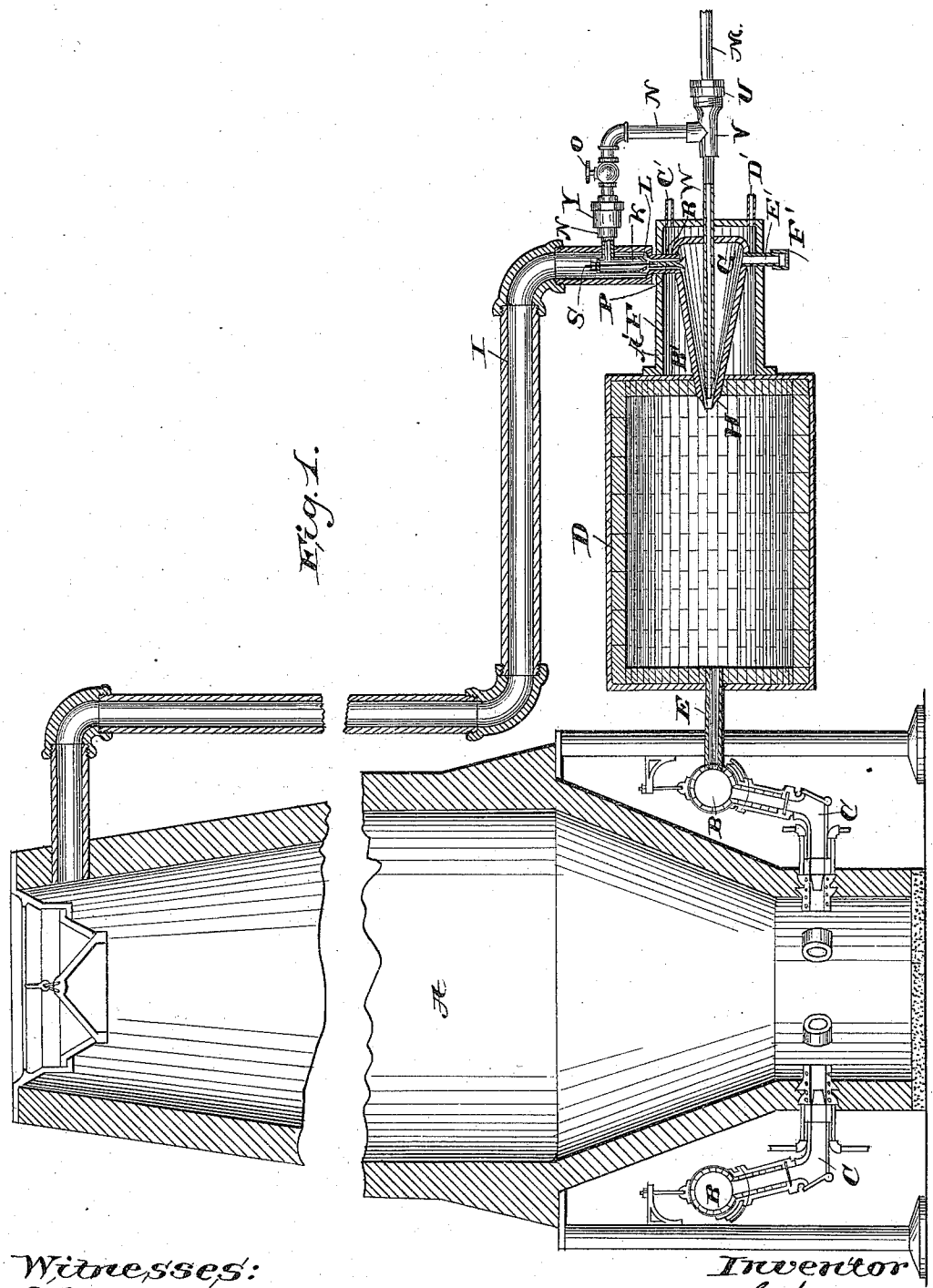


Fig. 1.

Witnesses:
E. F. Wallers
Wm. E. Doyle.

Inventor
Henry Schlimme.
By Johnston, Reinhold & Dyer
Attorneys.

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

H. SCHLIMME.

DEVICE FOR MIXING AIR AND GAS FOR FURNACES.

No. 385,072. Patented June 26, 1888.

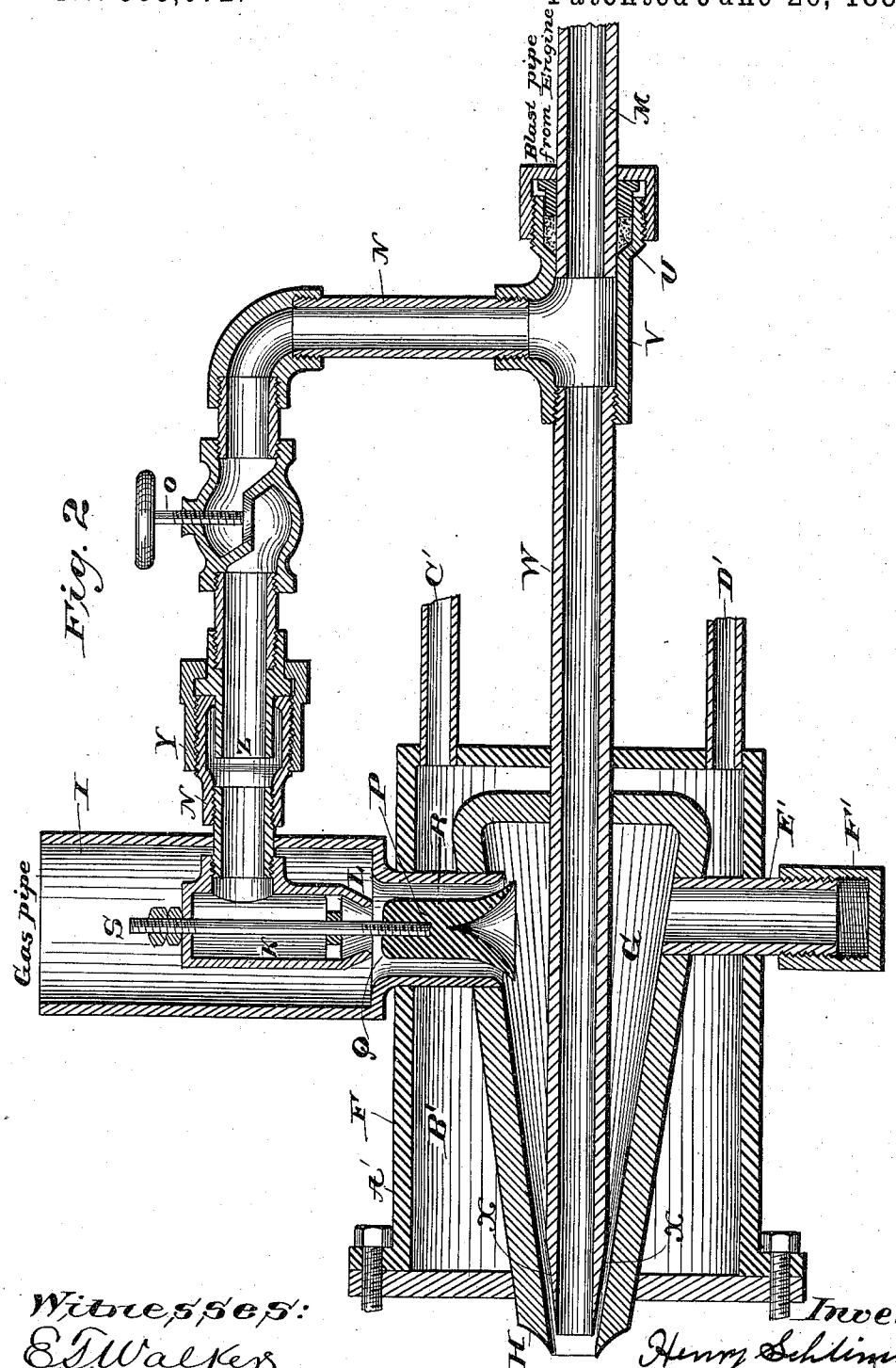


Fig. 2.

Witnesses:
E. T. Walker
Wm. E. Dyer

Inventor
Henry Schlimme,
By Johnston, Reinhold & Dyer,
Attorneys

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

HENRY SCHLIMME, OF LEBANON, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO JACOB H. GROVE, OF SAME PLACE.

DEVICE FOR MIXING AIR AND GAS FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 385,072, dated June 26, 1888.

Application filed October 8, 1887. Serial No. 251,850. (No model.)

To all whom it may concern:

Be it known that I, HENRY SCHLIMME, a citizen of the United States, residing at Lebanon, in the county of Lebanon and State of Pennsylvania, have invented certain new and useful Improvements in Devices for Mixing Air and Gas for 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 appertains to make and use the same.

My invention relates to devices for mixing air and gas for furnaces, and has for its object the construction of a simple and effective device for storing heated air in the receiver of a blast-furnace.

The prevailing practice of heating the blast of furnaces is by the use of hot-blast ovens, which are quite expensive, and, owing to the intense heat to which the pipes through which the air is conducted are subjected, they burn out rapidly and incur great expense in repairs. By my device the hot-blast oven is dispensed with, and the air from the blowing-engine heated in the receiver where it is stored, and from which it is conducted to the "bustle-pipe" and distributed to the tuyeres of the furnace.

The invention will be hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, which form a part of this specification, Figure 1 is a vertical section of a blast-furnace, showing the application of my blast-heater attached to one end of the blast-receiver; and Fig. 2 is a vertical longitudinal section of the blast-heater on an enlarged scale.

Reference being had to the drawings and the letters marked thereon, A represents a blast-furnace, B the bustle-pipe, and C the tuyeres, which are of any approved construction and form no part of my present invention.

D is the blast-receiver and storing-chamber, which is lined with fire-brick or other refractory material and communicates with the bustle-pipe B through the medium of pipe E.

In practice the receiver is about ten feet in diameter and about fifteen feet in length.

F is the heater, which is from five to six feet in diameter and from seven to ten feet long, and is provided with an interior conical gas-receiving chamber, G, which terminates in a nozzle, H, the outer surface of which is concave, and projects into the receiver D, as shown. By forming the outer surface of the nozzle H concave the back-pressure of the air in the receiver upon the exit-passage of the heater is reduced to the minimum and the air around the nozzle is put into circulation, revolving around the outer surface of the nozzle, and is thus prevented from re-entering the nozzle.

I is a pipe leading from the stack of the furnace and communicates with the gas-receiving chamber G, and within said pipe is an air-chamber, K, which is provided with a discharge-nozzle terminating in a valve-seat, L, and communicates with the blast or air pipe M, leading to the blowing-engine (not shown) by means of a branch pipe, N, which is provided with a valve, O, for regulating the quantity of air admitted to the chamber K for inducing the flow of the gas from the furnace into the gas-chamber G of the blast-heater.

P is a double automatic valve having a flaring outer surface, provided with a seat, Q, on its upper end, which closes the nozzle of the air-chamber, while its lower end closes the combining tube or chamber R between the gas-supply-pipe I and air-chamber K. The valve P is supported upon a rod, S, which extends through the upper wall of the air-chamber, is screw-threaded, and is provided with nuts for setting the valve to regulate the supply of gas admitted to the chamber G of the heater.

The air or blast pipe M enters a stuffing-box, U, on the end of the T-coupling V, and from the coupling extends a pipe, W, which enters the gas-chamber G and terminates in a tapered outer surface, X, which corresponds with the taper of the inner surface of the nozzle of the gas-chamber and forms a valve for controlling the supply of the gas and air admitted to the air or blast receiver D for heating the air stored therein.

To provide for the adjustment of the pipe W, a coupling, Y, is inserted in the branch pipe N, with a sliding or extension joint, Z, which enables the pipe W and that part of the branch pipe N between the T-coupling V and the coupling Y to be moved back and forth on

the end of the air-pipe M in the stuffing-box U. Between the outer wall of the gas-receiving chamber G and the cylinder A′ of the heater F is a chamber, B′, in which a continuous circulation of water is maintained by means of the supply-pipe C′ and the discharge-pipe D′.

E′ is a pipe communicating with the gas-chamber G for removing any solid matter which may be carried with the gas from the furnace-stack, and is provided with a removable cap, F′, cover, or a valve.

The operation is as follows: Air from the blowing-engine conducted through conduit M is divided and a small quantity conveyed through the pipe N, controlled by the valve O, and admitted to the air-chamber K, from which it is discharged into the combining tube or chamber R, mingles with the gas from the furnace in the pipe I, and flows into the gas-chamber G of the air-heater. The air admitted to the chamber K and discharging into the combining-tube R aids in inducing the current or column of gas from the furnace; but its primary function is to open the valve P after it has been closed by the back-pressure of the air caused by a sudden falling of the stock in the bosh of the furnace and the consequent choking of the tuyeres. In the event of the foregoing operation of the furnace, the back-pressure of the blast in the receiver D and in the gas-chamber G, the valve P will be thrown up automatically and shut off the supply of gas from the furnace and the air from the chamber K, which otherwise would flow up the pipe I and enter the furnace above the stock. As soon as the obstruction in front of the tuyeres has been burned away, the air in the chamber K will automatically open the valve P and the operation of heating the blast will again proceed. The major portion of the work of drawing the gas from the furnace through the pipe I is effected by the air-blast discharged from the pipe W in the nozzle of the gas-chamber. The air and gas entering the receiver D are thoroughly mixed and the air heated therein, from which they pass off through pipe E into bustle-pipe B and are distributed to the tuyeres, from which the mixture is discharged into the furnace, where it burns with an intense heat and assists very largely in smelting the stock.

While I have shown my invention applied to a blast-furnace for melting ores, it is not limited thereto, but may be applied to any kind of furnaces in which a hot blast is required.

I am aware that it has heretofore been proposed to utilize waste gases by returning them to furnaces, and do not, therefore, claim this broad feature as my invention.

Having thus fully described my invention, what I claim is—

1. In a device for mixing air and gas for furnaces, the combination of a gas-receiving chamber having a nozzle on the discharge end thereof, an air-supply pipe extending longitudinally through said chamber and provided with a conical end, a gas-supply pipe and an air-supply pipe communicating with said gas-chamber, and an automatic valve for controlling the supply of gas and air to the gas-chamber, substantially as described.

2. In a device for mixing air and gas for blast-furnaces, the combination of a blast-receiver, a conical gas receiving chamber or heater having a nozzle projecting through one of the end walls of the blast-receiver and provided with a concave outer surface, a major air-supply pipe passing through the gas-chamber, and a minor air supply pipe communicating with said chamber near its large end, a gas-supply pipe, a compound automatic valve for controlling air and gas supplied to the gas-chamber, and a valve in the minor air-supply pipe, substantially as described.

3. In a device for mixing air and gas for furnaces, a gas-receiving chamber having a tapering discharge end, a gas and air supply communicating with said chamber, and an automatic check-valve controlling the supply of gas and air, in combination with an adjustable air-pipe extending through the gas-chamber and discharging into the nozzle thereof, substantially as described.

4. In a device for mixing air and gas for blast-furnaces, the combination of a blast-receiver, a blast-heater having a nozzle projecting into said receiver, a gas-supply pipe communicating with a furnace and the blast-heater, an air-supply pipe, also communicating with said heater, an automatic valve for controlling the supply of gas and air to the heater, and a main blast-pipe extending through the heater and discharging into the blast-receiver, substantially as described.

5. In a device for mixing air and gas for blast-furnaces, a blast-heater, a bustle-pipe, and tuyeres, in combination with a blast-receiver between the heater and the bustle-pipe, a gas-supply pipe communicating with the furnace-stack and the heater, an auxiliary air-supply pipe, and an automatic valve for cutting off the gas and air, and a blast-supply pipe passing through the heater and discharging into the blast-receiver, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY SCHLIMME.

Witnesses:
S. A. TERRY,
WM. E. DYRE.