

No. 649,611.

Patented May 15, 1900.

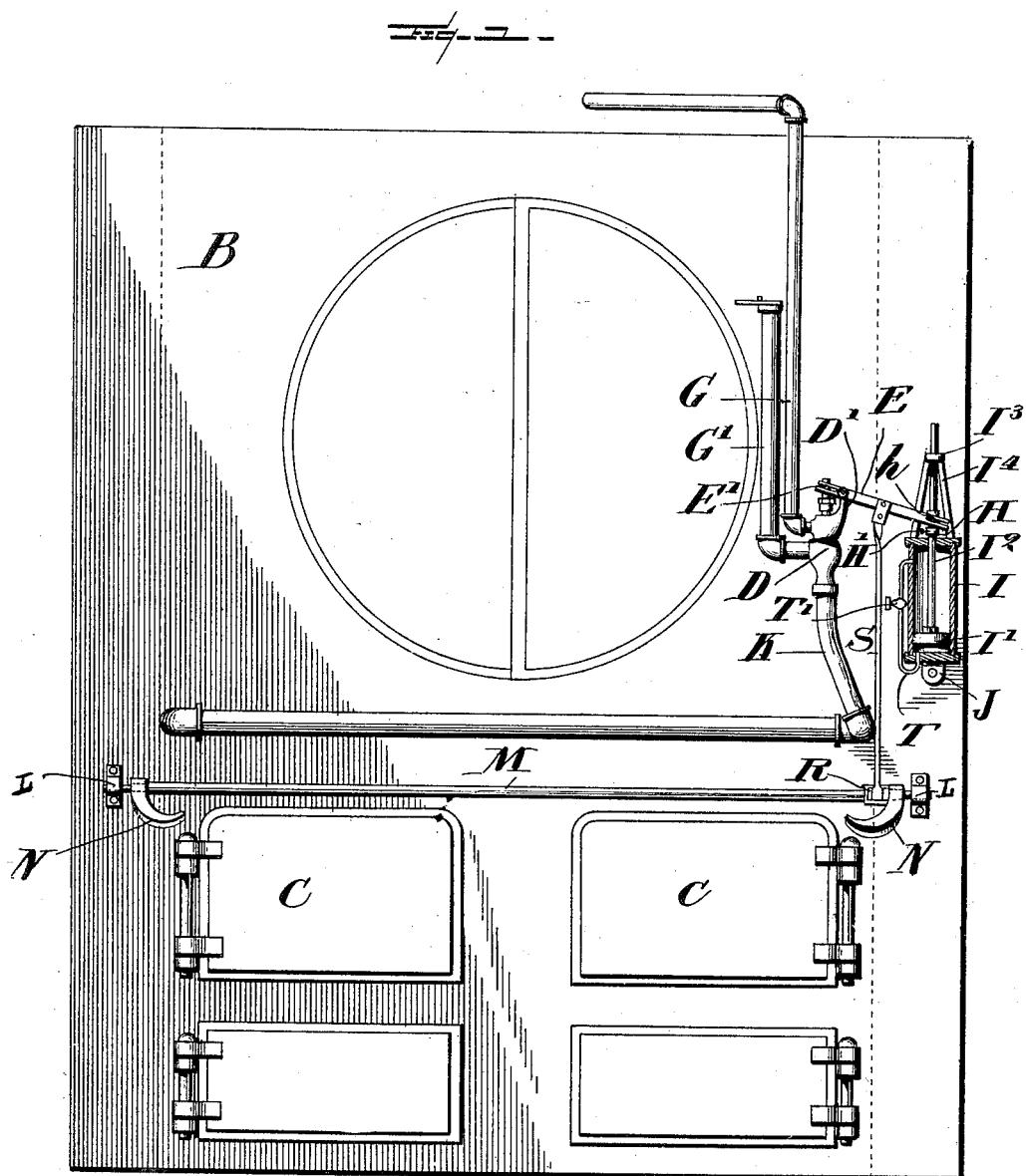
S. B. MOLONY.

APPARATUS FOR INTRODUCING AIR AND STEAM INTO FURNACES.

(Application filed Jan. 3, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses  
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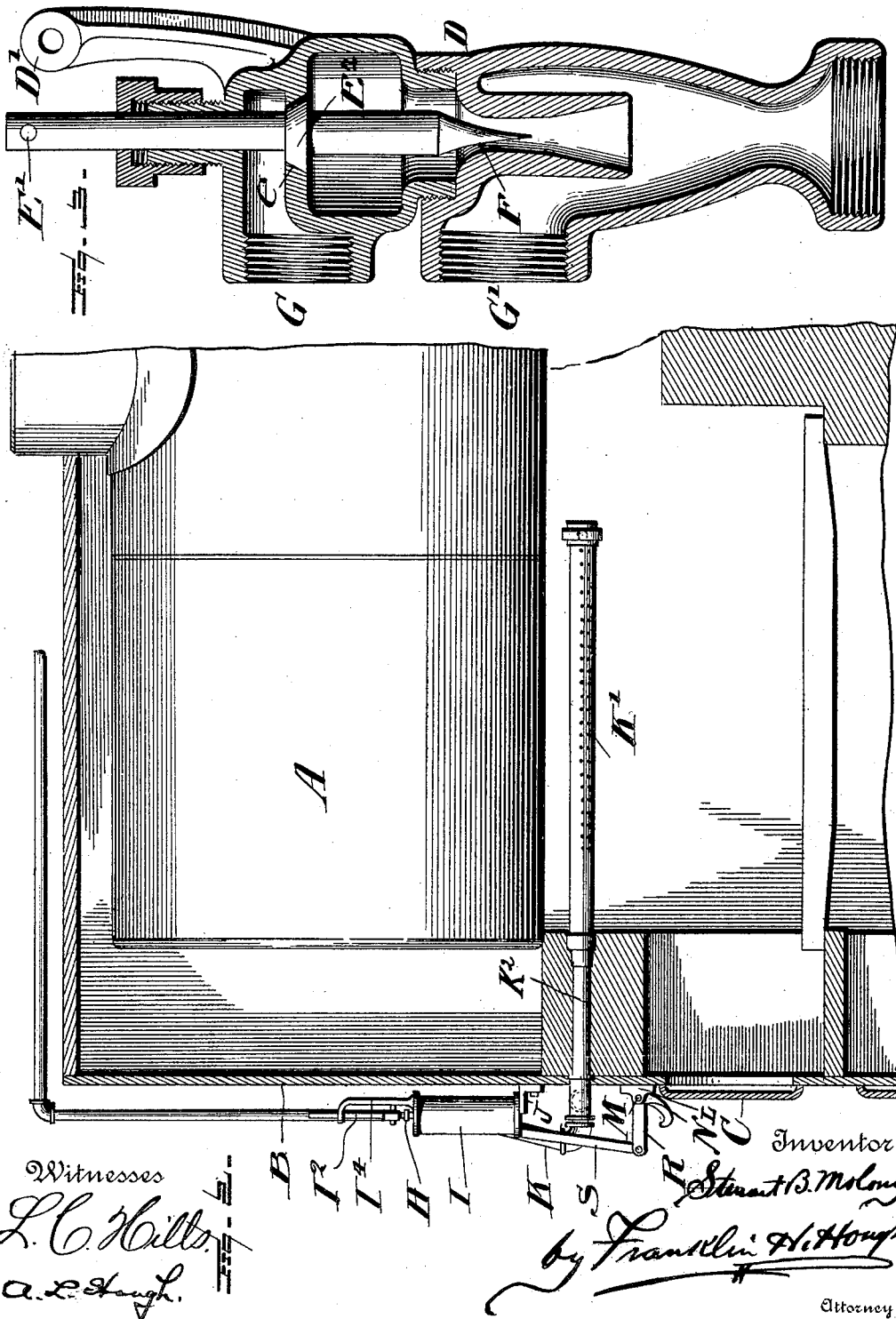
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# UNITED STATES PATENT OFFICE.

STUART B. MOLONY, OF NORRISTOWN, PENNSYLVANIA.

## APPARATUS FOR INTRODUCING AIR AND STEAM INTO FURNACES.

SPECIFICATION forming part of Letters Patent No. 649,611, dated May 15, 1900.

Application filed January 3, 1900. Serial No. 237. (No model.)

*To all whom it may concern:*

Be it known that I, STUART B. MOLONY, a citizen of the United States, residing at Norristown, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Introducing Steam and Air into Furnaces; and I do 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in apparatus for introducing steam and air into boiler-furnaces, whereby volatile gases may be consumed, the steam which is introduced being adapted to be decomposed into oxygen and hydrogen upon striking the hot fire-bricks and immediately uniting again and burning with a hot flame over the fresh coal.

More specifically, my invention consists in the provision of an apparatus for introducing steam and air into boiler-furnaces, of an injector with which communication is had to a steam-boiler or exhaust-steam pipe and having connected to said injector a pipe or pipes leading into the interior of the furnace or fire-chamber, and the provision of a rocking bar which is actuated as the furnace-doors are swung open, and in the employment of an oil dash-pot having connection with said rock-bar, also to the stem of the injector, whereby the valve of the injector is raised in the swinging open of the furnace-doors and allowed to gradually close by means of the piston in the oil dash-pot lowering to its normal position.

My invention is clearly illustrated in the accompanying drawings, which, with the letters of reference marked thereon, form part of this application, and in which drawings similar letters of reference indicate like parts throughout the several views, in which—

Figure 1 is an end elevation of a boiler and furnace, showing my apparatus connected thereto. Fig. 2 is a longitudinal vertical sectional view through a furnace and boiler, showing parts of my apparatus for introduc-

ing air and steam into the furnace in side elevation; and Fig. 3 is a vertical central sectional view through the air-injector.

Reference now being had to the details of the drawings by letter, A designates the boiler, and B the frame of the furnace, having swinging doors C hinged to its front wall. Mounted in any suitable location is an air-injector D, having an arm D' integral therewith, to which the lever E is fulcrumed, one end of said lever E being pivoted to the upper end of the piston-valve E', which has a valve E<sup>2</sup> adapted to be seated on the beveled wall in the apertured portion of the injector, as clearly shown in Fig. 3 of the drawings. The lower end of said valve-stem is pointed, and disposed in the tapering apertured portion F of the lower screw-threaded portion of the injector. Suitable steam and air ports G and G', respectively, are provided, which open into the interior of the injector. Connected to the lower end of the injector is a pipe K, which has one or more branching pipes K<sup>2</sup>, which are adapted to pass through the wall of the furnace and into the furnace-chamber and are preferably disposed horizontally therein a short distance below the bottom of the boiler. About the circumference, arranged in any suitable manner, as spirally, are perforations K'; also, the inner capped ends of said pipes K<sup>2</sup> are provided with perforations, whereby the steam and air which are forced by the injector into the furnace-chamber are directed against the bridge and the arch of the furnace.

Pivoted in suitable bearings L, carried on the front outer wall of the furnace, is a rock-shaft M, which has keyed or otherwise secured thereto the curved arms N, one near each end of said rock-shaft. These curved arms are so disposed as to be in the path of the furnace-doors C and to be struck by said doors when the latter are opened in the arc of a circle greater than ninety degrees, whereby said shaft is caused to rock. Keyed to the shaft M is an arm R, to the outer end of which is pivoted a rod S, the upper end of which is fulcrumed to the arm D' on the shell of the injector.

Located on a bracket or other suitable support J is an oil dash-pot I, having a plunger

I' therein connected to a stem I<sup>2</sup>, said stem passing through the upper end of the dash-pot and through a guide-plate I<sup>3</sup>, formed out of the bracket-arms I<sup>4</sup>. Mounted on said stem is a collar H, having a set-screw H' therein and carrying a lug h, which is designed to be engaged by the forward end of the lever or bar E, this collar being adapted to be held at different locations on the stem to regulate the throw of the plunger carried by the stem I<sup>2</sup>. Leading from the lower end of the dash-pot and communicating therewith is a pipe T, having a regulating-valve T' therein, the upper end of said pipe leading to and communicating with the interior of said dash-pot near its upper end. By the provision of this pipe connection communicating with the interior of the dash-pot on opposite sides of the plunger the speed with which it is desired to allow said plunger to return to its normal position after being raised by means of the bar S is determined, the regulating-screw being operated to allow the oil to pass through the tube more or less rapidly.

In operation when it is desired to introduce air and steam into the furnace after fuel has been thrown on the fire the doors are swung back, so that their upper edges will strike the curved arms secured to the rock-shaft, whereby the valve-stem in the injector is raised by reason of its connections with the rock-shaft, and the steam rushes through the injector, carrying air with it, into the tubes extending into the fire-chamber, and the steam becomes heated in the perforated pipes before it is delivered into the furnace. The mixture is directed against the hot sides of the fire-box and the bridge-wall. The steam decomposes into oxygen and hydrogen on striking the hot fire-bricks, and immediately unites again and burns with a hot flame over the fresh coal, where the gases are given off, thus producing a more complete combustion of the volatile gases. After the doors are closed the plunger

returns gradually to its normal position by gravity and the injector-valve closes, the speed with which it is desired to have the valve close being regulated by means of the adjusting means connected to the oil dash-pot. In the construction shown it will be observed that the doors of the furnace may be opened at right angles if it is desired to allow a draft of air to enter through the door-openings without operating the injector, the latter only being brought into operation when said doors are swung open sufficiently for the upper edges of said doors to strike against the curved arms and cause the rock-shaft to be actuated.

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

An apparatus for introducing steam and air into furnaces, comprising in combination with the furnace, an injector mounted on its outer wall and having suitable steam and air pipe connections, means for conveying air and steam from the injector to the interior of the furnace, a rock-shaft mounted on the furnace-wall, curved arms keyed to said shaft and adapted to be struck by the doors of the furnace only as said doors are swung wide open, the dash-pot and plunger-stem, an integral arm on the injector-wall, the lever E pivoted to said integral arm, a valve and valve-stem in the injector, said valve-stem having pivotal connection with one end of said lever, the opposite end of the latter being pivoted to the plunger-stem of the dash-pot, the crank and pivoted link connections between the rock-shaft and said lever, all as shown and described.

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

STUART B. MOLONY.

Witnesses:

JOHN J. CORSON,  
J. JAY CORSON, Jr.