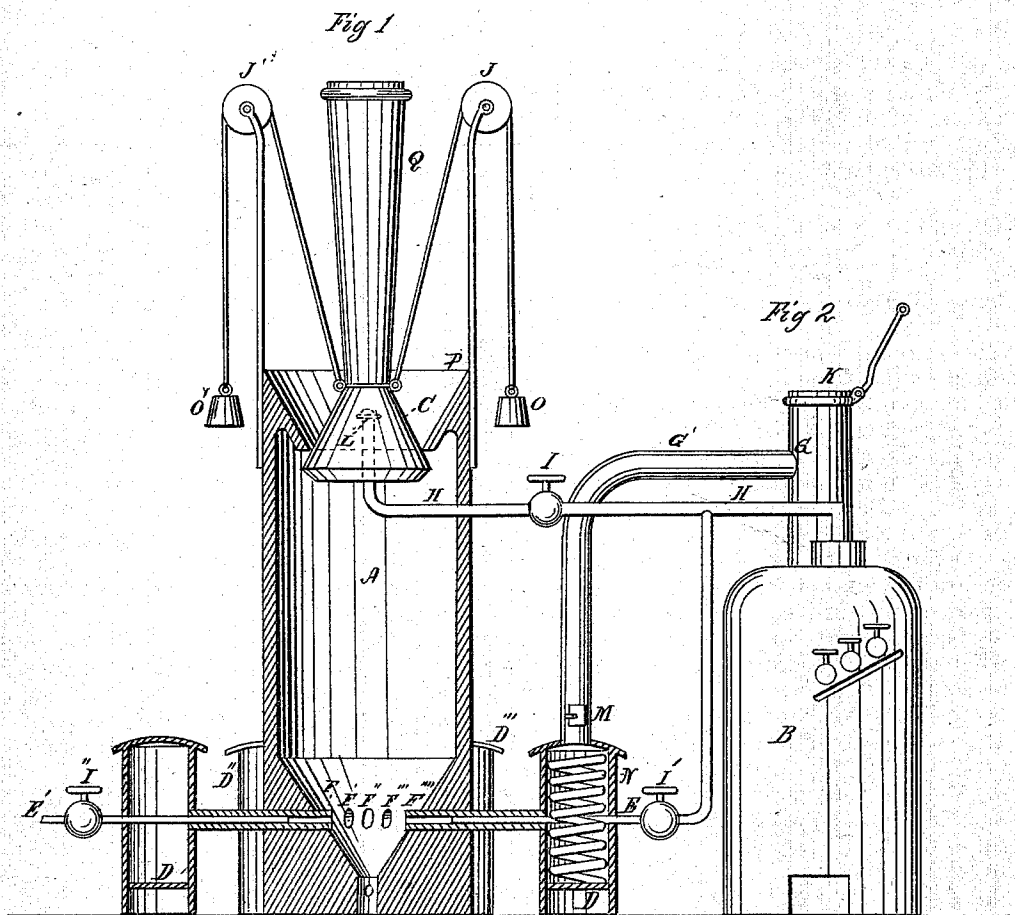


D. W. HENDRICKSON.
Blast and Cupola Furnaces.

No. 139,891.

Patented June 17, 1873.



Witnesses

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UNITED STATES PATENT OFFICE.

DAVID W. HENDRICKSON, OF RED BANK, NEW JERSEY.

IMPROVEMENT IN BLAST AND CUPOLA FURNACES.

Specification forming part of Letters Patent No. **139,891**, dated June 17, 1873; application filed April 2, 1873.

To all whom it may concern:

Be it known that I, DAVID W. HENDRICKSON, of Red Bank, Monmouth county, New Jersey, have invented a Blast and Cupola Furnace, of which the following is a specification:

The following is a description of my newly-invented blast and cupola furnace, which is as full, clear, and exact as I am able to give, reference being had to the drawings hereto annexed.

This invention relates to that class of furnaces operated by the steam-jet power or principle, with any kind of fuel desirable. The object of my invention is economy and simplicity of both construction and operation of furnaces for melting or smelting ores and metallic substances, with better results and quality of product, and a cheaper and easier mode of feeding the furnace, and by means of injectors to secure a greater or additional heat in the lower part of the furnace, whereby a hydrocarbon-blast or a compound blast may be obtained, when the steam coming through pipe E comes in contact with the fire from stove D, which superheats the steam, eliminating the hydrogen, which combines with the carbon of the fuel in the stoves, which by force of the steam and the natural draft of the furnace the blast is conducted into the furnace as a hydrocarbon blast, the steam and fire commingling in tuyeres F F' F'' F''' F'''' before entering furnace A, Fig. 1.

The feeding is accomplished by throwing, alternately, the charge, fuel, ores, or material into the concave hopper P and around the bell or cone C; then by lowering the cone C and stack Q by means of lifting-weights O O', operated by pulleys or wheels J J', it discharges the charge into the furnace A, Fig. 1, in an even and regular manner around the outer edge or interior of the furnace A. The blast and draft are obtained in a more powerful and more intense manner by the operation of steam-cocks I I' I''. The upper cock I admits the steam from tank or boiler B, Fig. 2, through pipes H H to nozzle L, where it escapes through bell C and stack Q, thereby forming a partial vacuum in furnace A, Fig. 1, causing a very powerful draft, which is supplied by tuyeres F F' F'' F''' F'''' with air, fire, steam, or a

compound blast of fire and steam. The blast is procured or produced by steam-cocks I' I'', which admit steam or water from tank or boiler B, Fig. 2, through pipe H to cocks I' I'', thence through pipe E and coil N, through tuyeres F F' F'' F''' F'''' into the bosh or crucible of furnace A, Fig. 1, the same passing through stoves D D' D'' D''', whereby the steam becomes superheated, or the water becomes steam by passing through coil N. The hot-blast is obtained by one or more stoves, D D' D'' D''', arranged around the outside of the furnace, filled with coke, coal, or any fuel it may be desirable to use. The fire and heat from the same is injected into the furnace A through tuyeres F F' F'' F''' F''''. The chimney G' G, provided with damper K, operates as a chimney for draft for the boiler, or as a conduit to conduct the smoke and heat from under the boiler to stove D, whereby it is consumed as fuel and saved, besides adding to the fuel in the furnace.

I am aware that the old style of bell and hopper has been in use for feeding furnaces; but I am not aware that a perforated bell and stack combined has ever before been used, as shown in the accompanying drawing, combined and operated as in letters C and Q.

I am aware that steam-jets have been used in creating a blast and draft at the top and bottom of a furnace; but I am not aware that they have ever been used, as in tuyeres F F' F'' F''' F'''', to conduct a hot-blast into furnace A.

I am aware that appliances have been invented to consume smoke and the waste gases from boiler-fires; but I am not aware of said smoke or heat being first conducted into outside stoves or independent fires, to be consumed by the hydrogen from the steam or water, and then injected into the furnace as fuel, as is operated by pipes E F', through stoves D D' D'' D''', thereby burning all the carbon and saving all the fuel, whereby the steam is generated that gives the draft and blast to the furnace on the steam-jet principle of furnaces, or as shown in the accompanying drawing.

In order that those skilled in the construction of furnaces may know how to erect and operate the same I will describe it as follows:

Figure 1, letter A, is the interior view of a blast or cupola furnace arranged with tuyere-holes F F' F'' F''' F''', crucible and tap-hole made of boiler-iron and lined with fire-clay or brick in the usual way, with an open hopper top. Fig. 2, letter B is a steam-boiler or water-tank, built in any desirable shape or size, of iron or wood, having iron-pipe connections H H, and operated with steam cocks or valves I I' I''.

Q and C represent a combined iron stack and perforated bell-feeder operated by wheels J J' and weights O O', for feeding furnace A, Fig. 1. D D' D'' D''' are stoves made of iron for holding and consuming fuel, coke, charcoal, oil, petroleum, wood, coal, or any desirable fuel, for either heating steam or water, and for causing more or additional heat and fire for the furnace, in combination with pipes E E', which inject the same into furnace A, and there become combined with the steam or water, causing a more intense and powerful heat, as shown, and operated in the accompanying drawing.

Therefore what I claim as my invention, and for which I ask Letters Patent, is—

1. The combination of furnace A, adjustable and combined stack Q and bell C as a feeder with hopper P, steam-pipes H H, nozzle L, tuyeres F F' F'' F''' F''', stoves D D' D'' D''', cocks I I' I'', pipes E E', coil N, chimney G' G, damper K, and boiler or tank B, Fig. 2, operated and shown in the accompanying drawings substantially as and for the purpose hereinbefore set forth.

2. The stack Q and perforated bell C, combined for the feeding of furnaces, substantially as and for the purpose hereinbefore set forth.

3. The combination of tuyeres F F' F'' F''' F'''' and injector-pipe E with stove D, substantially as and for the purposes hereinbefore set forth.

D. W. HENDRICKSON.

Witnesses:

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