(No Model.)

V. W. BLANCHARD.

FURNACE.

No. 413,916. Patented Oct. 29, 1889.

Fig. 1.

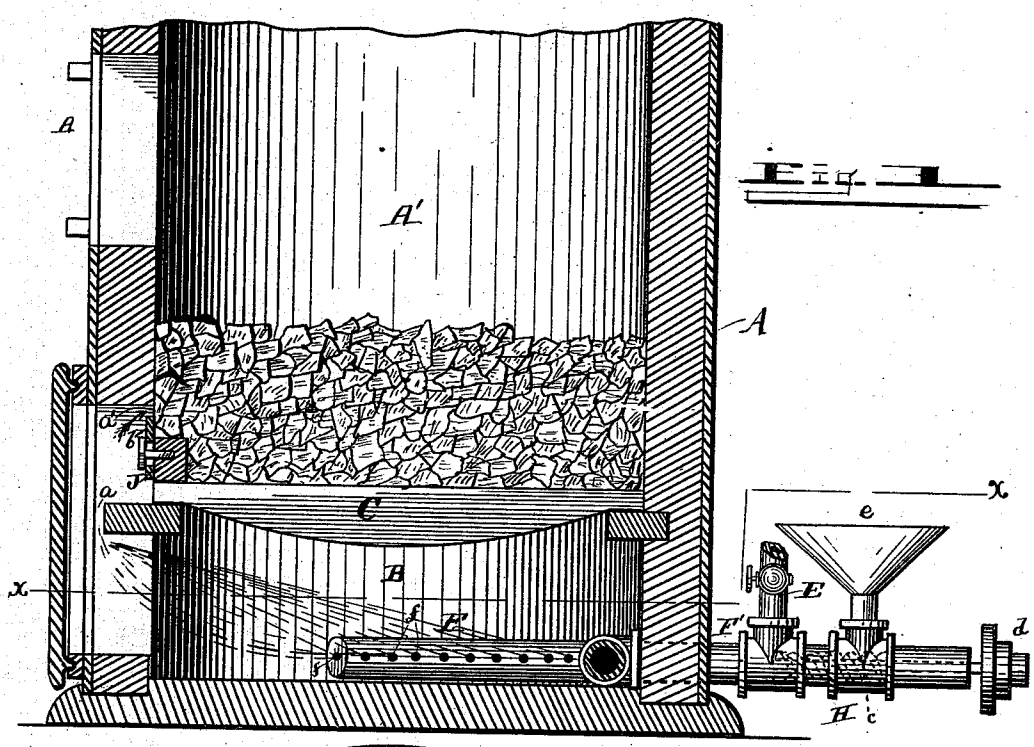
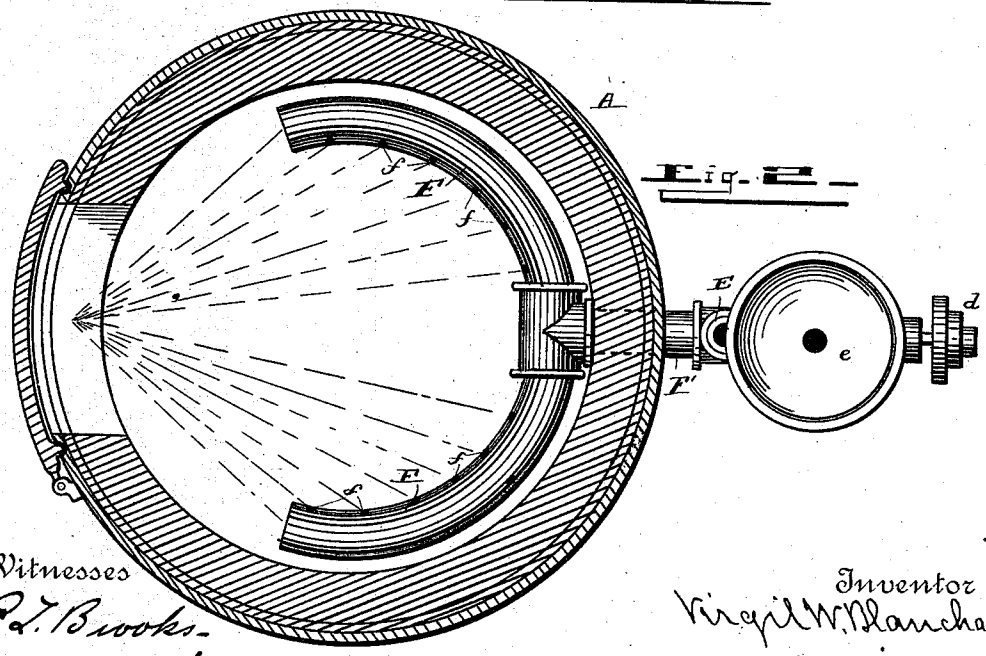


Fig. 2.



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UNITED STATES PATENT OFFICE.

VIRGIL W. BLANCHARD, OF NEW YORK, N. Y., ASSIGNOR TO JOSEPH A. DAVIS, OF SAME PLACE.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 413,916, dated October 29, 1889.

Application filed April 12, 1889. Serial No. 306,972. (No model.)

To all whom it may concern:

Be it known that I, VIRGIL W. BLANCHARD, of New York, in the county and State of New York, have invented certain new and useful Improvements in Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification, in which—

Figure 1 is a vertical section taken diametrically through a furnace, showing my improvement applied to it. Fig. 2 is a section taken through the ash-pit in the plane indicated by dotted line *x x*.

My object is to blow out of the ash-pit the ashes which accumulate therein and to utilize the ashes as means for producing heat.

In a furnace where a bed of coal is kept at an intense heat I have discovered that the silicates and the saline elements thereof can be volatilized into an atomic condition by conveying them by means of a blast of air from the ash-pit into, over, or through the bed of incandescent fuel.

The gist of my invention consists in means for conveying the ashes from the ash-pit to one side and over the grate and into, above, or through a body of incandescent coal on the grate.

I will now explain one practical mode of doing this. A designates a furnace, in which B is an ash-pit, and C is the grate. Now this grate may be made of cast-iron bars, or it may be made of fire-brick numerously perforated, and, if desirable, it may be sustained at the center in any practical manner. At one part of the furnace below the grate I introduce an air-blast. Part of the air will pass through the grate to supply combustion. The major part of the air will pass through pipes located at or near the base of the ash-pit and will be conducted directly up and through a passage *a* and through a passage *a'* into the fuel-chamber. The pipes F F are bifurcations of a common blast-pipe, and the jets of these pipes are directed to the outlet, which may be at the fire-door or at any other place about the grate-section of the furnace. The perforated blast-pipe is preferably bifurcated, so that it will sweep the entire area of the ash-pit and carry into and through the passage above named any and all particles of ash which may fall through the grate and deliver the same into or above the incandescent coal on the grate. The air-blast may be derived from a common air-forcing engine or from any other suitable equivalent motive power.

I have above given a general description of a furnace to which my invention is applicable.

I will now describe a furnace to which my invention is especially applicable.

A' designates a fuel-chamber which is surrounded with fire-brick incased by a metallic wall.

B designates the ash-pit, into which air is injected through the pipe or pipes above referred to. The jets from the said pipes are indicated by the letter *f*, and the directions of the currents of air are indicated by the arrows.

The passage which leads directly into the fuel-chamber may be made greater or less by means of a removable fire-brick block J or a septum of any desired material, which is provided with an adjustable plate *b* for diminishing or increasing the size of the orifice, and thus regulating the size of the passage from the ash-pit into the fuel-chamber.

Instead of applying the plate *b* to the removable block J, the plate (which is, in fact, a damper or valve) may be applied to any part of the throat *a'*, through which the air, or air and pulverized fuel, or air, pulverized fuel, and steam, if desired, can be forced. That portion of the pipe which protrudes from the shell of the furnace is provided with a pipe E, which communicates with an air-forcing engine of any suitable kind, external to which I employ a fuel-feeder H, adapted for feeding pulverized fuel into the pipe F' below the joint of the blast-pipe. This fuel-feeder consists, essentially, of a worm *c*, on the shaft of which is a cone-stepped pulley *d*, also a funnel *e*, which may be provided with a regulating-cock.

The special means for automatically feeding pulverized fuel to the pipe or pipes in the

ash-pit will be fully explained in another application for Letters Patent which bear even date with the filing of this.

It is obvious that any inflammable material may be substituted for the pulverized coal or other fuel.

The apertures through the pipe or pipes in the ash-pit are directed toward the passage *a*, which I have above described.

It will be seen from the above that I provide a furnace which is especially designed for burning pulverized fuel, and which is adapted for burning all kinds of fuel, alone or mixed, as may be desired; also, that in such furnaces the ash, which usually accumulates below the grate, is carried from the ash-pit by a draft of air into or above the incandescent fuel upon the grate and there volatilized or oxidized and thus utilized for giving off heat. The air which is forcibly injected through the pipe or pipes below the grate into the ash-pit, and which is the medium for conveying the finely-pulverized coal up through the space *a* and into or through the bed of incandescent fuel, also serves another very important purpose, to wit: This air, when it is heated below the grate and enters the space above the grate, becomes a secondary air-blast, carrying with it small particles of fuel, which, together with the air, are compelled to pass through the incandescent bed of fuel on the grate. I thus effect a complete combustion of the introduced matter above the grate.

It will be observed that I pick up particles of matter from the ash-pit and subject them to an intense incandescent heat, and at the same time to an air-blast, and thus oxidize and reduce them.

I hermetically close the doors leading to the fuel-chamber and to the ash-pit during the operation of my furnace.

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

1. The combination, with the ash-pit of a furnace, of a blast-pipe, a fuel-chamber provided with a passage at the end of the grate leading from said ash-pit into said chamber, and means for supplying fuel to said blast-pipe, whereby the ashes or fuel are blown into the latter, substantially as described.

2. The combination, in a furnace, of a fire-wall having a space outside of the grate, forming a communication between the ash-pit and fuel-chamber, with means for regulating the size of said space and a blast-pipe and fuel-feeder applied thereto, substantially as described.

3. In combination with a furnace having a passage outside of the grate area, a blast-pipe below the grate provided with curved perforated branches, substantially as described.

4. The combination, with a furnace having a passage outside of its grate area in or through its wall, of a blast-pipe in its ash-pit provided with apertures which converge to said passage.

5. A furnace having a blast-passage leading directly from its ash-pit, through its wall facing the door thereof and outside of the grate, to the combustion-chamber above the grate, in combination with a blast and a fuel-feeder, constructed and arranged to operate substantially as described.

6. The combination, with a furnace, of one or more blast-pipes leading into the ash-pit thereof, means for allowing the ashes to be blown from said pit into the fuel-chamber, means for regulating the size of the passage leading into said chamber, and a removable block applied at the upper terminus of said chamber, substantially as described.

7. The combination of a fuel-feeder arranged below a furnace-grate and a passage leading from the ash-pit to a point above the grate, substantially as described.

8. The combination, with a furnace, of a blast-pipe and a fuel-feeder, substantially as specified, whereby pulverized fuel is supplied to the ash-pit of a furnace and forced by a blast up through the grate and also above the grate, substantially as described.

9. The combination of the ash-pit and fuel-chamber, having communication between them outside of the margin of the grate, with an injecting-pipe, a blast-pipe, and a pulverized-fuel feeder, substantially as described.

10. The combination, with a furnace, of an injecting-pipe thickly perforated and located on or near the floor of the ash-pit, a blast-pipe F, provided with a regulating-cock, an automatic pulverized-fuel feeder, and a feed-hopper provided with a regulating-valve, all constructed and adapted to operate substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

VIRGIL W. BLANCHARD.

Witnesses:

ALEX. S. STEUART,

P. L. BROOKS.