

No. 659,161.

Patented Oct. 2, 1900.

E. M. WASHBURN.
FURNACE.

(Application filed Sept. 20, 1899.)

(No Model.)

Fig. 1.

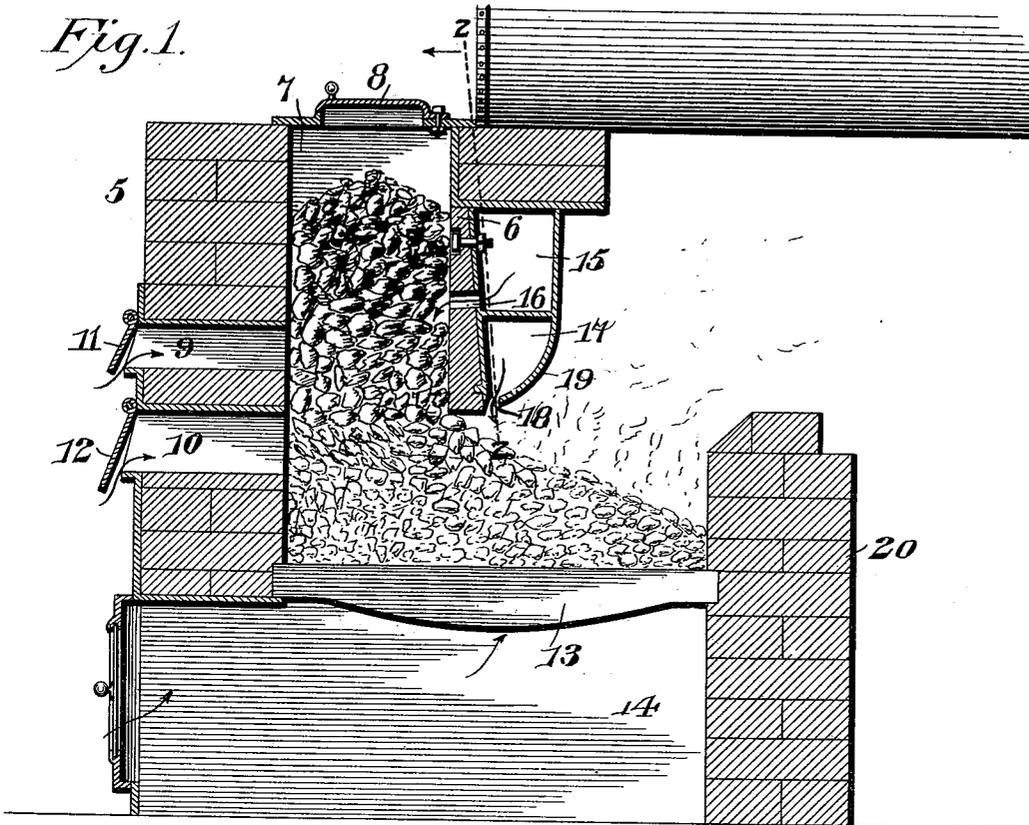
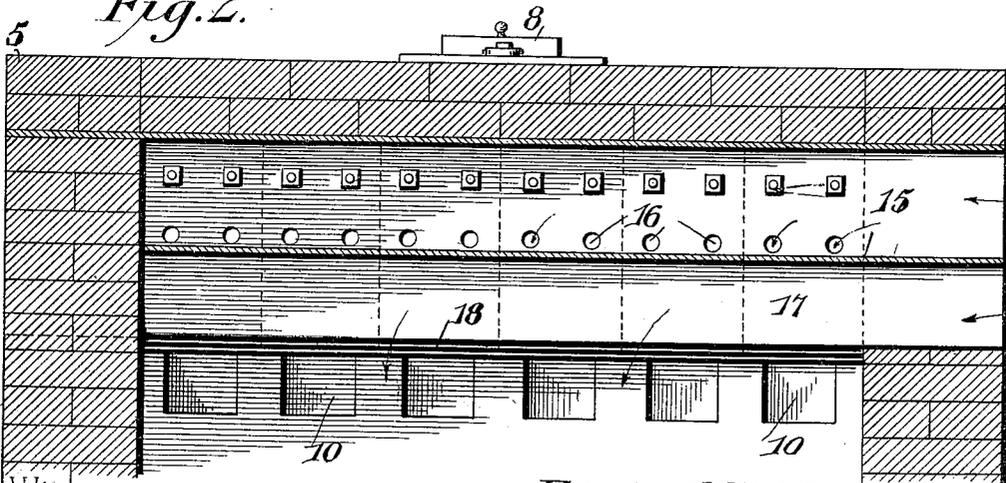


Fig. 2.



Witnesses

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EDWIN M. WASHBURN, OF HILLSDALE, MICHIGAN.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 659,161, dated October 2, 1900.

Application filed September 20, 1899. Serial No. 731,119. (No model.)

To all whom it may concern:

Be it known that I, EDWIN M. WASHBURN, a citizen of the United States, residing at Hillsdale, in the county of Hillsdale and State of Michigan, have invented a new and useful Furnace, of which the following is a specification.

This invention relates to furnaces particularly adapted for steam-boilers, but equally well applicable to stoves and other analogous devices adapted for burning solid fuel, such as coal; and the special object in view is to position an air-draft in the throat of the fire-box in such manner that a thin sheet of air will be delivered upon the coal and fire as it leaves a feeding-magazine and before the gases have had an opportunity to become cool, and thereby effectually dispose of all smoke by instituting a thorough consumption of all particles of combustion or gases usually emanating in an unconsumed condition from the throat of a fire-box by commingling the air with such particles of combustion and gases and causing an ignition of the same.

Other objects and advantages will appear in the subjoined description, and the novelty will be hereinafter claimed, embodiments of the furnace designed for practically carrying into effect the operation sought being illustrated in the accompanying drawings, wherein—

Figure 1 is a longitudinal vertical section of a portion of a furnace embodying the features of the invention. Fig. 2 is a section on the line 2 2 of Fig. 1 looking in the direction of the arrow.

Similar numerals of reference are employed to indicate corresponding parts in both views.

The numeral 5 designates the front wall of a furnace, between which and an inner wall 6 a magazine 7 is formed and supplied with a suitable lid or cover 8. The front wall 5 is provided with draft-openings 9 and 10, controlled by exterior hinged or pivoted damper-plates 11 and 12, which are adapted to be adjusted to regulate the ingress of air therethrough. These draft-openings 9 and 10 are located above the grate 13, which may be of either a ventilating or non-ventilating character, and disposed over an ash-pit 14.

The magazine 7 is located directly over and feeds the fuel downward to the grate 13, and in the inner wall 6 is mounted an air duct or flue 15, which, as shown by Fig. 2, has communication with the magazine 7 by means of a plurality of ports 16, opening into the base or lower portion thereof. The air duct or flue 15 opens out at one side of the furnace-wall and is intended to be supplied with a suitable regulating-damper, which may be shut off entirely to throw out the use of said duct or flue which may be operated at times to deliver air through the ports 16 into the upper portion of the charge of coal within the magazine 7. Below the duct or flue 15 is a second air duct or flue 17, which has a lower slot 18 extending full length thereof and to which the rear wall 19 has an inclined trend in a curved line. This duct or flue 17 also extends the full transverse length of the fire-box and opens out at one side of the furnace-wall, being supplied with a regulating-damper or other controlling means, and the air coming therethrough is delivered over the throat of the fire-box in a thin sheet. This form of the furnace, together with the other changed forms which will be presently set forth, is adapted for use in connection with any form of boiler.

In the present form of furnace and in applying the same to boilers a bridge-wall 20 is built or provided therein in addition to the usual bridge-wall, (not shown,) and the purpose of said bridge-wall is to throw the heat immediately against the boiler. This primary bridge-wall is not necessarily a novel feature in the present construction, as it has been heretofore used, and its use, size, shape, and location are subject to slight variations to fit particular cases. The said primary bridge-wall is without any particular features of construction in view of the location of the air duct or flue 17 in this arrangement of the device.

The parts essential to the improved furnace are the magazine and the duct or flue feeding air in a thin sheet to the throat of the fire-box or over the rear portion of the bed of coals. The shape or size of the magazine is not essential as long as it is commensurate with the required feed of fuel and the size of the furnace. The ports 16 are used

in the event that a heavy fire is necessary; but, as before intimated, the duct or flue 15 may be entirely shut out. The openings 9 and 10 may also be dispensed with and the 5 air-feed in a thin sheet relied upon solely and supplied at either one of the different points indicated. It is necessary, however, that the feed of the fuel from the magazine be regular and unobstructed and by the introduction of 10 the thin sheet of air at a point on the coal and fire before the gases have an opportunity to become cool is the salient feature of the invention in conjunction with a magazine-feed.

The air may be forced through the several 15 ducts or flues or permitted to be indrawn by suction arising from the combustion of the fuel, and by the particular arrangement of the parts and the utilization of the thin sheet of air in the manner stated a great saving in 20 fuel results, and the annoyance and inconvenience incident to the formation and conveyance of gases and smoke are entirely avoided.

Changes in the form, proportions, and details 25 other than those noted may be resorted to without in the least departing from the spirit or sacrificing any of the advantages of the invention.

Having thus described the invention, what 30 is claimed as new is—

1. A furnace having a fuel-feeding magazine vertically disposed over a grate below in advance of a primary bridge-wall, combined with a duct extending transversely in the 35 rear of the rear wall of the said magazine and having a lower front reduced feed-opening in the form of a continuous slot to feed a thin sheet of air to the throat of the fire-box downwardly in a vertical direction and over and 40 across the rear portion of a bed of coals therein to cause a consumption of the gases and particles of combustion, the air being directed fully and exclusively from above and over the plane of the rear surface of the burning 45 coals at the point of greatest heat of the latter and the ingress of the air to the duct tak-

ing place at the opposite ends of the latter solely.

2. A furnace having a fuel-feeding magazine, a grate and a primary bridge-wall, 50 combined with an air flue or duct extending transversely across the fire-box in rear of the magazine and provided with a continuous slot in the lower portion thereof to feed a thin sheet of air to the throat of the fire-box and 55 across the rear portion of the bed of coals therein, to cause a consumption of the gases and particles of combustion, and another transversely-extending flue or duct above that having the continuous slot and in rear 60 of the magazine, the said upper duct having communication with the magazine by means of perforations to cause the air to feed through the charge of coal and downwardly to the 65 burning bed of coal.

3. A furnace having a fuel-feeding magazine, a grate and a primary bridge-wall, and air-feeding ducts or flues arranged at different elevations and extending transversely in rear of the magazine from one side to the 70 other of the furnace, one of the said ducts admitting air to the charge of coal above the throat of the fire-box by means of a transverse line of apertures, and the other delivering a thin sheet of air by means of a transverse continuous slot in the lower portion 75 thereof below the plane of the said apertures, and the other duct, and above the bed of burning coals, the air from the lower duct being directed fully and exclusively above 80 and over the plane of the rear surface of the bed of burning coals at the point of greatest heat of the latter and the rear terminals of the grate-bars.

In testimony that I claim the foregoing as 85 my own I have hereto affixed my signature in the presence of two witnesses.

EDWIN M. WASHBURN. [L. S.]

Witnesses:

FRED B. HIX,
L. P. REYNOLDS.