

A. MUIR.
BOILER FURNACE.

(Application filed Feb. 17, 1902.)

(No Model.)

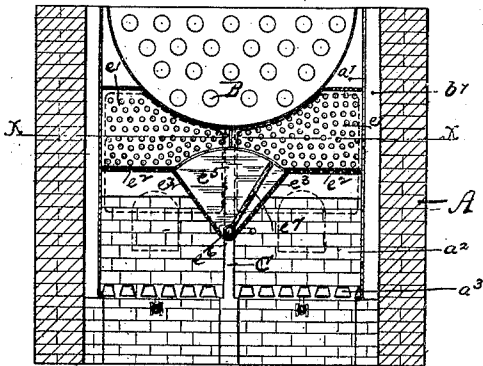


Fig. 1

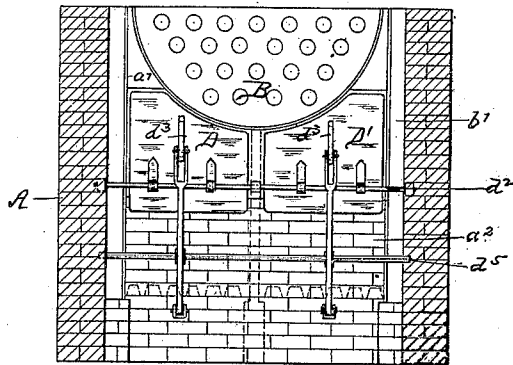


Fig. 2

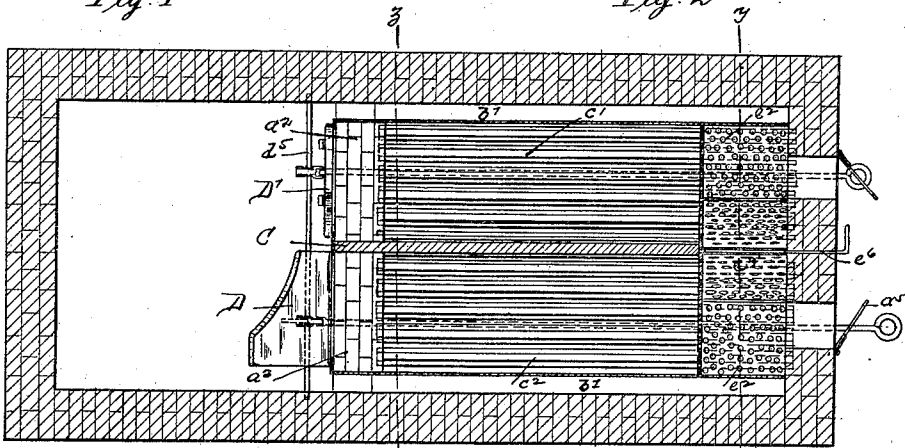


Fig. 3

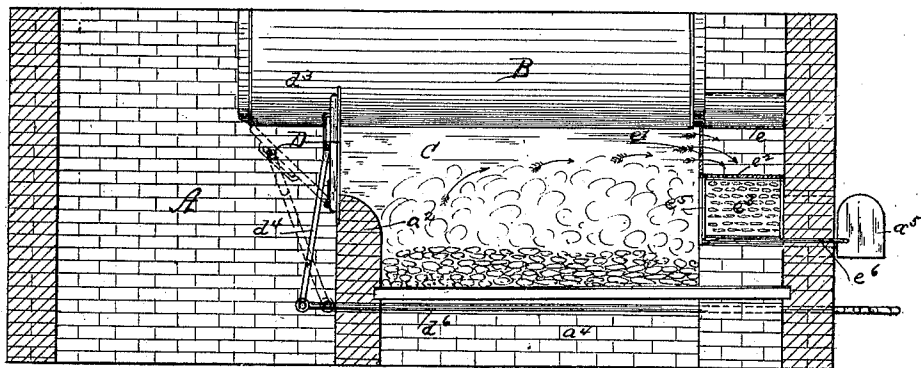


Fig. 4

WITNESSES:
Chas. S. Kull,
Harwell Benjamin,

INVENTOR.
Alexander Muir,
 BY
Frederick Benjamin
 ATTORNEY.

UNITED STATES PATENT OFFICE.

ALEXANDER MUIR, OF JOLIET, ILLINOIS.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 709,605, dated September 23, 1902.

Application filed February 17, 1902. Serial No. 94,397. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER MUIR, a citizen of the United States, residing at Joliet, in the county of Will and State of Illinois, have invented certain new and useful improvements in Boiler - 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 improvements in boiler-furnaces; and the object of my improvements is to produce a furnace of this character in which the excess of carbon given off by freshly-applied coal will be mixed with a proper amount of oxygen and be burned by coming into intimate contact with incandescent coal in another part of the fire-box, thus utilizing the maximum units of heat in the fuel and preventing the escape of unconsumed carbon or smoke up the chimney or stack.

My invention belongs to that class of smoke-consuming furnaces in which the principle of alternate firing is resorted to and in which the smoke from the newly-supplied fire-bed is conducted to an adjacent fire-bed of incandescent coals.

My improvements consist generally in the means for conveying the smoke from one compartment of the fire-box into the other, for controlling the draft in the fire-boxes, and in details of economic construction and arrangement which will be hereinafter pointed out.

A specific object sought by my invention is to divide the volumes of smoke into a number of fine jets or streams, whereby the mixing with air is facilitated and combustion is promoted.

In carrying into effect my invention I have designed the furnace shown in the accompanying drawings, which form a part of this application, and in which—

Figure 1 is a vertical cross-section of my improved furnace on the line yy of Fig. 3. Fig. 2 is a vertical cross-section on the line zz of Fig. 3. Fig. 3 is a horizontal section on a longitudinal plane taken above the fire-box and below the boiler on line xx , Fig. 1; and Fig. 4 is a vertical longitudinal section through one side of the fire-box.

Referring to the drawings in detail, A rep-

resents the usual brick furnace-walls, and B the lower half of a tubular boiler of common form set within the furnace-walls and supported in any convenient manner. Between the boiler and inner furnace-walls I preferably use iron plates a' , which with the side walls form an air-chamber or jacket b' , from which the heated air may be drawn into the fire-box in any suitable and well-known manner, such features being not essential elements of my invention. The fire-box is of the usual shape and dimensions, and is provided with a bridge-wall a^2 , grate-bars a^3 , ash-pit a^4 , and feed-doors a^5 of well-known form and construction. Extending longitudinally through the fire-box from its front wall to the rear of the bridge-wall and from the bottom of the ash-pit to the boiler is a partition-wall C, which subdivides the fire-box into two compartments c' and c^2 of like size and shape. At the rear of the bridge-wall and occupying the space between the top of the wall and the boiler are dampers D D', which are hinged on a rod d^2 , having its ends supported in the side walls of the furnace. On the back of each of the dampers is a fixed yoke d^3 , adapted to slidingly receive the upper end of a lever d^4 , which is pivoted on a cross-bar d^5 , which has end bearings in the side walls of the furnace, as shown in Fig. 2. The lower end of this lever is pivotally secured to a rod d^6 , which extends forwardly through the ash-pit under the grate-bars and projects with a suitable handle beyond the front wall of the furnace.

Between the front wall of the furnace and the fire-box are flues or boxes made up of perforated and plain iron plates e , e' , e^2 , and e^3 . The plate e is plain or without holes and forms the top of the flue extending from the front edge of the boiler to the inner face of the front wall of the furnace, thus preventing any of the products of combustion from passing directly up the chimney-flue. The plates e' are vertical and extend from the rear edge of the plate e downwardly in the same vertical plane as the front end of the boiler and are perforated to permit the smoke to pass there-through, as will be explained. At their lower edge the plates e' are met with the horizontal plates e^2 , which extend forwardly to the inner face of the front furnace-wall and are perfo-

rated, as shown, and also by the fan-shape plate e^5 , which is not perforated, as shown in Fig. 1. From the inner edges of the plates e^2 extend downwardly and inclined inwardly plates e^3 , which meet at their lower edges and extend from the plate e^5 to the inner face of the furnace-wall. Thus it will be seen that said plates form a flue which extends across the space at the front end of the fire-box, the top of which follows the contour of the boiler and the bottom of which is partly horizontal and partly a V-shaped chamber with perforated plates on the inclined walls thereof and a non-perforate plate on the rear wall. At the bottom of the V-shaped chamber formed by the plates e^3 and e^5 is a rod e^6 , on which is secured a damper e^7 , adapted to be rocked back and forth in said chamber and to cover or blank either of the plates e^3 . The end of the rod projects from the front of the furnace and is provided with a suitable handle, by which it may be turned in either direction from a horizontal to a vertical position.

From the construction above described it will be seen that unless products of combustion can escape at the rear of the fire-box they would be drawn forward, pass through the perforations in the plates e^1 , e^2 , and e^3 , and down through the fire, if a line of draft be provided from the ash-pit; but as the fire-box is divided longitudinally throughout its length the smoke formed on one side of the partition (if the damper on that side be closed and on the other be open) will be drawn through said plates on the side corresponding to that in which the smoke is formed through the flue at the front end of the boiler and be returned through said plates and the fire-box on the other side, in which the damper is open at the bridge-wall. Therefore in the operation of my improved furnace if it be desired to "coal up" I close one of the dampers at the bridge-wall and close the damper e^7 over the perforated plate e^3 on the side corresponding to said bridge-damper and at the same time open the damper at the bridge-wall on the opposite side of the partition, thus changing the line of draft from the fire-box on one side to and through the fire-box on the opposite side. As the smoke which results from the coal newly placed on the closed side of the fire-box is drawn forward, as indicated by the arrows in Fig. 4, it will be drawn through the holes in the plate e^1 on the closed side, some of it will be drawn down through the holes in the plate e^3 on the open side, and the rest of it will pass out through the plate e^1 on the open side. In passing through these holes the smoke becomes divided into a number of small jets, so that when it reaches the

fire-box in which there is a draft and a supply of oxygen it will readily become mixed therewith and combustion will be effected. As the general line of draft traversed by the smoke is near the bottom of the boiler, the latter will receive the benefit of the combustion; but the heavier particles in the smoke will fall or be drawn downwardly through the inclined plate e^3 , and thus enter the combustion-chamber near the surface of the incandescent coals. When the excess of carbon has thus been disposed of, the bridge-wall damper is open and the fire is allowed to burn under normal conditions.

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

1. In a furnace, a fire-box divided longitudinally into two compartments provided with separate doors at the front ends and separate dampers at their rear ends, a flue located at the front end portion of each compartment, said flue formed of perforated plates, and closed at its ends so that the smoke and gases must pass through the perforations in said plates, both upon entering and leaving said flue, substantially as set forth.

2. In a furnace, a fire-box divided longitudinally into two compartments provided with separate doors at their front ends and with separate dampers at their rear ends, a flue located at the front end portion of each compartment, said flue formed of perforated plates, and closed at its ends so that the smoke and gases must pass through the perforations in said plates upon entering and leaving said flue, and means for closing the openings in one or more of the said plates, substantially in the manner and for the purpose set forth.

3. In a furnace, a fire-box divided longitudinally into two compartments provided with separate doors at their front ends, and with separate dampers at their rear ends, a flue located at the front end portion of each compartment, said flue formed of perforated plates, and closed at its ends so that the smoke must pass through said perforations, and said flue having plates extending downwardly toward the bed of the fire, and means for closing one or more of said plates against the passage of smoke therethrough, substantially in the manner and for the purpose set forth.

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

ALEXANDER MUIR.

Witnesses:

F. BENJAMIN,
L. G. SNOW.