M. BLANCHARD.

FURNACE.

APPLICATION FILED JAN. 14, 1909.

970,417. Patented Sept. 13, 1910.

Fig. 1.

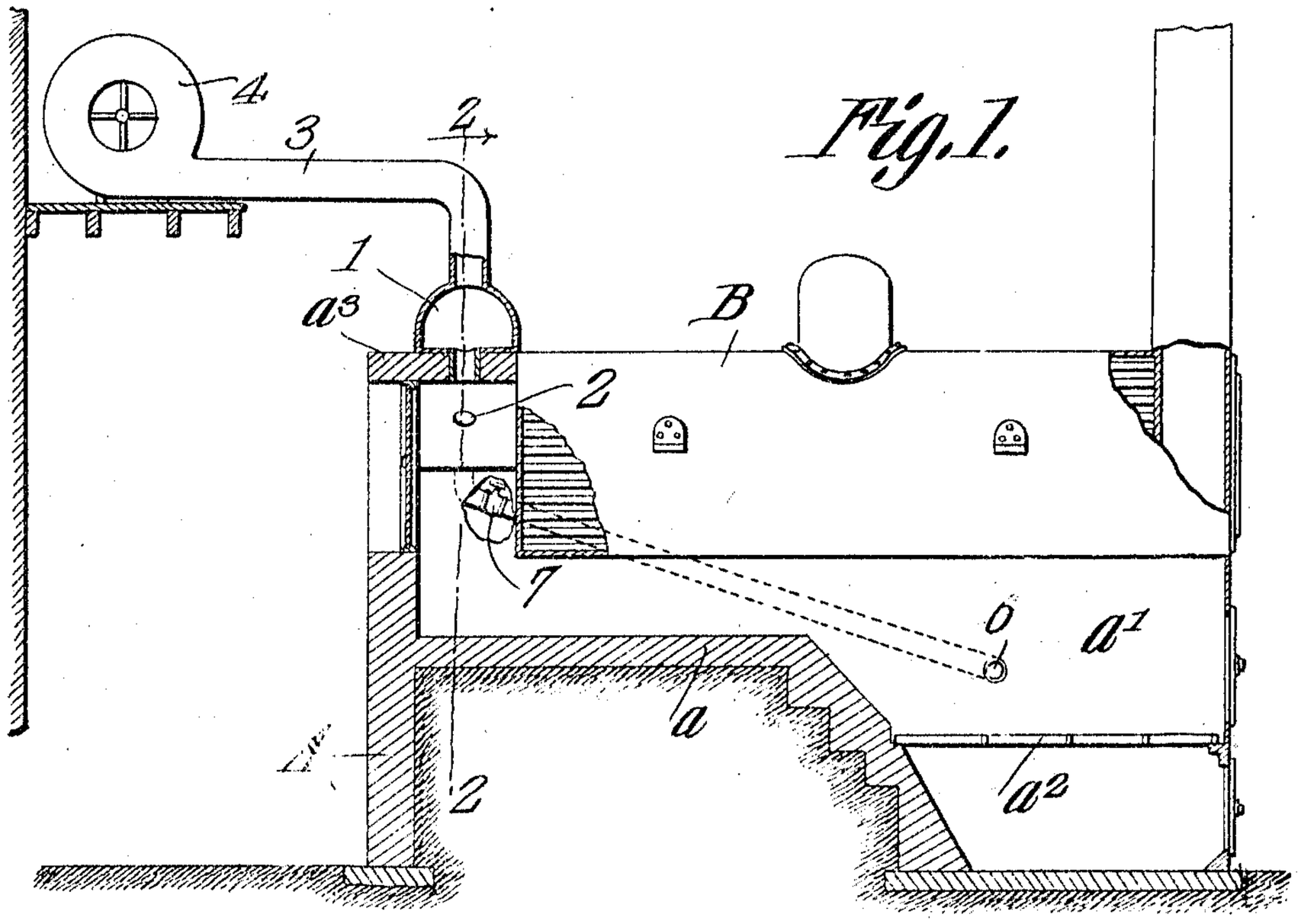


Fig. 2.

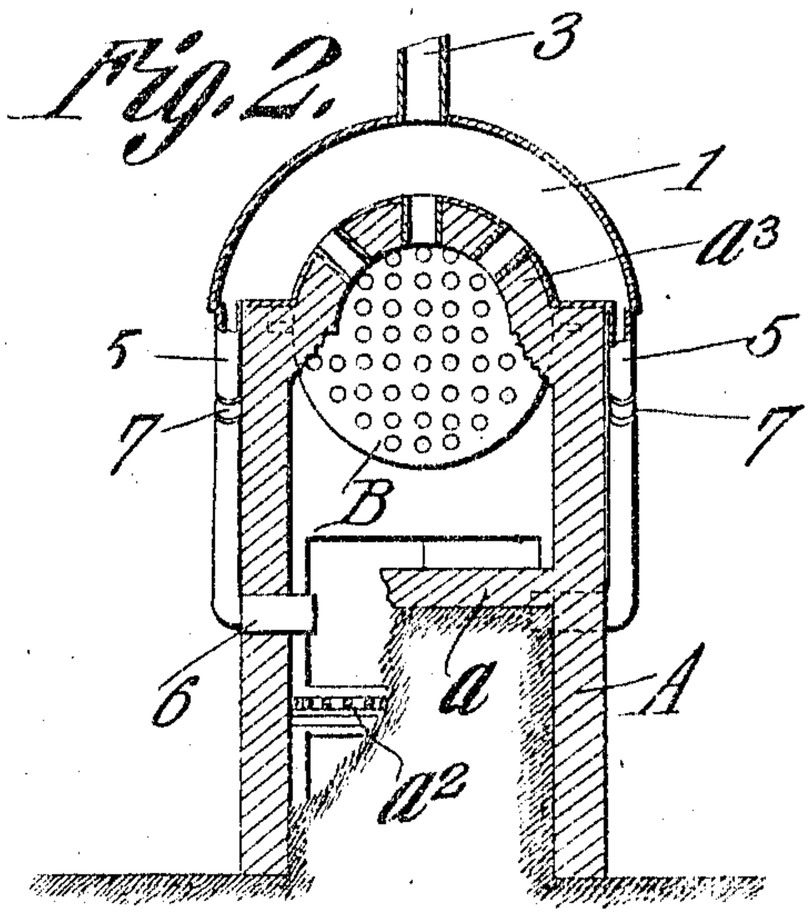
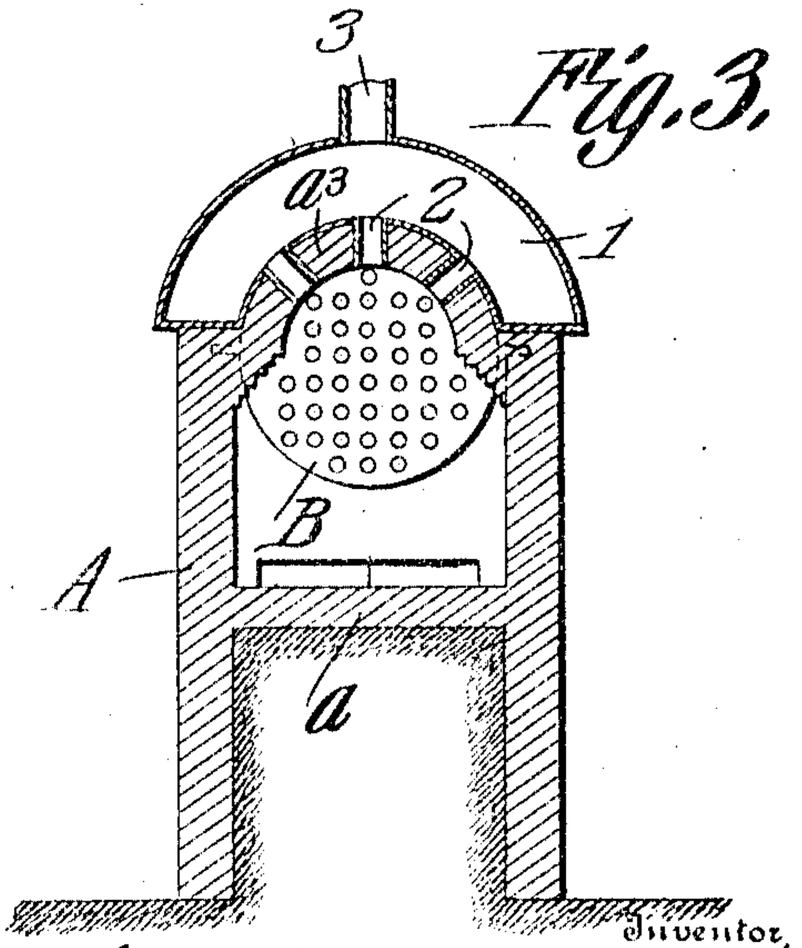


Fig. 3.



Witnesses:

E. F. Hollenbeck

R. M. Elliott

Inventor,

Maurice Blanchard.

By Church & Co.

Attorneys.

UNITED STATES PATENT OFFICE.

MAURICE BLANCHARD, OF WARDNER, IDAHO.

FURNACE.

970,417. Specification of Letters Patent. Patented Sept. 13, 1910.

Application filed January 14, 1909. Serial No. 472,327.

To all whom it may concern:

Be it known that I, MAURICE BLANCHARD, a citizen of the United States, residing at Wardner, in the county of Shoshone and State of Idaho, have invented a new and useful Furnace, of which the following is a specification.

This invention relates to boiler furnaces.

The object of the invention is, in a ready, simple, practical and novel manner to secure substantially perfect combustion of practically all of the fuel and of the gases arising therefrom, thereby not only to effect a pronounced saving in the operation of the furnace, but also to prevent accumulation of soot in the flues, whereby the loss of heat, due to the presence of such substance, is prevented, and the necessity of frequent cleaning of the flues is obviated.

With the above and other objects in view, as will appear as the nature of the invention is better understood, the same consists in the novel arrangement of mechanism for supplying air to the furnace at the rear flue sheet and to the firebox, as will be hereinafter fully described and claimed.

In the accompanying drawings forming a part of this specification and in which like characters of reference indicate corresponding parts:—Figure 1 is a view in side elevation, partly in section, displaying a boiler and a furnace equipped with the improvements of the present invention. Fig. 2 is a vertical transverse sectional view taken on the line 2—2, Fig. 1, and looking in the direction of the arrow thereon, a portion of the bridge wall being broken away to display the grate bars. Fig. 3 is a view similar to Fig. 2 of a modified form of the invention.

Referring to the drawings, A designates, generally, the furnace provided with the usual bridge wall a, firebox a', grate bars a^2 and arch a^3, in which is arranged a boiler B of the usual or any preferred construction.

As before stated, it is the object of the present invention to supply atmospheric air to the furnace adjacent to the rear flue sheet, and to the firebox above the grate bars, whereby to secure practically perfect combustion of all of the fuel and of the gases arising therefrom, thus to effect saving in the operation of the boiler and also to insure the tubes against any accumulations of unconsumed hydrocarbon.

The mechanism for securing the above results is shown in Figs. 1 and 2 and consists of a semicircular drum 1, that is semicircular in cross section, and is adapted to fit around the arch a^3 and is provided with a plurality of tubular extensions 2, which converge toward the center of the rear flue sheet and arranged in the openings provided in the arch a^3 for the purpose. These extensions or nozzles may terminate flush with the inner side of the arch, as shown in Figs. 2 and 3, or may project inward beyond the same, if found necessary or desirable. The drum 1 may be constructed of any suitable material, preferably of heavy sheet metal or boiler iron, and has connected at its top and preferably at its median line one end of a pipe or flue 3, the other end of which connects with the casing 4 of an ordinary fan blower which may be located at any convenient point in the building in which the boiler is installed and be driven by any suitable means.

As shown in Fig. 2, the drum extends beyond the outer surfaces of the sides of the furnace, and with each of these extended portions is connected a pipe or flue 5, the other end of each of which extends downwardly and forwardly, and each has connected with it a twyer 6, the two twyers being projected through the sides of the fire box at any desired distance above the grate bars and preferably to the rear of the center thereof. In order to control passage of air through the tubes or flues 5, each is provided with a valve 7 for the purpose, as clearly shown in Fig. 1.

With the construction above described, air may be supplied to the furnace in a plurality of jets, at points adjacent to the rear flue sheet, or in addition, by opening the valves, may be allowed to pass to the firebox. Where hard coal is burned, it will only be necessary to supply the air to the rear end of the boiler, but where soft coal is employed it may be necessary to employ supplemental means for supplying air to the firebox.

As shown in Fig. 3, the air supply tubes 5 are dispensed with and only the drum 1 is employed which will be disposed in the same manner as that shown in Fig. 1, and will operate in the same manner.

The advantage of supplying air to the furnace at points adjacent to the rear flue sheet, is that perfect combustion will take place within the flues, and thus not only prevent any accumulations of unconsumed hydrocarbon therein, but also protect the

brick lining of the firebox from deterioration, as by excessive heat.

As will be obvious, to install the structure, shown more specifically in Fig. 3, it will only be necessary to provide the arch a^3 with openings to receive the nozzles 2, so that no change in the structural arrangement of a boiler already in use will be necessary.

An economic feature of the present arrangement is that the drum 1 is mounted directly upon the top of the combustion chamber of the furnace, and consequently the air in said drum is pre-heated by radiation of heat from the combustion chamber and not from the boiler B. Of the heat that enters the said boiler as much as possible should be conserved for absorption by the contents of the boiler.

It has been found in practice that it is desirable to supply air for combustion to a very large degree from the top of the fuel mass in order that the formation of smoke may be prevented and that there may be more complete union of air for combustion with the carbon and hydro-carbon gases, and thus prevent the loss of fuel through the formation of and escape of carbon and carbon-monoxid gas, and also to prevent too great chilling of the fuel at the lower part of the fuel mass. It is practically impossible to pass sufficient air for combustion through the grate and fuel mass of a heating or power producing apparatus to secure perfect combustion, and if all the air for combustion is introduced through the grate and through the apertures in the feed door of the apparatus, the light volatile gases are floated out in advance of the introduced air for combustion; but if the air is introduced from above, the air is more thoroughly mixed and fused with the combustible gases and a more complete combustion produced. The introduction of air for combustion by means of forced jets or films into a combustion chamber is for the purpose of securing a more thorough admixture, diffusion, and quicker distribution of air for combustion with the volatilized combustible gases. In my invention it will be seen that the air is so introduced in this way in order that the volatilized gases as they rise must of necessity be brought into very intimate relation with films or jets of air for combustion. In case of films these rising gases must necessarily pass through those films. In steam power producing boilers of large capacity the control of the draft and the introduction of air through the action of mechanical means for producing draft such as I have described is an economical procedure.

The tubes and twyers in the walls of the combustion chamber are contracted to a size less than the heating drum from which they lead, so as to secure a penetrating action into the gases in the combustion chamber of the air forced through the said ports and a certain expansion of the introduced air after the entrance of the air into the combustion chamber.

It will be noted that the combustion chamber possesses relative length as well as height. The object of this is to secure a long run for the combustible gases and flames before they impinge, to any great extent, upon any transmitting surfaces which would absorb heat from the burning gases before they are completely consumed. This provision secures the greatest production of heat from the fuel and also prevents injury to the apparatus by the contact of too intense heat at any single point. A further object is to secure a larger area for the admixture of air for combustion and the volatilized gases and to secure time for their admixture and combustion before they come in contact with the transmitting surfaces.

In some instances where the heat of the burning fuel is very intense low down in the apparatus, as may be the case where injected fine coal dust is used or even where a highly forced draft is driven through a mass of ordinary fuel, it may be desirable to admit only a limited amount of air above and close to the fuel mass and with as little force as to restrict the action of the air just introduced to the circumferential part of the fuel mass and to allow the air to rise vertically between the flames and the volatilized hot gases at the walls of the combustion chamber, thus helping to prevent destructive action to the walls of the chamber by securing a more gradual union of the gases and a diffusion of the heat as the air and gases rise through the higher run of the combustion chamber, a final provision for complete union being a force projection of air at higher levels. The orifices for air introduction at the fire-box are located on opposite sides of the combustion chamber so that forcibly introduced currents may be carried entirely across the horizontal sectional area of the combustion chamber, and combustible rising gases will have to pass through the air currents.

The object of introducing the air for combustion at a high level in a heating apparatus is to secure a complete admixture of such air with unconsumed gases, which have a tendency to rise to the highest levels of the cavities of the apparatus and there form in a stratum of unconsumed gas at a somewhat lesser degree of temperature than the gases that have undergone complete union and combustion. Furthermore, a high introduction of air, if at the level of the exit of the outgoing volatilized combustible gases from the combustion chamber, meets the outgoing current of the gases and mixing with them assures their combustion before they leave the combustion chamber and at a high point

in the combustion chamber. It will be understood that it is most desirable to have the highest degree of heat in the highest level of the combustion chamber or heat-absorbing quantities of the heating apparatus. Another reason for the high introduction of air is that such parts of the air as escape combustion in the higher parts of the combustion chamber in its gravitation downward to the fuel mass has the opportunity of becoming more thoroughly mixed and diffused with the rising volatilized gases.

What is claimed is:—

A furnace having a combustion chamber, and a boiler having a flue sheet forming a wall of said combustion chamber, an air heater located upon the top of the combustion chamber beyond the end of the boiler, means for supplying air to the heater, pipes for leading air from the heater to the opposite sides of the forward portion of the combustion chamber and at relatively low levels, tubes for leading air from the heater to the highest level of the combustion chamber adjacent the flue sheet in streams directed in courses conflicting with the direction of the course of passage of the products of combustion through the combustion chamber.

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

MAURICE BLANCHARD.

Witnesses:

WILLIAM TURTON,

E. J. HORNIBROOK.