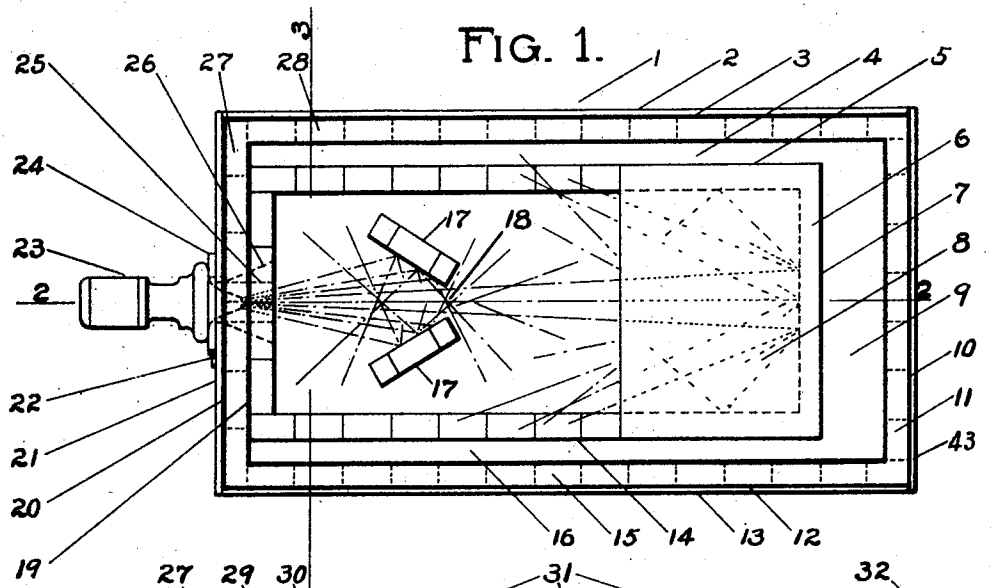
Feb. 19, 1929. 1,702,482

E. F. OTT

FIRE BOX FOR FURNACES

Filed July 7, 1923 2 Sheets-Sheet 1

FIG. 1.



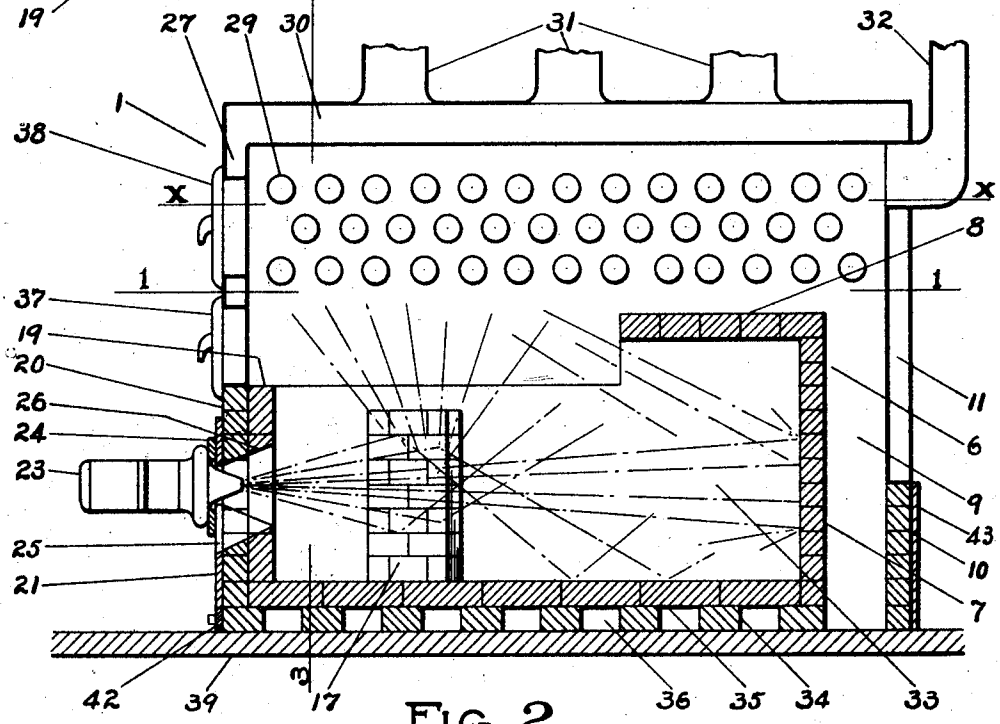


FIG. 2.

WITNESSES.

Lucian B. Jackson

Adon W Crosby

INVENTOR.

Edward F. Ott.

BY Charles B. Manlethorp

Attorney.

Feb. 19, 1929. 1,702,482

E. F. OTT

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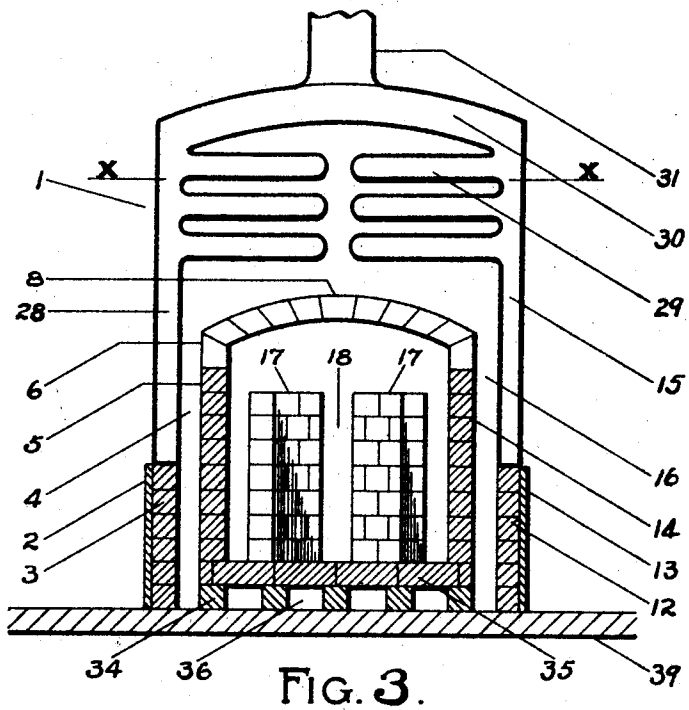


FIG. 3.

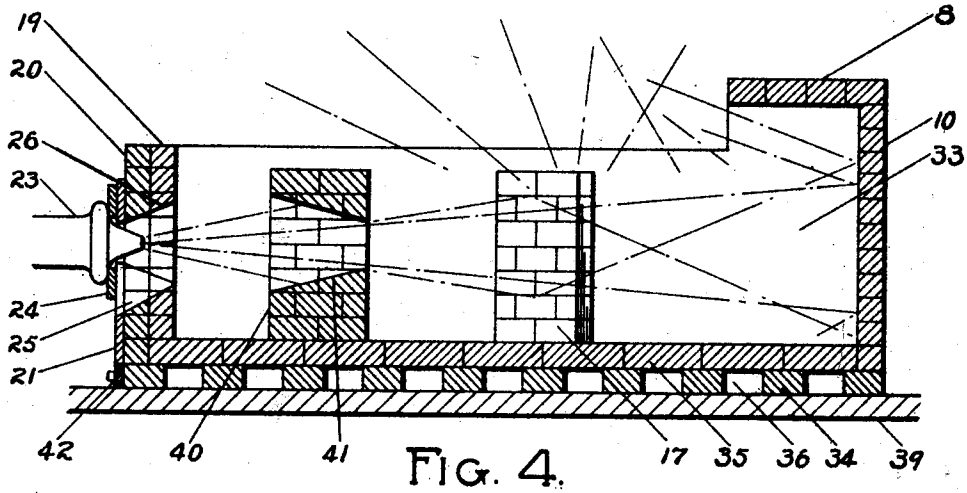


FIG. 4.

WITNESSES.

Lucinda Jackson

Alton W Crosby

INVENTOR.

Edward F. Ott.

BY Charles B. Mouldthrop

Attorney.

Patented Feb. 19, 1929. 1,702,482

UNITED STATES PATENT OFFICE.

EDWARD F. OTT, OF BUFFALO, NEW YORK.

FIRE BOX FOR FURNACES.

Application filed July 7, 1923. Serial No. 650,130.

My invention relates to certain new and useful improvements in fire boxes for heating furnaces or boilers and more particularly for utilizing oil or hydrocarbons.

Another object is to furnish an improvement which can be installed in coal or wood burning furnaces by substituting my device for, or on the coal or wood grate, as well as furnishing an improvement for new furnaces.

Another object is to furnish an improvement in fire boxes whereby the hydrocarbon is more thoroughly atomized and more thoroughly consumed and thereby eliminating the smoke.

A further object is to furnish an improvement in fire boxes whereby the heat of combustion from the fuel is better distributed to all of the heating parts of the furnace.

A further object is to furnish an improvement in fire boxes whereby the heat of combustion is not dissipated to the floor or to the atmosphere surrounding the furnace.

With these objects in view, the invention consists of certain features of novelty in the construction, combination and arrangement of parts by which the said objects and certain other objects which will hereinafter appear are attained, the invention being more particularly pointed out in the claims, it being understood that various changes may be made in the construction and arrangement of parts without departing from the spirit or sacrificing any of the advantages of the invention.

I am aware that burners have been introduced into furnaces and boilers for the purpose of burning oil or hydrocarbons and that the grates have sometimes been replaced by a fire brick lining or brick built into the grate, but as far as I know there has been no fire box improvement devised which heretofore has so successfully consumed the hydrocarbon so introduced or so successfully utilized the heat of combustion as in my improvement.

In the accompanying drawings, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1, is a plan of an improved fire box shown in a furnace of the steam heating type, below the line 1—1 of Fig. 2 and constructed according to the present invention.

Fig. 2, is a sectional elevation on the center line 2—2 of Fig. 1.

Fig. 3, is a vertical sectional elevation on line 3—3 of Figs. 1 and 2.

Fig. 4, is a central sectional elevation similar to Fig. 1 and of a modification of the present invention.

In the drawings, 1 is the furnace having iron or steel plates 2 and 13 on the sides outside of the brickwork 3 and 12, and plates 21 and 43 outside of the brickwork 20 at the front and 10 at the back. The furnace proper is mounted on the brickwork mentioned and is adapted to hold water in front space 27, side spaces 28 and 15, back space 11 and tubes 29 up to the line x—x, above which is the steam space 30 and steam outlets 31.

37 and 38 are handhole plates covering openings into the heating space of the furnace and 32 the chimney leading from said heating space.

39 is a concrete or brick floor on which the furnace rests and on this floor, but raised above it by individual bricks 34, which are spaced from each other by air spaces 36, is placed my fire box construction 6. This fire box is also spaced from the inside of the furnace by an air space 9 at the back and side air spaces 4 and 16. This air space construction is provided to utilize all of the heat from the fire box and convey it to the water in the furnace without losing part of it to the floor as in the usual construction, or to the brickwork at the back and sides and so to the outside air as is done when the latter spaces are filled in with broken brick or sand or like material as is also the usual construction.

A damper 42 in the front is provided to introduce fresh air underneath the fire box, as, and when needed, and furnish a means of circulation to carry the heat from the bottom and up the sides and back to contact with the inside surfaces of the furnace.

In my fire box construction, which is built preferably of refractory material, the top is open except at 8 which forms a partial cover and so makes a combustion space 33 next to the back wall 7. 35 is the floor of my fire box, 5 and 14 the sides and 19 the front. Through the front wall 19 of my fire box and the front supporting wall 20 of the furnace, is a cone shaped opening 26 tapering toward the outside to meet a hole through the front plate 21. Into said hole and cone shaped opening 26 projects the nozzle of a hydrocarbon oil burner 23 of any suitable blowing type, said burner mounted in a door 24 which swings from the front plate 21 by means of a hinge 22. Beneath the door 24 and communicating with the cone shaped opening 26 is an air hole

25 to furnish the necessary extra air for supporting the proper combustion of the mixture of fuel oil introduced into the fire box from the burner 23. This opening 25 is shown as a fixed opening beneath the nozzle of the oil burner 23 but an adjustable damper can also be arranged at said opening to vary the amount of air introduced and said opening can also be arranged more or less symmetrically around the said nozzle.

Between the nozzle of the burner 23 and the combustion chamber 33 are mounted two fire-brick baffle plates 17, 17 placed at an angle to each other so as to form a V-shaped construction with the point of the V directed toward said combustion chamber 33 and having a small opening 18 between said plates at the point of the V.

Where a longer fire box than that shown in Figs. 1 and 2 is advisable a modification is desirable and is shown in Fig. 4. This latter construction in Fig. 4 is similar in every way to that shown in Figs. 1 and 2 except that between the burner 23 and the baffle plates 17, 17 is introduced another set of baffle plates which can be identical with 17, 17 or a brick or similar construction 40 and having a cone shaped opening 41. This cone shaped opening 41 is widest toward the burner 23 and tapers toward the second set of baffle plates 17, 17.

The operation of the fire box is as follows: The flame from the nozzle of the burner 23 is blown out into a blast which is smallest at the nozzle and gradually widens as it leaves the burner. This flame is projected into the V-shape between the baffle plates 17, 17 and the main result is to deflect and compress it through the opening 18 and in so doing the side extremities or edges of the flame striking the incilned surfaces of said plates rebound back and forth toward the center of the flame. This retards part of the flame and contributes to the better atomizing and more complete combustion of the globules of oil which are carried in the flame stream. It also throws off flame and heat upward and toward the front and top of the furnace so the front tubes are heated equally with the back tubes. This is a very decided advantage in this construction as it has been demonstrated the front tubes are highly heated by the flame from these baffle plates while they remain considerably cooler than the back ones without the baffle plates. The baffle plates become heated to a white heat and also radiate an intense heat, to the inside surfaces of the furnace, from the outside surfaces as well as deflecting the flame from the inside of the V surfaces.

The center of the flame from the burner 23 passes through between the baffle plates and striking the inner walls of the combustion chamber 33 atomizes and burns the oil fuel. The retarding, mixing and burning of the fuel between the baffle plates 17, 17 burns up the retarded fuel there in a very complete manner and any smoke from the stream which passes between the baffle plates at 18 is completely consumed by the reflected and rebounding flame from the combustion chamber 33. This latter flame after heating the combustion chamber 33 is projected forward and upward to heat the water tubes. The combustion chamber radiates heat from its outside surfaces to the water spaces of the boiler while the air from underneath and around the sides and back takes up some heat which it again gives up to the boiler surfaces before passing out of the chimney 32.

The action of the fire box in the modification shown in Fig. 4 is similar to that already described, i. e. if both sets of baffle plates were the same as 17, 17 flame would be reflected and heat radiated from both sets, while if the construction was with a cone shaped opening 41 in a baffle plate 40 the result would be more to confine and direct the flame through to the second set of baffle plates and the combustion in the cone 41 would heat up the baffle plate to a high heat which would be more radiated than reflected.

I have demonstrated that my construction in using the baffle plates will burn oil much more efficiently, with more complete combustion, giving off more heat to the furnace and so keeping up a better steam pressure with the same amount of fuel, and without smoke or soot deposit, than the same construction without baffle plates.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A fire box for a furnace, said fire box having a covered rear chamber, said rear chamber open only forward into said fire box, a burner having a nozzle directed through an aperture in the front of said fire box, whereby a supply of fuel may be discharged thereinto, and a pair of baffle plates in said fire box independent of and in front of said rear chamber, said baffle plates spaced apart and disposed at an angle to each other and in line with said nozzle, whereby fuel from said nozzle may be discharged between said baffle plates and into said rear chamber.

2. A fire box for a furnace, comprising a bottom, two sides and front and rear end walls, the rear portion of said box having a cover to form with said rear and side walls a rear chamber open only forward into said fire box, the front wall of said fire box in contact with the front wall of said furnace, the bottom, sides and rear end of said fire box separated from the inside portions of said furnace, a burner having a nozzle directed through an aperture in the front of said fire box and said furnace, and a pair of baffle plates in said fire box between said end walls, said baffle plates having a V-shaped opening between them in line with, and pointed away from, said directed nozzle.

3. A fire box for a furnace, comprising a bottom, two sides and front and rear end walls, the rear portion of said box having a cover to form with said rear and side walls a rear chamber, said rear chamber open only forward into said fire box, said fire box located in said furnace and spaced from it at the bottom, sides and rear and with its front wall in contact with the front wall of said furnace, a burner having a nozzle directed through an aperture in the front of said fire box and said furnace, and a pair of baffle plates in said fire box independent of said end walls and in front of said rear chamber, said baffle plates spaced apart and disposed at an angle to each other to form a V-shaped opening in line with said nozzle, whereby fuel from said nozzle may be concentrated and directed between said baffle plates and out through the point of said V-shaped opening into said rear chamber.

In testimony whereof, I have signed my name to this specification.

EDWARD F. OTT.