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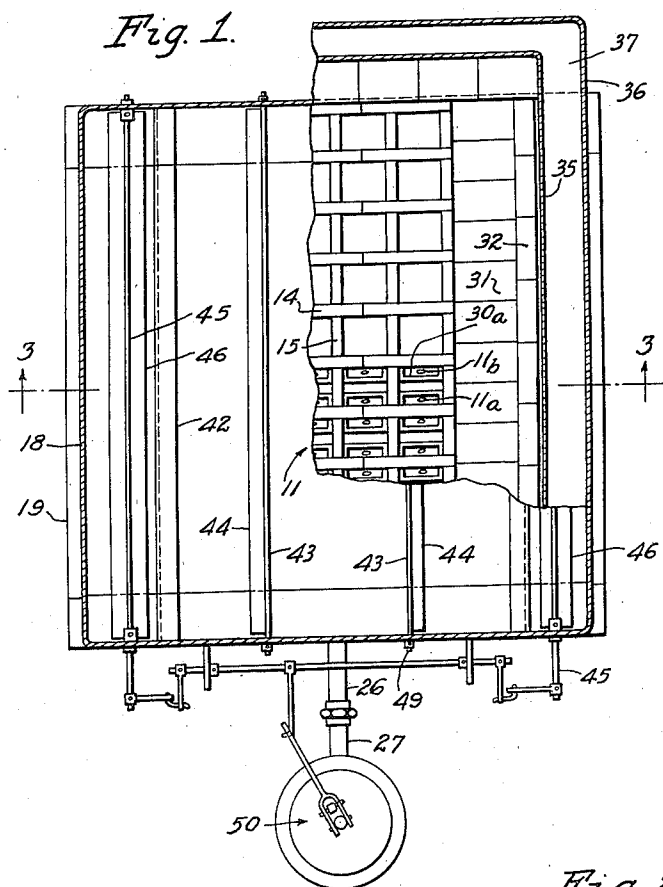
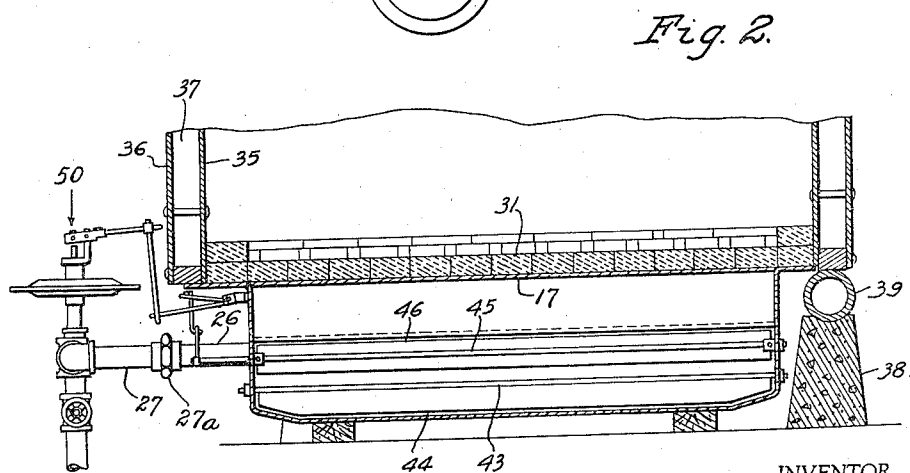
A. E. MARTOIS

2,231,391

FURNACE CONSTRUCTION

Filed March 10, 1939

2 Sheets-Sheet 1



INVENTOR.
Arthur E. Martois
 BY *Robt. W. Pearson*
 ATTORNEY.

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Fig. 3.

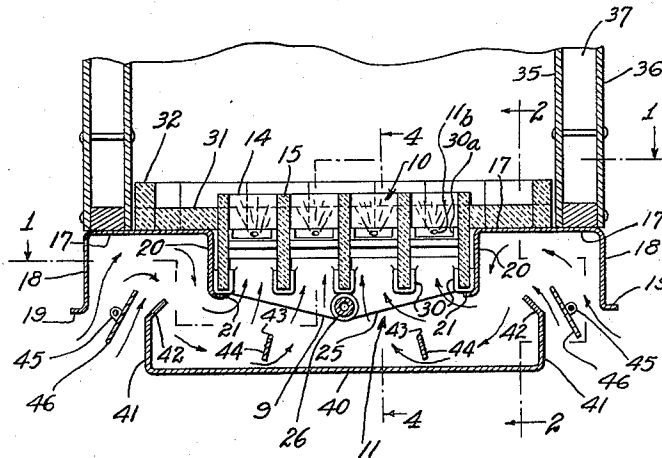
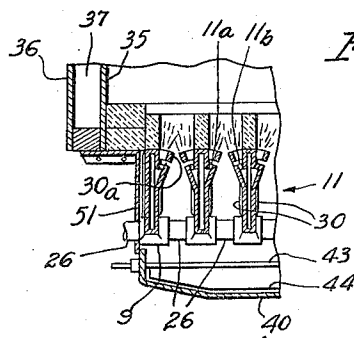


Fig. 4.



INVENTOR.

BY *Arthur E. Martois*
Robt. W. Pearson

ATTORNEY.

UNITED STATES PATENT OFFICE

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FURNACE CONSTRUCTION

Arthur E. Martois, Lomita, Calif.

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6 Claims. (Cl. 158—7)

This invention relates to a furnace construction which is adapted to be used in a great variety of situations, but which is more particularly intended for use in conjunction with steam boilers used in well drilling operations.

Due to the great variation in steam demand throughout the day in the drilling of oil wells, the firebox boilers are subjected to a constant change in rate of firing. At one moment they are operating at 50% of their rating and at the next instant the driller may open wide the throttle and cause the automatically controlled rate of firing to jump to as high as 200% of boiler rating and even higher.

Such abuse of boilers will naturally result in frequent repairs and replacement of parts. Particularly is this true of flues and flue sheet.

The injury to such parts does not result from the intense heat of firing, although too heavy firing is not the best practice. Dirty water and lack of proper care are contributing factors. But, cold air has ruined more boilers than any other cause. When cold air rushes into a firebox, immediately after a period of extremely heavy firing, and comes in contact with the flue sheet and flues, distortion of these parts is bound to result after they have been subjected to such treatment over a considerable period of time.

It is an object of this invention to provide improved means for preheating the air before it reaches the combustion chamber, thereby preventing cold drafts of air from coming in contact with the heating surface of the boiler.

Among other objects of the invention are:

To provide a portable, more compact burner unit assembly for moving from one location to another; to provide an improved means to control the currents of air fed to the combustion chamber; and to provide an air control means of the kind stated that can be fitted into an operative position in many different kinds of furnace constructions.

Other objects, advantages and features of the invention will hereinafter appear.

Referring to the accompanying drawings, which illustrate what is at present deemed to be a preferred embodiment of the invention,

Fig. 1 is a plan view of a combined furnace and boiler construction embodying the invention, partly sectioned on line 1—1 of Fig. 3, only part of the burner structure being shown, to simplify the drawings.

Fig. 2 is a section on line 2—2 of Fig. 3.

Fig. 3 is a section on line 3—3 of Fig. 1.

Fig. 4 is a fragmental sectional view of the burner structure taken on line 4—4 of Fig. 3.

Referring in detail to the drawings, the invention resides in part in the means, best shown in Fig. 3, for preheating and directing the course of the air currents fed to the mixing chambers 10 of the burner structures 11. Said burners each include an elongated manifold 9 desirably straight across its top side and having a bottom lowest at the center and upwardly inclined toward each side. Said manifolds are disposed in a parallel spaced relation to each other as best shown in Fig. 4.

The mixing chambers 10 are rectangular in shape and are arranged in a mass formation, adjacent chambers being separated from each other by vertically positioned slabs 14 and 15 of refractory material, said slabs being arranged in two courses with the slabs 14 disposed at a right angle to the slabs 15, thus producing a pigeon-hole effect as best shown in Fig. 1.

The burner structure shown in the drawings of the present application is similar to that described and claimed in Patent Number 2,083,169, on gas burners, issued to me June 8, 1937.

In order properly to support and position both the aforesaid slabs which form the walls of the mixing chambers, and certain other structures, along each side of said structures is located a plate, preferably of sheet steel, having a horizontal body portion 17 at each side of the area occupied by the slabs 14 and 15. Each of said plates is shown shaped as an inverted rectangular U and has an outer downwardly directed limb or flange 18 with a stiffening flange 19, and an inner, downwardly extending limb or flange 20 which is deflected near its lower edge thus providing shelf-forming flanges 21 to support the aforesaid assembly of slabs 14 and 15, together with the burner structures 11.

The burner manifolds 9 serve as portable supports for the assembly of mixing chamber slabs 14 and 15 together with the burner nozzles and nipples or pipe sections 26 which unite said manifolds and which form the immediate source of their fuel supply, the outer member of said pipe sections being connectible by means of a pipe union 27a with the stationary fuel supply pipe 27. The opposed sides of adjacent manifolds 9 are furnished with U-shaped of channel shaped saddle members 30 to receive opposite lower corner portions of the slabs 15, and U-shaped ribs 30a to hold upright the slabs 15. The slabs 14 rest upon the tops of the burners 11 between their spaced apart burner outlet

portions 11a and 11b, which inject gas into the mixing chambers 10. The end portions of the burner manifolds 9 constitute runner means which are slidably supported by the aforesaid

5 shell flanges 21 of the main support. Hence said flanges 21 function as the rails of a horizontal track along which the assembly of burners and mixing chamber forming members are slid-

10 able into and from their operative positions. The horizontal, upper plate portions 17 have deposited upon them spacing slabs 31 and 32, the inner slabs 31 being shown lying on their sides while the outer slabs 32 are supported in an edgewise manner with their outer faces abut-

15 ting against the inner boiler walls 35. The boiler is of the locomotive firebox type, and is shown rectangular as viewed in plan. It has an outer wall 36 which cooperates with said wall 35 to form the water and steam chamber 37. Said boiler is supported by conventional means, the cement member 38 and tube 39 of Fig. 2 being a partial illustration of said means.

Below the burner supporting structure, in

25 downwardly spaced relation thereto is a floor plate 40 having oppositely disposed upstanding side walls 41 with inwardly deflected top flanges 42. Horizontal rods 43 carrying deflecting plates 44 are arranged above the plate 40 to direct the air currents as indicated by the arrows in

30 Fig. 3, thus equalizing the amount of air fed to the different burners. Also horizontal outer damper rods 45 carry damper plates 46, these dampers controlling the ingress of air between the plate walls 41 and the outer plate portions

35 18. The incoming air is preheated owing to it being directed upwardly by the floor plate portions 41 and 42 causing it to engage the hot horizontal upper plate portion 17, whence it passes downwardly over the hot flange 20, then

40 finally upwardly between the manifolds 9 and the slabs 14 and 15 into the combustion chambers. The preheating of the air in this manner to only 200 degrees Fahrenheit will save about

45 three to four per cent of the amount of gas required in a given period of time.

A diaphragm type gas pressure controlled air damper regulator 50 automatically controls the air supply to the furnace.

50 A steam pressure controlled boiler fuel governor or thermostatically controlled gas valve, not shown, regulates the fuel input to the boiler.

The front of the structure is closed by a plate 51 which is removably secured in place by any

55 suitable means after the burner assembly 11 has been put in place.

I claim:

1. A mixing chamber and air feed construction for boiler furnaces comprising a frame of a generally rectangular shape, said frame having a

60 pair of top plates in a substantially horizontal plane, said plates being in a spaced substantially parallel relation to each other and having each a downwardly directed portion along its inner

65 side furnished with a flange which is directed toward the other plate, said flanges forming track rails, an assembly of members secured together in a rectangular mass formation of the pigeon-hole type, burners included in said assembly, said

70 assembly being supported upon and between said rails and being slidable along them for positioning in and withdrawal from operative position, said downwardly directed plate portions being positioned to radiate heat supplied from said

75 burners and forming heat radiating walls of air

intake passages for said burners, and means to supply fuel to said burners.

2. A mixing chamber and air feed construction for boiler furnaces comprising a frame of a generally rectangular shape, said frame hav-

5 ing a pair of top plates in a substantially horizontal plane, said plates being in a spaced substantially parallel relation to each other and each having a downwardly directed portion along its inner side, said downwardly directed portions

10 each being furnished with a flange, said flanges forming two burner supporting rails, a row of spaced apart saddle shaped members the bases of which are slidable along said rails, an assembly of refractory slabs secured together in a

15 rectangular mass formation of the pigeon-hole type thus affording a multiplicity of air chambers having open upper and lower ends, said saddle members forming seating means for lower edge portions of slabs at opposite sides of said

20 assembly, and spaced apart parallel gas manifolds underlying said assembly of slabs and supported by said saddle members, said gas manifolds extending across the space between said track rails, said saddle members being channel shaped and the open sides of the channels thereof being

25 directed upwardly.

3. The subject matter of claim 2, in which said gas manifolds are provided with outlets for injecting gas into said air chambers, and said

30 gas manifolds have slab alining U-shaped ribs, the gas passing through the space included between the side portions of said U-shaped ribs.

4. In combination, a pair of plates in substantially the same horizontal plane each of which

35 has a substantially rectangular top portion which is in parallel, spaced relation to the corresponding top portion of the other plate, a burner structure occupying the space between said plates and supported by them, walls upstanding from

40 said plates thereby inclosing a combustion chamber above said burner structure, said plates and burner structure being supported to allow air to pass thereunder and said burner structure having

45 air passages into said combustion chamber, a floor plate underlying said burner structure, said floor plate having upstanding side walls along two of its opposite sides and each plate of the

50 aforesaid pair of plates having along each of its opposite sides a downward extension, each of said side walls of the floor plate cooperating with the downward extension at its side of the burner structure to form an outer upward passage and then a downward inner passage on its

55 way to said burner structure.

5. In combination, a pair of plates in substantially the same horizontal plane each of which has a substantially rectangular top portion which is in parallel, spaced relation to the corresponding top portion of the other plate, a burner structure occupying the space between said plates

60 and supported by them, walls upstanding from said plates thereby inclosing a combustion chamber above said burner structure, said plates and burner structure being supported to allow air to

65 pass thereunder and said burner structure having air passages into said combustion chamber, a floor plate underlying said burner structure, said floor plate having upstanding side walls along two of its opposite sides and each plate of the

70 aforesaid pair of plates having along each of its opposite sides a downward extension, each of said side walls of the floor plate being located between the lower portions of the two downward extensions at its side of the burner structure

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to form an outer upward passage and then a downward inner passage whence the air passes inwardly and then upwardly to said burner structure, and an air deflecting plate in the path 5 of the air at each side of the center of the floor plate to equalize the amount of air fed to the different portions of the burner structure.

6. In a structure of the kind described, a boiler, means to support said boiler with an air space

therebeneath, horizontal track rails underlying said boiler in a downwardly spaced relation thereto, and an assembly of combined burners and members forming mixing chambers for said burners, portions of said assembly constituting 5 runner means normally supported by said track rails and movable along them for the insertion or removal of said assembly.

ARTHUR E. MARTOIS.