Jan. 2, 1940. L. L. ANTHES ET AL 2,185,365

HEATING FURNACE

Filed July 2, 1937

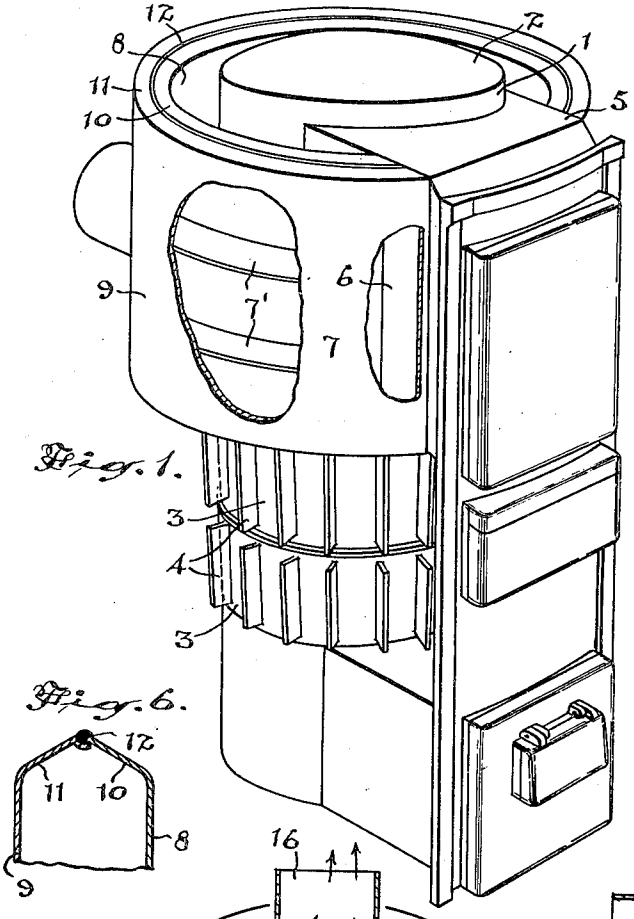


Fig. 1.

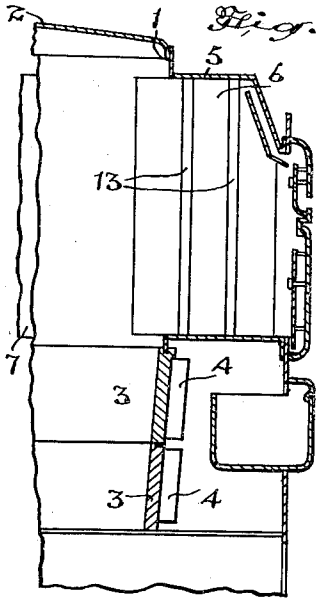


Fig. 2.

Fig. 6.

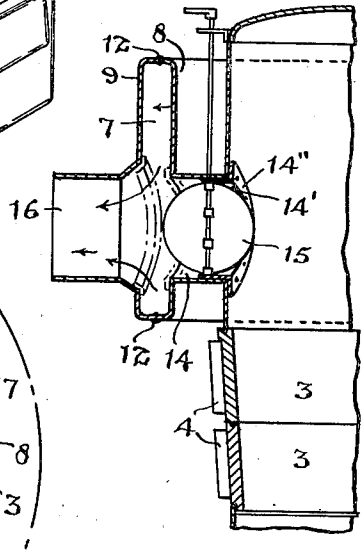


Fig. 3.

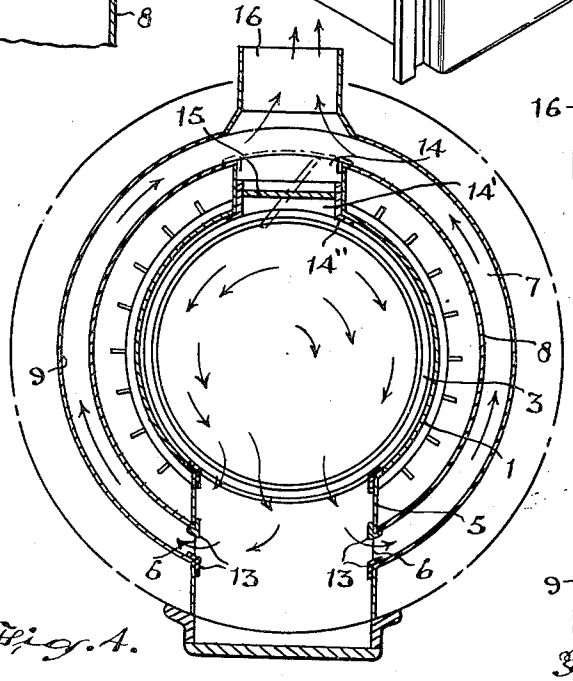


Fig. 4.

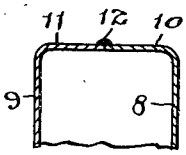


Fig. 5.

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Patented Jan. 2, 1940 2,185,365

UNITED STATES PATENT OFFICE

2,185,365

HEATING FURNACE

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Application July 2, 1937, Serial No. 151,560
In Canada July 17, 1936

1 Claim. (Cl. 126—102)

The principal objects of this invention are to produce a furnace having a fire dome and flue passages constructed of steel, so as to present an extraordinary heating surface, and in which the flue passages are effectively sealed in a very simple manner against leakage of gas, and will have remarkable freedom of expansion without harmful stresses, thereby presenting a furnace particularly adaptable for burning coal, coke, oil and gas fuels.

The principal feature of the invention consists in the novel construction of a flue drum to surround the fire dome, whereby a pair of part cylindrical flanged plates are united by welding the flange edges together in a permanent gas tight joint and said drum is connected to the fire door casing by welded joints.

In the accompanying drawing,

Figure 1 is a perspective view of the inner sheet metal fire dome and flue drum with the fire pot and door structures.

Figure 2 is a part vertical mid-sectional view through the front door structures and fire dome.

Figure 3 is a part vertical mid-sectional view through the fire dome and flue drum at the smoke flue exit.

Figure 4 is a horizontal plan section taken through the fire door and smoke flue exit.

Figure 5 is an enlarged sectional view of a portion of the flue drum illustrating a preferred form of flange and joint construction.

Figure 6 is a view similar to Figure 5 showing a modified form of flange and joint construction.

Heating furnaces constructed with steel plate fire-domes and flues of steel plate have been proven to be extremely desirable in their very efficient heat transfer qualities and their freedom from rupture through the effects of expansion and contraction, but they have some inherent defects or objections which the present invention aims to overcome in a manner which renders the whole construction very economical to build, and which will have no joints or seams which will be liable to open under the stresses applied through constant expansion and contraction.

In the construction of furnace herein illustrated the fire dome 1 is of the usual cylindrical form with an arched cap 2 which may be either welded or riveted in place. This dome is here shown mounted on the fire pot sections 3, which are usually cast iron, and formed with radiation vanes 4.

The dome is provided with a rectangular fire door casing 5 which is welded to the dome and has vertical flue slots 6 in the side walls.

Surrounding the dome 1 is a flue drum 7 which, according to the present invention, is formed of a pair of sheet metal plates 8 and 9, the inner plate 8 having its top and bottom edges flanged outwardly presenting the part circular flange 10, and the outer plate 9 having its top and bottom edges flanged inwardly presenting the part circular flange 11. The peripheral edges of the flanges 10 and 11 are butted together or lapped and are welded together in a gas tight joint 12 thus joining the two plates to form a part circular tubular flue drum, the ends of which abut the side walls of the fire door casing 5 and are welded along the edges of the flue slots 6 in the sides of said casing and protective corner plates 13 of angled form are preferably applied over the welded joints thus formed.

The flue drum thus constructed has rounded or filleted edges at the top and bottom which permit of great freedom of expansion and contraction of the vertical side walls without stress on any corner seam or joint, and, as will be readily understood, the plates can be readily rolled to form, the edge flanges being upset in the rolling operation. The lapped or butt joint is extremely strong and will easily withstand any stresses applied through expansion and contraction.

A thimble 14 is inserted between and welded at the respective ends to the drum 7 and dome 1 at a point opposite the fire door leading to the flue drum, and a collar 14′ fits snugly into the inner end of the thimble and serves to support the damper 15, and the collar carries an outwardly turned flange 14″, which snugly overlies the inner side of the dome and forms a protection for the welded joint between the dome and thimble and the welded joints between the drum and thimble, and the welded-in smoke flue exit 16 may be protected in a similar manner if desired.

It will be understood that when the damper is closed, the gases of combustion in the fire dome flow through the slots 6 in the fire door casing and circulate through the drum to the exit 16, and almost a complete double circle of heat exchange areas is provided for heating the air circulating around the combustion chamber in addition to that presented by the combustion chamber or dome 1 and fire box.

While, for the purpose of illustration, we have shown only a single flue drum 7, we may, in certain cases, provide two or more such drums spaced diametrically apart to further increase the areas of the heat interchange surfaces, and we may also arrange suitable baffles such as are indicated in broken lines at 7′ in Figure 1 to direct the flue

gases in circuitous paths within the drum and this will be found particularly advantageous in furnaces using fuel oil or gas.

The construction described will present extraordinarily large heat exchange areas and the danger of gas leakage is entirely eliminated.

What we claim as our invention is:

A heating furnace having a flue drum formed of cylindrically walled sections of different diameters spaced apart the one within the other and having respectively inturned and out-turned integral end closure flanges at each end welded together at their peripheral edges in a peripheral zone medially of the cylindrical wall portions, said inturned and out-turned flanges each having well rounded strain-relieving fillet connections with the respective cylindrical walls extending in continuous peripheral paths about the ends of the flue drum to impart resiliency to the structure and whereby the welded joints will be subjected to the minimum strain on the relative expansion and contraction of said cylindrical walled sections.

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