April 21, 1931. F. W. BROOKE 1,802,000

FURNACE

Filed Sept. 17, 1928

Fig. 1.

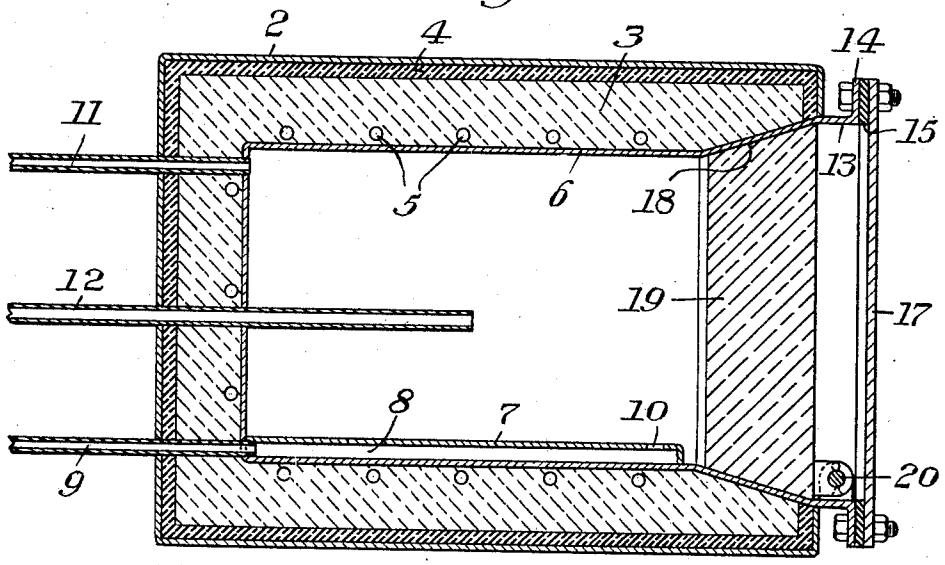
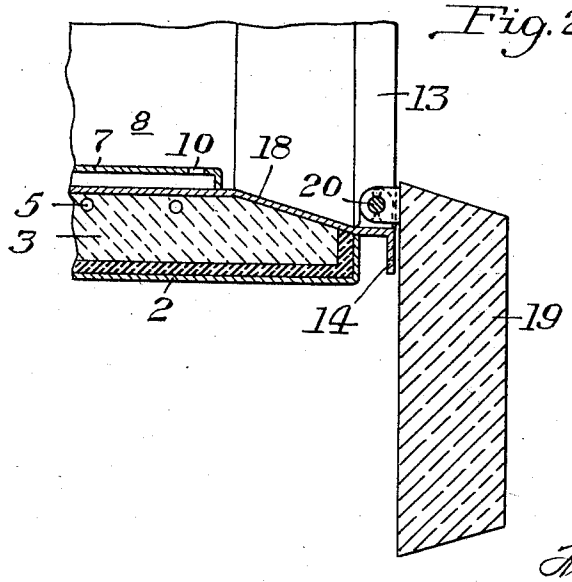


Fig. 2.



INVENTOR

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his attys.

Patented Apr. 21, 1931 1,802,000

UNITED STATES PATENT OFFICE

FRANK W. BROOKE, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WILLIAM SWINDELL & BROTHERS, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

FURNACE

Application filed September 17, 1928. Serial No. 306,597.

The present invention relates broadly to the art of heating furnaces, and more particularly to a furnace adapted for the carrying out of heat treating operations in a gas atmosphere capable of being controlled or changed at will during the heat treating period.

Heat treating operations of the general nature herein contemplated are usually carried out by placing the work to be treated in a separate receptacle having a gasket sealed closure, and bodily putting the sealed receptacle into a suitable furnace for the heat treating period. This method has not been entirely satisfactory not only because of the difficulty of obtaining a gasket suitable for the high temperature conditions to which it must be subjected, but because of the inability to examine the receptacle for leakage during the heat treating operation and the difficulties incident to providing the necessary connections for the maintenance of the desired atmosphere within the receptacle.

In accordance with the present invention there is provided a furnace of improved construction overcoming the difficulties heretofore encountered, and expediting the performance of the various steps incident to the heat treating operation.

In the accompanying drawings I have shown for purposes of illustration only, and in more or less diagrammatic form, a preferred embodiment of the present invention, it being understood that the embodiment shown is susceptible of various changes without departing either from the spirit of the invention or scope of my broader claims.

In the drawings:

Figure 1 is a vertical longitudinal sectional view through a furnace constructed in accordance with my invention, and

Figure 2 is a partial sectional view similar to Figure 1, illustrating the furnace in condition for charging or discharging.

In carrying out the present invention there may be utilized any standard furance construction comprising an outer steel shell 2 with a refractory inner lining 3 of fire brick, there being any suitable heat insulation 4 between the fire brick and the outer shell.

Cooperating with the refractory lining is a plurality of heating units 5 of any desired type and constructon, electrical units being preferred due to the ease of arranging and controlling the same for the most advantageous operation.

Within the lining 3 is placed a metallic receptacle 6 of some material such as nickel-chromium iron or steel sheets having such analysis as to withstand the temperature conditions to which it is subjected, and also reaction of the gas atmosphere hereinafter, described. Within the receptacle 6 is a false partition 7 preferably at the bottom of the receptacle, although it may be arranged at any of the other sides of the receptacle as desired. In any case, the partition will be arranged to form a narrow chamber subjected to the full temperature conditions within the furnace, and effective for preheating any fluid passing therethrough.

Attached to the receptacle 6 in such manner as to extend through the back wall of the furnace and communicate with the chamber 8 is a pipe 9 connected at its outer end to a suitable gas supply, and effective for delivering such gas to the chamber 8. This gas in traveling through this chamber is raised to the full furnace temperature before being discharged into the receptacle through the openings 10. In this manner I effectively obviate the objectionable cooling effect incident to passing gas at substantially room temperature directly into the heat treating chamber. The disposition of the preheating chamber will be determined largely by the character and nature of the heat supply.

Circulation of the gas atmosphere from the furnace to permit continued renewal thereof may be obtained by providing a second pipe 11 preferably connected to the receptacle at a point remote from the openings 10.

A third pipe 12 extending into the receptacle 6 provides for the insertion of suitable thermocouples, not shown, by which the temperature conditions may be continuously observed.

The receptacle 6 is provided with an extension 13 through the throat of the furnace, formed with a flange 14. This flange is

adapted to receive a suitable gasket 15 by means of which the joint between the receptacle and its cover 17 may be effectively sealed. It will be noted that the cover and gasket are both located exteriorly of the furnace, thereby enabling a low temperature gasket material to be utilized, and enabling the joint to be observed throughout the heat treating operation.

Within the receptacle extension 13, which is preferably shaped to provide a tapered seat 18, is a plug door 19 having proper heat insulation and of such material as to withstand both the temperature and gas conditions within the furnace. This plug door has a pivotal mounting 20 so located and arranged that upon removal of the cover 17, the door may be pulled out and dropped to the position shown in Figure 2, entirely clear of the furnace.

The provision of the heat insulating door 19 prevents such a heat loss through the extension and gasket joint as to cause lack of uniformity in the work near the cover.

The present invention is thus seen to provide a furnace which may be easily charged and discharged, which may have the desired gas conditions easily maintained therein or renewed as necessary, which obviates lack of uniformity in the temperature of the work being treated regardless of its location, and which precludes cooling of the work by the gas being admitted. It also provides a gasket susceptible of inspection at will, and which may be of such characteristics as to most effectively seal the joint against leakage or air infiltration, thereby further assisting in the maintenance of the required conditions throughout successive heat treating cycles.

It will be further understood by those skilled in the art that the drawings do not define the limits of my invention, it being apparent that changes in the construction and arrangement illustrated are contemplated within my invention.

I claim:—

1. In a furnace, a heating chamber integral with the furnace and having a charging opening, a heat insulated closure in said opening, and sealing means for said chamber exteriorly of said closure and unconnected therewith.

2. In a furnace, a heating chamber integral with the furnace and having a charging opening, a heat insulated closure in said opening, and sealing means for said chamber exteriorly of the furnace and of said closure said sealing means being unconnected with said closure.

3. In a furnace, a heating chamber integral with the furnace and having a charging opening, a heat insulated closure in said opening and sealing means for said chamber exteriorly of said closure, the closure and sealing means being unconnected, there being means cooperating with said chamber for introducing a gas thereinto.

4. In a furnace, a heating chamber having a charging opening, a heat insulated closure in said opening, and sealing means for said chamber exteriorly of said closure, there being means cooperating with said chamber for supplying gas thereto and preheating the supplied gas within the confines of the chamber but maintaining it separate from the gas contained in the chamber until it is heated.

5. In a furnace, a heating chamber having a charging opening, a heat insulating closure in said opening, and sealing means for said chamber exteriorly of said closure, there being means cooperating with said chamber for supplying gas thereto and preheating the supplied gas, said means including a preheating chamber through which the supplied gas must pass before entering said heating chamber.

6. In a furnace having a throat, a receptacle within said furnace having an enlarged extension through said throat, a heat insulated closure for said extension located within said throat, and a sealing cover exteriorly of said closure.

7. In a furnace having a throat, a receptacle within said furnace having an enlarged extension through said throat, a heat insulated closure for said extension, and a sealing cover exteriorly of said closure, there being means for supplying gas to said receptacle.

8. In a furnace having a throat, a receptacle within said furnace having an enlarged extension through said throat, a heat insulated closure for said extension, and a sealing cover exteriorly of said closure, there being means for supplying gas to said receptacle and preheating the supplied gas before delivery thereto.

9. In a furnace having a throat, a receptacle within said furnace having an extension through said throat, a heat insulation closure for said extension, and a sealing cover exteriorly of said closure, there being means for supplying gas to said receptacle and preheating the supplied gas before delivery thereto, said means including a thin preheating chamber substantially coextensive with one dimension of the receptacle.

10. In a heat treating furnace, a metallic receptacle having an extension thereon projecting through the furnace wall, a heat insulated plug closure for said extension movably cooperating therewith, and a sealing cover for said extension exteriorly of the plug closure and susceptible of inspection at will with the furnace in operation, said sealing cover being unconnected with said plug.

11. In a furnace, a heating chamber integral with the furnace and having an opening, a heat insulated closure therefor, and sealing means for the opening spaced from the closure and unconnected therewith.

12. In a furnace, a heating chamber integral with the furnace and having an opening, a heat insulated closure therefor, and sealing means extending across the opening exteriorly of the closure and unconnected therewith.

In testimony whereof I have hereunto set my hand.

FRANK W. BROOKE.