April 16, 1929. O. A. COLBY 1,709,658

ELECTRIC FURNACE

Filed July 14, 1927

Fig.1.

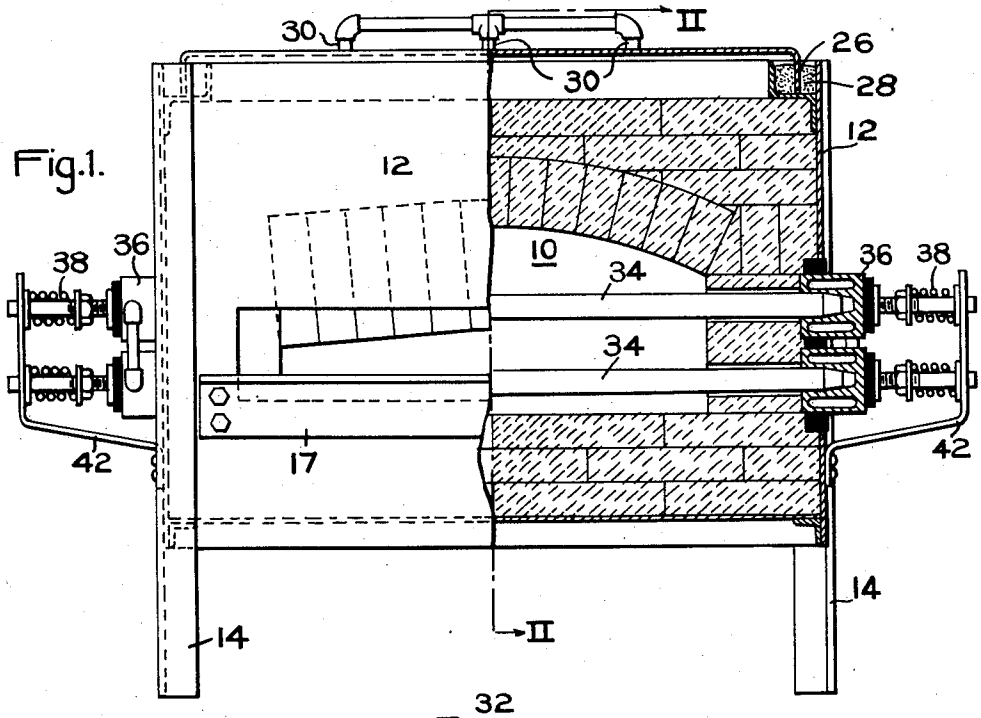
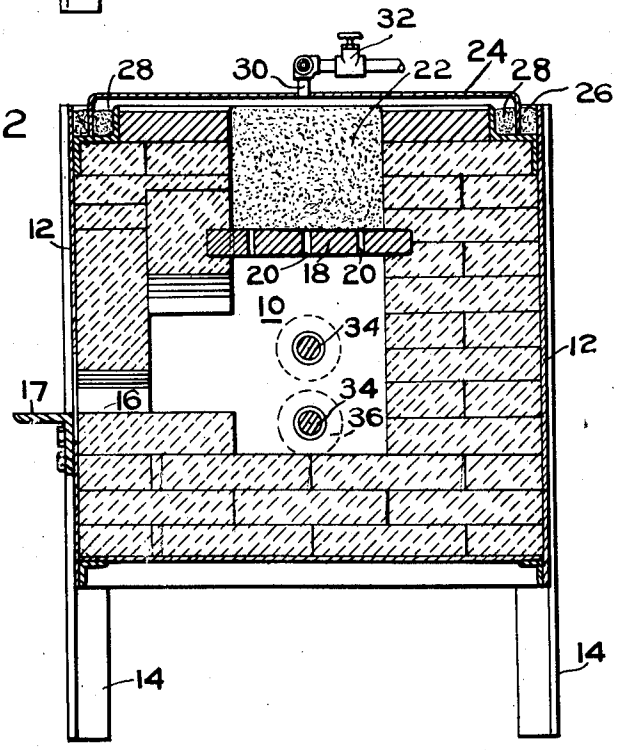


Fig.2



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UNITED STATES PATENT OFFICE.

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ELECTRIC FURNACE.

Application filed July 14, 1927. Serial No. 205,551.

My invention relates to furnaces and more particularly to heat treating furnaces of the electrical resistance type.

In furnaces of the above mentioned type, it is essential that the atmosphere of the furnace chamber be chemically neutral or at least non-oxidizing, to prevent oxidation and consequent scaling of the articles being heated.

It is an object of the present invention, therefore, to provide, in a heat treating furnace, means for maintaining a non-oxidizing atmosphere in the heating chamber thereof.

It is a further object of my invention, to provide means accomplishing the double purpose of maintaining a chemically neutral furnace chamber atmosphere and of preventing the entrance of air into the furnace chamber through the charging opening thereof.

In practicing my invention, I provide a heat treating furnace comprising a heating chamber and a charging opening therefor, means for causing a current of air to flow through said chamber from the roof thereof through said charging opening, and means for reducing said air prior to the entrance thereof into said chamber, whereby a non-oxidizing atmosphere within said chamber is obtained, and air is prevented from entering through said charging opening.

In the drawing:

Figure 1 is a view, in front elevation, of a furnace embodying my invention, having a portion of the front wall thereof broken away, and

Fig. 2 is a view, in longitudinal vertical section, taken on the line II—II of Fig. 1.

Referring to the drawing, a furnace embodying my invention comprises a roof, bottom and side walls, built up of suitable refractory heat-insulating material, defining a furnace chamber 10. A sheet metal shell 12 covers the refractory bottom and side walls to provide necessary structural strength, and the assembly is supported upon angle irons 14 suitably secured to said shell.

As shown more clearly in Fig. 2, the heating chamber 10 is provided with a work receiving opening 16 extending through the front wall of the furnace and communicating with the heating chamber.

Secured to the outer surface of the shell 12 and in alignment with a portion of the floor of the heating chamber, is an angle bar 17, coextensive in length with the width of the charging opening 16, forming a shelf for supporting articles to be heated.

A passage, substantially coextensive in lateral section with the dimensions of the heating chamber, extends vertically through the roof of the furnace into communication with said chamber. The lower extremity of said passage is substantially closed by a diaphragm 18 of refractory material constituting the top wall of said heating chamber, and apertured as at 20, for a purpose hereinafter described. A quantity of granular material 22, carbon in the present embodiment, is supported upon the diaphragm 18 and substantially fills said passage.

Closure of the top of the furnace structure is effected by a cover plate 24 provided with depending flanges 26, formed peripherally thereof, which are adapted to rest in channels 28, supported upon the roof of the furnace and suitably secured to the sheet metal shell 12. A quantity of granular material, sand for example, fills the channels 28 and cooperates with the depending flanges 26 to form a sand seal, in the usual manner.

Conduits 30 project through the closure plate 24 and are operatively connected, through a valve 32, to a source of compressed air (not shown).

With the structure described, it is obvious that upon the opening of valve 32, air under pressure will pass down through the granular material 22, the apertures 20 in diaphragm 18, through the heating chamber, and out through the charging opening 16.

Heating of the furnace chamber is effected by electrical resistance rods 34, the ends of which are supported in, and extend through, apertures formed in the side walls of the furnace structure. Water-cooled terminals 36 engage the ends of the resistors and are connected to a suitable source of electrical energy (not shown), in the usual manner. Resilient means 38 is provided for each end of a resistance rod to maintain the terminal 36 in close operative engagement with the resistance rod 34, a bracket 42 constituting an abutment for the springs 38.

In operation, the resistance elements are energized to effect a desired furnace chamber temperature and the valve 32 is opened to cause a flow of air down through the

granular material 22, into and through the furnace chamber. The granular material 22 becomes heated by reason of the energization of the resistance rods 34, and the air passing therethrough is chemically reduced to a more or less harmless, non-oxidizing gas. The pressure at which the air is introduced into the top of the furnace is of such a value that substantially all of the oxygen contained in the air chemically combines with the granular carbon.

The result is a continuous stream of inert, or non-oxidizing gas which flows through the heating chamber and out through the charging opening. The resistance elements and work being heated are thereby protected against oxidation and the efflux of gases through the charging opening effectively prevents the influx of the air therethrough.

A portion of the gas entering the chamber will exhaust through the apertures receiving the ends of the resistance elements 34, thereby preventing the influx of air therethrough and effect a lowering of the temperature of the terminals 36. If a sufficient air pressure is maintained, the passage of the gas past the resistor terminals may be relied upon to cool the terminals to a safe operating temperature, thereby obviating the necessity of the water cooling means shown.

Quite obviously, my invention may be applied to furnaces varying considerably in design from that disclosed. For example, the diaphragm 18 may constitute the bottom or side wall of the furnace chamber, and various sources of heat known in the art may be employed in place of the resistors 34.

It is further pointed out, that although I have described specifically a system wherein air is passed through a quantity of heated carbon, it is clearly within the scope of the present invention to employ various other gases and various granular materials to produce a furnace chamber atmosphere having desired chemical characteristics.

By my invention I have provided, in conjunction with a heat treating furnace, means for effecting a furnace chamber atmosphere having a desired chemical effect upon the heating elements and work being heated, said means at the same time also preventing the entrance of air into the furnace chamber.

Modifications may be made in my invention without departing from the spirit and scope thereof, and I desire therefore that only such limitations shall be placed thereon as are imposed by the prior art and set forth in the appended claims.

I claim as my invention:

1. In a furnace, the combination with a heating chamber and a charging opening therefor, of means for forcing a gas into and through said furnace chamber, and a quantity of oxidizable material positioned to be heated by said furnace and through which said gas passes prior to entry into said furnace chamber, whereby an atmosphere of non-oxidizing gas is maintained in said chamber.

2. In a furnace, the combination with a furnace chamber having a perforated roof portion and a charging opening, of means for forcing a gas through said roof portion and out of said charging opening, and means for chemically reducing said gas prior to passage through said roof portion whereby said chamber is filled with a non-oxidizing gas and the entrance of air through said charging opening is prevented.

3. In a furnace, the combination with a furnace chamber, a perforated diaphragm forming a roof therefor, and a charging opening for said chamber, of a quantity of granular oxidizable material upon said perforated roof, and means for forcing air at relatively low pressure through said granular material into said chamber and out through said charging opening, thereby maintaining a non-oxidizing atmosphere in said furnace chamber and preventing the entrance of air through said charging opening.

4. In a furnace, the combination with a heating chamber and a plurality of openings formed through the furnace wall and communicating therewith, of a perforated member closing one of said openings, a quantity of granular oxidizable material beyond said opening and adapted to be heated by heat from said chamber, and means for forcing air through said granular material, into said heating chamber, and out through said openings, whereby said chamber is filled with a non-oxidizing gas and said openings are substantially sealed against the influx of air therethrough.

In testimony whereof, I have hereunto subscribed my name this 24th day of June, 1927.

ORA A. COLBY.