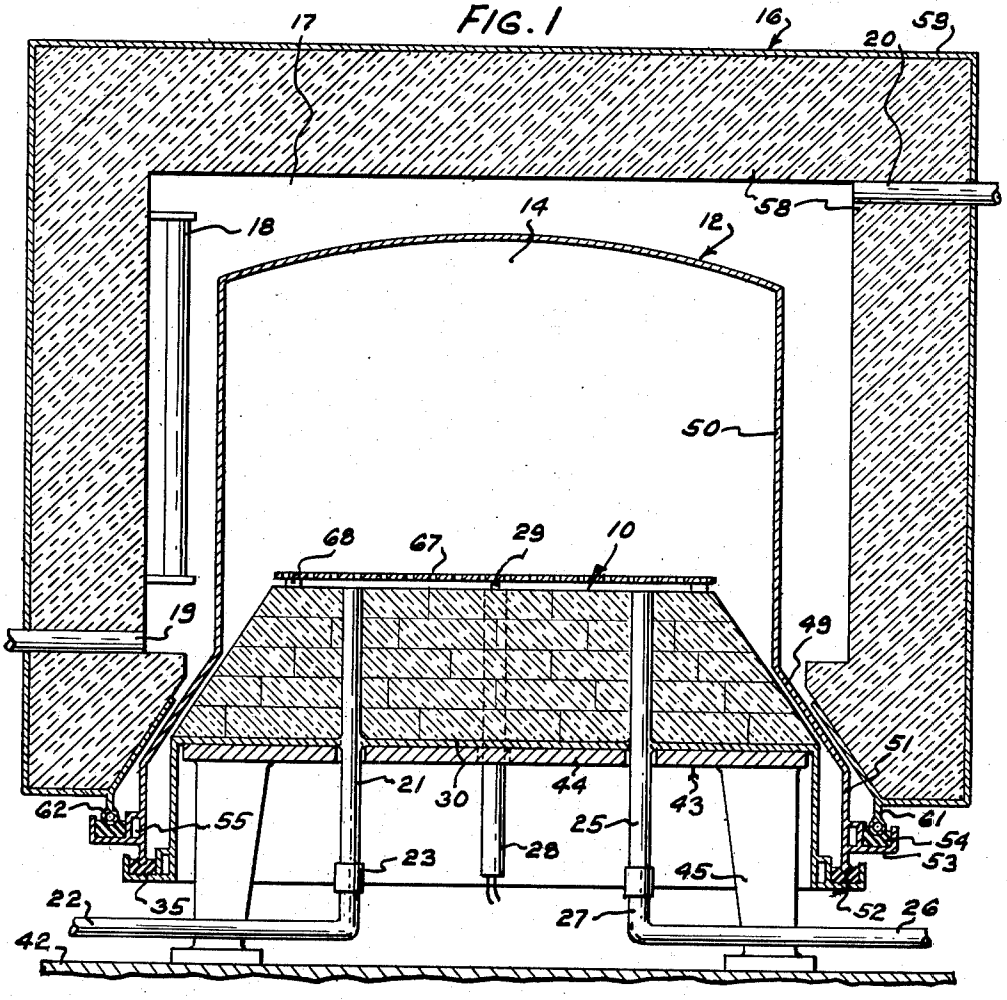
July 9, 1957 E. PUGH 2,798,716

HEARTH STRUCTURES FOR HIGH TEMPERATURE FURNACES

Filed Jan. 8, 1954

FIG. 1



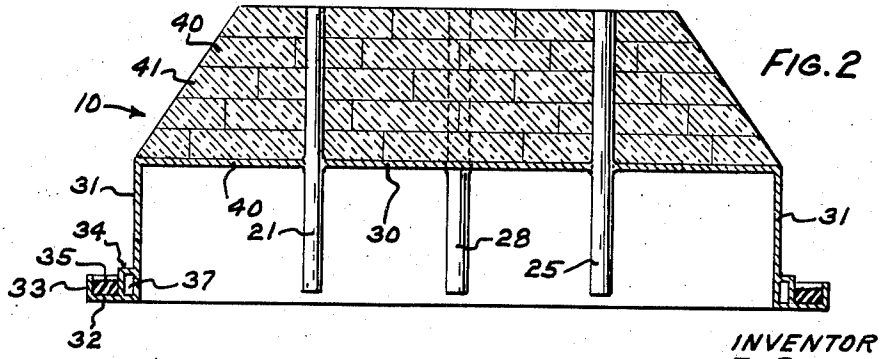


FIG. 2

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United States Patent Office 2,798,716 Patented July 9, 1957

2,798,716

HEARTH STRUCTURES FOR HIGH TEMPERATURE FURNACES

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Application January 8, 1954, Serial No. 403,001

1 Claim. (Cl. 263—49)

This invention relates to quickly replaceable hearth structures for high temperature furnaces.

The upper metal cap portion of the hearth structure of electric furnaces such as disclosed in Patent 2,556,962 is subjected to heat of approximately 2100° F. with the result that due to the oxidizing effect and mechanical stresses of the high temperature the metal cap deteriorates rapidly and the hearth structure has to be replaced frequently.

An object of the invention is to provide a furnace having an improved hearth structure capable of withstanding a relatively high temperature.

It is a further object of the invention to provide a quickly replaceable unitary hearth structure for a furnace, which may be readily moved into operative position and quickly removed therefrom.

A furnace illustrating certain features of the invention may have a fixed pedestal mounted on the floor, a hearth removably supported on the pedestal and including a plate and a slab of refractory material on the plate, an inverted cup-shaped hood removably supported on the plate and engageable with a sealing member thereon to form a closed inner chamber above said hearth in which parts are to be heated, a bell housing removably supported on the hood and engaging a sealing member thereon adjacent said hearth to form an outer chamber around the hood in which heating elements are mounted, and tubes on said plate passing through the slab and connectible to pipelines for flowing gas into and out of the inner chamber, said components being arranged so that the plate is insulated by the slab of refractory material from the intense heat of the inner chamber and so that when the bell and the hood have been removed, a defective hearth may be readily removed from the pedestal and a new hearth replaced thereon.

Other objects and advantages of the invention will become apparent by reference to the following detailed description and the accompanying drawings, illustrating a preferred embodiment thereof, in which:

Fig. 1 is a vertical central sectional view through the furnace; and

Fig. 2 is a vertical central sectional view of the unitary hearth structure.

Referring to the drawings the furnace comprises generally a unitary hearth structure **10**, an inverted cup-shaped metal hood **12** adapted to be lowered onto the hearth to form an inner chamber **14** in which the articles to be heated are placed, and an inverted cup-shaped bell **16** adapted to fit over and enclose the hood **12** and be supported on the lower portion thereof to form an outer chamber **17** enclosing the inner chamber **14**. A plurality of electrical heating elements **18** are mounted on the inner walls of the bell **16** for heating the furnace and a plurality of pipes **19** and **20** pass through the walls of the bell to establish communication between the interior and exterior of the bell for supplying a predetermined atmosphere in the outer chamber **17**. An inlet pipe **21**

extends upwardly through the hearth **10** and is connected to a pipeline **22** through a union **23** for supplying a predetermined gas to the inner chamber and outlet pipe **25** extends through the hearth **10** and is connected to a pipeline **26** through a union **27** for exhausting the atmosphere therefrom. An additional pipe **28** extends through the hearth structure to provide an opening for the insertion of a thermocouple or other measuring instruments **29** into the inner chamber of the furnace. Each of the pipes **21**, **25**, and **28** is bonded to the plate **30** to provide a hermetic seal therebetween.

The hearth structure **10** comprises a circular metal plate **30** having a cylindrical skirt **31** depending from the outer edge thereof to form an extension thereof and from the lower end of the skirt extends a horizontal annular portion **32**. An upwardly extending cylindrical flange **33** is formed on the outer edge of the portion **32** and cooperates with an L-shaped portion **34** to form an annular channel for receiving a rubber sealing gasket **35**.

A plurality of courses of fire brick or other refractory material is laid on the plate **30** around the pipes **21**, **25**, and **28** to form a layer or slab **40** of a predetermined thickness. The pipes **21**, **25**, and **28** are welded to the plate **30** to provide a hermetic seal therebetween. As shown herein the refractory slab **40** has sloping or conical walls **41**. The unitary hearth structure **10** thus formed is supported in spaced relation to the floor **42** on a suitable pedestal **43** comprising a horizontal plate **44** supported on a plurality of legs **45**, which in turn are supported on the floor **42**. The plate **44** of the base is provided with clearance apertures for the pipes **21**, **25**, and **28**. The unitary hearth structure as shown in Fig. 2 may be prefabricated and lowered onto the pedestal **43** and the pipes **21** and **25** connected to the pipe lines **22** and **26**, respectively.

The hood **12** is adapted to be lowered onto the hearth **10** and has a flared or conical shaped wall portion **49** extending from the lower end of the cylindrical wall portion **50** thereof, which conical wall **49** conforms to the conical walls **41** of the slab **40**. The hood **12** has a cylindrical skirt **51** projecting from the lower end of the conical portion **49** and the lower end of the skirt **51** is enlarged to form an annular bead **52** which is adapted to engage the rubber sealing gasket **35** and form a seal between the hood **12** and the plate **30** of the hearth structure **10**. An annular shelf structure **53** extending outwardly from the cylindrical walls **51** of the hood **12** has a channel for receiving a rubber sealing gasket **54** and a conduit **55** through which coolant may be circulated to cool the gasket **54**.

The bell **16** which is adapted to be raised from and lowered to an operative position as shown in Fig. 1 comprises relatively thick walls of refractory material **58** enclosed within a metal shell **59**. An annular sealing ring **61** extends downwardly from the bell **16** and has a rounded bead on the lower edge thereof which may be hollow as indicated at **62** for the circulation of a cooling fluid therein, and which is engageable with the sealing gasket **54** on the hood **12** for effecting a seal between the hood **12** and the bell **16**. The gasket **54** and the annular shelf structure **53** also serve to support the bell **16**. Thus, when the hood **12** and the bell **16** are lowered onto the hearth **10** the components cooperate with each other to form a sealed inner chamber **14** within the hood **12** and a sealed outer chamber **16** surrounding the inner chamber **14** so that the atmosphere in the inner chamber may be purged therefrom and hydrogen flowed therein and the atmosphere in the outer chamber may be purged therefrom and an inert gas supplied thereto as described in more detail in the above-referred-to patent.

The articles to be heat treated may be placed upon

the upper surface of the slab 40 but preferably are placed on a perforated metal tray 67 provided with feet 68 which rest on the upper surface of the slab. The relatively thick refractory slab 40 of the hearth structure serves to insulate the plate 30 and the seal 35 from the intense heat of the furnace which rises to a temperature of from 2000° to 2200° F. so that the plate 30 during the operation of the furnace is heated only to a temperature of from 200° to 300° F. With this design of hearth structure only the slab 40 of refractory material is exposed to the high temperatures while the plate 30 is relatively cool and free from oxidation and thus the hearth structure does not deteriorate rapidly with use but has a relatively long life. However, when the refractory slab 40 deteriorates through repeated heating and cooling stresses, it is a relatively simple matter, after the bell 16 and the hood 12 have been removed, to disconnect the pipes 21 and 25 from the lines 22 and 26 and raise the unitary hearth structure 10 from the pedestal and remove it, and then place another prefabricated unitary hearth structure on the pedestal. The removal of an old hearth structure and the replacement thereof with a new hearth structure requires about half an hour and thus it does not necessitate an extended shutdown of the furnace and does not appreciably interfere with the continued operation thereof.

It is to be understood that the above-described arrangements are simply illustrative of the application of the prinicples of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

A base for a high temperature furnace having a removable domed hood, which comprises a stationary platform having a horizontal supporting member and a plurality of depending legs in engagement with a floor, a unitary hearth structure supported removably on said platform above and in spaced relation to the floor, said hearth structure comprising a metal plate supported removably on and positioned immediately adjacent to the horizontal supporting member of the platform, said metal plate having a marginal portion for supporting the domed hood to form a gas-tight chamber for heating articles therein, a layer of refractory material supported upon the metal plate, said layer forming a bottom for the gas tight chamber and insulating the metal plate and stationary supporting member from direct exposure to heat within the chamber, and vertical tubes extending through and attached fixedly to the metal plate with upper portions of said tubes extending through the layer of refractory material to the top surface thereof and lower portions of said tubes depending below the supporting member of the stationary platform through complementary oversized openings formed in the supporting member, the lower ends of said tubes being detachably arranged to conduct gases into and out of said chamber, and an article supporting tray mounted upon the upper surface of the layer of the refractory material.

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