Jan. 27, 1925. 1,524,362

A. M. McINTOSH

HIGH TEMPERATURE FURNACE

Filed July 15, 1922 2 Sheets-Sheet 1

Fig. 1

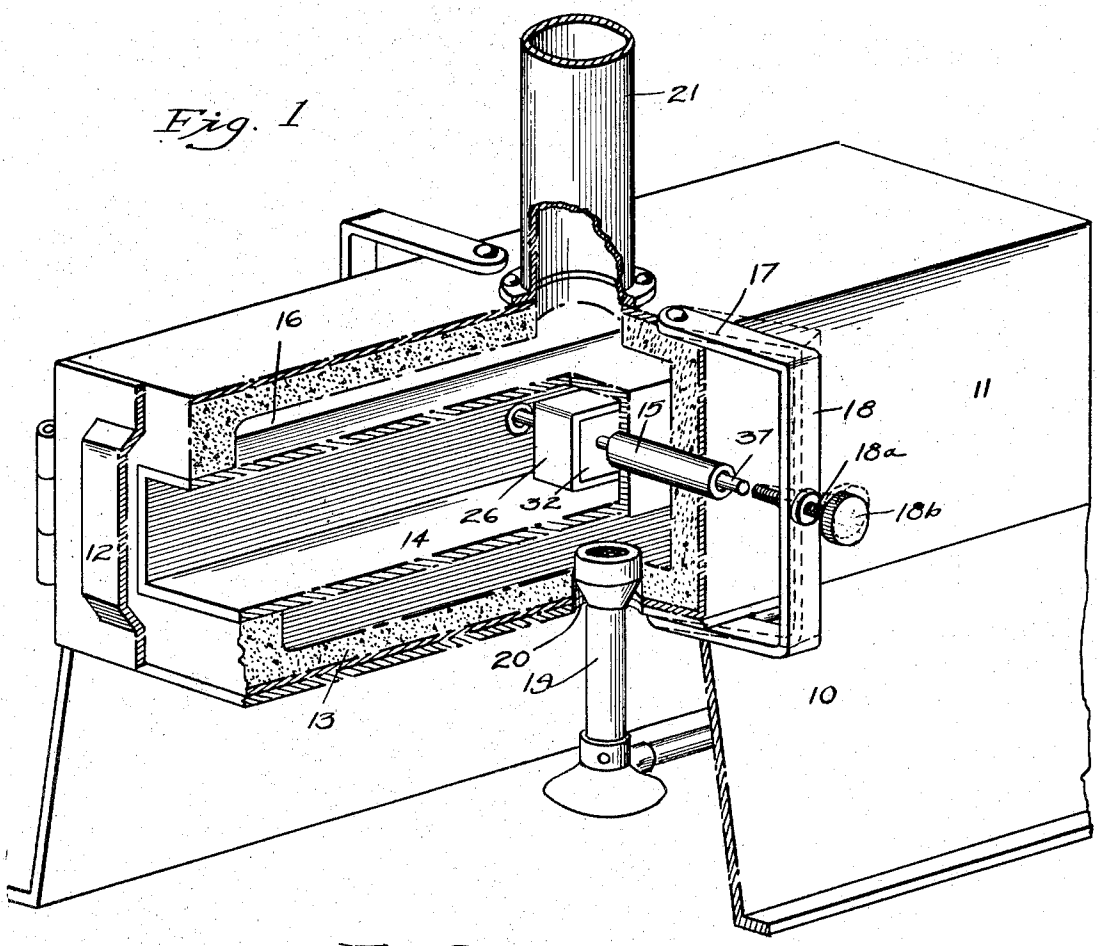
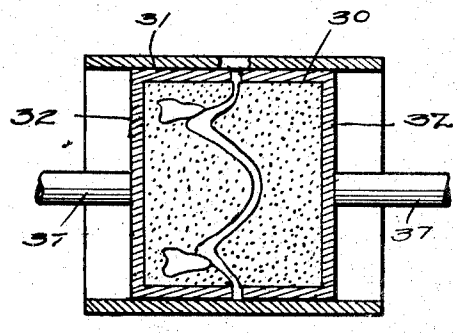


Fig. 2



Witness
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Fig. 5

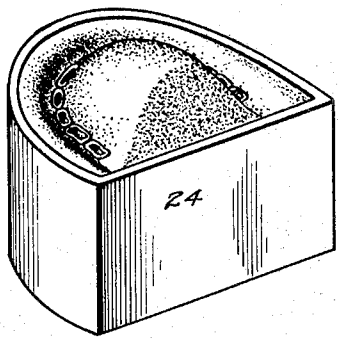


Fig. 6

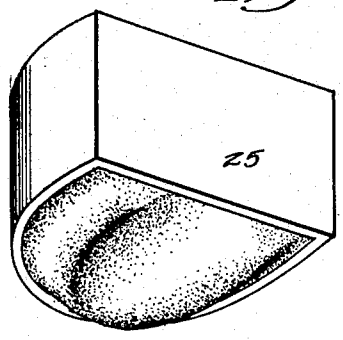


Fig. 4

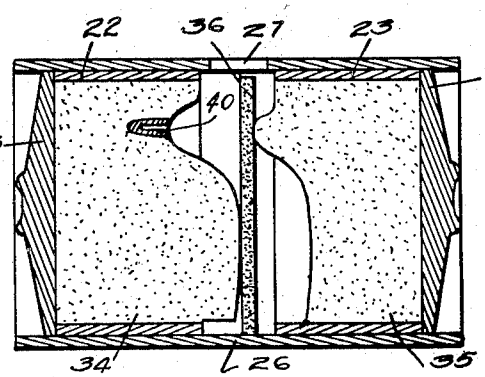


Fig. 7

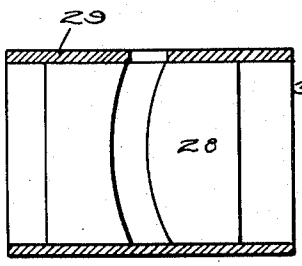


Fig. 8

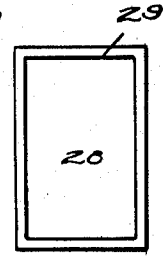
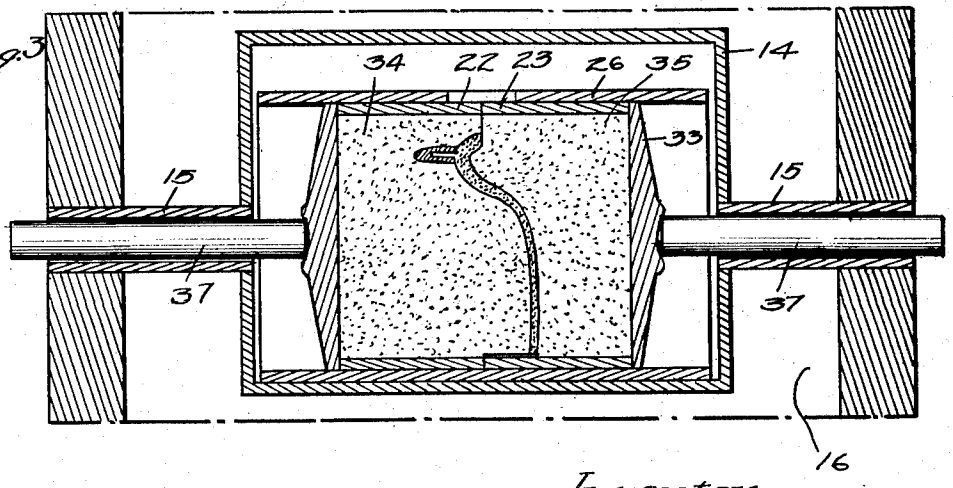


Fig. 3



Inventor

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Witness

Lynn Latta

Patented Jan. 27, 1925. 1,524,362

UNITED STATES PATENT OFFICE.

ARTHUR MARSHALL McINTOSH, OF SYDNEY, AUSTRALIA.

HIGH-TEMPERATURE FURNACE.

Application filed July 15, 1922. Serial No. 575,388.

To all whom it may concern:

Be it known that I, ARTHUR MARSHALL McINTOSH, a citizen of the Commonwealth of Australia, and a resident of Sydney, Australia, have invented a certain new and useful High-Temperature Furnace, of which the following is a specification.

My invention has to do with high temperature furnaces of the kind used in fusing ceramic ware and the like.

The purpose of my invention is to provide a furnace of the general kind under consideration, properly built and equipped for fusing porcelain, ceramic ware and the like and with appliances or apparatus for pressing the porcelain or other ware into the desired shape in the furnace, and while the ware is heated to such a temperature that it is plastic and can readily be bent or pressed into shape.

A further object is to provide in such a furnace, suitable mechanism for conveniently accomplishing the purposes just mentioned.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 shows a perspective view of a furnace embodying my invention, parts being broken away and parts being shown in section.

Figure 2 shows a detailed, sectional view of my mold holding device.

Figure 3 shows a vertical, sectional view of my furnace and the mold holding device therein and the pressure effecting and controlling apparatus.

Figure 4 shows a detailed, sectional view through my holding device, showing the mold members spaced slightly apart from each other before the pressure operation is performed.

Figures 5 and 6 are perspective views of mold holding members.

Figure 7 is a side elevation of a slightly different form of mold holding device; and

Figure 8 is an end view of the receiving link or tube of one of the mold holding devices.

It may be mentioned at this time that I have not attempted by the drawings herewith to illustrate anything more than the general idea of my furnace construction and it should be understood that my furnace may be made in a great variety of sizes and forms and that many details of the structure and arrangement may be changed without departing from the real spirit of my invention.

In the drawings herewith, which illustrate a form in which my invention may be embodied, I have used the reference numeral 10 to indicate generally a supporting base for my furnace, which has the body 11, which may be rectangular in cross section, as shown, and have the form of a tube, which is considerably longer than it is wide.

The furnace may be divided into an upper and lower half, if desired.

At the ends of the furnace body 11 are the doors or the like 12. The furnace is lined with fire clay 13 or other refractory material suitable for the purpose.

It should be noted that the fire clay lining 13 is provided at its ends with openings, which are accessible through the doors 12 and are adapted to receive the muffle 14. The muffle 14 may have a variety of shapes, but as here illustrated, is rectangular in cross section, and of such length that its ends may be projected into the openings at the ends of the fire clay lining 13.

Mounted in the side walls of the muffle 14, substantially between its ends or at the point where the greatest heat is to be applied, are tubes 15.

The muffle 14 is of highly refractory material and the tubes 15 are preferably of the same material and fused thereto, thus making a gas-tight joint.

The material may be fused quartz, for instance.

It may be mentioned in this connection that there is a space 16 around the muffle and inside the fire clay lining 13 and that the construction wherein the tubes 15 are used is designed for use where gas or the like is employed for supplying heat. Where electricity is used for heat, it is obvious that the provision of the gas-tight joints is not so necessary.

The tubes 15 project through suitable openings in the side walls of the fire clay lining 13 and the furnace body 11.

Pivotally secured to the furnace body 11

are the arms 17 of yokes 18 arranged at opposite sides of the furnace body. Adjustably mounted in the yokes 18 are screw bolts 18^a having at their outer ends, the heads 18^b convenient for the manual manipulation of the screw bolts.

I have illustrated in my drawings, a furnace of the type with a gas burner 19, the nozzle of which extends through an opening 20 into the compartment 16 below the muffle 14 and preferably about the middle of the furnace from end to end.

A pipe 21 extends upwardly from the furnace and communicates with the interior thereof and is designed to carry off the dead gases from around the flame of the burner 19.

For use with my furnace, I provide mold holding devices, one of which will now be described.

Each mold holding device preferably consists of three tubular members. In Figures 3 and 4, I have shown a mold holding device, having the tubular members 22 and 23 arranged to register with each other and having the same shape in cross section. These tubular members may be rectangular in outline or may have other shapes.

In Figures 5 and 6, I have shown two of such members indicated by the reference numerals 24 and 25.

The tubular members 22 and 23 of the mold holding apparatus are designed to be received in a longer, larger guide and receiving tube 26, which has an opening 27 in its wall through which the members 22 and 23 and the mold members supported thereby and the material to be molded may be inspected.

In Figure 7, I have shown a slightly different form of mold holding apparatus 28, having the guide and receiving member 29, illustrated also in Figure 8.

In Figure 2, I have shown the mold holding members 30 and 31 provided with the end members 32.

In Figure 3, I have shown adjacent to the end members 22 and 23, the plates or the like 33.

I will now illustrate the practical use of my improved furnace by explaining one of the processes for making or forming ceramic ware or porcelain ware, which may be practiced with my furnace.

Assume that it is desired to make and form a piece of porcelain ware, such for instance as a denture plate, having artificial teeth attached thereto.

Two mold members 35 are formed in a suitable investment material, such for instance as my own special material called piroplastic. These members are mounted in the mold holder members 22 and 23, and both of these members 22 and 23 are then mounted in the guide and receiving member 26 and are held therein spaced apart from each other with a plate of biscuit porcelain 36 received between them.

The members 33 are placed in position and the mold holding device is placed in the furnace within the muffle between the tubes 15. The molds are gradually heated.

The ordinary process is to put them into the furnace at one end thereof and gradually move them toward the center of the furnace from end to end, where the heat is greatest.

When the porcelain 36 becomes heated to a certain temperature, it becomes plastic and may be readily bent.

The interior of the furnace may be observed by opening the doors at the end of the furnace or by looking through the tubes 15.

When the porcelain plate 36 reaches the proper heat for bending, the molds 35 and 34 are moved toward each other by pressure for bending the porcelain plate 36 to proper shape.

Pins or the like 37 are mounted in the tubes 15 in registry with the respective screw bolts 18, and the screw bolts 18 are screwed inwardly until they engage the ends of the pins 37, which are of suitable refractory material, and as the screw bolts 18 are screwed farther in, they will force the mold members 34 and 35 toward each other for pressing the porcelain 36 into shape between the mold members.

If one of the mold members, for instance the member 34, contains artificial teeth or the like 40 of porcelain, the plate 36 will be fused to the teeth 40.

If a little enamel is painted on the teeth in the mold before the mold holder is placed in the furnace, the fusing of the porcelain to the teeth will be facilitated.

It will be seen that when the mold holder members 22 and 23 are pressed together, the porcelain will have been pressed to the desired shape. The screw bolts or the like 18 may then be moved outwardly and the pins 37 pulled away from the mold holding members and the mold holding device may be removed from the furnace. This is usually done by moving the mold holding device toward the end of the furnace and allowing the fused ware to cool gradually.

It will be understood that in a furnace of the kind, having a pressure applying device or devices, means may be provided for automatically successivelv bringing a series of mold holding members to position, where they may be acted upon by the pressure devices.

A great advantage of a furnace of this kind arises from the fact, that it permits the easy practice of the process of making ceramic ware, wherein the ware is shaped by pressure while in a state sufficiently plastic

to permit such shaping and after fusing has occurred. Such a process is the subject of my companion application, Serial No. 575,387, filed July 15, 1922.

I claim as my invention:

1. In a furnace, a muffle of refractory material mounted to leave a space between the muffle and the furnace lining, tubes secured to said muffle by tight joints and arranged to communicate with the interior of the muffle and to project through the walls of the furnace, sliding members in said tubes, and adjustable means for forcing said sliding members inwardly.

2. In a furnace, a muffle of refractory material mounted therein, sliding members mounted in the walls of the muffle and the furnace, and means for forcing said sliding members inwardly, said means comprising pivoted members, and adjustable elements supported on said members.

3. In a furnace, a muffle of refractory material mounted therein, sliding members mounted in the walls of the muffle and the furnace, and means for forcing said sliding members inwardly, said means comprising pivoted yokes and members having screw-threaded connections with said yokes.

4. The combination of a high temperature furnace, having an elongated heating chamber with a mould holding device adapted to travel in said chamber, comprising a plurality of members and a guide and receiving member for holding said members opposite each other and opposite the side walls of said chamber, adjustable devices extending through said side walls of the furnace and adapated to be operated for pressing said members toward each other.

5. The combination of a high temperature furnace, having an elongated heating chamber having a flat bottom, with a mould holding device adapted to slide on said bottom, comprising a plurality of members and a guide and receiving member for holding said members opposite each other and opposite the side walls of said chamber, adjustable devices extending through said side walls of the furnace and adapted to be operated for pressing said members toward each other.

6. In combination, a furnace, a muffle of refractory material mounted to leave a space between the muffle and the furnace lining, tubes secured to said muffle by tight joints, the tubes being arranged to communicate with the interior of the muffle and to project through the walls of the furnace, and slidable members in said tubes, said slidable members being readily removable to permit inspection of the interior of the furnace through said tubes.

Des Moines, Iowa, June 16, 1922.

ARTHUR MARSHALL McINTOSH.