May 31, 1949. E. O. HOWLE 2,471,749

FURNACE

Filed Aug. 11, 1945

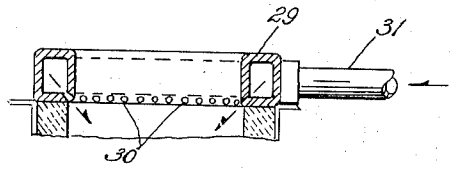


Fig. 3.

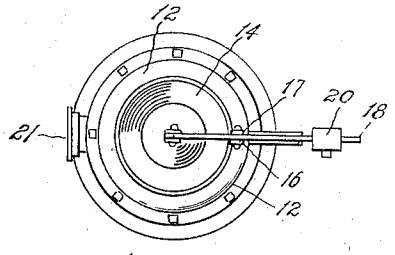


Fig. 2.

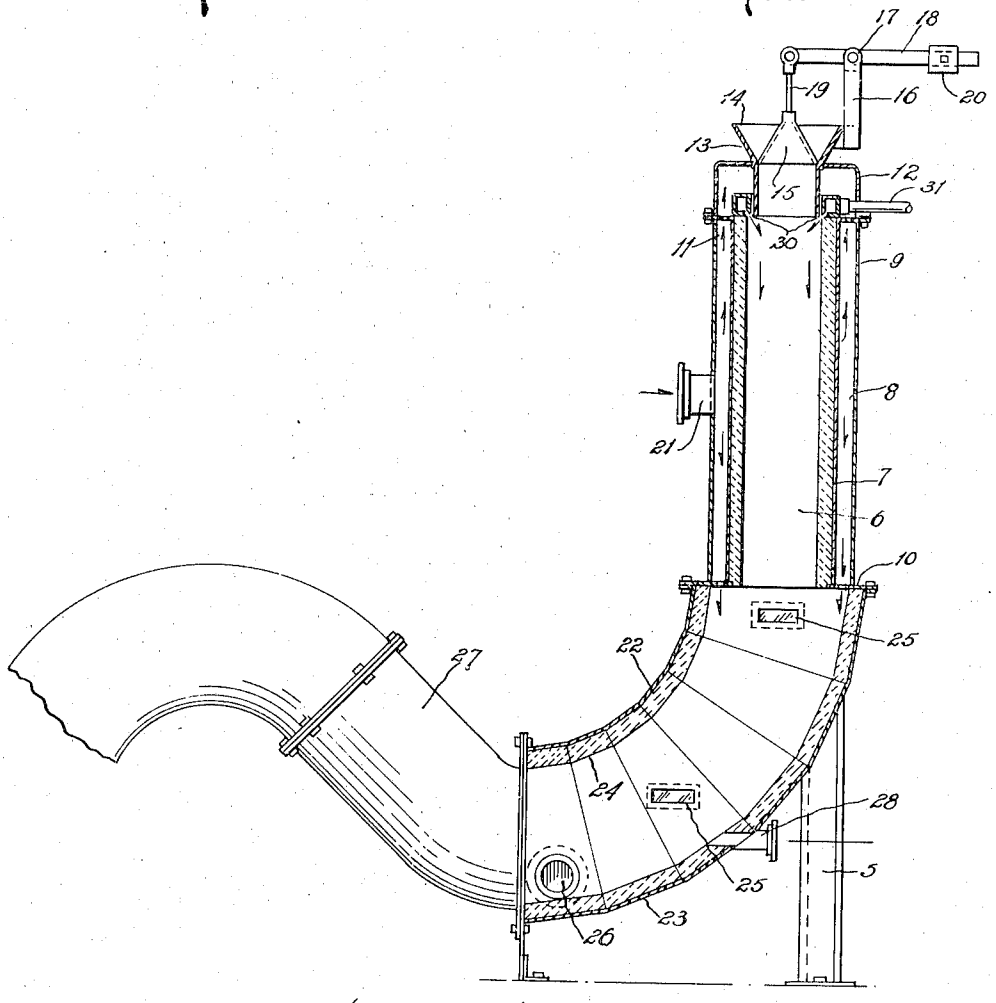


Fig. 1.

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Patented May 31, 1949

2,471,749

UNITED STATES PATENT OFFICE

2,471,749

FURNACE

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Application August 11, 1945, Serial No. 610,222

4 Claims. (Cl. 263—21)

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The present invention has to do with a furnace, and more particularly, to a furnace utilized for expanding granular aluminum silicate to powdered form.

It has been found that aluminum silicate when reduced to powdered form and expanded by heat is very useful as insulating material for heat as well as cold.

An object of the present invention is to provide means for reducing granular aluminum silicate to light finely powdered form for use as insulation.

Another object of the invention is to provide a furnace for expanding granular aluminum silicate to reduce it to powdered form suitable for use in making insulation.

The above, other and further objects of the invention will be apparent from the following description and accompanying drawing.

An embodiment of the furnace construction, as illustrated in the drawing of the views thereof, are as follows:

Figure I is a vertical sectional view through the furnace of the invention with parts in elevation.

Figure II is a top plan view of Figure I.

Figure III is an enlarged sectional view through the gas ring showing direction of gas discharged into the interior of the furnace.

The drawing will now be explained.

A foundation represented generally at 5 supports a tubular combustion chamber which consists of an inner chamber 6 of refractory material, cylindrical in shape, and open at both ends. Surrounding this chamber is a casing 7 of metal. Surrounding the casing 7 and spaced from it to form an air space 8 is an outer casing 9. The casings 7 and 9 rest on a foot 10 suitably supported by the foundation. The upper end of the casing 7 has an outturned flange 11 to which is bolted the outer casing 9. The flange 11 is perforated for air travel. Above the flange 11 is a ringlike hood 12 which rests on the flange 11 and which supports a hopper 13 opening into the combustion chamber 6 at its upper end. The hopper has a flared entrance 14 and a bell member 15 which closes the passageway through the hopper when it rests on the bell at its smallest diameter. An upright arm 16 is secured to the bell and to this arm is pivoted at 17 a lever 18 having one end connected by a link 19 to the bell and on its other end supporting a counterweight 20 which may be slid along the lever to balance the weight of the bell.

21 designates an air entrance to the air space 8 between the casings 7 and 9. It will be observed

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that this inlet air entrance is part way of the height of the casing so that some of the incoming air, which is under pressure, will be driven upwardly, thence downwardly into the interior of the combustion chamber 6. Other flow of air will be from the inlet 21 downwardly into the elbow 22 which communicates with the interior of the combustion chamber.

The elbow 22 is a 90 degree one and is shown as formed of a plurality of sections suitably secured together. The outer portions 23 are of metal and are lined with suitable material 24 which might be refractory material or its equivalent. In order that the observer might know what takes place in the elbow 22, inspection openings 25 are provided in the elbow which are closed by transparent panes. At the lower part of the elbow 22 is a cleanout opening 26 having a cover, not shown, applied to it in any approved manner.

Bolted to the end of the elbow 22 is a pipe 27 which leads to a collector for material entering the elbow from the combustion chamber.

In order to separate the fines from the heavies, inlet 28 is provided opening into the elbow and through this inlet fluid under pressure is admitted to the interior of the elbow.

For supplying heat to the interior of the combustion chamber 6, a gas ring 29 is illustrated. This ring surrounds the hopper at the upper end of the refractory wall of the chamber 6 and has a plurality of gas discharge openings 30 entering the interior of the chamber at an angle so that the gas flame will heat centrally of the chamber and create a zone of maximum heat. Gas is supplied to the ring 29 through a pipe 31 from a suitable source of supply.

The aluminum silicate material to be treated in this furnace is ground, and then a measured quantity is put in the hopper 13. When the hopper is full, the bell 15 is lowered thus dropping the material into the combustion chamber 6. The temperature within the combustion chamber is high so that the particles of material are quickly expanded by heat. The expansion of the particles increases their full size, and expels all moisture so that the products dropping into the elbow 22 is a dry, finely powdered mineral substance.

It inevitably happens that in a charge of material placed in hopper 13, there will be some particles larger than others. It has been found that all of the particles of material delivered into the combustion chamber are expanded by the heat, resulting in dried particles of various sizes. The particles of larger size naturally fall to the bot-

tom of the elbow 22 while the fines are carried in suspension by the air current created by injection of air or steam through the nozzle 28. The fines are carried through the pipe 27 to a collector for suitable disposition.

While the furnace herein illustrated appears to be simple in construction, it has been found that it has been highly successful in operation, accomplishing results far greater than could be accomplished by furnaces of different construction.

The aluminum silicate material expanded by this furnace has proved to be very useful as insulation material for heat and sound. It is light in weight and can be easily mixed with suitable binders to make a cementitious product. The aggregate can be used in concrete or plaster. It has been found that the insulating material made from expanded aluminum silicate is the most efficient inert mineral insulation obtainable.

Insulation made with the material is buoyant, odorless, flame-proof, flame resistant, and resistant to acids and weak alkalies.

The invention has been described herein more or less precisely as to details. It is to be understood that the invention is not to be limited thereby, as changes may be made in arrangement and proportion of parts, and equivalents may be substituted without departing from the spirit and scope of the invention.

The invention is claimed as follows:

1. A furnace of the class described and comprising an upright combustion chamber, a gas ring at the upper end of said chamber arranged to discharge jets of gas into the chamber in directions other than axial, a hopper for receiving a charge of material, an air jacket about said chamber admitting air to the interior of the chamber at its top, an elbow discharge conduit communicating with the lower end of the chamber receiving air discharged from said jacket.

2. In a furnace of the class described, a tubular upright combustion chamber having a hopper at its upper end to receive a measured quantity of material, a gas ring about the upper end of the chamber having discharge ports inclined to discharge downwardly in said chamber and toward its axis, an elbow duct communicating with the lower end of the chamber, an air jacket about said chamber, a means establishing communication between the jacket and the interior of the chamber outside of said gas ring to direct the flow of entering air into the vortex created by the gas discharge.

3. In a furnace of the class described, a tubular upright refractory wall defining a combustion chamber, an air jacket about said wall having an air inlet, a hopper and bell at the top of the chamber, an elbow at the lower end of the chamber to receive matter therefrom and divert its path of travel, an air nozzle communicating with the interior of the elbow for admitting air thereto for separating fines from heavies, and means for enabling observation of the interior of the elbow.

4. A structure as described in claim 2 characterized by the fact that means are provided for air communication between said air jacket and the interior of the elbow.

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