Nov. 17, 1931. E. C. LOESCHE 1,832,226

FURNACE FOR SINTERING, CALCINING, ROASTING, AND SMOLDERING OF SUBSTANCES AND PROCESS FOR WORKING SAID FURNACE

Filed Oct. 10, 1928 2 Sheets-Sheet 1

Fig. 1.

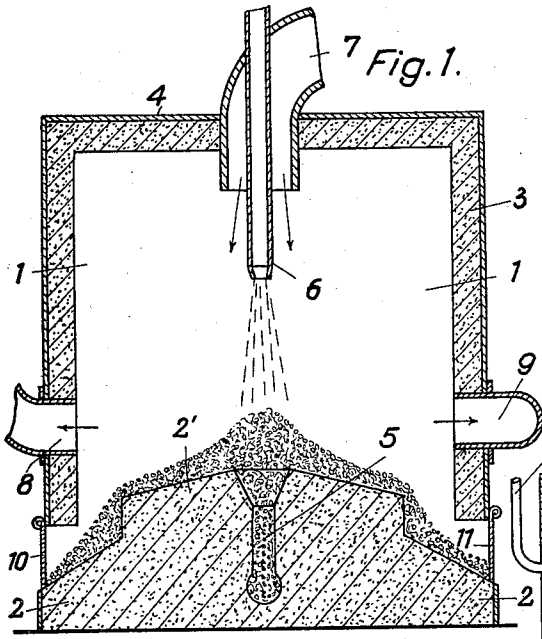
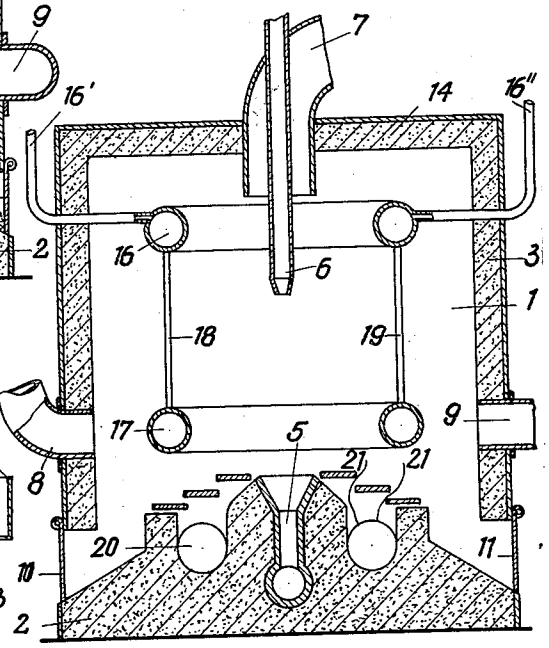


Fig. 3.



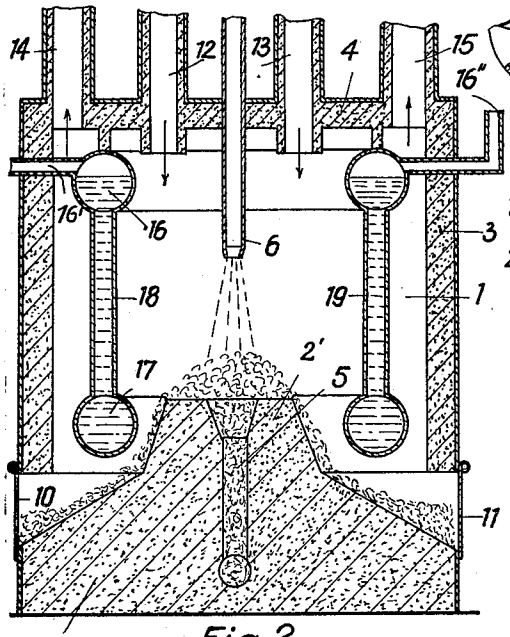


Fig. 2.

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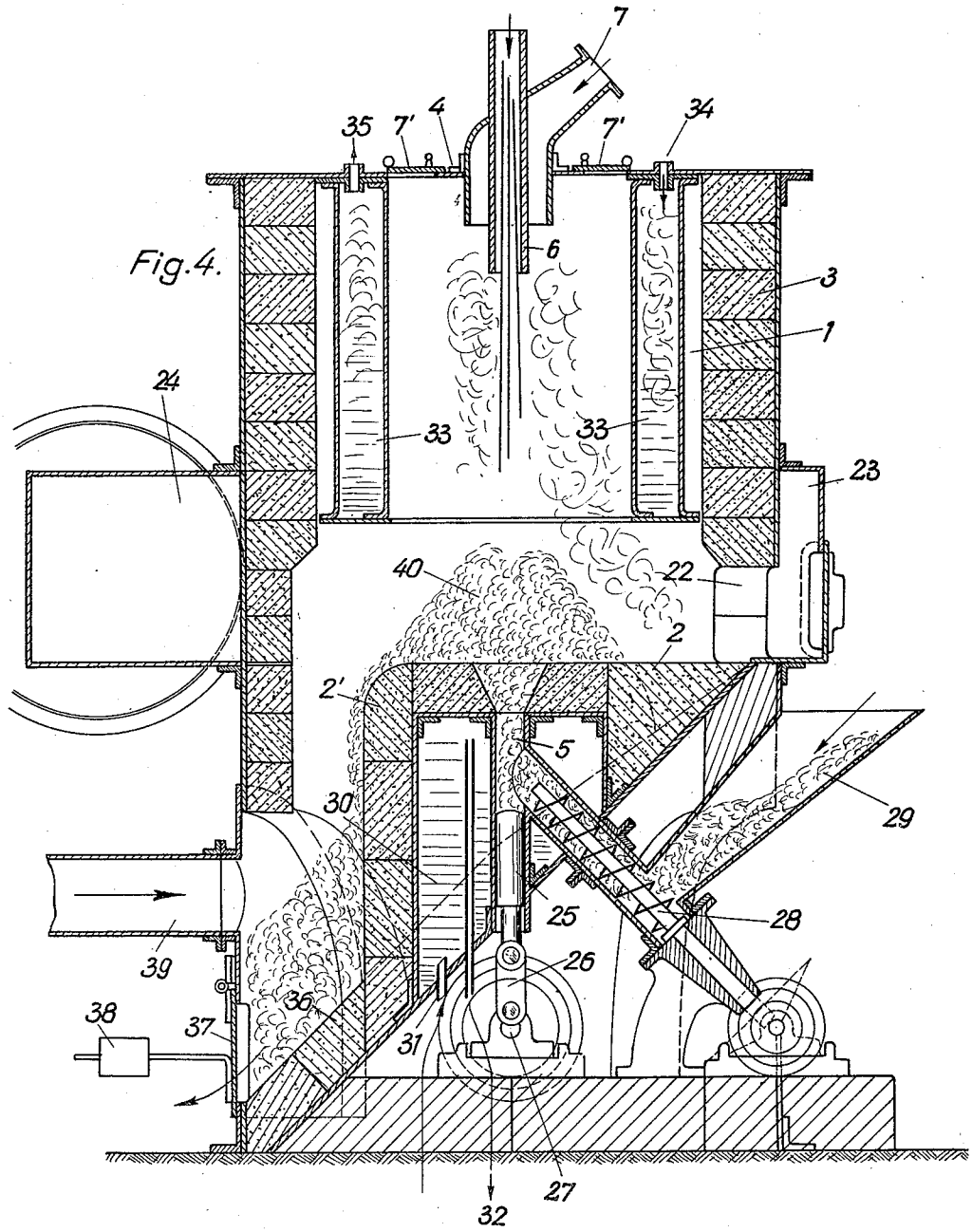
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Fig.4.



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UNITED STATES PATENT OFFICE

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FURNACE FOR SINTERING, CALCINING, ROASTING, AND SMOLDERING OF SUBSTANCES AND PROCESS FOR WORKING SAID FURNACE

Application filed October 10, 1928, Serial No. 311,667, and in Germany October 14, 1927.

The invention relates to chamber-furnaces in which all particles of material to be calcined are, if possible in continuous working, passing the flame, or zone kept at the required temperature, directly on their way to the furnace, in order to be discharged thereafter, possibly automatically from the furnace. A chamber is for this purpose used, at the one end of which the flame enters preferably from above, being practically produced by means of oil, gas, coal-dust etc., while the material to be calcined enters at the oposite side in such a way, that the material to be calcined opposes the flame about in the shape of a crater-like heap. The calcined particles of material are forced over the edge, while the material following is coming up from the inside of the said heap.

The advantage of the invention consists therein, that the flame only strikes fresh particles to be calcined and consequently can not destroy the walls of the chamber. As the supply of the material to be calcined can be adjusted exactly corresponding to the combustion and the flame can likewise very easily be regulated, every single particle of material to be calcined will be calcined thoroughly, without having to remain longer in the furnace than necessary.

The consequence is, that the furnace will in itself be of comparatively small dimensions and can be made very cheaply.

Several constructions of a chamber-furnace according to the present invention have been illustrated by way of example in the accompanying drawings, in which:

Figs. 1–3 show diagrammatically 3 different constructions of the furnace in vertical section,

Fig. 4 shows another modified construction in vertical section.

In Fig. 1 the calcining-chamber is marked 1, having a raised bottom 2, with a central elevation or hearth 2′, walls 3 and a ceiling 4. A vertical canal 5 has been provided in the bottom 2, through which the material to be treated is conveyed to the furnace. The canal 5 discharges to the upper surface of the hearth 2′.

A pipe 6 has been passed through the ceiling 4 of the furnace, located opposite the canal 5. This pipe 6 serves for supplying the fuel. The pipe 6 is surrounded by a pipe 7, through which air is admitted.

The two pipes 8 and 9, connected to openings in the side-walls 3, serve for the outlet of the flue-gases. The flaps 10 and 11, provided on the side-walls 3, serve for closing openings through which the ready calcined material can be removed, after the flaps 10 and 11 have been opened.

In the construction according to Fig. 2, 1–6 and 10 and 11 designate the same parts as in Fig. 1. The air is supplied by two pipes 12 and 13 provided in the ceiling 4 of the furnace. The discharge of the flue-gases is effected through the pipes 14 and 15, likewise arranged in the ceiling 4.

Inside of the furnace-chamber 1, two annular receptacles 16, 17 have been provided, for water and connected with one another by vertical pipes 18, 19. A steam-boiler is produced in this way, by which the heat of the furnace-chamber is utilized. The produced steam can escape by the pipe 16′.

The construction according to Fig. 3 differs from the construction according to Fig. 1 only thereby, that an annular canal 20 has been provided in the bottom 2, being connected with ring-like gaps 21. Part of the combustion-air is supplied to the furnace-chamber by way of the annular space and the gaps.

In the construction according to Fig. 4, the furnace-chamber 1 is provided with a bottom 2, side walls 3, and a ceiling 4. 6 is a pipe for supplying the fuel, 7 a pipe for the supply of air. Adjustable openings 7′ have furthermore been provided in the ceiling 4, for the supply of additional air.

In the side-walls 3, several outlet-openings 22 have been provided entering an annular canal 23, connected with a smoke-flue 24.

In the hearth 2′, a canal 5 has been provided for feeding the material to be treated. The canal 5 discharges to the upper surface of the hearth 2′. The material is supplied to the furnace-chamber by means of a piston 25, driven by a crank 26 and a shaft 27. The material is supplied to the canal 5 by a spiral-conveyor 28 while a funnel 29 conducts the material to the spiral-conveyor 28.

Below the bottom 2, a water-receptacle 30 has been provided for cooling the bottom, and fitted with a water-supply 31 and a water-discharge 32.

A water-tank 33 has been provided in the furnace-chamber serving as steam boiler. This tank 33 is fitted with a supply pipe 34 for the feed-water, and a discharge-pipe 35 for the produced steam.

The bottom 2 of the furnace-chamber has a cylindrical elevation 2′ projecting from an inclined surface 36. At the lower end of this inclined surface 36 a discharge-opening has been provided, usually held closed by the flap 37. The flap 37 is loaded by a weight 38. Above the flap 37, a pipe 39 has been provided, through which cold air can be admitted for the purpose of cooling the heated material.

The working method of the furnace is the following:

The material to be calcined is, according to the construction explained in Fig. 4, supplied to the bottom of the furnace through the canal 5 by means of the worm 28, and the piston 25, forming there a crater-like heap 40. As soon as a sufficiently high enough heap has been formed, the fire is turned on. The flame escaping from the pipe 6 is directed upon the point of the cone 40. As fresh material is supplied through the canal 5, the material treated by the flame rolls down over the mantle-surfaces of the cone upon the inclined surface 36 and in this way to the discharge flap 37. The brickwork cannot be damaged by the flame, as the flame only strikes the heap of material 40. The heat produced in the furnace-chamber is utilized in the boiler 33, for the production of steam. The air, supplied through the pipe 39, is warmed by the ready-treated material and serves for the combustion of the fuel supplied by means of the pipe 6. For treating some substances, indirect heating can be employed, and in this case, the supply and the path of the material to be calcined is so regulated, that every particle which moves through the zone of combustion, has the required temperature.

According to the shape of the surface of the chamber-bottom 2 the heap of material 40 can be given the form of a more or less high tone, a pyramid or the form of a saddle. In some cases it may be practical to arrange the axis of the cone and the axis of the pipe 6 at an angle to each other.

I claim:

1. In a furnace, an open horizontal hearth adapted to receive the material to be treated, a canal in said hearth for the supply of said material to said hearth, said canal discharging to the upper surface of said hearth so that it is covered by the material supplied to said surface, a burner above the discharge opening of said canal, the flame of said burner being directed upon the material.

2. In a furnace, an inclined bottom, side walls surrounding the bottom, a ceiling supported by the side walls, an open horizontal hearth projecting from said bottom and adapted to receive the material to be treated, the side wall at the lower end of said inclined bottom having a discharge opening, a canal in said hearth for the supply of said material to said hearth, said canal discharging to the upper surface of said hearth so that it is covered by the material supplied to said surface, a burner above the discharge opening of said canal, the flame of said burner being directed upon the material.

3. In a furnace, an inclined bottom, side walls surrounding the bottom, a ceiling supported by said side walls, an open horizontal hearth projecting from the bottom adapted to receive the material to be treated, a canal in said hearth for the supply of said material to said hearth, said canal discharging to the upper surface of said hearth so that it is covered by the material supplied to said surface, a burner in said ceiling above the discharge opening of said canal, the flame of said burner being directed upon the material, a circular receptacle for water in said combustion chamber, said receptacle surrounding the burner, a supply pipe for water and a discharge pipe for steam arranged on said receptacle.

4. In a furnace, an inclined bottom, side walls surrounding the bottom, a ceiling supported by said side walls, an open horizontal hearth projecting from said bottom and adapted to receive the material to be treated, the side wall at the lower end of said inclined bottom having a discharge opening therein, a canal in said hearth for the supply of said material to said hearth, said canal discharging to the upper surface of said hearth so that it is covered by the material supplied to said surface, a burner in said ceiling above the mouth of said canal, the flame of said burner being directed upon the material, a canal for the supply of air in that side wall, which contains the discharge opening, the last-mentioned canal discharging near to said discharge opening so that the air passes the heated material.

5. A process for working furnaces, consisting in forcing the material to be treated

through a canal to the surface of an open horizontal hearth so that the material forms a cone above said hearth and above the mouth of the said canal and directing the flame of a burner downwardly upon the material to calcimine the material and adapted to run down from the hearth upon an inclined bottom.

In testimony whereof I have affixed my signature.

ERNST CURT LOESCHE.