

Feb. 18, 1930.

F. MARCHAND

1,747,522

HEATING APPARATUS EMPLOYING POWDERED FUEL

Filed June 28, 1926

2 Sheets-Sheet 1

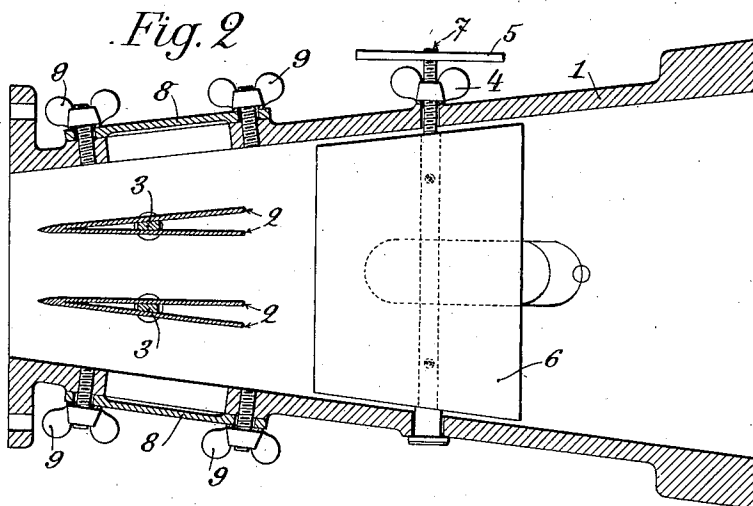
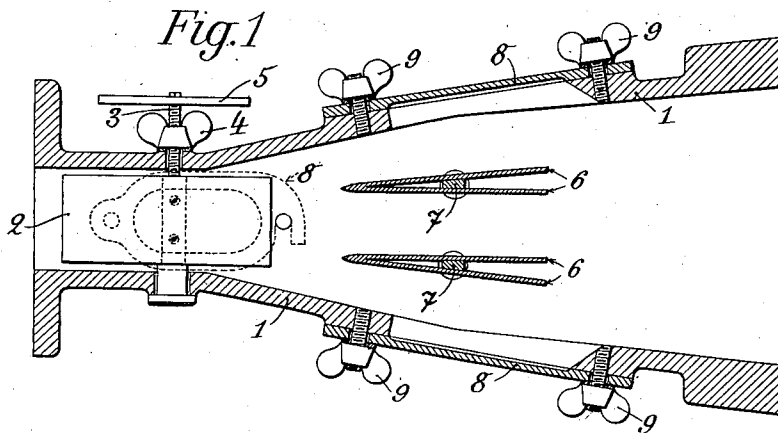
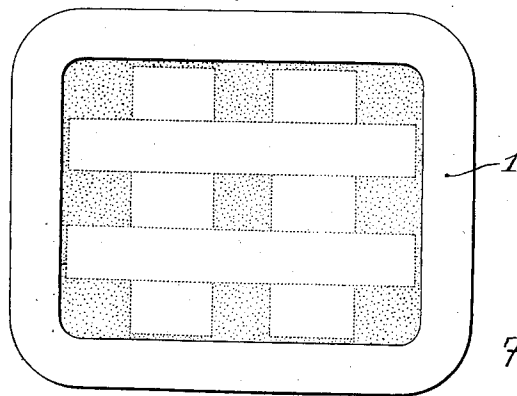


Fig. 3



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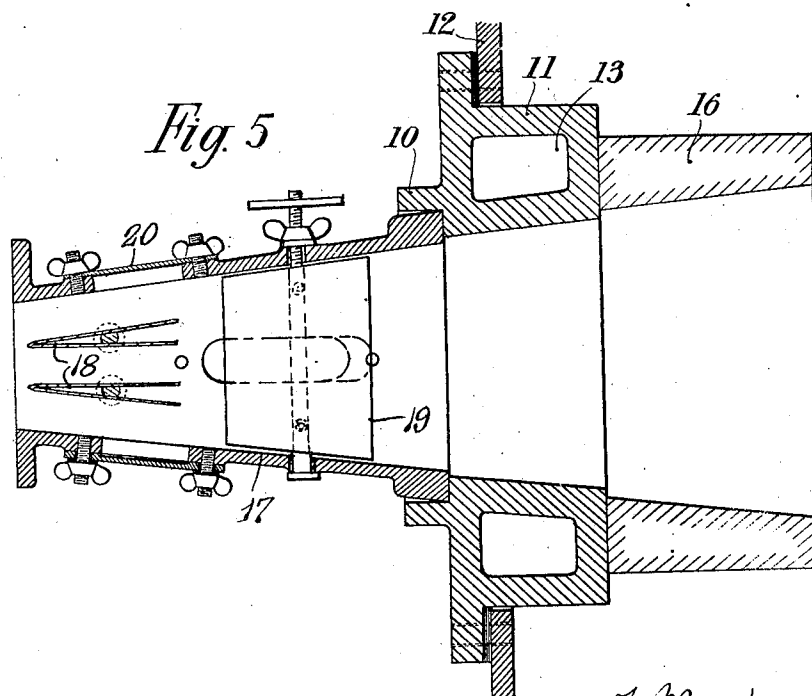
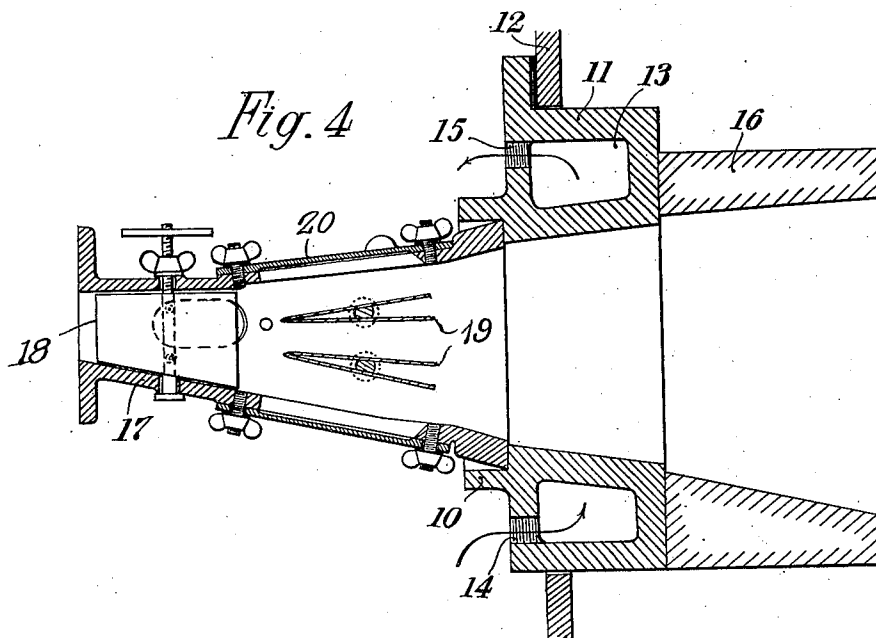
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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HEATING APPARATUS EMPLOYING POWDERED FUEL

Application filed June 28, 1926, Serial No. 119,141, and in France February 1, 1926.

In current practice, the rapid wear of the combustion chambers employed for heating by means of powdered fuel makes it necessary to proceed with frequent repairs of an expensive nature whereby the advantages due to this method of heating are much diminished.

In such chambers, the mixture of the powdered fuel and the air serving as a vehicle is supplied to the burner by a tube, in a compact stream which is projected at a certain speed upon a point of the rear wall of the chamber, and usually upon the fire bridge, in which the brick will become rapidly melted; the wall will thus be rapidly pierced, and it will fall down, so that the furnace must be stopped in order to make long and expensive repairs.

Further, this compact stream when entering the chamber will offer but a small surface which is insufficient for an exchange of heat, so that the combustion in the chamber will be incomplete and it will continue more or less effectively in the furnace bed; ash will be deposited upon the products to be heated, and due to the less degree of temperature prevailing in this part of the furnace the combustion will be stopped and the unconsumed products will be added to the ash; so that the heating will be rendered almost impossible.

Attempts have been made to obviate such disadvantages by modifying the size and shape of the chamber, and by varying the quality of the brick used in the construction. But the said defects have been only slightly diminished.

The present invention has for its object to entirely obviate such disadvantages, and it relates to a burner by which I can diffuse in all directions the stream of the fuel and air mixture supplied to the burner by a single tube, so that the stream may attain all parts of the chamber on occasion.

For this purpose, the walls of said chamber are flaring towards the combustion chamber and containing deflectors or like members which serve to divide the stream into the desired number of unit streams of a divergent nature. Inasmuch as the said flaps are piv-

otally mounted and are independent, they will send the unit streams in variable directions and the output and the direction of said streams can be regulated.

The appended drawings show by way of example an embodiment of the invention.

Figs. 1 and 2 are lengthwise sections of the burner on two perpendicular planes.

Fig. 3 is an end elevation showing the divided stream.

Figs. 4 and 5 show a device for cooling the burner.

The said burner consists of a casing 1 which flares in all directions towards the combustion chamber and whose size and shape depend upon each type of chamber and upon the amount of the mixture to be burned.

At the inlet end of the said casing are disposed a plurality of deflectors 2 (two in number in the present example) having the form of an elongated wedge; these are pivoted upon vertical axles 3 and can be held in any desired position, for instance by means of the wing nuts 4 which are screwed upon the threaded part of the axles 3. Each deflector is turned about by means of a handle 5 mounted on the end of the respective axle.

The said deflectors divide the main current of fuel mixture into as many small streams as may be necessary, and each stream can be turned in a direction corresponding to the position of each deflector and on a given horizontal plane.

Following this first set of deflectors, the device comprises a second set comprising the deflectors 6 mounted in the same manner as the deflectors 2 but upon horizontal axles 7, so as to divide the first streams obtained, and to send them in different directions, but herein in a vertical plane.

Above and below each set of deflectors, the casing 1 is pierced with an aperture whereby the said deflectors may be inspected, cleaned and replaced, said apertures being closed by the doors 8 which are provided each with a sight hole device for observing the functioning of the burner, the doors being mounted upon the latter by means of the wing nuts 9.

It will be noted that by a combination of

several sets of deflectors, I may obtain all the streams which may be necessary as regards their number, direction and size. I thus obtain the proper diffusion of the fuel mixture which may reach all parts of the chamber according to a distribution which is uniform or is otherwise chosen at will, this arrangement being substituted for the known single stream employed for the burners. In this manner the wear is distributed over the whole surface of the chamber, and the durability of the latter is much augmented.

A further advantage of a much more important nature resulting from the diffusion of the stream, consists in the fact that I increase the flame surface of the mixture when issuing from the burner, thus affording a rapid exchange of heat and a much more complete combustion, by producing in the chamber a high temperature, so that the unconsumed parts and the ash will almost entirely disappear from the pieces to be heated.

Obviously, the shape of the burner and also the shape of the said deflectors, as well as their number, are given only by way of example, and these points may be varied on occasion without departing from the spirit of the invention.

For instance, by giving suitable shapes to the said deflectors, I may vary the cross section of the streams so as to give them all shapes adapted to the shape of the combustion chamber.

The direction of the streams may be made to vary at each instant, and according to a continuous motion, and it is simply necessary to provide for the continuous displacement of the several registers by suitable mechanical means.

My experience with burners of this kind shows that they give entire satisfaction as concerns the complete combustion of the fuel mixture as well as for the preservation of the chamber, but the burners heat up rapidly, thus causing a somewhat rapid wear. To obviate this, I place between the burner and the wall of the combustion chamber a device forming a cooling device by reason of a circulation of water or like fluid.

This device proves most effective in delaying the ignition of the mixture until it enters the chamber, while at the same time it cools the bricks at this place and prevents all heating of the burner, and it will now last almost indefinitely.

In Figs. 4 and 5, the burner 17 containing the deflectors 18 and 19 and closed by the doors 20 is fitted at its large end into a metal collar 10 extending from the cooling wall 11 and mounted on the frame pieces 12 of the furnace.

The said cooling partition comprises a chamber 13 in which water is circulated, this entering through the orifice 14 at the bottom

of the chamber and issuing through the orifice 15 at the top.

At the rear of the cooling device, the entrance of the combustion chamber is extended by bricks or like refractory material, for instance a conduit 16 of flaring shape.

With my aforesaid device I am enabled to reduce the temperature of the brick at the entrance of the chamber and to prevent all heating of the burner, so that the latter will last indefinitely.

Having thus described my apparatus, what I claim as new therein, and my own invention, is:—

1. In a burner adapted to burn powdered coal, the combination of a flaring nozzle allowing the passage of a mixture of coal and previously heated air, two sets of deflectors arranged transversely according to two different directions substantially at right angles, the said deflectors and the walls of the nozzle being adapted to divide the stream of combustible mixture into several elementary streams which diverge towards the outlet of the said burner, both in the vertical and in the horizontal directions.

2. In a burner adapted to burn powdered coal, the combination of a flaring nozzle allowing the passage of a mixture of coal and previously heated air, two sets of deflectors arranged transversely according to two different directions substantially at right angles, the said deflectors and the walls of the nozzle being adapted to divide the stream of combustible mixture into several elementary streams which diverge towards the outlet of the said burner, both in the vertical and in the transverse directions, each said deflectors having the form of elongated wedges.

3. In a burner adapted to burn powdered coal, the combination of a flaring nozzle allowing the passage of a mixture of coal and previously heated air, two sets of deflectors arranged transversely according to two different directions substantially at right angles, the said deflectors and the walls of the nozzle being adapted to divide the stream of combustible mixture into several elementary streams which diverge towards the outlet of the said burner, both in the vertical and in the horizontal directions, and a cooling chamber disposed at the outlet of the said burner, the said chamber consisting in a hollow frame which is distinct from the said nozzle and the internal walls of which form substantially the extensions of the walls of said nozzle.

4. In a burner adapted to burn powdered coal, the combination of a flaring nozzle allowing the passage of a mixture of coal and previously heated air, two sets of deflectors arranged transversely according to two different directions substantially at right angles, the said deflectors and the walls of the

nozzle being adapted to divide the stream
of combustible mixture into several elemen-
tary streams which diverge towards the out-
let of the said burner, both in the vertical
5 and in the horizontal directions, and a cool-
ing chamber disposed at the outlet of the said
burner, the said chamber consisting in a
hollow frame distinct from the said nozzle
and whose external walls form substantially
10 extensions of the walls of the said nozzle, the
wall of the said chamber which is adjacent
to the nozzle being provided with edges which
are adapted to be secured to the wall of a
15 furnace and with a collar in which the large
basis of the said nozzle is engaged.

In testimony whereof I have hereunto af-
fixed my signature.

FERDINAND MARCHAND.

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