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Sept. 7, 1926. 1,598,894

J. TAYLOR

FURNACE

Filed March 9, 1925 4 Sheets-Sheet 1

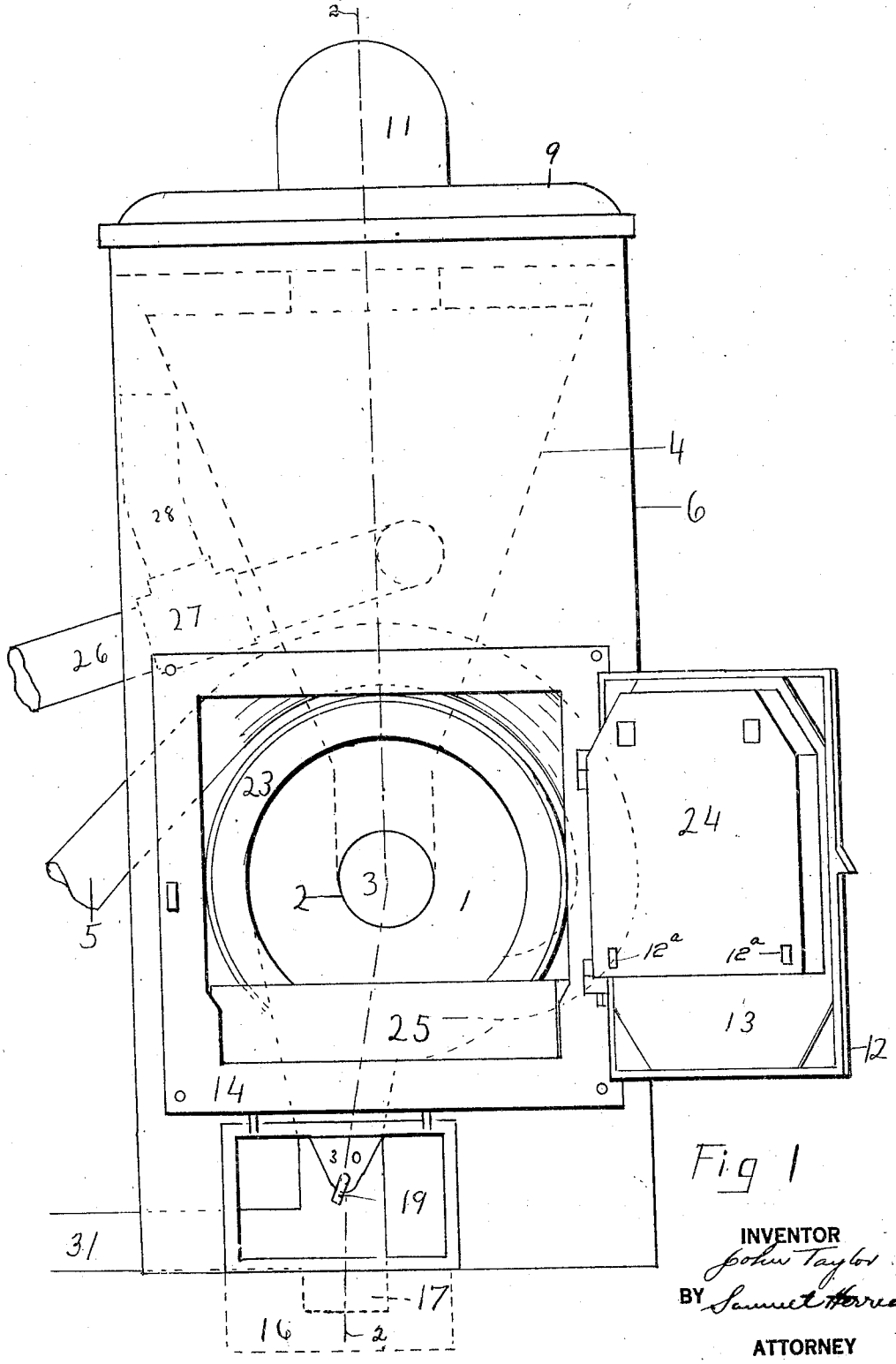


Fig 1

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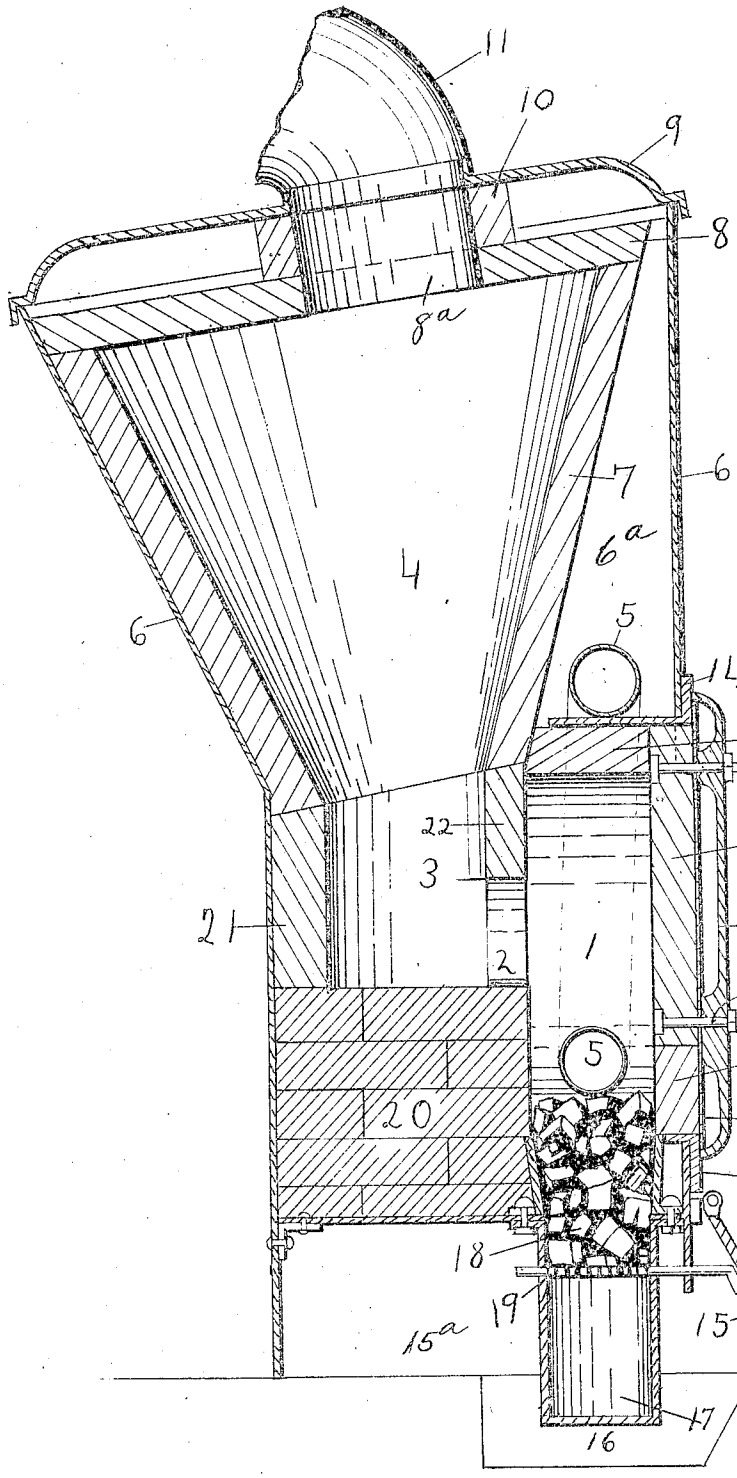


Fig 2

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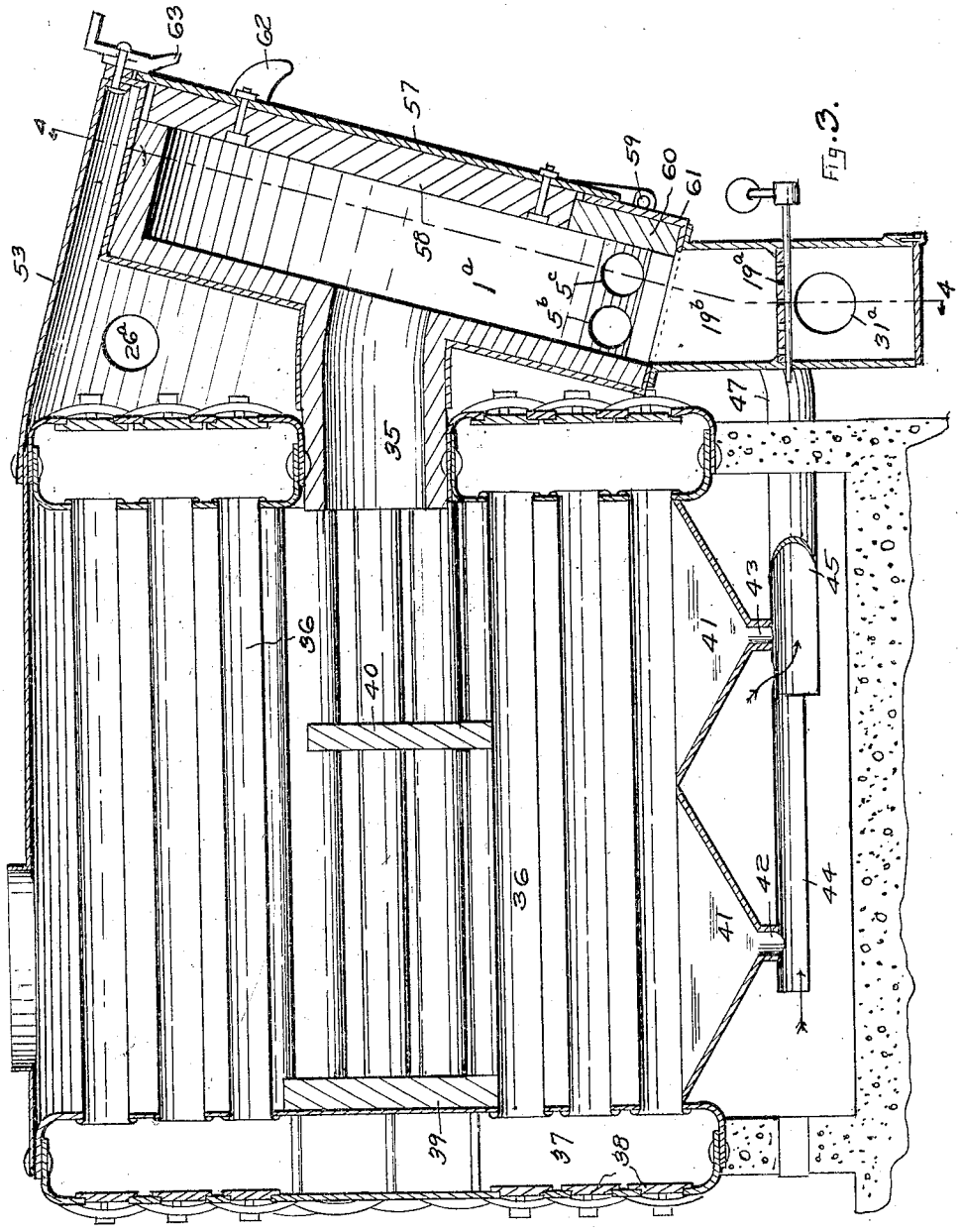
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Fig. 3.



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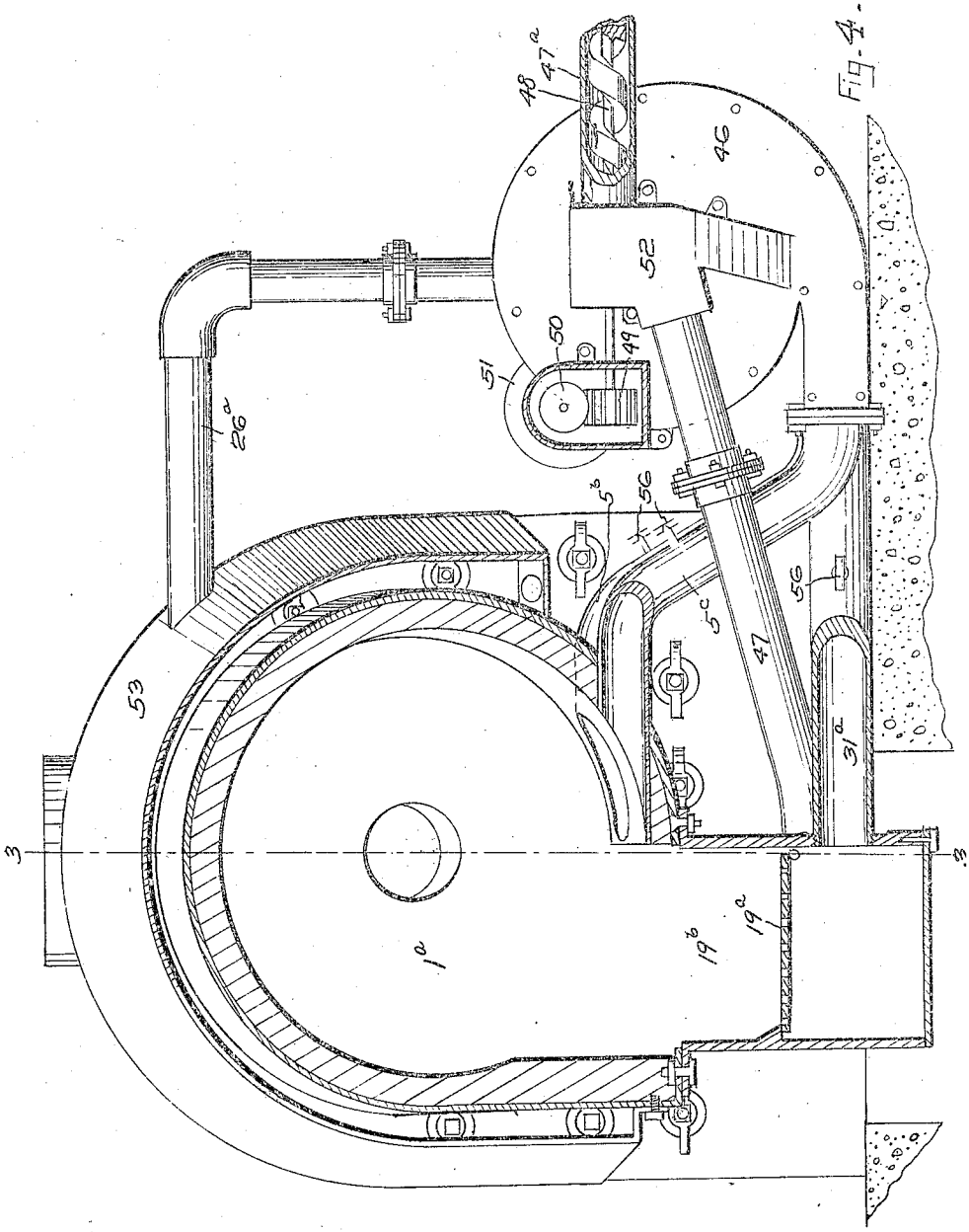
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Fig. 4.



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1,598,894

UNITED STATES PATENT OFFICE.

JOHN TAYLOR, OF SALT LAKE CITY, UTAH.

FURNACE.

Application filed March 9, 1925. Serial No. 14,133.

This invention relates to a furnace adapted to burn fine fuel in suspension and it has for its object to provide certain features of construction by virtue of which the fuel will be completely consumed with a maximum of efficiency and economy in operation.

Further objects and advantages of the invention will be more particularly brought out in the detailed description which follows.

In the accompanying drawing:

Fig. 1 is a front elevation of a furnace constructed in accordance with the invention.

Fig. 2 is a vertical sectional view upon line 2—2 of Fig. 1.

Fig. 3 is a longitudinal sectional view upon line 3—3 of Fig. 4 illustrating a modified form of furnace with certain of the parts omitted and

Fig. 4 is a transverse sectional view upon line 4—4 of Fig. 3.

Like numerals designate corresponding parts in all of the figures of the drawings.

Referring to the drawings and particularly to the Figs. 1 and 2, 1 designates a combustion chamber of fire brick. This combustion chamber is of a circular formation and has a discharge conduit, 2, leading substantially centrally through its rear wall, which is a communication with a chamber 3. The other portion of the chamber 3 is in communication with the lower portion of a chamber 4 which is in the form of an inverted frustrum of a cone. A fuel supply pipe 5 discharges tangentially into the circular combustion chamber 1 in a manner which will be hereinafter set forth. The walls of the chamber 4 are preferably formed of fire-brick indicated at 7 and the said chamber is provided with a fire-brick or other refractory top 8. A casing 6 and a cover 9 constitute a shell or housing for the structure. An annular collar 10 of fire-brick alines with an opening 8^a of the cover or top 8, and these parts constitute a discharge flue which is in communication with a discharge pipe 11.

The combustion chamber 1 is provided with a door 12, the inner face of which carries a metallic plate 13. Bolts 12^a secure a fire-brick block 24 to the upper portion of the plate 13. This block 24 in conjunction with a fire-brick block 25, which is not secured to the door and which does not move with the door, forms the front of the combustion chamber when the door is closed; the door frame being indicated at 14. An ash pit door 15 gives access to an ashpit 15^a and sump 16 the latter constituting an ash pit for a forced draft heater, comprising an air box 17, and a grate 19, the latter being adapted to support a bed of fuel indicated at 18.

A mass of fire-brick 20 constitutes the rear wall for the lower portion of the combustion chamber and the bottom of the chamber 3. The rear wall of the chamber 3 is composed of fire-brick 21 and the front wall above conduit 2 consists of fire-brick 22. The wall of the combustion chamber 1 comprises also the fire-brick, or other refractory material indicated at 23.

The pipe 26 in Fig. 1 leads from the space 6^a within the casing 6 to a blower which is not shown in Figs. 1 and 2 but which is like the blower illustrated in Fig. 4. The function of this pipe 26 is to conduct the hot air from the space within the casing to the blower, said blower serving to return said air together with powdered fuel through the pipe 5, discharging it tangentially into the circular combustion chamber 1 and across the bed of incandescent fuel indicated at 18; it being understood that when the furnace is to be started, a fire is first built upon grate 19^a and of the materials indicated at 18. The fire may be started with any suitable kindling and then some lump coal thrown on. I preferably include in the pipe 26 a T 27 and an extension 28 through which atmospheric air may be admitted as may be desired. Clean air from the blower is delivered through a pipe 31 to the air box 17.

Referring now more particularly to Figs. 3 and 4 it will be seen that the combustion chamber is inclined. This is to aid in retaining the cinders in the combustion chamber until they are as nearly consumed as possible. In this form of the invention the combustion chamber 1^a is connected by a conduit 35 with a circular space lying within a battery of water tubes 36, of a steam boiler. The water space is indicated at 37 and clean out plugs are indicated at 38. Plates 39 and 40 of refractory material cause the products of combustion to spread out and come in contact with the tubes. Cinder collecting funnels 41 are connected by openings 42 and 43 with pipes 44 and 45. These pipes preferably have open ends to prevent the gases of combustion from being drawn

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down into them, it being understood that the cinders fall through the openings 42 and 43 into these pipes, said pipes leading to the casing 46 of the blower, and merging into a common return pipe 47 leading to the casing of the blower by making the pipes 44 and 45 with open ends, entry of the necessary air to carry the cinders along through said pipe, under the action of the blower, is permitted. Otherwise there would be a tendency for the blower to draw the products of combustion downwardly through openings 42 and 43. A fuel feed pipe 47^a has a spiral conveyer 48 disposed therein which is driven by a pinion 49 and worm 50 from a motor 51. Fine fuel fed through pipe 47^a by the spiral conveyer 48 enters the casing 46 of the blower through an intake box 52. Heated air which is withdrawn from the interior of a casing 53, which surrounds the furnace, passes through a pipe 26^a to a corresponding intake box (not shown) upon the opposite side of the fan casing, through which clean air may be admitted to the casing of the blower. An air supply pipe 31^a corresponding to pipe 31 of Fig. 1 discharges air beneath the grate 19^a of a heater, the fire box of which is indicated at 19^b. It will be observed that there are two pipes 5^b and 5^c entering the combustion chamber tagentially and these several pipes 5^b, 5^c, and 31^a are provided with dampers or valves 56 by means of which the flow through them may be controlled. Thus it will be understood that air may be discharged through pipe 31^a beneath grate 19^a and that the cinders which have not been completely consumed are returned through pipe 47 and intake 52 to the blower and are discharged from this blower along with the powdered fuel into the combustion chamber to be again subjected to the intense heat therein. The result of this is to insure complete combustion of the fuel since it is returned to the combustion chamber as many times as may be necessary to effect best results. The cinders and fine fuel are discharged through the pipe 5^c while the clean warm air from pipe 26^a is discharged from the fan casing through pipe 5^b and the proportions of these may be varied at will by manipulation of dampers 56 in said pipes 5^b and 5^c. In the form of the invention illustrated in Figs. 3 and 4, a door 57 having its inner face lined with fire-brick 58 is hinged at 59 and a thick section of fire-brick 60 is carried by a frame 61. A handle 62 is provided for manipulating the door and a latch 63 serves to retain it in a closed position.

Referring to Fig. 2, after the fire is kindled on the grate 19 and the fuel feeding mechanism is started to operate, the larger pieces of fuel settle into the fire on the grate and are consumed, while the smaller particles whirl around in the combustion chamber and the products of combustion and any unconsumed small particles leave through the flue 2. In the form of the invention illustrated in Fig. 3, after the fire is started on grate 19^a and the fuel feeding mechanism is started, the larger pieces of fuel settle into the fire on grate 19^a and are consumed, while the smaller particles whirl around in the combustion chamber and the products of combustion and any unconsumed small particles leave through flue 35.

The feature of drawing heated air from the space within the casing not only helps to keep the boiler cool but it promotes the efficiency of the device by delivering warm air through the blower to the combustion chamber.

It is to be understood that the invention is not limited to the precise construction set forth but that it includes within its purview whatever changes come within either the terms or the spirit of the appended claims.

Having described my invention, what I claim is:

1. A device of the character described comprising a circular combustion chamber, having a port leading axially out of its rear wall, a boiler disposed in the path of movement of the products of combustion from said port, cinder traps located to receive cinders from said port, a blower casing, means for conducting the cinders from said traps to said casing, a fuel feeding mechanism including a blower in said casing, a conduit arranged to discharge fuel and cinders from the blower casing tangentially into the combustion chamber, a heating device comprising a grate disposed below the combustion chamber and constituting a bed for a body of fuel, across which bed of fuel the fuel from the fuel feeding mechanism is discharged, an enclosed chamber beneath said grate, a pipe leading from the blower casing to said closed chamber, a casing surrounding the boiler and combustion chamber, a conduit leading from the interior of said last named casing to the blower, said blower serving to deliver warm air drawn from the interior of said last named casing to the space beneath the grate of the heater.

2. A device of the character described comprising a circular combustion chamber having a port leading out of its rear wall, said chamber lying at an inclination, a boiler disposed in the path of movement of the products of combustion from said port, cinder traps located to receive the cinders discharged from said port, a blower casing, a conduit for conducting the cinders from the cinder trap to the blower casing, a fuel feeding mechanism, means for delivering the returned cinders and the fuel tangentially into the circular combustion chamber, a casing surrounding the combustion

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chamber, a heating device at the bottom of the circular combustion chamber, said heating device comprising a grate, means for delivering heated air from the last named casing to that portion of the heating device below the grate, said heating device being disposed in such relation to the combustion chamber that the fuel discharged tangentially into said chamber is directed across said grate.

In testimony whereof he affixes his signature.

JOHN TAYLOR.