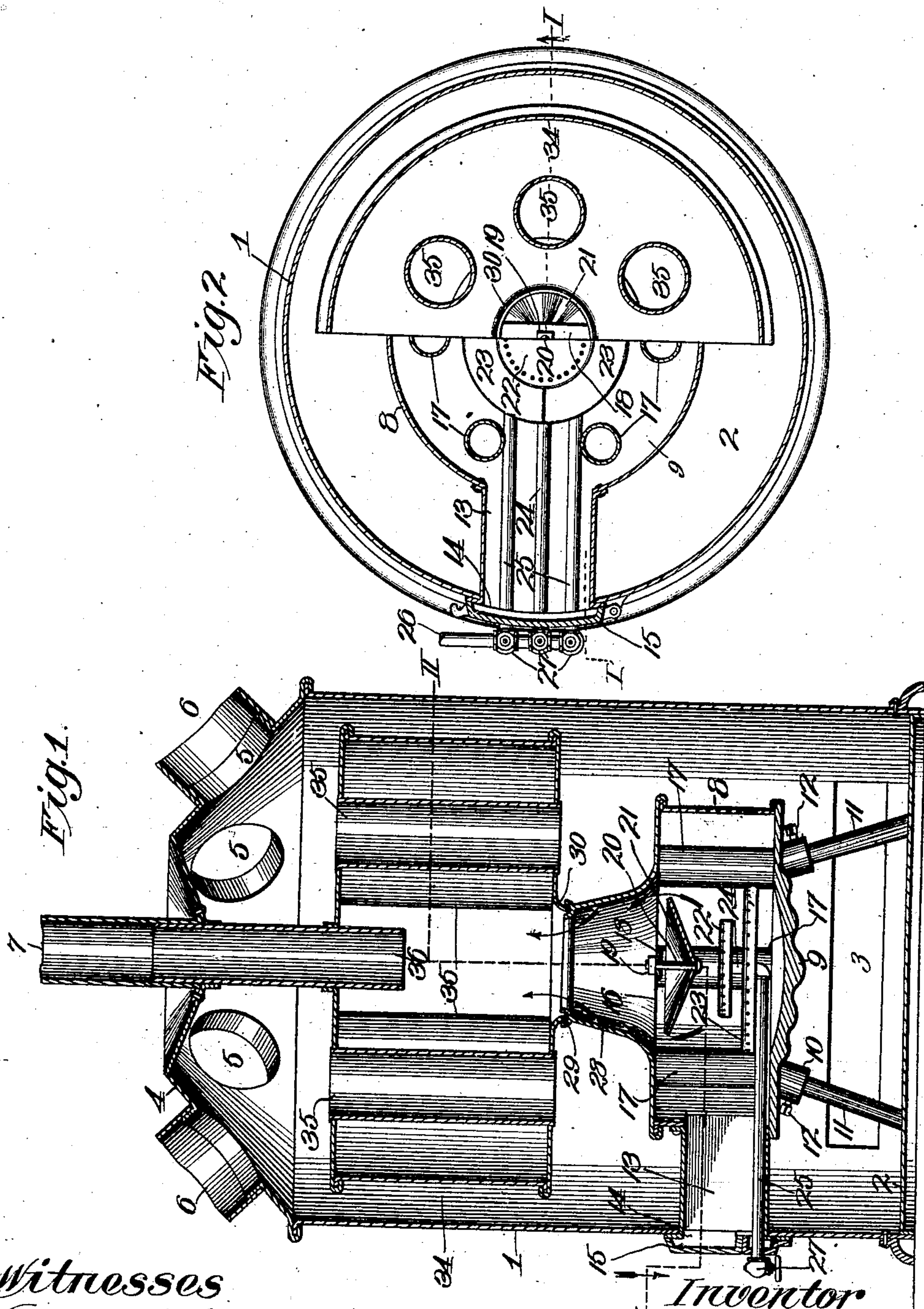


No. 880,710.

PATENTED MAR. 3, 1908.

J. H. BENNETT.  
FURNACE.

APPLICATION FILED MAY 28, 1907.



Witnesses  
Frank R. Gore  
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# UNITED STATES PATENT OFFICE.

JAMES H. BENNETT, OF KANSAS CITY, MISSOURI.

## FURNACE.

No. 880,710.

Specification of Letters Patent.

Patented March 3, 1908.

Application filed May 28, 1907. Serial No. 376,153.

*To all whom it may concern:*

Be it known that I, JAMES H. BENNETT, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

This invention relates to furnaces and more especially to furnaces in which gas, 10 gasolene or oil is the fuel, and my object is to produce a furnace of this character having a maximum surface for heating the air passing through it by direct conduction and radiation of heat.

15 A further object is to produce a furnace in which provision is made for rapid and efficient air circulation and for retarding the progress of the products of combustion sufficiently to largely extract their heating prop- 20 erties.

A further object of the invention is to produce a furnace of simple, strong, durable and inexpensive construction.

With these objects in view the invention 25 consists in certain novel and peculiar features of construction and organization as herein-after described and claimed; and in order that it may be fully understood reference is to be had to the accompanying drawing, in 30 which—

Figure 1, is a central vertical section taken on the line I—I of Fig. 2, with the burners in elevation. Fig. 2, is a horizontal section taken on the line II—II of Fig. 1.

35 In the said drawing, 1 indicates the outer casing or shell of the furnace, 2 is the bottom thereof and 3 an inlet opening for air at the bottom, the supply of air being brought from the inside or outside of the building 40 containing the furnace, as preferred.

4 indicates the crown of the furnace provided with a suitable number of air-exit openings 5, to communicate with the pipes 6 for conveying such air to the rooms to be 45 heated, and 7 is the escape pipe for conducting the products of combustion to the chimney, not shown.

Arranged concentrically within and a suitable distance above the bottom of the casing 50 or shell is a cylinder 8, to provide a combustion chamber, the bottom 9 of such cylinder being preferably of cast metal and provided with downwardly opening sockets 10

to receive a plurality of gas pipe or equivalent legs 11, set screws 12 securing the legs 55 reliably in the sockets.

13 indicates a radial tube connecting the cylinder with a door opening 14 in the casing, said opening being controlled by a door 15 of any suitable type. 60

The top of the cylinder is provided with a relatively large central opening 16 as an exit for the products of combustion from the combustion chamber and extending through the cylinder around said opening is a series 65 of air tubes 17 which communicate at their opposite ends with the interior of the casing or shell below and above the cylinder.

18 indicates a bar extending transversely across exit opening 16 and secured to the top 70 of the cylinder in any suitable manner, and depending from a nut 19 resting centrally upon said cross bar, is a bolt 20, the head of the bolt forming a support for the inverted conical deflector 21. Vertically below the 75 deflector and also within the cylinder are burners 22 and 23, the latter preferably consisting of two semi-circular ring members with their ends abutting.

24 is a pipe extending downward from the 80 burner 22 and parallel with the pipes 25 which are connected at their inner ends with the members of burner 23, the pipes 24 and 25 extending out through tube 13 and below door 15, and outward of the latter are con- 85 nected to a supply pipe 26, suitable valves 27 being provided to control the passage of the fuel through said pipes 24 and 25.

28 indicates a tube cast with or secured to the cylinder around said opening 16 and 90 preferably tapering upward and provided at its upper end with a circular groove 29 to receive the lower end of a short circular flange 30, depending from and surrounding an inlet-opening in the bottom of a cylin- 95 drical drum 34 of greater size than the combustion chamber; said drum being provided with a circular series of vertical air tubes 35 which communicate at their opposite ends with the interior of the shell or casing. 100

36 indicates an escape tube secured at its upper end in pipe 7 and depending centrally through the top of the drum 34, and said tube is preferably of less diameter than air tubes 35. 105

As shown the furnace is designed primarily



for burning natural gas or gasoline though it is to be understood that the heavier oils may be burned by the use of suitable burners, it being further understood that the special type of burner is immaterial.

To operate the burner the gas or volatile oil is turned on and ignited by introducing a lighted match or taper through the door opening, the door being then closed by preference, especially when gas is used as the fuel. The flame from the lower burner, which it will be noticed is provided only with side perforations, is intended to impinge upon the tubes 17 and the wall of the cylinder, the heat thus produced radiating outward from the cylinder and into the tubes, so as to respectively heat the surrounding and inclosed air and facilitate its circulation or upward movement in the casing or shell around the cylinder and up through the tubes. The flame from the upper burner which preferably has its jet orifices in its upper side, impinges upon the deflector 21 and is spread outward by the latter so as to impinge upon the upper portions of tubes 17, said deflector being of sufficient size to materially contract the exit opening 16 so as to retard the upward passage of the fumes or products of combustion therethrough and thus more effectively and quickly effect the heating of the tubes and cylinder and raise the temperature of the air as it passes from the inlet opening 3 to a point above the cylinder in the shortest possible time. The fumes or products of combustion then pass into the drum and because of the fact that the inlet opening thereto is of greater size than the escape pipe 36, the escape of such fumes and products of combustion is retarded and the drum is more completely filled and with its tubes becomes highly heated and so maintained as long as the burners are in operation, the fumes and products of combustion eventually escaping up through pipes 36 and 7. The drum by contact and radiation heats the air passing up externally thereto because the space between the drum and casing or shell is comparatively narrow and the tubes by conduction and radiation raise the temperature of the air which circulates or passes upward there-through. The hot air which passes up through tubes 35 mixes or commingles with the air which passes up around the drum and from the casing or shell passes off through opening 5 and pipes 6 to the rooms to be heated in the customary manner. The flame can be regulated so as to vary the heat generated by the proper manipulation of the valves.

From the above description it will be apparent that I have produced a furnace possessing the features of advantage enumerated as desirable and I wish it to be understood that I do not desire to be restricted to

the exact details of construction shown and described as obvious modifications will suggest themselves to one skilled in the art.

Having thus described the invention what I claim as new and desire to secure by Letters Patent, is:—

1. A furnace comprising a casing or shell provided with an air inlet opening at its lower end and an exit opening at its upper end and with a door-controlled opening, a cylinder within the casing or shell and provided with a central exit opening in its top, and with a tube connecting it with said door-controlled opening, air-pipes extending through the cylinder and communicating at their upper and lower ends with the interior of the casing or shell, a burner in the cylinder, a valve-controlled supply pipe connected with the burner and extending through said tube and shell or casing and adapted to direct the flame upon said air tubes, a drum within the casing or shell and above the cylinder and provided with a central opening in its lower end in communication with the exit opening of the cylinder, an escape pipe depending into the drum to convey the products of combustion therefrom, and a series of air pipes extending up through said drum and communicating at their opposite ends with the interior of the casing or shell.

2. A furnace, comprising a casing or shell provided with an air-inlet opening at its lower end and an exit opening at its upper end and with a door-controlled opening, a cylinder within the casing or shell and provided with a central exit opening in its top and with a tube connecting it with said door-controlled-opening air-pipes extending through the cylinder and communicating at their upper and lower ends with the interior of the casing or shell, a burner in the cylinder, a valve controlled supply pipe connecting with the burner and extending through said tube and shell or casing and adapted to direct the flame upon said air-tubes, a tube secured to the top of the casing or shell around said exit opening, and provided at its upper end with an inwardly projecting annular flange, a cross bar bridging the exit opening of the cylinder, a bolt depending centrally from said cross bar, an inverted conical deflector mounted upon said bolt and disposed in the upper part of the cylinder, a drum in the casing or shell and provided with a depending tube communicating with it and secured upon the flange of the tube surrounding the exit opening of the cylinder, an escape pipe depending into the drum to convey the products of combustion therefrom, and a series of air-pipes extending up through said drum and communicating at their opposite ends with the interior of the casing or shell.

3. A furnace, comprising a casing or shell having an air-inlet opening at its lower end and air-exit openings at its upper end and



provided with a door-controlled opening, and  
an escape pipe, a cylinder within the drum  
and provided with a central exit opening in  
its top and with depending legs resting upon  
5 the bottom of the casing or shell, a tube con-  
necting the cylinder with the door-controlled  
opening, an inverted conical deflector sus-  
pended in the upper part of the cylinder cen-  
trally of its exit opening, a pair of burners in  
10 the lower central part of the cylinder, valve-  
controlled fuel-supply pipes connected to  
said burners and extending out through the  
shell, air tubes extending vertically through  
the cylinder around the burners and deflector  
15 and communicating at their opposite ends  
with the interior of the casing or shell, a tube

surrounding the exit opening of and rising  
upward from the cylinder, a drum supported  
upon said tube and communicating at its  
lower end therewith, air-pipes extending ver- 20  
tically through the drum and communicat-  
ing at their opposite ends with the interior of  
the casing or shell, and a pipe fitting at its  
upper end in said escape pipe and depending  
into the drum to convey the products of com- 25  
bustion therefrom.

In testimony whereof I affix my signature,  
in the presence of two witnesses.

JAMES H. BENNETT.

Witnesses:

H. C. RODGERS,  
G. Y. THORPE.