June 10, 1958 TZE-NING CHEN 2,838,042

UNIT HEATER

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FIG. 1

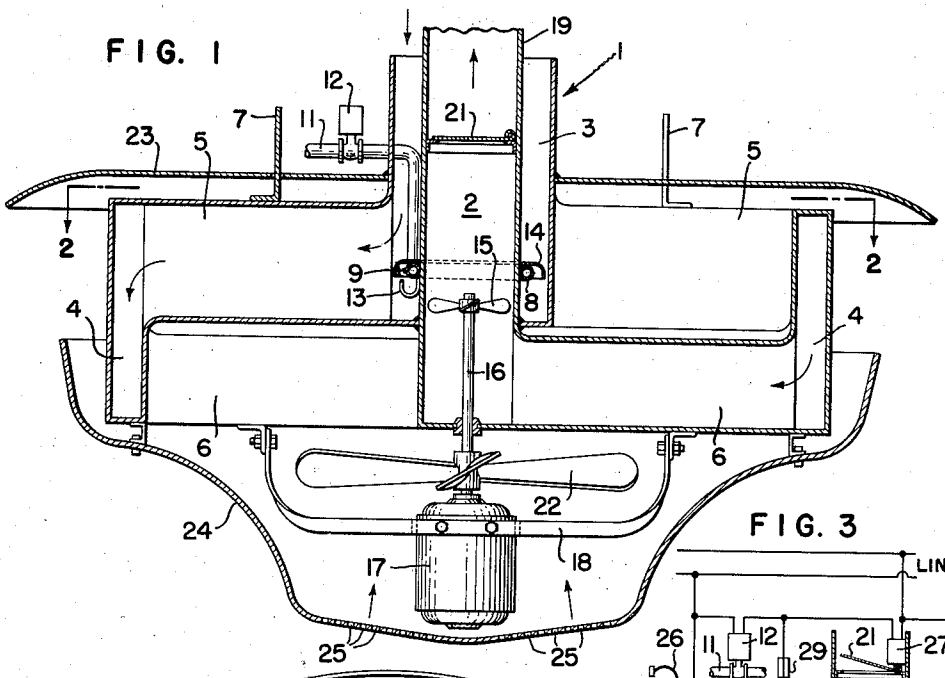
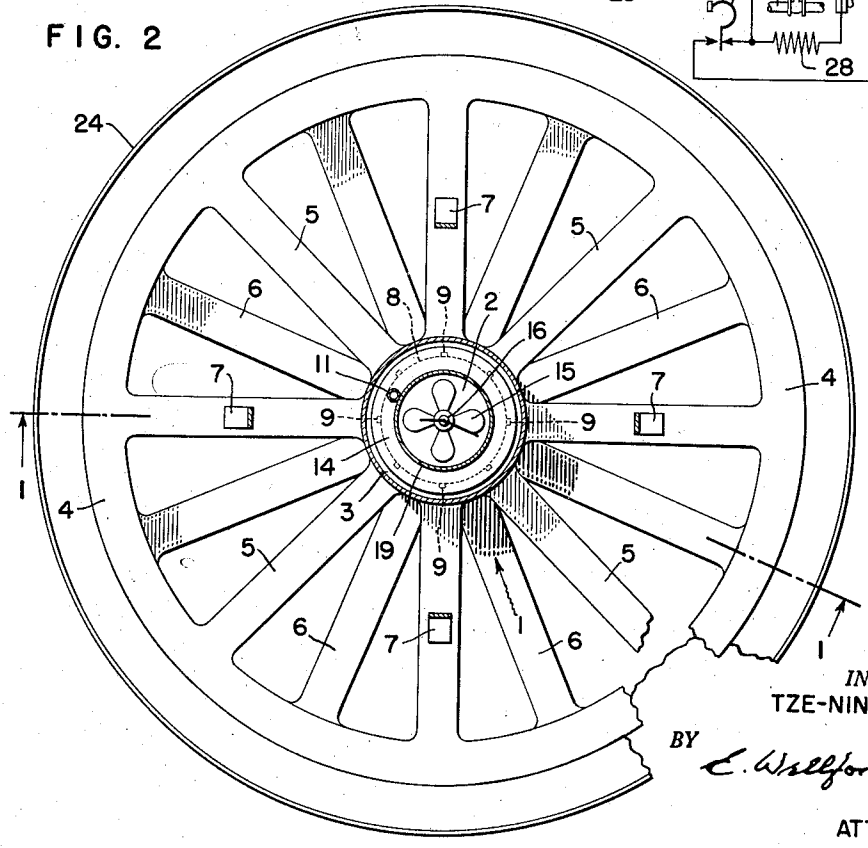


FIG. 3

FIG. 2



INVENTOR.
TZE-NING CHEN

BY E. Wellford Mason

ATTORNEY.

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UNIT HEATER

Tze-Ning Chen, Lakewood, N. J., assignor to Selas Corporation of America, Philadelphia, Pa., a corporation of Pennsylvania

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4 Claims. (Cl. 126—110)

The present invention relates to gas fired unit heaters of the type that are self-contained and are used to heat a room or other large open space.

It is an object of the present invention to provide a unit heater in which the burner is so designed that it will supply heat evenly to all portions of the heat exchanger. It is a further object of the invention to provide a protected burner that may be flash ignited by a pilot light. Another object of the invention is to provide a unit heater which has a large heat radiating surface, and one in which heated air can be delivered through a complete circle.

The heater of the present invention includes a combination combustion and heating chamber in the general shape of a horizontally disposed wheel having a hub, spokes and rim. All of the spokes are connected to the rim while some are connected to one and some to the other of a pair of concentric chambers formed in the hub. One of these chambers contains a burner that fires into the spokes connected therewith. The other chamber contains a fan that draws the products of combustion through the spokes and discharges them through a flue. Air to be heated is forced over the spokes and rim, and is discharged, by suitable guiding means, radially in all directions. The burner is provided with a shield to protect it from air flowing into the combustion chamber, and to protect the pilot light that is used for automatic ignition.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, its advantages and specific objects attained with its use, reference should be had to the accompanying drawings and descriptive matter in which I have illustrated and described a preferred embodiment of the invention.

In the drawings:

Fig. 1 is a section view through the heater taken on line 1—1 of Fig. 2.

Fig. 2 is a plan view of the heating element taken on line 2—2 of Fig. 1, and

Fig. 3 is a diagrammatic view of a control system for the heater.

Referring to the drawings there is shown a heating element that may be cast or fabricated from sheet metal. This element consists of a wheel-like structure which includes a hub 1 that is divided into an inner chamber 2 and an outer chamber 3, annular in shape, that are separated by a wall 19. The structure also includes a rim 4 that is connected to the hub by a plurality of spokes that are located in different horizontal levels. It will be seen that the upper spokes 5 connect chamber 3 and the rim, whereas the lower spokes 6 connect the rim and the inner chamber 2. Thus there is provided an enclosed path through which air and products of combustion may pass including the chamber 3, spokes 5, rim 4, spokes 6 and the inner chamber 2. In normal operation of the apparatus the heating element is supported in a horizontal position by means of brackets 7 that are attached to the ceiling of the room in which the heater is located.

A burner 8 in the form of a ring is located in the annular chamber 3 and attached to the wall of this chamber. This burner is provided with ports 9, one of which is directed radially into each of the spokes 5 that is connected with the chamber. The burner is supplied with a suitable fuel gas through pipe 11 having a solenoid valve 12 located therein. There is also provided a pilot light 13 which is supplied with fuel from the pipe 11. A shield 14 extends outwardly beyond the top of the burner in such a manner that the ports and pilot lights are protected from the axial flow of air into chamber 3.

A fan 15, in chamber 2, induces air for combustion into chamber 3 and discharges products of combustion through a flue that is connected in some suitable fashion with the upper end of the chamber 2. The fan is mounted on a shaft 16 of a motor 17 that is supported by a bracket on the lower portion of the heating element. It is noted that an air operated damper 21 is mounted on wall 19 across the upper end of chamber 2 to prevent reverse flow of air into the chamber when the burner is not in operation.

The air to be heated is drawn by a fan 22, also on shaft 16, upwardly in an axial direction to pass over the exterior of the heating element. This air is then directed in a radial direction away from the heater by upper and lower guides 23 and 23 respectively. The lower guide is provided with suitable openings 25 through which air flows toward the heating element.

Many different control systems can be used in the operation of a heater of this type. One is shown diagrammatically, however, in Fig. 3 of the drawing. This system includes a thermostat 26 that is located in the line supplying motor 17. There is also provided a switch 27 that is closed by the damper 21 when it opens, which switch is in the circuit for valve 12. Switch 27 also controls the supply of current through a thermal switch 29 and an igniting coil 28 that is located adjacent to the pilot light.

In the operation of the apparatus the thermostat 26, which is located in the space to be heated, will close when more heat is required. Closure of this thermostat energizes motor 17 to start a circulation of air by fan 15 through the heating element. As the air starts to circulate, damper 21 will open to close switch 27. This switch simultaneously energizes the coil for fuel valve 12 and closes the circuit to the ignition coil 28 thereby heating the coil. As gas flows into the burner it will be discharged from ports 9, a portion thereof being trapped under shield 14, and from pilot burner 13. This burner will be lighted by the hot ignition coil and will in turn ignite the gas trapped under the shield. Flames flashing around the main burner under the shield will ignite gas flowing from ports 9, thus starting the heater to operate. After a suitable interval of time, if the burner is operating properly, thermal switch 29 will open to break the circuit to the igniter.

The fuel being discharged from ports 9 will combine with air flowing into chamber 3 to burn radially outwardly in the spokes 5. The burning of this gas and the hot products of combustion flowing through the spokes and rim of the heating element will heat this element to a relatively high temperature. Heat is transferred from the element to air that is being blown over it by fan 22, thereby heating the air that is discharged into the room.

It will be seen that the arrangement is such that an even heating will occur all around the heating element and that the heated air will be discharged radially throughout a complete circle. Thus there is provided a heater which can be placed in a central location in a room to heat the entire room evenly. The heater is so designed that it will not begin operating until there is a proper flow of air through the heating element. It will also be seen that no products of combustion are introduced into the room being heated.

While in accordance with the provisions of the statutes, I have illustrated and described the best form of embodiment of my invention now known to me, it will be apparent to those skilled in the art that changes may be made in the form of the apparatus disclosed without departing from the spirit and scope of the invention as set forth in the appended claims, and that in some cases certain features of my invention may be used to advantage without a corresponding use of other features.

What is claimed is:

1. A unit heater comprising in combination a wheel-shaped heat exchanger having a hollow hub, hollow spokes and a hollow rim, means in said hub forming a pair of concentric chambers with some of said spokes connected to one chamber and the rest of said spokes being connected to the other chamber and all of said spokes being connected to said rim, means through which combustion air is supplied to the outer of said chambers, exhaust means connected to said inner chamber, a burner in the outer of said concentric chambers having ports directed radially toward the spokes connected therewith, a fan in the inner of said chambers operating to discharge axially thereof to said exhaust means whereby products of combustion are drawn through said spokes and rim to heat the same and are discharged axially of the heat exchanger, and drive means for said fan.

2. The combination of claim 1 including a second fan disposed coaxial with the first fan to blow air to be heated axially over said heat exchanger, said drive means being common to said two fans, and means to direct said axially flowing air across and radially outward from said heat exchanger.

3. A unit heater comprising a heat exchanger element shaped like a wheel, having hollow spokes, hub and rim, with the outer ends of the spokes in communication with the rim, means forming in the hub an exhaust chamber connected to some of the spokes and concentric therewith a combustion chamber connected to the remainder of said spokes, an exhaust duct connected with said exhaust chamber, an inlet for combustion air connected to said combustion chamber, burner means in said combustion chamber operative to direct a flame into each spoke connected therewith, means in said exhaust chamber to draw products of combustion through said spokes and rim and to discharge the products of combustion axially of said element, and means to operate said last mentioned means.

4. The combination of claim 3 including means to direct air to be heated axially of said element toward the hub thereof, and means to direct discharge of said air radially beyond the rim thereof.

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