

Feb. 6, 1945.

W. G. CARTTER ET AL

2,368,802

RADIANT MANTLE

Original Filed Jan. 29, 1940

Fig. 1.

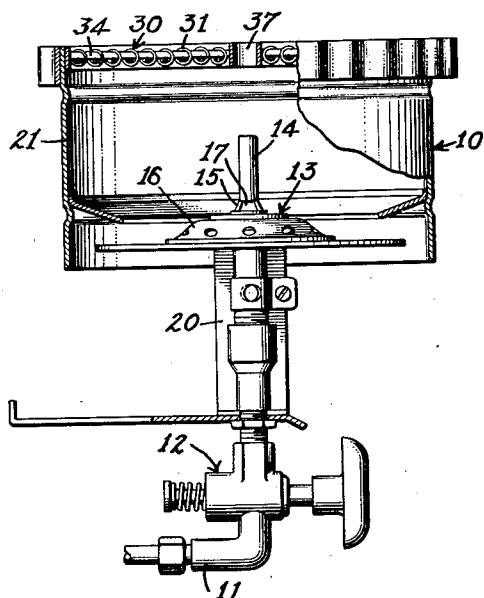


Fig. 2.

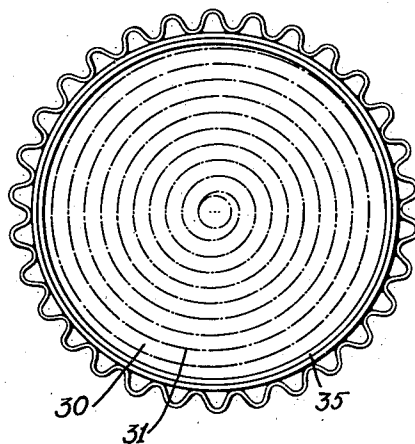


Fig. 3.

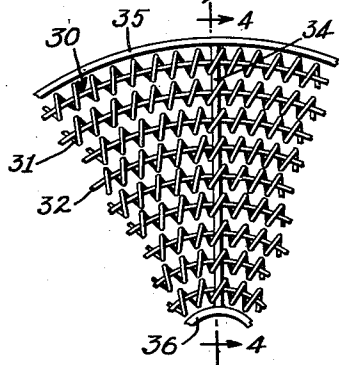
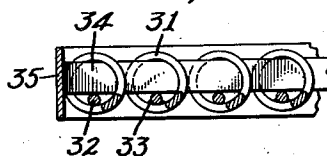


Fig. 4.



WILLIAM G. CARTTER
FRANK E. WOOD
INVENTORS

BY *Herbert A. Schubert*
ATTORNEY.

UNITED STATES PATENT OFFICE

2,368,802

RADIANT MANTLE

William G. Cartter and Frank E. Wood,
Monrovia, Calif.Original application January 29, 1940, Serial No.
316,116. Divided and this application October
20, 1941, Serial No. 415,743

4 Claims. (Cl. 158-113)

This invention relates generally to the gas heating art and particularly to a radiant mantle for incorporation in a gas heater. By gas heater we intend to include any type of heater in which the combustion of a fluid generates the heat.

This application is a division of our copending application, Serial No. 316,116, filed January 29, 1940, for Radiant mantle, Patent No. 2,280,061. In the present divisional application we claim a different species pursuant to requirement for election of species in the parent application.

At the present time space heaters are being provided which utilize gas as a fuel and which incorporate a member interposed between the gas and the space to be heated whereby the interposed member is heated to a point of incandescence.

It is the principal object of the present invention to provide a heater which may be used in connection with stoves or the like for cooking purposes but which is more especially adapted for heating the air in a given space, such as a room, and which structure is small and compact in design and embodies the use of a burner and a mantle element made of metal which in use is heated to a point of incandescence so that heat is radiated.

It is a further object of our invention to provide a foraminous mantle of the character described in which heated gases may readily pass through and upwardly away from the mantle in aid of combustion in the burner below as well as providing for circulating heat in addition to the radiant heat emanating from the mantle.

It is a further object of the invention to provide means whereby the burner which is below the mantle may be ignited before a sufficient amount of gas accumulates between the burner and mantle to cause danger of an explosion.

It is another object of the invention to provide a mantle fabricated from metal which is cheap in construction cost and may be readily made to conform to any desired configuration, and will retain its original shape when subjected to intense heat.

The present invention is intended especially for use with a burner enclosed within a housing to furnish a combustion chamber as disclosed in our Patent No. 2,263,432, the mantle being located at the upper end of the housing, the burner and the mantle being formed with cooperating means whereby the flame from the burner may be directly ignited through the mantle for instantaneous combustion and without impairing the usefulness of the mantle as an incandescent radiant heating element. The mantle has somewhat the appearance of an electric resistance grid although it is heated by the use of gaseous fuel.

In the drawing:

Figure 1 is a vertical section through a burner assembly incorporating our mantle.

Figure 2 is a schematic plan view of the burner assembly illustrating the spiral arrangement of the coiled wire used in the mantle.

Figure 3 is an enlarged fragmentary plan view of the mantle shown in Figures 1 and 2.

Figure 4 is an enlarged fragmentary vertical section of the mantle along section line 4-4 of Figure 3.

Referring more particularly to the drawing, 10 indicates a burner assembly connected by a tube 11 with a suitable source of fuel supply and including a valve 12 and a burner 13. Above the burner is an ignition tube 14 supported by arms 15 and in line with an orifice, not shown, in the upper face of the portion 16 of the burner. The arms position the inner end of the ignition tube 14 above the end face of the burner also providing a space 17. The upper end of the tube 14 terminates at a desired position as will be hereinafter set forth. When the valve is opened a mixture of gas and air ascends from the burner 13 into the tube 14 and is there ignited. The flame then travels back down the tube 14 and ignites the gaseous mixture which is issuing from the burner.

Supported upon uprights 20 of the burner structure 10 is a housing or drum 21. The drum 21 is mounted concentrically with the axis of the burner and the ignition tube. The upper end of the drum 21 is open and in the preferred form of the invention here shown defines a circular space within which a radiant mantle 30 is positioned. This mantle is of special design and novelty.

By reference to Figures 1, 2 and 3 of the drawing it will be seen that the mantle comprises a continuous wire coiled in the form of a helix as indicated at 31, the coil being arranged spirally in a single plane shown schematically in Figure 2.

A wire 32 is passed longitudinally through the coil preferably before it is formed into the spiral, and also is preferably spot welded at spaced points to aid in maintaining the coil in position. An illustration of the spot welding is indicated at 33.

Additional support may be provided by a radial spider 34, the outer ends of which are welded or otherwise attached to a circumferential confining band 35. This spider may be made with a central collar 36 providing an opening through which to light the burner as well as a barrier against which the inner convolution of the spiral rests. The central collar is not a necessary element of the invention as the coil may be welded to the inner ends of the spider arms.

We prefer to locate the wire 32 along the lower inside surface of the coil, and having installed the wire and secured it at various points by spot welding, the spiral may then be formed; after

this the arms of the spider are inserted in a radial direction and secured to the collar 36 (if used) at their inner ends and to the confining band 35 at their outer ends. The confining band 35 is not essential inasmuch as either the coil 31 or the wire 32 or both may be spot welded adjacent the outer ends of the spider arms 34 and thus retain the form of the mantle. The spacing of the adjacent convolutions of the coil is primarily a matter of design within certain limits, it being desirable that the convolutions be close enough together to provide in effect a continuous perforate surface.

In speaking of a wire coil we contemplate either a circular, a square, or rectangular type of wire coil.

By the arrangement described it will be seen that the convolutions of the radiant element will be securely assembled and will maintain their aligned position within a flat plane at the upper end of the drum 21. Ordinarily the mantle will be welded into the drum at the position shown in Figure 1.

The wires forming the coil 31 and the wire 32 may be made of any suitable metal or alloy such for example as chrome steel.

At the vortex of the spiral forming the mantle is a central opening 37 which as previously described may be formed by the collar 36 or merely defined by the inner convolutions of the wire coil. This opening is disposed directly above the upper open end of the ignition tube 14, and is for the purpose of facilitating the lighting of the gas issuing from the upper end of the tube. If the mantle is designed so that the pitch of the coiled wire is long and there is considerable space between successive turns it is feasible to eliminate the central opening 37 and light the gas as it issues up through the mantle.

The mantle is placed above the burner a sufficient distance so that the mantle is above the normal upper limit of the flame and so the flame will heat the mantle to incandescence but will not pass through the mantle. The spacing of the wire coil convolutions should be sufficient for the heat at the upper limits of the burner flame to readily penetrate. Any combustion which may occur at this point will not be visible to the eye and when the mantle has become properly heated the incandescent glow will dominate the burner flame and the latter will not be normally visible.

In the operation of the invention the burner structure is assembled as shown in the drawing and is connected to a suitable source of fuel. This fuel is preferably a gaseous fuel which when delivered to the burner will produce a combustible gas. Igniting means is placed at a point above the surface of the mantle and will temporarily ignite gas passing therethrough after which the flame will ignite the gas in the end of the tube 14 and then ignite the burner. When the burner is in full operation the combustion takes place within the drum 21 and the mantle 30 will be heated to the point of incandescence.

It will thus be seen that the structure described provides simple and effective means for heating air by radiation without sacrificing circulation and by the use of a gaseous fuel and that furthermore it provides a heating element which will maintain its shape when heated, will not sag and through which ignition may be brought about without danger of explosion.

The mantle may be made oval in plan instead

of circular if desired without changing the elements of which it is comprised, or it may even be laid out in a rectangular pattern.

While the form illustrated is planular, the same elements are adequate to make the mantle conical, either natural or inverted, and such modification is within the scope of our invention.

Our concept is a radiant mantle for gas heaters in which the mantle is placed in the burner assembly between the burner itself and the normal heat exit preferably above the normal upper limit of flame from the burner. The mantle is a coiled wire suitably supported in the form of a spiral or other arrangement in which the coiled wire occupies most of the area covered by the mantle, with the aid of a wire extending longitudinally through the coiled wire and assisted by radially arranged spider arms. The pitch of the convolutions in the coil must be sufficiently great to provide ample space through which heated gases may rise in aid of combustion in the burner below as well as to prevent fusing of the metal. The supporting means must be firm enough to retain the shape of the mantle as formed without presenting any substantial bulk to obstruct the upward flow of the heated gases. It is desirable that the material and proportions of the coiled wire and the supporting elements be such that they heat evenly and maintain comparable incandescence.

Having described our invention what we claim as new and desire to secure by Letters Patent is:

1. A mantle for radiant heaters comprising a helically coiled wire arranged in spiral shape, and means for holding the coil as thus arranged, said means comprising relatively thin metal bars vertically on edge extending transversely through the coiled wire, and an enclosing band secured to the outer ends of the supporting bars.

2. A mantle for radiant heaters comprising: a wire coil arranged in spiral shape, and means for holding the coil as thus arranged, said means comprising a wire passing longitudinally through the coil and secured to said coil, and a radial support comprising thin metal bars vertically on edge extending transversely through the spirally arranged coil.

3. A mantle for radiant heaters comprising: a wire coil arranged in spiral shape, and means for holding the coil as thus arranged, said means comprising a wire passing longitudinally through the coil and secured to said coil, and a radial support comprising thin metal bars vertically on edge extending transversely through the spirally arranged coil, said wire being disposed at the intersection of the vertical diameter of the convolutions of the wire coil, and the said metal bars occupying the remainder of such vertical diameter.

4. A mantle for radiant heaters comprising: a wire coil arranged in spiral shape, and means for holding the coil as thus arranged independently of any physical contact of the convolutions of the spiral diametrically thereof, said means comprising a wire passing longitudinally through the coil and welded thereto at a plurality of locations along the lower inside surface of the coil, and radial bars extending transversely through the coil, said bars engaging said wire at their lower edge and engaging the upper inside surface of the coil at their upper edge.

WILLIAM G. CARTTER.
FRANK E. WOOD.