This invention relates to a gas brooder, and more particularly to a gas heating unit which is specially suitable for use in a brooder for chicks.

In conventional gas burners which are commonly used for brooders of this type, the air for combustion is mixed with the gas within the burner by suction created by the flow of the gas through a venturi in the burner. The combustible gas-air mixture then passes through the burner orifices where it is ignited by a pilot. Because of the high dust level, which is characteristic of the atmosphere in brooder houses for chicks, this type of burner is very susceptible to a build-up of dust and other particles within the burner which may restrict the flow of gaseous fuel and even close some of the burner orifices. Despite efforts to filter the air which is drawn into the burner, fine dust particles are drawn into the burner and settle out to create this problem. This, at least, results in an inefficient burner and necessitates frequent cleaning of the burner.

Another object of this invention is to provide a gas burner which cannot become clogged due to dust or other particles in the atmosphere.

Another object of this invention is to provide a simple and efficient gas burner which provides for complete combustion of the gas.

A further object of this invention is to provide a gas heating unit, for a brooder for chicks, which maintains a very even temperature under the brooder.

The novel features of the invention, as well as additional objects and advantages thereof, will be understood more fully from the following description when read in connection with the accompanying drawing, in which:

FIG. 1 is a cross sectional view of a brooder for chicks taken in a vertical plane, showing the heating unit partially in elevation; and

FIG. 2 is a cross sectional view, taken in a vertical plane, of the heating unit shown in FIG. 1.

The brooder illustrated in the accompanying drawing consists generally of a flat, conical canopy and a gas heating unit mounted centrally under the canopy. The heating unit consists of a ceramic radiant disposed near the top of the canopy and defining an inverted conical surface, and an improved burner which produces a ring of flame and directs the ring of flame over the ceramic radiant to assist in maintaining a uniform temperature under the canopy. The burner consists of an upward directed gas jet, defined by a tip secured to a gas line and having an appropriate orifice; a horizontal deflector plate disposed axially below and immediately beneath the ceramic radiant and which is impinged by the gas flowing from the jet; and a spreader ring spaced axially below the deflector plate and which defines a flow for directing the ignited gas-air mixture radially outwardly and upwardly over the conical surface of the ceramic radiant.

Referring to the drawing in detail, FIG. 1 shows a brooder for chicks which includes a flat conical canopy 11, made of sheet metal; the canopy being open at the bottom and being closed at the top by a flat portion which is parallel to the base. The canopy 11 may be suspended from any appropriate support in a brooder house by means of three chains 12 attached to suitable brackets 13 which are mounted at the top of the canopy.

The heating unit includes a heat radiating assembly 15 and an improved burner 30, which are mounted in assembled relation as will be described.

The heat radiating assembly 15 includes a ceramic radiant 16 which is in the form of a truncated conical shell closed by a wall 17 at its smaller end, and a baffle plate 18. The baffle plate 18 is generally in the form of an inverted dish having an upwardly extending cylindrical recess 19, for receiving the upwardly extending base of the ceramic radiant 16, and an outwardly and downwardly extending flange 20. The baffle plate 18 is provided with a central aperture, as is the wall 17 of the ceramic radiant, and the radiant 16 is secured to the baffle plate by means of a bolt 21 which extends through these apertures and is threaded into a weld nut 35, which is an integral part of the burner 30 to be described.

A metal washer 22, confined against the upper surface of the wall 17, defines a bearing member for centering the lower end of the ceramic radiant 16 relative to the bolt 21. The washer 22 further defines a bearing surface engaged by the lower end of a metal spacer sleeve 23 placed over the bolt 21 to define a rigid structure member between the radiant wall 17 and the baffle plate 18. A metal washer 24, disposed in a recess in the lower surface of the radiant wall 17, defines a bearing surface engaged by the weld nut 35 which receives the lower end of the bolt 21. The bolt 21 and weld nut 35, when, clamp the radiant 16 and baffle plate 18 and associated parts in assembled relation.

The radiant 16 is provided with a plurality of closely spaced projections 25 which extend outwardly from its conical surface to be exposed to the flame from the burner to be described.

The above described heat radiating assembly 15 is secured to the upper flat part of the canopy 11 by means of suitable bolts 26 and spacers 27, the bolts passing through the flange 21 of the baffle plate 18 and through the flat upper surface of the canopy. The supporting brackets 13 are secured to the canopy by means of the same bolts and associated nuts.

An improved burner 30 according to the present invention consists of a deflector plate 31, a spreader ring...
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3, 32, and a gas jet 33 supported in spaced relation, as best shown in FIG. 2 of the drawing. The deflector plate 31 consists of a relatively heavy, flat, circular plate fabricated, preferably, from stainless steel. The plate has welded thereto an upwardly extending central weld nut 35 provided with a threaded bore for receiving the end of the bolt 21; and by this means the deflector plate is rigidly secured to the heat radiating assembly 15. The deflector plate 31 is provided with four holes 36 equally spaced both angularly and radially relative to the center of the deflector plate, for the purpose of securing the spreader ring 32 to the deflector plate.

The spreader ring 32 consists of a generally flat metallic ring, preferably fabricated of stainless steel, having an outer diameter greater than that of the deflector plate and having an upturned peripheral flange 38. This ring is provided with four holes 37 aligned with the holes 36; and the plate and ring are secured together rigidly and in spaced relation by means of bolts 39 and associated nuts and spacer sleeves 40, the bolts passing through the holes 36 and 37.

A U-shaped bracket 34 is rigidly secured to the under side of the spreader ring 32 by means of two of the bolts 39, and rigidly supports the gas jet 33 in spaced relation to the other elements of the burner. As best shown in FIG. 2, the jet 33 consists of a plug, provided with an orifice 41, which is threaded into an elbow 42 of the gas line. This elbow passes through an aperture in the base arm of the bracket 34 and is rigidly secured in the bracket by means of nuts 43 threaded onto the elbow on either side of the base arm. It will be seen that all of the elements of the burner are rigidly assembled in predetermined spaced relation to each other, which is necessary for the efficient operation of the burner. It will be noted further that the burner 30 is rigidly assembled in predetermined relation to the heat radiating assembly 15.

Referring again to FIG. 1, there is shown a shield 45 consisting of a metal plate having an upturned peripheral flange, which is suspended below the burner 30 from the baffle plate 18 of the heat radiating assembly, by means of three bracket arms 46. The bracket arms 46 are conveniently secured to the baffle plate 18 by the bolts 26. The shield 45 serves to protect the chicks from brushing against the hot parts of the burner 30 and also to collect any hot residue from the burner assembly. This shield may also serve to support a pilot burner or elements of a temperature control system for the burner, which are not shown in the drawing.

In the operation of a brooder employing the above described heating unit, the burner will be ignited conventionally from a continuously burning pilot. When the control system opens the main gas valve, a gas stream issues under pressure from the orifice 41 and is directed upwardly in a relatively thin stream through the opening in the spreader ring 32 to impinge upon the deflector plate 31. As a result of this impingement, the gas stream is agitated and is actively mixed with the air which is drawn freely from the atmosphere to produce a combustible air-gas mixture. Efficient mixing of the gaseous fuel and air occurs under the deflector plate in the area of the spreader ring opening, which defines a combustion chamber for the burner, and the resultant flame spreads radially through the annular space provided between the deflector plate 31 and the spreader ring 32. This flow of the flame and products of combustion radially outward through the above mentioned annular space is promoted by a flue effect which draws air from the atmosphere under the spreader ring to actively mix with the gas issuing from the jet 33 to produce a highly efficient air-gas mixture, resulting in complete combustion of the gas.

The upturned flange 38 of the spreader ring 32 directs the flame upwardly toward the projections 25 of the ceramic radiant 16. The radiant will become heated, of course, but it is important that the projections 25 be heated to a red glow. In brooders of this type it is important to keep the temperature within a rather narrow range, particularly when the chicks are very young; and it is, of course, desirable to do this with as simple a burner as possible. With a single burner it is necessary that the burner be operated cyclically. With the heat radiating assembly as above described, the radiant 16 will continue to receive heat when the main burner is shut off, and this has the effect of slowing the temperature change and providing for less frequent cycling of the burner to maintain the desired evenness of temperature. As indicated in the foregoing description, it is preferable that certain elements of the burner 30 be fabricated from stainless steel, particularly the deflector plate 31 and the spreader ring 32. It has been found that these elements of the burner, when fabricated from stainless steel, attain a cherry-red flow within a few minutes after ignition of the burner; and these elements then give off infrared heat. This penetrating heat is particularly beneficial for young chicks, and also penetrates the floor to maintain a dry floor.

Another particular advantage of a stainless steel burner is that the members which attain the cherry-red glow attain a temperature in the range of 1400° F. to 1500° F. At this temperature the stainless steel is not weakened by the effects of foreign particles which may come in contact with the burner are consumed. It has been observed that the surfaces of the infrared radiating stainless steel parts are free of any deposit or coating after months of use.

What has been described is an improved gas burner which is simple in structure; which provides efficient and complete combustion of the gas; which obviates the problem of clogging due to a build up of dust or other foreign particles carried in the air; which may be fabricated from stainless steel to provide infrared heat; and which, in combination with a ceramic radiant, provides a heating unit which maintains even temperature. What is claimed is:

1. In a gas heating unit for a brooder a gas burner of open construction comprising a gas jet; a deflector plate, and a spreader ring; said deflector plate comprising a member defining a generally horizontal, downward facing, circular surface; said spreader ring comprising a generally flat circular ring member supported in a plane parallel to said deflector plate circular surface in spaced relation below said surface; said burner having an opening of a diameter smaller than that of said circular surface, and having an outer periphery of a diameter at least as large as that of said circular surface, whereby said deflector plate and said ring member define confronting, generally parallel surfaces; means supporting said gas jet in spaced relation below said deflector plate and said spreader ring, to direct a gas stream upwardly through said spreader ring to impinge on said deflector plate surface, said supporting means permitting the flow of ambient air directly into said spreader ring opening; said deflector plate and spreader ring defining a combustion chamber within the projection of the ring opening, for the gas and air flowing upwardly through said opening; and the confronting surfaces of said deflector plate and said spreader ring defining an annular flue directing the products of combustion radially away from said combustion chamber.

2. The gas heating unit set forth in claim 1 wherein said deflector plate and spreader ring are fabricated from stainless steel, said elements attaining a red glow when said burner is ignited to produce an intense heat which consumes foreign particles drawn into said burner.

3. The gas heating unit set forth in claim 1 wherein said ring member extends radially beyond the
5. The gas heating unit set forth in claim 4
said one or more ceramic members having a plurality
of integral projections extending outwardly from
said conical surface.

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