May 22, 1956 R. T. KEATING 2,746,532

GAS BURNER

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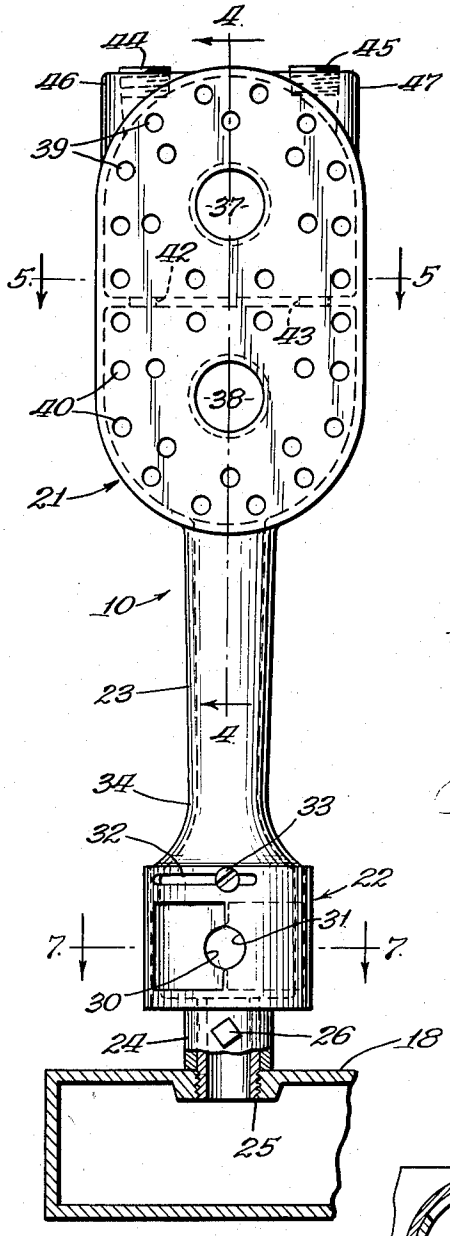

Fig. 1

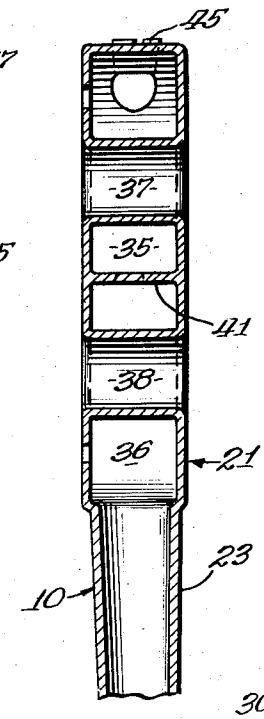

Fig. 2

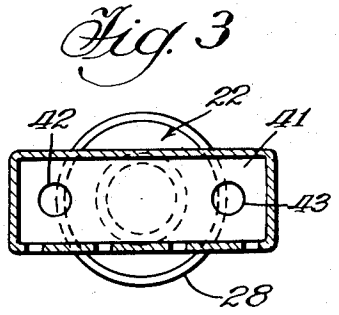

Fig. 3

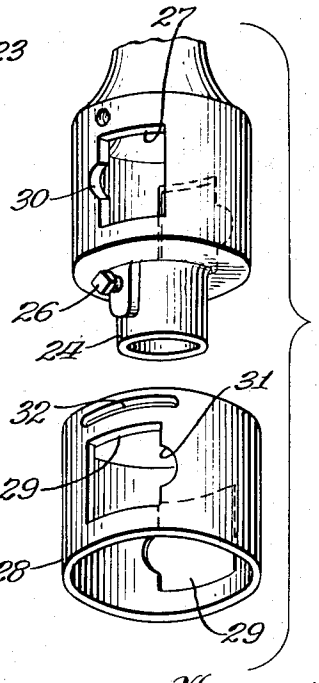

Fig. 4

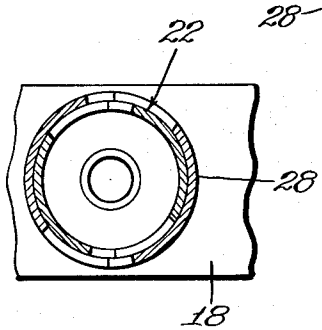

Fig. 5

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GAS BURNER

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2 Claims. (Cl. 158—114)

This invention relates to gas burners, and particularly to a gas burner of novel mechanical design and construction particularly suited for use in connection with deep fryers having combustion tubes extending in a generally horizontal direction through the grease tank.

The provision of satisfactory gas burners for heating deep fryers presents problems not encountered in most conventional gas heating applications, primarily due to the fact that deep fryer tanks of conventional construction include combustion tubes which extend horizontally through the tank, and thus require burners designed to operate in vertical position rather than horizontally, as is more conventional. Conventional gas burners do not operate with proper efficiency in this position, partially due to the fact that conventional gas burners fail to provide a uniform mixture of gas and air when operated in vertical position, since the gas tends to flow more freely out of the ports at the top of the burner than out of those at the bottom of the burner. This brings about incomplete combustion of the gas due to improper proportioning of the gas and air in the flame, and interferes with its heating efficiency. Moreover, these effects are further increased by the fact that gasses of different specific gravity, different B. t. u. content, and different pressure have widely variable characteristics of performance.

These deficiencies of conventional types of gas burners have long since been recognized, but prior efforts to provide a burner of more satisfactory design have been unavailing. For example, it has been proposed to provide the upper portion of the burner with gas ports of a different size than those at its lower portion. This may, to a limited extent, improve the functioning of a burner as long as it is operated only at one pressure, with a gas of one specific gravity and constant B. t. u. content. But a burner intended for a gas of the pressure and B. t. u. content used in one community could not be used in a different locality having a gas supply differing in these characteristics.

Thus, to produce a burner which is commercially acceptable, it is essential that it should be adaptable to use in any community. It follows that it should be of such design that any burner turned out by the manufacturer can be used with any gas supply, and can be suited to such relatively simple means.

It is, therefore, the primary object of the present invention to provide an improved gas burner for heating the combustion tubes of deep fryers, with the burner so designed and constructed as to be easily and conveniently suited to use with any commercially employed type of gas, notwithstanding variations in pressure, specific gravity and B. t. u. content, yet to accomplish intimate and uniform mixture of gas and air with any of said gasses and to operate satisfactorily in a vertical position; that is, with the gas ports disposed in a generally horizontal direction.

The foregoing objects are accomplished in the present invention by the provision of a burner of unique design

and construction which is illustrated in connection with the cabinet and grease pan of a deep fryer to show a typical installation of the preferred form of the invention.

In the drawings:

Figure 1 is a front elevational view of a gas burner constructed in accordance with the present teachings, the burner being shown in position on a supply manifold illustrated in cross section;

Figure 2 is a fragmental vertical cross sectional view taken substantially on the plane of the line 2—2 of Figure 1;

Figure 3 is a detail plan sectional view taken on the plane of the line 3—3 of Figure 1;

Figure 4 is an exploded perspective view showing the mixing chamber and air inlet of the burner, together with the adjustable closure valve therefor; and

Figure 5 is a detail plan sectional view taken on the plane of the line 5—5 of Figure 1, showing the relative positions of the mixing chamber and air valve in partially closed position.

The gas burner **10** in which the novelty of the present invention resides consists of a head portion **21** and a mixing chamber **22** interconnected by a vertically extending draft tube **23** (Figure 1). The entire unit is supported by an inlet sleeve **24** which may be slipped over a tubular nipple **25** and secured thereon as by the set screw **26**. The nipple **25** discharges gas into the enlarged mixing chamber **22**, which is provided with a pair of generally rectangular air inlets **27** and a sleeve-like adjustable closure valve **28** having air inlets **29** shaped like the inlets **27** but oppositely disposed (Figure 4). The sleeve-like valve **28** is provided with a slot **32** through which a locking screw **33** is threaded into the wall of the mixing chamber to provide a means for securing the valve in any position of adjustment within its range.

The openings **27** and **29** are of generally rectangular configuration as is conventional, but are provided with semi-circular cut-away portions **30** and **31**, as shown in Figures 1 and 4. These portions coact to form a generally circular air inlet when the parts are moved toward their closed position.

In operation, gas is projected into the mixing chamber through the nipple **25** and passes upwardly therefrom through the restricted neck portion **34** of the draft tube **23** and thence upwardly through the draft tube into the head **21** of the burner. This head comprises two substantially identical but opposite sections, each having an internal gas chamber. The two sections of the burner are positioned one above the other, but are in series with each other so that all of the gas mixture entering the head of the burner from the draft tube **23** passes into the lower chamber while the gas flow to the upper chamber is restricted. As shown, the upper section **35** and lower section **36** are open at the center as indicated at **37** and **38** to provide horizontal air ducts therethrough. The upper gas chamber and the lower gas chamber each feed a multiplicity of gas outlet ports **39** and **40**, respectively, and the gas chambers are separated from each other by a horizontally disposed transverse partition **41**. This partition has a pair of metering apertures **42** and **43** which serve as means to regulate the flow of gas from the lower chamber to the upper chamber of the burner, and thus the partition functions as a means of equalizing the flow of gas from the ports of the upper section of the burner with the flow from the ports in the lower section. In manufacture, these apertures are of the minimum size required for any gas currently employed in commercial heating. It is a feature of this invention, however, that means be provided to increase the size of the apertures to suit the characteristics of the

gas employed in any community. To this end, a pair of plugs 44 and 45 are threaded into bosses 46 and 47 at the upper end of the burner, in alignment with the apertures 42 and 43 respectively. Thus, by removing these plugs the metering apertures may easily be drilled out or reamed to the size the gas supply requires.

The burner here illustrated possesses important advantages over those heretofore known in several respects. Of utmost importance is the fact that it provides an efficient and convenient means of equalizing the flow of gas through the upper and lower ports of a vertical burner. Moreover, this is accomplished by means which may easily be suited to any gas supply. In addition, this result is accomplished by means disposed entirely within the gas burner where there is no possibility of the adjustment being altered by the accumulation of grease, which is always troublesome in deep fryer burners. In short, the design and construction of the burner brings about a more equal distribution of gas and a more intimate gas and air mixture than is possible with conventional types of burners when operated in vertical position. This avoids the improper mixing and incomplete combustion characteristic of burners heretofore utilized in connection with deep fryers, and thus brings about improved efficiency in heat conversion and corresponding reduction in operating costs.

With all of the above, the burner here disclosed is of simple mechanical design and composed of a relatively few parts. Moreover, it is of such form and construction that it may be economically manufactured, yet is strong, simple and rugged, and capable of withstanding long continued, hard use and abuse, as is expected in operation of commercial cooking equipment.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. In an upright gas burner, the combination of a vertically disposed, oblong head portion comprising a vertical front wall, a generally vertical rear wall parallel with said front wall, and a marginal wall extending between said front and rear walls around their peripheral edges, with at least one open air duct extending between said front and rear walls; said head portion having a multiplicity of relatively small gas outlet ports disposed in generally horizontal position and located in spaced apart relationship in the aforementioned front wall; said head portion having a generally horizontal transverse center partition extending between and interconnecting said front and rear walls and dividing the space within the head of the burner into an upper chamber and a lower chamber of substantially equal size and shape, oppositely disposed with respect to each other and located one above the other; said burner including a fuel mixture inlet comprising a mixing chamber and an elongated draft tube disposed in vertical position wholly below and communicate with the head portion of the burner; with the upper end of the draft tube discharging entirely into the lower gas chamber of the burner at the bottom thereof; said partition having at least one enlarged metering aperture therein between the lower and upper gas chambers whereby the upper gas chamber is wholly in series with the lower chamber and is supplied with a portion of the fuel mixture flowing upwardly from the tube through the lower chamber to the upper gas chamber; said flow being restricted by the metering apertures in the aforementioned partition.

2. An upright gas burner as in the foregoing claim with a removable plug in the upper marginal wall of the burner in alignment with the axis of said metering aperture to provide access to said aperture from the outside of the burner for varying the size thereof.

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