

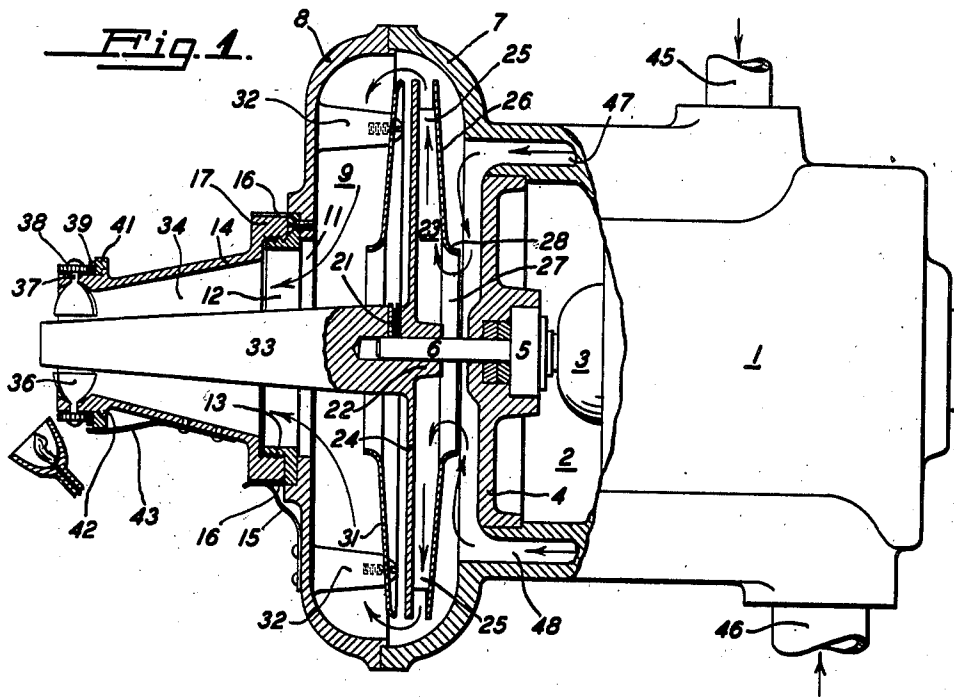
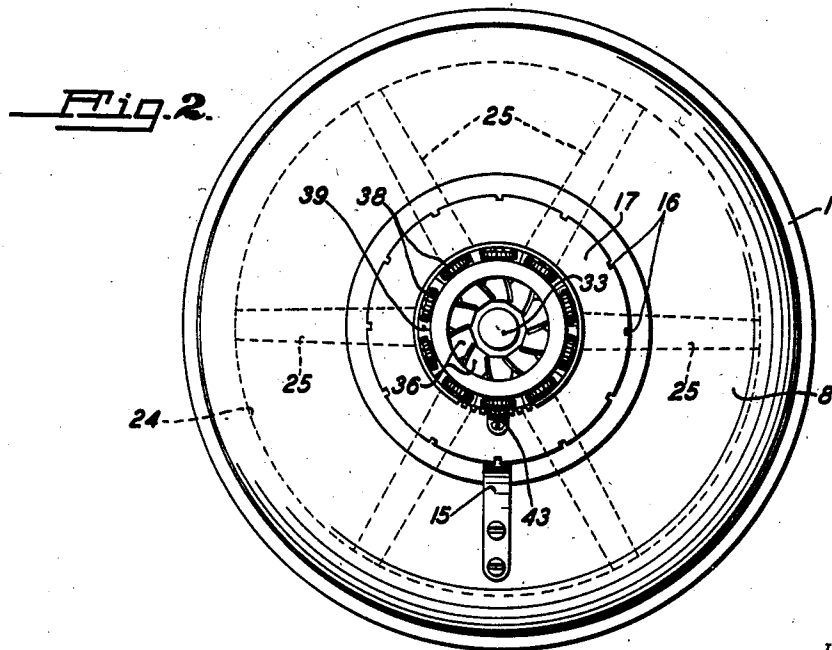
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FUEL BURNER

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FUEL BURNER

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10 Claims. (Cl. 158-109)

This invention relates to fuel burners and particularly to burners for gaseous fuels such as natural gas. In the past there has been little or no thought given to the development of burners of this type for the cost of gas has prohibited its use for industrial purposes. However, with the piping of natural gas from various oil fields to industrial centers its use has been made economically possible and it will undoubtedly become a serious competitor of fuel oil provided that an efficient gas burner can be developed.

Upon investigation it has been found that although the oil burner art is very highly developed, due to the inherent differences between the characteristics of fuel oil and natural gas, there is no burner now available in which gas can be burned without leaving much to be desired. Fuel oil for example must of necessity be atomized before it can be burned and therefore all oil burners are provided with an atomizer. Gas, of course, needs no such treatment but it has a very marked tendency to stratify if not thoroughly mixed with the air necessary to support combustion. Whether oil or gas is used, it is of course desirable not only that complete combustion be obtained but also that the heat generated be as uniformly dissipated within the fire box as possible. Fire boxes differ greatly in size and configuration and therefore it is advantageous to have a burner provided with adjustable means for controlling the angle taken by the flame within the burner. The amount of heat delivered by a burner depends not only upon the above factors but also upon the rate at which fuel is fed to the burner. In the past, gas has been fed to a burner only at the normal line pressure.

In general, the object of this invention is the provision of a gas burner provided with means for feeding a combustible mixture at pressures above the normal line pressure, to the burner nozzle and with adjustable means for delivering the mixture from the mouth of the nozzle at any predetermined angle to thereby cause the flame (and consequently the heat) to be dissipated as uniformly as possible throughout any particular fire box.

More specifically one of the objects of my invention is the provision within a burner nozzle of simultaneously adjustable vanes for controlling the angle at which a combustible mixture is delivered from the nozzle.

The invention possesses other advantageous features, some of which, with the foregoing, will be set forth at length in the following description, where I shall outline in full that form of

my invention which I have selected for illustration in the drawing accompanying and forming part of the present specification. In said drawing, I have shown one form of my invention, but it is to be understood that I do not limit myself to such form, since the invention as set forth in the claims, may be embodied in a plurality of forms.

Referring to the drawing:

Figure 1 is a side elevation of a burner, partly in section and in which are embodied the novel features of my invention.

Figure 2 is a front elevation of the burner shown in Figure 1.

The burner shown in these figures comprises a casing generally designated as 1, and in one end of which is a motor housing 2 containing a motor 3. A plate 4 serves to seal the open end of the motor housing 2 and carries a suitable bearing 5 for the motor shaft 6 extending there-through. The enlarged left hand end 7, of the casing 1 forms, with the dish shaped cover plate 8 secured thereto in any desired manner, a fan housing generally designated as 9. Screwed to the plate 8 in registration with the circular opening 11 is a collar 12 provided with threads 13. A frusto-conical nozzle 14 threadedly engages the collar 12 and is thereby capable of longitudinal adjustment with respect to the plate 8. For the purpose of securing the nozzle 14 in any adjusted position, a spring clip 15 secured to the plate 8 is adapted to engage serrations 16, formed on the shoulder 17 of the nozzle.

To the free end of the motor shaft 6 secured by means of the set screw 21, is the hub 22 of a fan generally designated as 23. The fan is cast integral with the hub 22 and comprises a disc 24 provided with ribs or vanes 25. As shown in dotted lines in Figure 2 there are six vanes 25 radially and symmetrically arranged on the disc 24. It will be noted from Figure 1 that the depth of the vanes 25 decreases from the center of the disc outwardly. A dish shaped plate 26 provided with a circular opening 27, formed by the outwardly turned flange 28, is secured to the ribs or vanes 25, and forms, with the vanes and the disc 24, sector-shaped channels. A deflecting disc 31, similar in every respect to the plate 26, is screwed to posts 32 carried by the cover plate 8.

Formed integral with, and as an extension of, the hub 22, is a tapered mandrel 33 which extends axially through the frusto-conical nozzle 14 and forms therewith what may be termed an annular channel or space 34.

At the mouth of the nozzle 14 and within the

annular space 34 are radially arranged deflecting vanes or plates 36 which are provided with cylindrical stems 37 journaled in the nozzle 14. Secured to the outer ends of the stems 37 are small gear wheels 38 which are adapted to mesh with gear teeth 39 carried by the ring 41. As shown in Figure 1 the ring 41 is rotatably disposed over the end of the nozzle 14 and engages a head or shoulder 42 formed on the nozzle. The periphery of the ring 41 is provided with serrations which are adapted to accommodate the spring clip 43 to thereby retain the ring in any desired position. Due to this construction it is obvious that by merely rotating the ring 41, all of the vanes or plates 36 are simultaneously adjusted to increase or decrease the angle at which the combustible mixture is delivered or emitted from the nozzle. It is to be particularly noted that it is a predetermined mixture of gas and air that is deflected in passing through the end of the nozzle and not merely air alone or gas alone. This is of considerable importance, for by delivering an intimate mixture of gas and air from the nozzle there is little or no tendency for these two substances to stratify as is the case when they are delivered from the nozzle in two or more converging streams. The term "combustible mixture" as herein used therefor designates an intimate predetermined mixture of gas and air or other source of oxygen.

The casing 1 is provided with a gas inlet 45 and an air inlet 46 which communicate, through channels 47 and 48 respectively, with the fan housing 9 and it is to be noted that the fan housing may be also considered as a mixing chamber.

The operation of the burner as above described is as follows:

The motor 3 is first put into operation by means of the usual thermostatic switch and rotates the fan 23, as well as tapered mandrel 33, at a speed of from four to six thousand R. P. M. The gas is then turned on and, after passing through the inlet 45, the conduit 47, the fan housing 9 and the nozzle 14, is finally ignited at the mouth of the nozzle either by means of the usual pilot light, or by means of an electric spark. Air is then introduced into the burner through the inlet 46, and, in passing through the fan housing 9, is thoroughly mixed with the gas. The combustible mixture is forced through the annular space formed by the tapered mandrel 33 and the frusto-conical nozzle 14 and is deflected by the adjustable vanes or plates 36, at any predetermined angle into the furnace. The size and form of the furnace of course governs the adjustment of the vanes or plates 36 but because of the ease with which all of the vanes may be simultaneously adjusted and set at any predetermined angle, a standard burner may be efficiently used in furnaces vary greatly in size and form. Furthermore, stratification of the gas and air is prevented due to the fact that these elements are delivered from the mouth of the burner as an intimate admixture thereby insuring perfect combustion.

It is to be noted that the normal line pressure of the gas is not depended on and that the pressure at which the combustible mixture is delivered may be boosted to any extent permitted by the fan. Needless to say this enables a far greater number of B. T. U.'s to be generated per given time than is possible by a gas burner operating at the normal line pressure.

The control mechanism forms no part of the

present invention although the sequence of operation as above given is desirable to the normal operation of the burner as described.

I claim:

1. In a gaseous fuel burner, a mixing chamber for mixing air and gas into a combustible mixture, a nozzle associated with said chamber through which the combustible mixture is adapted to be passed, a plurality of radially disposed deflecting vanes rotatably secured within said nozzle by means of pins passing through the nozzle, gear wheels secured to the outer ends of said pins and a ring rotatably secured over the end of said nozzle and provided with gear teeth adapted to engage and rotate said gears to simultaneously adjust the angular position of said vanes.

2. In a gaseous fuel burner, a mixing chamber for mixing air and gas into a combustible mixture, a frusto-conical nozzle associated with said chamber; a mandrel disposed within said nozzle and along its axis and defining therewith a substantially annular space through which the combustible mixture is adapted to be passed; and adjustable means disposed within said annular space for controlling the angle at which said mixture is emitted therefrom.

3. In a gaseous fuel burner, a fan housing and mixing chamber; a motor driven fan within said housing; a frusto-conical nozzle communicating with the housing; a mandrel secured to said fan and disposed within said nozzle and along its axis and defining therewith an annular space through which a combustible mixture is adapted to pass; and adjustable means disposed within said annular space for controlling the angle at which said mixture is emitted therefrom.

4. In a gaseous fuel burner, a fan housing and mixing chamber; a motor driven fan within said housing; means for introducing air and gas into said housing; a nozzle communicating with the housing; a mandrel secured to said fan and disposed within said nozzle and along its axis and defining therewith an annular space through which the mixed air and gas is adapted to be passed; and adjustable means disposed within said annular space for controlling the angle at which said mixture is emitted therefrom.

5. In a gaseous fuel burner, a fan housing and mixing chamber; a motor driven fan within said housing; means for introducing air and gas into said housing; a frusto-conical nozzle communicating with the housing; a mandrel secured to said fan and disposed within said nozzle and along its axis and defining therewith an annular space through which the air and gas mixed in said housing is adapted to be passed; and adjustable vanes disposed within said annular space for controlling the angle at which said mixture is emitted therefrom.

6. In a gaseous fuel burner, a mixing chamber; a nozzle associated with said chamber; a mandrel disposed within said nozzle and defining therewith a substantially annular space through which a combustible mixture is adapted to be passed; means for boosting the pressure of said combustible mixture prior to its introduction into said nozzle and means disposed within said annular space for controlling the angle at which said mixture is emitted therefrom.

7. A gaseous fuel burner comprising a mixing chamber; means for introducing air and gas into said chamber; means within said chamber for boosting the pressure of the mixture of air and gas passing therethrough; a nozzle in communication with said mixing chamber and adjustable

means within said nozzle for controlling the angle at which the fuel mixture is emitted therefrom.

8. A gaseous fuel burner comprising a mixing chamber; means for introducing air and gas into said chamber; means within said chamber for boosting the pressure of the mixture of air and gas passing therethrough; a nozzle in communication with said mixing chamber and adjustable vanes within said nozzle for controlling the angle at which the fuel mixture is emitted therefrom.

9. A fuel burner comprising an outer casing; a fan housing and mixing chamber associated with one end of said casing; a nozzle associated with said fan housing and fuel and air conduits formed as an integral part of said casing and establishing communication between the fan housing and the exterior of said casing.

10. A fuel burner comprising: an outer casing;

a fan housing and mixing chamber associated with one end of said casing; a motor housing disposed within said casing; fuel and air conduits formed between said outer casing and motor housing and integral therewith, said conduits communicating with the fan housing; a nozzle associated with said fan housing; a fan disposed within said fan housing and operatively connected to a motor disposed within said motor housing; a mandrel carried by said fan and extending through said nozzle to form an annular space therewith; a plurality of radially disposed vanes adjustably secured to the outer end of said nozzle and extending into the annular space formed between the nozzle and mandrel; and means disposed on the exterior of said nozzle for simultaneously adjusting the angularity of said vanes.

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