June 6, 1944. S. PERRY 2,350,920

HEAT RESPONSIVE MEANS FOR CONTROLLING THE AIR SUPPLY TO LIQUID FUEL BURNERS

Filed Jan. 22, 1941 2 Sheets-Sheet 1

Fig. 1

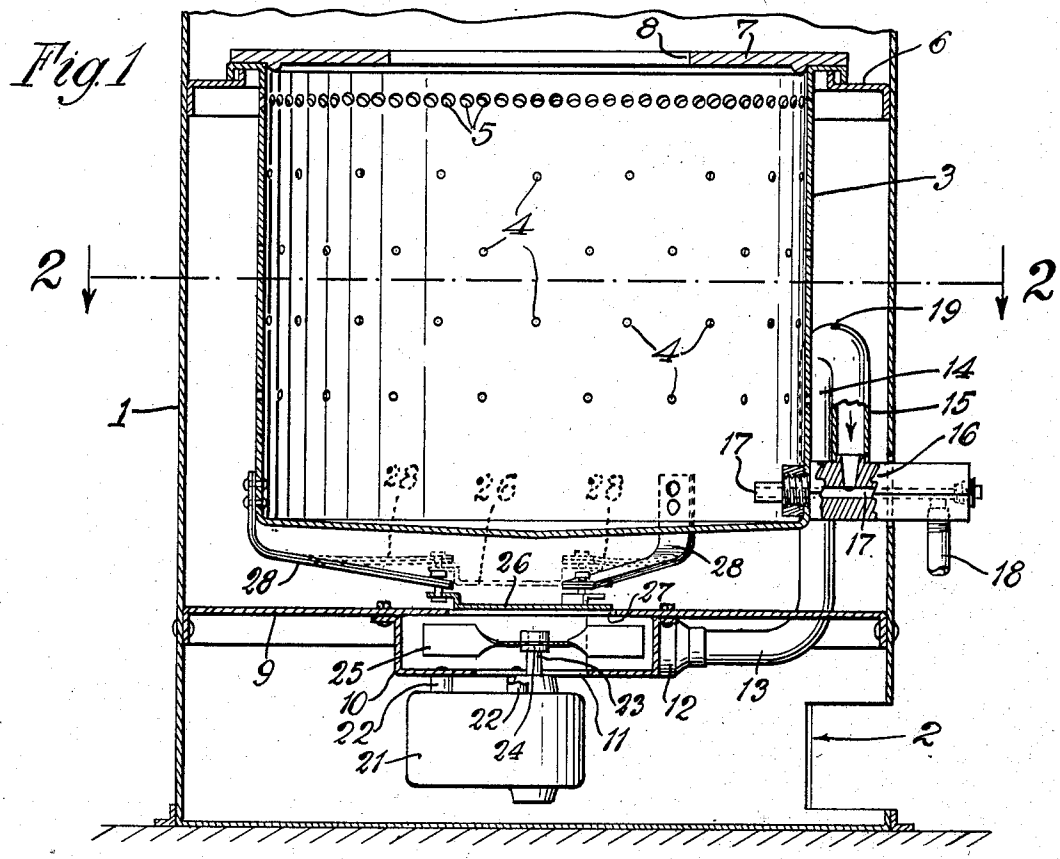



Fig. 2

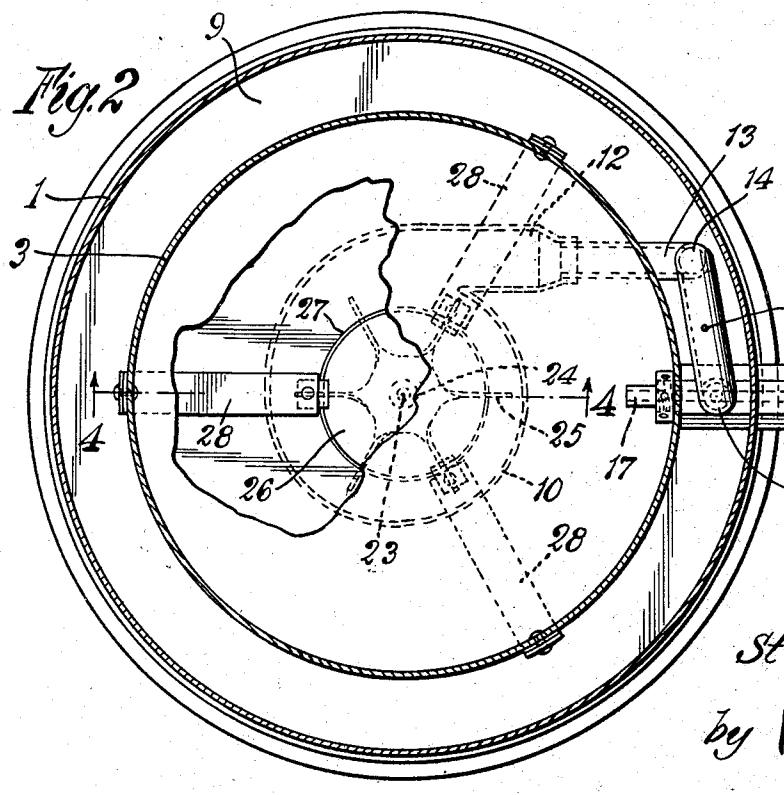
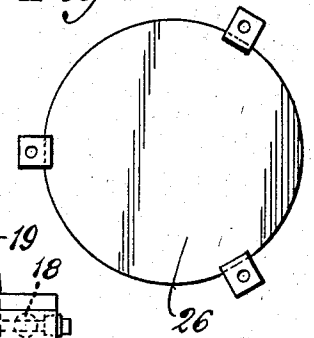



Fig. 3



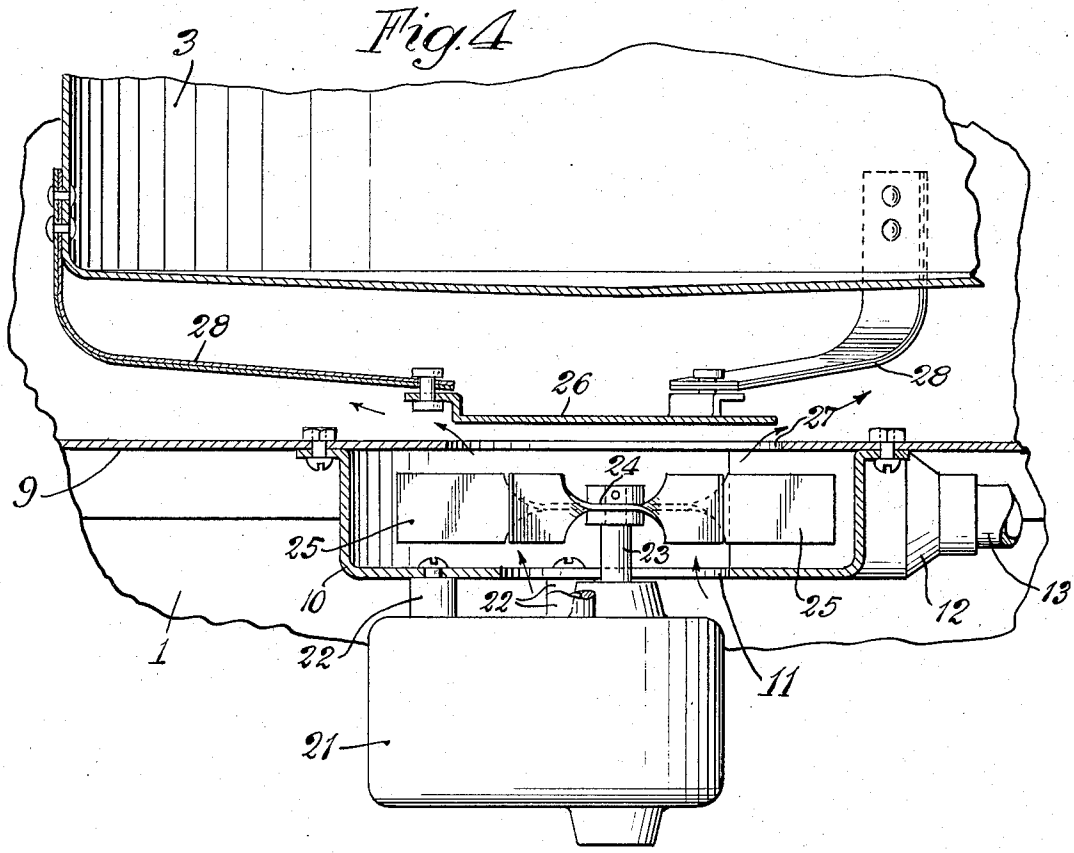

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HEAT RESPONSIVE MEANS FOR CONTROLLING THE AIR SUPPLY TO LIQUID FUEL BURNERS

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Fig. 4




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# UNITED STATES PATENT OFFICE

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## HEAT RESPONSIVE MEANS FOR CONTROLLING THE AIR SUPPLY TO LIQUID FUEL BURNERS

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Application January 22, 1941, Serial No. 375,468

10 Claims. (Cl. 158—91)

My invention relates to an improvement in burners and has for one purpose the provision of a burner, for example a liquid fuel burner, in which the air pressure surrounding the burner may be controlled or varied in response to changes in temperature at or adjacent the burner itself.

Another purpose is the provision of means for varying the delivery of air about a burner from a motor driven fan and the cross sectional area of the delivery opening from the fan in response to heat changes at or about the burner. It may be advantageous to control the air supply in response to heat conditions at or near the bottom of the pot, but under some circumstances it may also be advantageous to control it in response to temperature conditions elsewhere in, on or near the pot.

Another purpose is to provide for the delivery of air to the oil pilot of an oil burning burner.

Another purpose is to provide for delivery of air under different pressures, but from a common source about a pot type burner and to the pilot inlet of such pot type burner.

Other purposes will appear from time to time in the course of the specification and claims.

I illustrate my invention more or less diagrammatically in the accompanying drawings wherein:

Fig. 1 is a vertical axial section;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a detail; and

Fig. 4 is an enlarged section on the line 4—4 of Fig. 2, with the parts in a different position.

Like parts are indicated by like symbols throughout the specification and drawings.

Referring to the drawings, I may employ an outer shell or drum 1, having any suitable air inlet means or apertures 2 to admit air to a lower portion thereof. Mounted within the drum 1 is a pot 3 having a plurality of primary air inlet apertures 4, located at various levels, and in the particular embodiment shown, a row of secondary air inlet apertures 5. The pot may be mounted for example upon any suitable ring 6, and 7 indicates a fire ring with a central aperture 8.

9 is a generally horizontal partition located below the pot and shown as having a generally central offset portion 10, with an aperture 11 therein. The offset portion may be formed as a typical fan scroll, as shown in Fig. 2, terminating at one side in a tangential air discharge nozzle 12, which in turn delivers air along a duct 13, having a portion 14, preferably in fairly close proximity to the exterior of the pot. It may then be recurved downwardly, as at 15, to a fuel inlet nozzle generally indicated at 16. The air delivered along the duct 13 may then be mixed with the inflowing fuel or vapor therefrom, which flows inwardly along the passage 17 of the nozzle 16.

18 indicates a line extending from any suitable source of fuel supply not herein shown. The top of the air delivery passage should be located above the lowest row of primary air holes 4, and therefore above any possible fuel level. 19 is a vent in an upper portion of the duct, which prevents any possible siphoning action in the event of flooding.

21 is any suitable motor, which may for example be suspended from the bottom of the offset or scroll portion 10 by any suitable connections 22. It serves to actuate a fan shaft 23, having a hub 24 with fan blades 25. 26 is a plate or air control member located above the fan, herein shown as having a diameter somewhat less than the circular opening 27, which closes the top of the above described scroll structure. It will be understood, however, that it may be of larger diameter if desired, the essential point being that the plate 26 shall constitute a removable or flow control member. The space between it and the adjacent portion of the partition 9 serves as an air gate, the cross sectional area of which may be varied by the employment of bimetallic strips or warping bars or other heat responsive means 28, as supports for the plate 26. I illustrate a simple and convenient arrangement in which the plurality of warping bars 28 serve both as actuating means and as supports for the plate 26.

It will be understood, however, that I may employ a wide variety of mechanisms, the essential point being that the plate 26 or its equivalent is moved in response to heat conditions in, at or near the pot in order to vary the outlet passage between the plate 26 and adjacent portions of the partition 9. It may be desirable to increase the clearance in response to an increase in heat, or to decrease the clearance in response to an increase in heat, and either purpose may be simply and efficiently obtained by the structure herein shown or by modifications thereof. A simple application of my invention, as shown in Fig. 1, is to have the warping bars 28 so formed as to lift the plate 26 in response to the increase of heat in the pot. But this is merely one embodiment of my invention.

It will be observed that the air is delivered at higher pressure to the pilot duct 17 than it is to the space about the pot, since the pilot duct is in communication with the tangential discharge nozzle 12. It is important that the pilot duct be not large enough to take the entire output of

the fan. It is also important that the lower inlet 11 to the scroll 10 be of less diameter than the aperture through which air is discharged to the space about the pot.

In the operation of my invention I provide a lesser volume of air to the pilot at a relatively high pressure, and a larger volume of air to the space about the pot at a relatively low pressure—that is to say, more air is supplied to the pot than to the pilot, but the pressure to the pilot is higher than the pressure about the pot.

In the particular form herein shown the air passage 13, 14 extends sufficiently closely to the outer face of the pot 3 to provide a pre-heating of the air delivered to the pilot, which may be useful to assist or increase the vaporization rate of the fuel inwardly supplied along the fuel inlet nozzle 16, and may also increase the velocity of flow through the orifice.

It will be realized that, whereas I have described and illustrated a practical and operative device, nevertheless many changes may be made in the size, shape, number and disposition of parts without departing from the spirit of my invention. I therefore wish my description and drawings to be taken as in a broad sense illustrative or diagrammatic, rather than as limiting me to my precise showing.

For example, whereas I have shown the passage 13 extending from the peripheral outlet 12 of the fan casing or scroll to the fuel inlet, it will be understood that I may employ the duct 13 or its equivalent to deliver air directly to the pot or to deliver air both directly to the pot and to the fuel housing.

I claim:

1. In combination, a burner pot having a plurality of air inlet apertures, a fuel duct extending to the pot, a housing surrounding the pot, a fan casing having an air inlet aperture, a fan in said casing, said fan casing having a peripheral discharge aperture, and an axial discharge aperture, the latter communicating with the space about said pot, an air delivery passage extending from said peripheral aperture to the interior of the fuel duct, the fan having an air delivery capacity greater than the capacity of the peripheral aperture, the aperture in the fan casing in communication with the space about the pot being of greater diameter than the air inlet of the fan casing.

2. In combination, a burner pot having a plurality of air inlet apertures in its wall, a housing surrounding said pot, a fuel duct extending to the pot, a motor, a fan driven by said motor, and a fan housing for said fan, said housing having an air inlet aperture adapted to receive outside air and an air delivering aperture adapted to deliver air to the space between the pot and the housing and in line with the bottom of the pot, and an air delivery duct extending from the fan housing to the fuel duct and in communication with the interior of the fuel duct at a point spaced outwardly away from the fuel delivery end of the duct.

3. In combination, a burner pot having a plurality of air inlet apertures in its wall, a housing surrounding said pot, a fuel duct extending to the pot, a motor, a fan driven by said motor, and a fan housing for said fan, said housing having an air inlet aperture adapted to receive outside air and an air delivering aperture adapted to deliver air to the space between the pot and the housing, and an air delivery duct extending from the fan housing to the fuel duct and in communication with the interior of the fuel duct at a point spaced outwardly away from the fuel delivery end of the duct, and means for varying the effective opening between the fan housing and the space about the pot, including a closure element aligned with said aperture, and means responsive to changes in temperatures for moving said element toward and away from maximum closing position in response to changes in temperature of the space adjacent the pot.

4. In combination, a burner pot having a plurality of air inlet apertures, a fuel duct extending to the pot, a housing surrounding said pot, a fan, adapted to deliver air to the space about the pot, means for delivering air from the fan to the interior of the fuel duct at higher pressure and in smaller volume than the pressure and volume of the air delivered from the fan to the space about the pot, and means for varying the rate of flow of air from the fan into the interior of said housing in response to variations of temperature adjacent the burner.

5. In combination, a burner pot having a plurality of air inlet apertures, a fuel duct extending to the pot, a housing surrounding said pot, a fan, adapted to deliver air to the space about the pot, means for delivering air from the fan to the interior of the fuel duct at higher pressure and in smaller volume than the pressure and volume of the air delivered from the fan to the space about the pot, and means for varying the rate of flow of air from the fan into the interior of said housing in response to variations of temperature adjacent the burner, including shutter means movably positioned between the fan and the pot.

6. In combination, a burner pot having a plurality of air inlet apertures, a fuel duct extending to the pot, a housing surrounding said pot, a fan, adadapted to deliver air to the space about the pot, means for delivering air from the fan to the interior of the fuel duct at higher pressure and in smaller volume than the pressure and volume of the air delivered from the fan to the space about the pot, and means for varying the rate of flow of air from the fan into the interior of said housing in response to variations of temperature adjacent the burner including shutter means positioned between the fan and the pot and heat responsive means for moving said shutter means.

7. In combination, a burner pot having a plurality of air inlet apertures, a fuel duct extending to the pot, a housing surrounding said pot, a fan adapted to deliver air to the space about the pot, means for delivering air from the fan to the interior of the fuel duct at higher pressure and in smaller volume than the pressure and volume of the air delivered from the fan to the space about the pot, and means for varying the rate of flow of air from the fan into the interior of said housing in response to variations of temperature adjacent the burner, including shutter means between the fan and the pot, and a warping bar, subjected to the heat of the pot, in actuating relationship with the shutter means.

8. In combination, a burner pot having a bottom and a generally cylindrical side wall with a plurality of air inlet apertures through said side wall, a fuel duct extending to the pot, an outer housing surrounding said pot, a fan positioned generally co-axially with the pot and adapted to deliver air to the interior of the outer

housing and toward the bottom of the pot, a fan housing for said fan and an air duct extending from a peripheral portion of the fan housing to the interior of the fuel duct.

9. In combination, a burner pot having a bottom and a generally cylindrical side wall with a plurality of air inlet apertures through said side wall, a fuel duct extending to the pot, an outer housing surrounding said pot, a fan positioned generally co-axially with the pot and adapted to deliver air to the interior of the outer housing and toward the bottom of the pot, a fan housing for said fan and an air duct extending from a peripheral portion of the fan housing to the interior of the fuel duct and means for varying the rate of air flow from the fan housing to the interior of said outer housing in response to variations of temperature adjacent the pot.

10. In combination, a burner pot having a bottom and a generally cylindrical side wall with a plurality of air inlet apertures through said side wall, a fuel duct extending to the pot, an outer housing surrounding said pot, a fan positioned generally coaxially with the pot and adapted to deliver air to the interior of the outer housing and toward the bottom of the pot, a fan housing for said fan and an air duct extending from a peripheral portion of the fan housing to the interior of the fuel duct, said outer housing having a wall with an aperture aligned between said fan and pot and means for varying the rate of air flow from the fan housing through said aperture to the interior of the outer housing in response to variations of temperature adjacent said pot, including shutter means associated with said aperture and means for actuating said shutter means in response to changes in temperature conditions adjacent said pot.

STANLEY PERRY.