United States Patent

Brooks et al.

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[54] BUNSEN BURNER SIMULATING FLAMELESS ELECTRIC HEATER

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[52] **U.S. Cl.**.....**219/ 373**, 219/364, 219/368, 219/ 381, 219/531, 431/ 355

[51] **Int. Cl.**.....**F24h 3/04**, F23d 3/40

[58] **Field of Search**.....219/364, 368, 369, 370, 373, 219/375, 379, 381, 531

[56] **References Cited**

UNITED STATES PATENTS

3,094,606	6/1963	Ferris	219/375 X
2,439,713	4/1948	Bredice	219/373
1,217,229	2/1917	Smith	219/364
1,639,200	8/1927	Pitts	219/368 X
1,824,585	9/1931	Wolcott et al.	219/531 X
2,027,605	1/1936	McCord et al.	219/370

FOREIGN PATENTS OR APPLICATIONS

250,103	5/1948	Switzerland	219/381

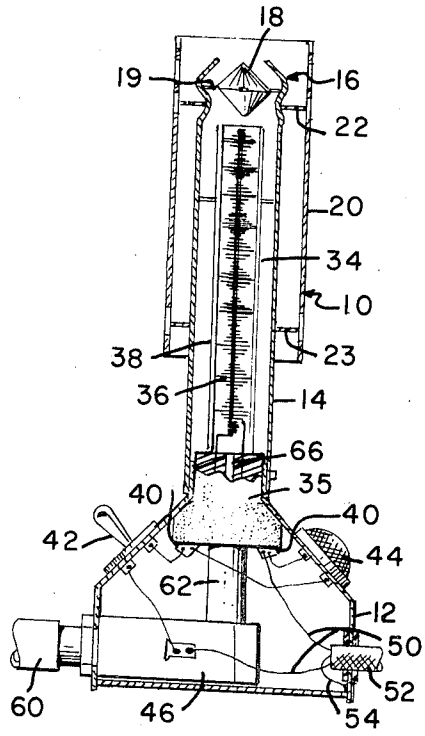
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[57] **ABSTRACT**

A flameless electric heater having a resistance wire heater coil insulated from and positioned within a vertical tubular stack. A constant air flow is directed over the coil establishing a hot air zone at the exit point of the stack. The electric power source to the heater is controlled by a cutoff device that is actuated when the air flow drops below a predetermined pressure, thus preventing overheating and burn-out of the coil of the heater.

2 Claims, 3 Drawing Figures



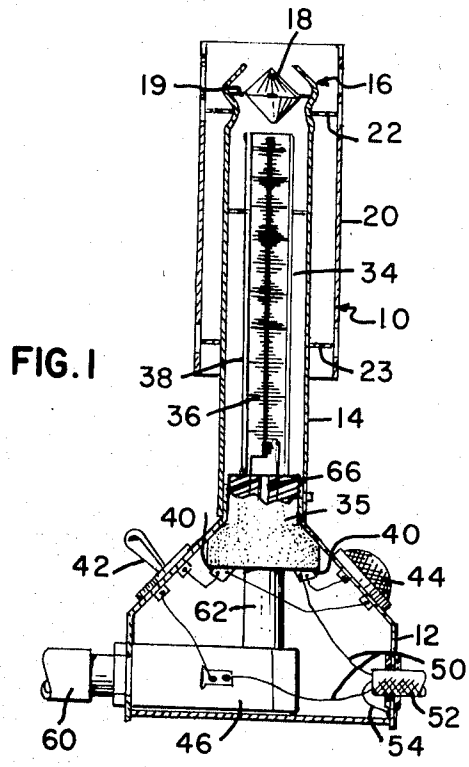


FIG. 1

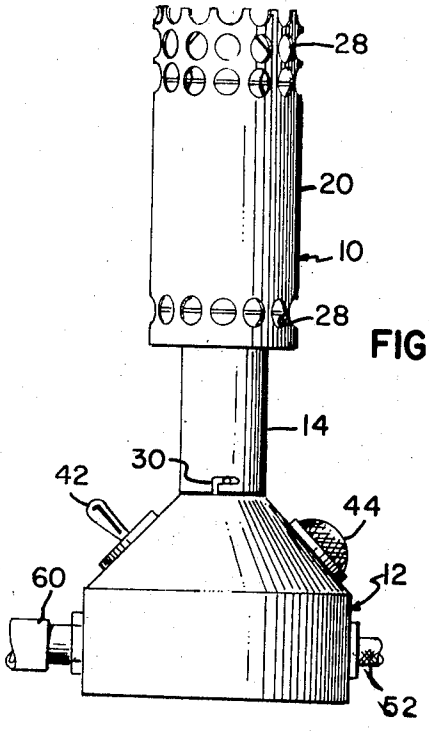


FIG. 2

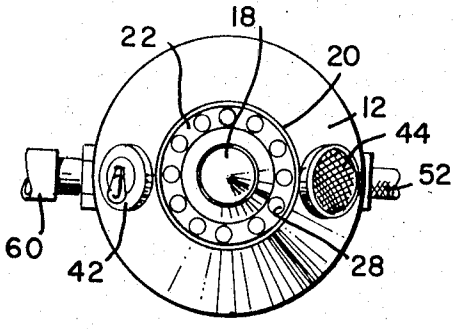


FIG. 3

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BUNSEN BURNER SIMULATING FLAMELESS ELECTRIC HEATER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention pertains to electric flameless heaters where a flow of air is passed over an electric coil thereby producing a flameless heat blast. The application of this type of heater is varied but it can be utilized where a high flow of extremely hot air is needed, such as in package sealing, drying and in particular as a replacement for the standard gas flame Bunsen burner.

2. Description of Prior Art

Previously burners or heaters of this type such as Bunsen burners, blow torches, etc. utilized other sources of fuel, such as an ignitable liquid or gas, all of which are explosive, poisonous or flammable. The heater that this invention could replace would be Bunsen burner which comprises a straight upstanding tube or stack extending from a stand or base, the lower part of the stack being provided with air holes for a supply of air which mixes with a combustible gas that is fed through the tube. This type of burner gives an exceptionally hot flame and is used extensively in chemical laboratories.

In using a burner of this type there is always a danger of tipping over the upright stack which obviously is very dangerous, especially when it is used with combustible materials.

Another decided disadvantage of this type of burner is that the material being heated can spill into the stack during operation of the burner causing smothering of the flame or a flash fire if the material is flammable.

SUMMARY OF THE INVENTION

This invention relates to an improved and more efficient flameless electric heater.

The heater comprises a conical base stand and a vertical hollow stack fitted to the top of the stand. The upper end portion of the stack is provided with an integral baffle and nozzle arrangement. Located integral with the base stand there are a socket having a centrally located aperture and an air control valve connected to the aperture of the socket. A heating element, similar to that described in the co-pending application Ser. No. 674,823, filed Oct. 12, 1967 now U.S. Pat. No. 3,551,643 by Theodore Princenski, is fitted to the socket. The base of the heater element also has an aperture and registers with the aperture of the socket. With this arrangement air can be directed through the air valve over the coils of the heater producing a controlled heat blast as the exit point of the formed nozzle and baffle. Electric power to the heater is directed by way of the air control valve, which is so constructed that a prescribed amount of air will flow over the heater coils. If the air pressure drops below a minimum requirement, the electric power will be shut off, thus protecting the heater coils from burn-out.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is an elevational cross sectional view of the heating device showing in particular the location of the heating element and the related electrical components.

FIG. **2** is an elevational view of the device.

FIG. **3** is a top plane view of the heater.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The flameless electric heater of our invention as shown in the drawings comprises a vertical stack **10**, fitted to a conical stand or base portion **12**. The stack assembly includes a main tubular pipe **14**, the top end of which is provided with a formed nozzle **16**. Within the interior of the nozzle a diamond-shaped baffle **18** is centrally supported by spaced apart support bars **19**. A heat shield **20** is rigidly spaced from the upper part OF main tubular pipe **14** by circular perforated discs **22** and **23**. The upper support disc **22** is fixed to a restricted portion of the nozzle head **16**, and the lower disc **23** is fixed to the general diameter of the tubular pipe **14**. Each of supports **22,23** and the upper and lower ends of the heat shield are provided with perforations **28** so air convection currents will carry heat generated by the pipe **14** to the top of the stack. As mentioned above the stack assembly **10** is fitted to the base portion **12** by a pin and groove arrangement **30**, which allows easy removal of the tubular pipe and heat shield from the base **12**. This arrangement provides easy replacement of a vertically positioned coiled heater **34** from its socket **35**, the socket **35** being held to the base **12**.

The heater **34** comprises a heater element **36** formed of a continuous coiled length of resistance wire and enclosed in a cylindrical insulating glass tube **38**. The precise description of the heater element is fully disclosed in the above mentioned co-pending application. The design of this type of heater coil element, specifically its overlapping coverage, results in increased efficiency of heat transfer to the air passing therethrough and operating temperatures equal to or surpassing that of the conventional Bunsen burner.

Referring to FIG. **1**, the lamp socket **35** is fixed to the upper end of the conical base **12**. The socket **35** is provided with appropriate electrical contacts **40** that are electrically connected to an "off" and "on" switch **42**, and to indicator light **44** and an air pressure valve **46** by a pair of electrical wires **50** extending from a supply cable **52**. The cable **52** has a third wire **54** that is used as a ground wire and is connected to the inside of the metal base **12**.

The air pressure valve **46** located within the base is connected to an air supply line **60**. An upstanding pipe **62** is connected between the valve **46** and a centrally located bore **66** in the base **35**. This allows air from the pipe **62** to be directed through the loops of the coiled heater **34** that is positioned within the glass envelope **38**.

As mentioned above, the nozzle **16** is provided with a baffle **18**, the main function of which is to prevent any spillage from entering the heater element **34**.

The temperature of the burner at its exit nozzle is dependent on the amount of air pressure, that is the air mainly is used as a coolant for the coil so with a minimum use of air the temperature will be increased. In this particular instance, the heater will not start until air pressure of approximately 3½ pounds is fed into the system, and once in operation, the heater automatically turns off when the air pressure drops below 2½ pounds. This is a decided advantage in that by using air as a medium, the temperature can be controlled by the amount of air pressure.

The air pressure valve **46** also serves as a coolant to the base portion **12**, in that the valve has selectively placed holes not shown in the drawings that direct air on the inside of the base **12**.

The advantages of the above-described burner are that the burner does not require a dangerous fuel, it is safe when it is tipped over and this is especially important with laboratory work where Bunsen burners are extensively used.

What we claim is:

1. An electric heater comprising:

a conical base stand;

a socket in said conical base stand, said socket having a central aperture located therein;

an electric coil supported in said socket and aligned axially with the central aperture therein;

a vertical hollow stack fitted over said electric coil, said stack having a formed nozzle at its upper end and a baffle fitted within said formed nozzle, said baffle spacedly overlying the upper ends of said coil and said stack;

a heat shield;

means for supporting said heat shield spaced from the upper end of said stack;

an air pressure valve connected to said base stand and in communication with said socket and said central aperture located therein;

electric power means connected through said base stand to said electric coil;

and control means interconnecting said air pressure valve and said electric power means whereby the electric power to said electric coil is controlled by the flow of air through said air pressure valve.

2. An electric heater according to claim 1 wherein said heat shield supporting means comprises a pair of circular support discs having a series of holes therein for the convection of heat from said stack.

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