Nov. 22, 1960 E. R. WOLTERS 2,961,040

HEATING UNIT CONTROL

Filed Aug. 15, 1958

Fig-1

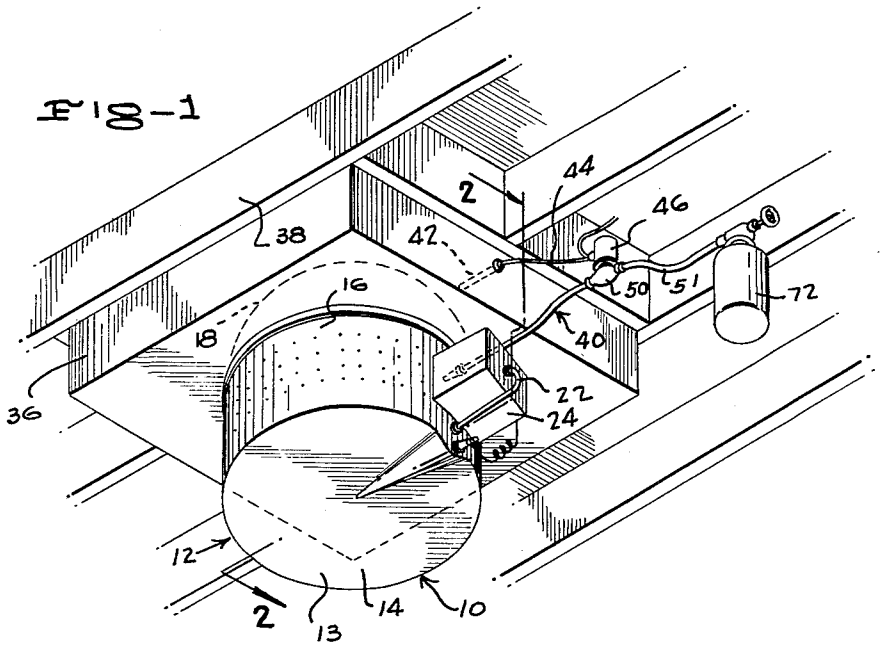


Fig-2

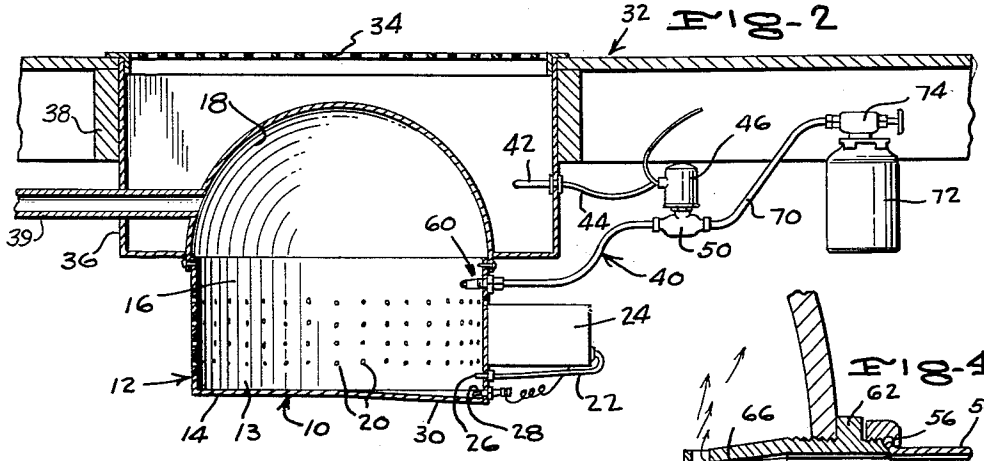


Fig-4

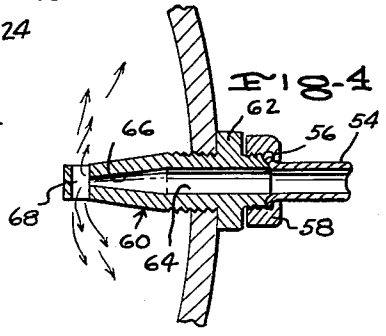
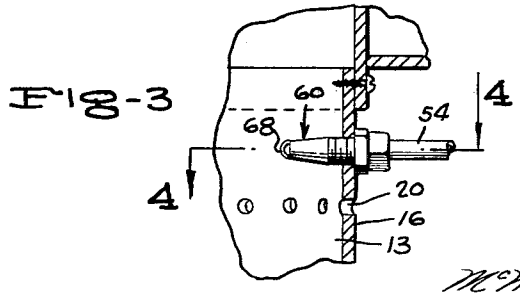


Fig-3



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HEATING UNIT CONTROL

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2 Claims. (Cl. 158—4)

This invention is directed to heating unit controls, and more specifically to an appliance for automatically controlling the combustion of fuel within the fire pot of a space heater, or the like, and comprises a continuation-in-part of my co-pending application, Serial No. 740,361, filed June 6, 1958, and entitled "Control For Heating Unit."

One object of the invention resides in the provision of a safety control of the general type having an improved construction and assembly over previously known devices of this character.

Another object is the provision of a heater control wherein gas under pressure is utilized to extinguish or smother the fire in the combustion chamber or fire pot of a space heater.

Numerous further objects and advantages will become more readily apparent from a consideration of the following specification, when read in conjunction with the annexed drawing, in which:

Figure 1 is a perspective view of the space heater mounted beneath a floor or the like, and employing a fire pot flame control means constructed and assembled in accordance with the teachings of this invention;

Figure 2 is a detail cross-sectional view of the heater assembly, flame control means and automatic valve control assembly therefor, taken substantially along the section line 2—2 of Figure 1, looking in the direction of the arrows;

Figure 3 is an enlarged, fragmentary detail cross-sectional view of the nozzle to which extinguishing gas or flame control medium is introduced into the fire pot; and

Figure 4 is an enlarged fragmentary cross-sectional view of the nozzle, taken substantially along the horizontal plane of the section line 4—4 of Figure 3, looking in the direction of the arrows.

From the drawings, it will be seen that reference numeral **10** denotes a space heater employing a control assembly constructed and assembled in accordance with the teachings of the present invention. The heater **10** has a main body portion **12** which includes a fire pot **13** having a substantially discoidal base **14** and an integrally formed, upright, cylindrical side wall **16**. The main body portion **12** also has a dome shaped combustion chamber **18** secured to, or formed integrally with, the side wall **16** thereof. As seen in the drawing, the side wall **16** of the fire pot **13** is provided with a plurality of air supply openings **20** formed therein to permit the entrance of air or other combustion supporting media into the fire pot. Fuel is supplied into the fire pot **13** by conduit **22** leading from a fuel source reservoir **24** and terminating within the fire pot at a fuel supply nozzle **26**, and the fuel is ignited by the contact thereof with a conventional electrical starter unit **28** set in a depressed portion **30** of the base **14**.

The environment of a space heater **10** here consists of the floor **32** of a building having a heat distributing grating **34** therein and the heater **10** is secured in a

plenum chamber **36** which is secured to the floor joist **38** subjacent the aforesaid grating. As seen in Figures 1 and 2, the openings **20** in the side **16** of the fire box are outside of the chamber **36** in order that air may be readily drawn therethrough. Products of combustion are exhausted to the ambient atmosphere through a conventional flue pipe **39** which connects at its inner end with the combustion chamber **18**.

Proceeding now to a specific description of the control means assembly **40** which forms a primary means of accomplishing the objectives of this invention, it will be seen that a temperature responsive switch or thermostatic control **42** is secured within the plenum chamber **36** at a point in proximity to the combustion chamber **18**. The switch **42** is connected by leads **44** in an electrical circuit including a solenoid **46** and a source of EMF. The solenoid **46** is adapted to actuate a normally closed valve **50** having its inlet port connected with one end of a conduit **70**, the other end of the conduit being connected with a flame extinguishing medium source **72**. The discharge side of the valve **50** is connected with a pipe **54** having a flared outer end **56**. A rotatable nut **58** is slidably positioned on the pipe **54** and is held thereon by the outwardly flared end **56** thereof. As best seen in Figures 3 and 4, the nut **58** is threadedly engageable on the outer end of a substantially ogive extinguishing nozzle **60**. The nozzle **60** is threadedly secured to the wall **16**, and is seen to extend into the fire pot **13** above the openings **20**. An integrally formed tightening nut **62** is positioned around the nozzle **60** at a point adjacent to but spaced from the outer end thereof and serves to limit the inward displacement of the aforesaid nozzle.

In the cross-sectional view of Figure 4, it is seen that the nozzle **60** has a longitudinal passageway **64** having an enlarged outer end conforming in size substantially to the passageway in the pipe **54**, and that the inner end thereof tapers to a substantially reduced portion **66**. The inner end of the nozzle **60** is provided with a semi-circular diffusing ring **68**. The diffusing ring **68** serves a purpose to be described more fully below.

The intake side of the valve **50** is connected with a pipe **70**, as described above, which leads to a pressurized container **72** having a flame extinguishing medium therein and including control means **74** which are normally left in their open position after installing the container **72** in the system. The flame extinguishing medium may be selected from a number of gases all of which are held under pressure and possess the characteristic of having a specific gravity greater than air, are volatile and nonflammable, examples of such gases being carbon dioxide, and a fluorochloromethane such as, for example, that sold under the registered trademark "Freon."

In operation, the fuel supply conduit **22** is activated by any conventional control means (not shown) and combustible fuel is directed through the nozzle **26** on to the starter unit **28** whereby the fuel is ignited. The combustion supporting media for the flame is drawn into the fire pot through the openings **20** formed in the side wall **16**. When the combustion chamber **18** surpasses a predetermined maximum optimum operating temperature, the thermostatic control **42** is activated which in turn energizes the solenoid circuit thereby causing the control valve **50** to move to its open position. The gas under pressure in the container **72** now flows through the pipe **70** and valve **50** into the pipe **54** and is sprayed into the fire pot **13** through the nozzle **60**. As seen in Figure 4, the gas is diffused in various directions by the semi-circular tip **68** of the nozzle **60**. The action of the gas is twofold in that it smothers the flame in the fire pot by effectively blocking the entrance of further

combustion supporting media through the openings **20**, and secondly, the refrigerant quality of the gas lowers the temperature of the fuel to a point beneath its ignition temperature. The flow of fuel from the conduit **22** is automatically cut off by any conventional thermal responsive control means which is sensitive to the lack of fire in the fire pot to prevent resultant flooding thereof.

When the unit **10** has cooled to a predetermined low temperature, the thermostatic control switch **42** is automatically opened to energize the circuit to the solenoid thus closing the valve **50** and shutting off the gas supplied therethrough. The gas is self-evaporating, and the fuel in the fire pot is re-ignited by the ignition unit **28**.

Having described and illustrated in detail one embodiment of this invention, it will be understood that the same is offered merely by way of example, and that this invention is to be limited only by the scope of the appended claims.

What is claimed is:

1. In a space heater having a main body portion including a dome shaped combustion chamber and subjacent fire pot having a plurality of air supply openings formed therein; a plenum chamber enclosing said combustion chamber, a thermostatic control means and a sensing element disposed in said plenum chamber adjacent said combustion chamber, said control means including an electrical circuit adapted to energize a solenoid to operate a valve in response to a predetermined excessive temperature in said plenum chamber, said valve being connected with a source of gas under pressure, said gas comprising a member of the class of gases known as fluorochloromethanes, said thermostatic control means being operable in response to said excessive temperature to actuate said solenoid to open said valve and to permit

said gas to flow through said valve and into said fire pot to extinguish the flame in said fire pot, and said thermostatic control means upon cooling of said plenum chamber below said predetermined temperature being operable in said circuit to de-energize the latter and close said valve to cut off the supply of gas to said fire pot.

2. In a space heater including a main body portion, a dome shaped combustion chamber, a subjacent fire pot having a plurality of openings extending transversely therethrough to admit a combustion supporting medium therein, a plenum chamber surrounding said combustion chamber, means extending through said fire pot above said openings for introducing a nonflammable gas into said fire pot to the exclusion of said combustion supporting medium, and internally sealing said openings, said last named means being operable only as a consequence of the presence of a temperature in said plenum chamber above a predetermined degree, and means for venting said combustion chamber to the atmosphere through said plenum chamber without mixing the products of combustion with the air in said plenum chamber.

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