Jan. 7, 1958 B. T. MOHN ET AL 2,819,375

SPACE HEATER

Filed Oct. 27, 1954

FIG. 1

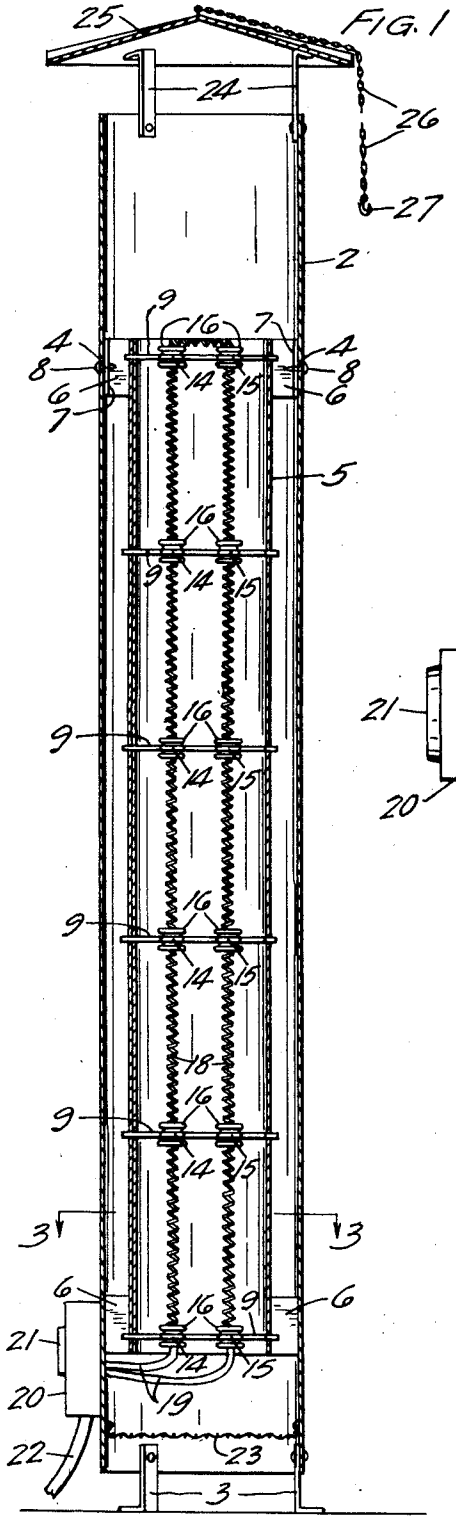



FIG. 2

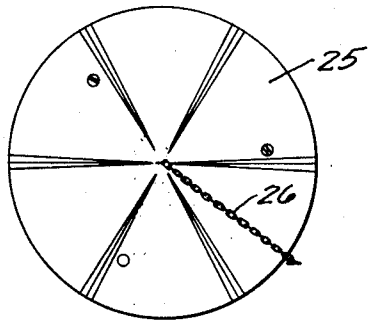



FIG. 3

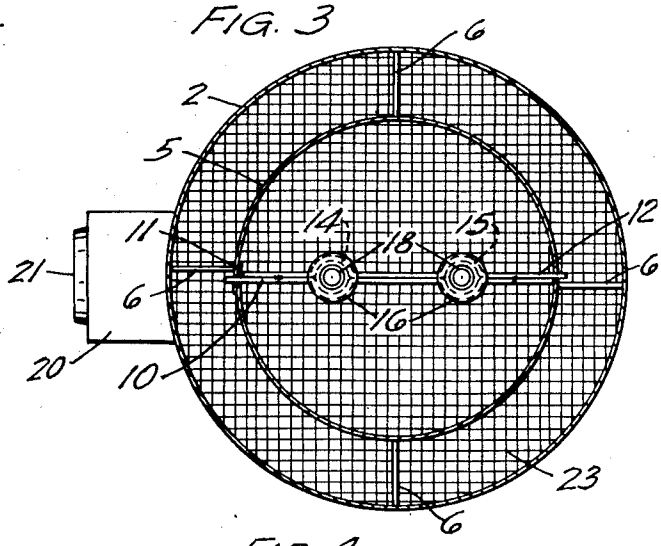



FIG. 4

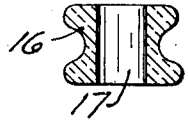
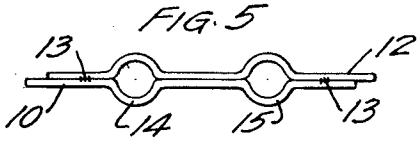



FIG. 5





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2,819,375

# SPACE HEATER

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1 Claim. (Cl. 219—34)

This invention relates to apparatus most commonly referred to as "space heaters." Such apparatus is frequently used to heat the air in small structures (e. g., outbuildings on farms) intended for the storage of freezable or perishable goods. In farming operations conducted in northerly climates, it is necessary to employ some heating apparatus for maintenance of proper temperature in milk houses or hen houses, etc., so that goods or stock kept therein will not be adversely affected by prevalent cold weather. Of course, there are numerous other types of structures (automobile garages, for example) which should desirably be kept warmer than the ambient atmosphere during the winter months, and it will be understood that the device of our invention has utility for use in such other structures, as well as those particularly referred to herein.

Various expedients have heretofore been employed for the purposes above mentioned, but none of them has proved to be wholly satisfactory. For example, many farmers have used oil stoves or fan type electrical heaters to raise the winter temperature in their outbuildings. Oil stoves are not entirely satisfactory because of the necessity for their frequent refueling, for one reason, and fan type electrical heaters (in addition to being rather expensive to operate and maintain) fail to heat satisfactorily as large an area as is desirable.

It is an objective of the present invention to provide a portable space heater which will function to circulate air in an enclosed structure, without smoke, and without danger of burning or igniting any inflammable material which might be found adjacent the site of the heater. It is a further objective of the invention to provide a heater which can be suspended from the ceiling or roof of the structure in which it is used, so that valuable floor space in the outbuilding, or such like, will not be taken up. The heater of the present invention, in its embodiment as herein particularly described, will heat about forty-two cubic feet of air per minute and render the same almost completely dry. One of our commercial size units as described will keep a structure of from 800 to 1000 cubic feet in area at temperatures above freezing, and will keep the floor in such structure free of moisture, even though it is operated only part time, during normal winter weather. Because of the novel construction of our heater, as hereinafter specifically described, the volume of air which it will heat and dry is considerably greater than the volume of air which can be processed by any other heater (designed for the same purpose) of which we are aware. Our heater is completely safe in operation, being well insulated against the short circuiting of electrical current. It is extremely simple to manufacture in commercial quantities, light in weight, and easy to install. It requires only a relatively small amount of electrical energy to operate, and may be plugged into any electrical outlet. It eliminates the necessity of a fuel supply, and the possibility of the heater ceasing to function because of exhaustion of fuel. Other objectives and advantages



of the invention will be developed as this description proceeds.

Referring now to the drawings:

Figure 1 is a vertical cross-sectional view of the heater.

Figure 2 is a plan view of the bonnet for the heater.

Figure 3 is a cross-sectional view taken along line 3—3 of Figure 1.

Figure 4 is a cross-sectional view of one of the insulator elements.

Figure 5 is a detail view of one of the struts.

The heater of this invention includes an outer sleeve or shell designated generally by reference character 2. In one commercial model of our machine, as shown, we prefer that shell 2 be forty-eight inches in length and seven inches in diameter. It may be made of galvanized iron. The bottom rim of this first shell is provided with legs 3 which, conveniently, may be about one and one-half inches in length. These legs serve to maintain the heater spaced upwardly from any surface upon which it might be set so that air may have free access to the inner area of the heater and pass upwardly therethrough; thereby preventing the unit from becoming overheated even if it is set upon a floor, for example, rather than being suspended in the proper manner hereinafter referred to. The side walls of shell 2, at a point about nine inches down from the upper rim of said shell are provided with diametrically opposed screw holes 4, through which inner shell 5 is suspended within shell 2, in the manner hereinafter set out.

Inner shell 5 is of lesser length and diameter than outer shell 2. If, for example, said outer shell is 48" by 7", we then find it preferable to make inner shell 5 approximately 36" by 5". The periphery of said inner shell 5 (at both its bottom end portion and its top end portion) is provided with spacer fins 6 which extend radially outward from said inner shell. These spacer fins (if the difference in diameter between shell 2 and shell 5 is two inches, as above referred to) are each one inch in width; viz., in the distance they project radially. As will be noted, said fins are spaced 90° apart from each other about the periphery of shell 5. Thus each of said fins is in opposed relationship to another thereof. By reason of this arrangement of fins 6, shell 5, when it is inserted within shell 2, is spaced concentrically therein, and is maintained secure against movement toward shell 2 by abutment of fins 6 against the inner surface of shell 2.

Two of the fins 6, at the top end of shell 5, are provided with apertured flanges 7. When shell 5 is inserted within shell 2, the apertures in these flanges are brought into register with screw holes 4, and screws 8 are threaded through said holes and apertures to maintain shell 5 suspended within shell 2. The top rim of shell 5 is then located a substantial distance below the upper rim of shell 2, and the bottom rim of said inner shell is likewise located a substantial distance above the lower rim of shell 2. By reason of this arrangement, hot air, when it is caused to pass upwardly through the heater (by action of the heating element hereinafter described), will, when it reaches the upper rim of shell 5 spill over and out from that shell and extend to the inner surface of outer shell 2. This hot air, at the top of the heater, will serve to greatly increase the draft in the unit and the volume of relatively cold air which is drawn upwardly through the space between the inner and outer shells. Said cool air will serve to keep the temperature of the outer shell cool to the touch and well below any temperature which would be likely to ignite combustible material which might come into contact with the unit.

The fact that the lower rim of the inner shell is located a substantial distance (about four inches in the embodiment shown) above the lower rim of the outer

shell serves to create a funnel-like action at the bottom of the heater, thereby permitting a larger quantity of air to be drawn thereinto.

Inner shell 5 is provided with a plurality of transverse struts 9 which are spaced apart substantially uniformly from top to bottom of said shell. Each of these struts comprises, first, a wire 10 which pierces overlapping edge portions of shell 5 at point 11, and, second, wire 12 which pierces shell 5 at a point diametrically opposite point 11. Each of said wires 10 and 12 are formed with a pair of U-shaped portions and those wires are spot welded together, as at 13, with the U-shaped portions of each wire in juxtaposition, to form insulator clips 14 and 15. Wires 10 and 12, together, serve to hold shell 5 in cylindrical configuration: it is not necessary to weld or solder the seam formed by the overlapping edges of the sheet from which shell 5 is made. The tip of wire 10 (in each of struts 9) serves to maintain those edges in overlapping relationship, so that shell 5 will stay round in shape. This technique simplifies considerably the manufacture of our unit.

Insulator elements 16 comprise ceramic material formed in bobbin or spool shape. Each of these elements 16 is provided with a vertical channel 17 through its center, and each element is of lesser diameter through its mid-portion than through either of its end portions. Said elements are thus adapted to be firmly secured within the clips 14 and 15 formed by wires 10 and 12, in the manner shown. Said clips are of proper diameter to fit snugly about the mid-portion of insulators 16, and said insulators are retarded from moving upwardly or downwardly within said clips by reason of their being of greater diameter at their end portions. Each pair of insulator elements is vertically aligned with the pairs above and/or below it.

Heating element 18, in one preferred embodiment of our heater, comprises a length of No. 16 "Nichrome" wire coiled to have an outer diameter of approximately .292". This coil of wire is formed in hair-pin shape and is threaded downwardly through the aligned apertures in insulator elements 16, with its free ends extending toward the bottom of the heater. The lower ends of said element are affixed to conductors 19, which, in turn, lead to thermostat 20, which is manually adjustable by dial 21 so that the heater may be set to operate at any temperature between 0 and 80°. Plug-in wire 22 with a plug (not shown) on its end extends from said thermostat. As a safety factor, the open bottom end of shell 2 is fitted with screen 23 so that no large object may be inserted upwardly in the heater, toward element 18.

The top rim of shell 2 is provided with supports 24, and bonnet 25 is mounted upon said supports. This bonnet, which preferably is of cone-like configuration, serves to deflect downwardly, toward the floor of the structure being heated, hot air which rises in the heater when the same is in operation. Said bonnet also functions to prevent extraneous material from dropping into the open top end of the unit. Chain 26 is affixed to the top surface of bonnet 25. This chain is provided with hook 27 by means of which the entire unit may be suspended above the floor when it is being used.

Although one particular commercial form of the invention has been described, it will be apparent that the sizes and particular mechanical arrangement as above set out could be changed or modified without departing from the invention. For example, in some usages it may be desirable to substantially reduce, or increase, the overall size of our unit. Again, it may be desirable to use a heating element of a different particular kind, or one employing a wire of heavier or lighter gauge. The No. 16 "Nichrome" wire above referred to is we find quite suitable for use when the unit is to be operated on a 110–115 volt current. However, if the unit is to be operated on a 220 volt current, it is preferable that a No. 20 gauge wire be used.



In the particular structure described, the heating element will attain a temperature of more than 1300° F., after the unit has been in operation just a short time. The temperature of the air at the bonnet of the heater, as it emerges therefrom, will be approximately 400° F. However, despite this high degree of heat, at those places, the outside surface of shell 2 will remain cool to the touch at all times by reason of cold air continually flowing upward in the chamber between the inner shell 5 and outer shell 2.

Having described our invention, what we claim is:

A space heater comprising a first open-ended shell, said first shell being provided with a pair of peripherally opposed screw holes in its upper end portion a substantial distance downwardly from its top rim and being provided at its bottom rim with legs for supporting said shell in vertical position with its bottom rim spaced upwardly from the surface upon which said legs might rest; a second open-ended shell of lesser length and diameter than said first shell, said second shell being cylindrical and being provided at both its lower end and its upper end with a plurality of spacer fins extending radially outward from said second shell, said second shell also being provided at its upper rim with a pair of circumferentially opposed, apertured flange members, said second shell being mounted within said first shell with said apertured flanges secured to said outer shell through said screw holes therein, the top rim of said second shell lying a substantial distance below the top rim of said first shell, the bottom rim of said second shell lying a substantial distance above the bottom rim of said first shell, said second shell being maintained cylindrical by a plurality of parallel wire struts extending transversely of said second shell, opposed ends of each of said struts piercing opposed walls of said second shell, said struts being spaced apart substantially uniformly from top to bottom of said second shell, each of said struts carrying a pair of insulator elements, each pair of said insulator elements being vertically aligned with other pairs of said elements, each element having a vertical channel through it; a hair-pin shaped heating element extending from the bottom to the top of said second shell through said insulator elements; the free ends of said heating element lying at the bottom end of said second shell, and means associated with the free ends of said heating element for attaching the same to a source of electrical energy, said space heater being provided with a thermostat, the top of said first shell being fitted with a bonnet spaced upwardly from the top rim of said first shell, said bonnet having a diameter greater than the diameter of said first shell.


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