Title: RECHARGEABLE BATTERY-OPERATED CHAFER HEATER

Abstract: This invention described herein pertain generally to a rechargeable battery-operated electric heating unit for chafing dishes.
RECHARGEABLE BATTERY-OPERATED CHAFER HEATER

Technical Field

The invention described herein pertains generally to rechargeable battery-operated chafer heaters. In particular, the present invention relates to a rechargeable 24 volt, direct current battery-operated chafer heater including a heating assembly positionable above a base by a resilient biasing member, e.g., spring or gas cylinder, wherein the heating assembly has a heating surface resiliently biased against the chafing dish of a chafer when the base is supported by a shelf or apertured opening disposed below the chafing dish.

Background of the Invention

A chafer is a portable food or beverage warmer or heater which includes a chafing dish for holding foods or beverages and a shelf disposed below the chafing dish for supporting at least one heater for warming the foods or beverages. Chafers are used to provide food service in restaurants, dining rooms, hotels, institutions and the like, and are often used to provide buffet service. Different types of chafing dishes exist, such as food trays, water pans, coffee urns and soup servers.

Chafers typically require one or two chafer heaters, depending upon the capacity of the chafing dish. Chafer heaters are typically metal canisters (i.e., cans) filled with a flammable chemical fuel. A standard can heater of this type is the STERNO® can heater, with a diameter of approximately 3.5 inches. Accordingly, chafers typically include a shelf configured to support one or two standard can heaters such that heat from the burning chemical fuel is directed onto the bottom of a chafing dish. The shelf often has an aperture (e.g., a hole or recess) sized for receiving a standard can heater. The shelf and chafing dish are separated by a leg assembly to provide clearance for the can heater and the flames. Many chafers designed to accept chafer heaters of the type described above have been manufactured and sold.

Flammable fuel chafer heaters, however, suffer from a number of drawbacks such as being a fire hazard with an open flame using an extremely flammable jellied fuel and having poor temperature control. Flammable fuel chafer heaters also emit relatively high levels of smoke, pollution and odor, especially when used indoors, and are inconvenient to use because of the difficulty in determining when the fuel will burn out.
Several attempts have been made to provide chafer heaters without the above-listed drawbacks. For example, one portable food warming device includes a gas burner assembly and a control box for controlling the supply of gas from a fuel cartridge to the gas burner. This device, however, does not adequately solve the above-listed problems and, in addition, is relatively bulky and inconvenient.

For another example, some chafers are equipped with electric resistance heaters integral to the chafing dish. For example, The Vollrath Company manufactures electric chafers having integral electric heaters for use in areas where fuel cans are not allowed or desired. The electric heaters provide an efficient and reliable source of heat without the odor, smoke and pollution problems associated with flammable-fuel chafer heaters. However, electric heaters integrally attached to chafing dishes cannot be used by chafers designed to use can heaters.

The Electric Heating Unit made by Host Products of California can be used as a heat source by some chafers. Many chafers, however, cannot use the Host Products unit since its cylindrical body has a diameter different than that of a standard can heater and, thus, the unit will not fit within apertures sized to receive standard can heaters. Further, the heat from the Host Products unit is difficult to control since it has only a single power setting (i.e., on/off). In addition, the Host Products unit does not include ballast weight to lower the center of gravity and provide a stable heat source. Other electric heaters, similar to the Host Products unit such as the Yukima model CW-240, the Sanyo model RNW-300, and another heating unit believed to be made in Japan, are also not configured to be received within apertures sized for standard can heaters, have only a single power setting, and do not include a ballast.

Therefore, the need still exists for a battery-operated electric chafing dish heater which has universal application.

**Summary of the Invention**

In accordance with the present invention in one aspect, there is provided an improved chafer heater which uses a battery-operated electrical heating element.

It is an object of this invention to provide an electric chafer heater having variable power settings.

It is another object of this invention to provide a universal electric chafer heater configured for use by a high percentage of chafers with improved heating
characteristics so that the surface area of the heating element is greater than that of the chafer base.

It is yet another object of this invention to provide an electric chafer heater which provides an indication when the heating surface reaches a predetermined temperature.

It is still yet another object of this invention to provide a rechargeable battery-operated electric chafer heater which eliminates the need for a power cord.

These and other objects of this invention will be evident when viewed in light of the drawings, detailed description, and appended claims.

Brief Description of the Drawings

The invention may take physical form in certain parts and arrangements of parts, a preferred embodiment of which will be described in detail in the specification and illustrated in the accompanying drawings which form a part hereof, and wherein:

Fig. 1 is a side plan view of a rechargeable battery-operated upwardly biased electric chafer unit, the unit shown in the fully retracted position; and

Fig. 2 is a partial top plan view of the chafer unit of Fig. 1.

Detailed Description of the Invention

In the following description, similar features in the drawing have been given similar reference numerals. As illustrated in Fig. 1, rechargeable electric chafer unit 10 has essentially cylindrical outer base housing walls 16 within which cylindrical heating unit housing 26 can move in a telescoping longitudinal axial direction both upwardly and downwardly. When fully extended, engaging contact is made between silicone-sealed vitreous ceramic glass plate 14 (a glass-like heat resistant material sold by EuroKera, dimensioned to be approximately 4.5") and the bottom of a chafing dish (not shown). Telescoping longitudinal axial movement is effected via gas spring cylinder 22 which is normally biased in the fully extended position. A distance pad equalizer 50 is often fixedly attached to a contacting area of the base 24 of the heating unit housing which is connected to the cylindrical inner walls 26 via fastening means 20, e.g., screws, nuts & bolts, rivets.

In order to promote stability of heating unit 10 when the unit is not positioned within a STERNO® opening, a cast iron ring 18 is often positioned within a recessed base 54 of the unit. This recessed cylindrical portion is typically 3.5" (89 mm) in diameter so that it fits relatively snugly within the 3.5" apertured opening of the chafing unit. When there is no apertured opening within the bottom of the chafer unit and only
a shelf is provided, stability is promoted by including a heavy snap-over housing ring 28 into which recessed base 54 is inserted thereinto.

Heating is effected via radiant heating element bodies 50 (sold by EGO) in electrical communication with a switch 46 positionable at various settings 44 within the unit and electrical contact 28 with the radiant heating elements 50 through wire 52. Switch 46 controls the electrical current flowing to the radiant heating elements 12 positioned underneath the vitreous ceramic top 14, dimensioned in preferred embodiment to be 110 mm. By using foil technology, a total electric pattern 50 is attached to the underside of the vitro ceramic glass disk. The heating element itself is a self-adhering heat conductive foil. In order to stabilize the circuitry and enhance the efficiency of the unit, electronic connections 28 are attached to the underside of the foil-ceramic disk. At full power, the SAFEChafe™ heater quickly brings the water in the water tray to the temperature 82°C (180°F) required for steam water vapor to heat the food tray above the water pan. Lower settings on the control switch help keep the water at the correct chafer temperature for food warming, providing period of up to three hours of heating from a single charge.

Electrical operation is indicated by power on light 38 and recharge signal light 42 positioned on a downward extension 40 of handle 34. This extension is designed to improve the support accorded to 24 volt battery pack 36 (capable of delivering 300 watts and desirably operating up to three hours per charge when a nickel platinum system is used) when positioned within handle 34 in electrical contact with electrical module 32. In order to accommodate various elevations between the height of a top surface upon which to rest extension 40, longitudinal movement is effected through sliding upward and downward positioning with subsequent tightening of set screws 48 within longitudinal channel 30 on the exterior wall of outer housing 16 into which a slingly engageable edge 56 of handle 34 interfaces.

In order to provide for better heat distribution and quicker heating, the diameter of the heating elements (e.g., 110 mm) within or in close proximity to, the ceramic top of the unit is greater than a diameter of the apertured opening (e.g., 89 mm) within which the unit is positioned. It is preferred that the diameter of the heating elements is of even greater diameter, e.g., 120 - 130 mm, thereby heating a larger surface area of a bottom of the chafer.
Recharging of the battery is accomplished by a 15 amp recharger which runs on 120 volts AC (alternating current) and converts the power to 24 volt DC (direct current). Optionally, multiple battery units will be capable of charging at one time, preferably at a time of less than two hours.

**Discussion**

Therefore, what has been described is a SAFEChefe™ heater with several unique features: (1) a cylindrical core design with a holding edge for placing the unit directly into the current die-cut stamped opening on most chafer heating shelves; (2) a telescoping, gas-spring powered adjustment design that allows for firm and consistent direct contact with the bottom of the water tray; and an adjustable sliding downward support track as part of the 24 volt battery insert mechanism, allowing for precise battery weight control and stability no matter the type of shelf on the chafer.

In operation, when the SAFEChefe™ heater is placed in the shelf opening or on the shelf itself, the user simply compresses the upper heating unit into the lower base for ease of installation. Upon the removal of the compressive longitudinal axial force, the gas spring will telescope the ceramic glass surface snug against the bottom of the water tray. The height of the battery extension or handle is adjusted by longitudinal axial movement within the channels on the exterior of the base housing and locked into position by set screws of other retaining devices. It is easily recognized that the sequence of when the support track is positioned in relationship to the step of telescoping the ceramic glass surface may be inverted if desired.

The best mode for carrying out the invention has been described for the purposes of illustrating the best mode known to the applicant at the time. The examples are illustrative only and not meant to limit the invention, as measured by the scope and spirit of the claims. The invention has been described with reference to preferred and alternate embodiments. Obviously, modifications and alterations will occur to others upon the reading and understanding of the specification. It is intended to include all such modifications and alterations insofar as they come within the scope of the appended claims or the equivalents thereof.
**What is Claimed is:**

1. A rechargeable electric chafer heater which comprises:
   (a) a cylindrical outer housing having an exterior height positioning means for a detachable handle;
   (b) a closely-fitting outwardly-biased telescoping cylindrical inner housing having a heatable ceramic top; and
   (c) a rechargeable electrical means positioned within said handle with said rechargeable electrical means in electronic communication with a heating element on an inner surface of said ceramic top.

2. The chafer heater of claim 1 wherein
   (a) a biasing means for said outwardly-biased telescoping cylindrical inner housing is selected from the group consisting of a spring and a gas piston.

3. The chafer heater of claim 1 wherein
   (a) said exterior height positioning means is a longitudinal channel affixed to an exterior longitudinal side of said outer housing.

4. The chafer heater of claim 3 which further comprises
   (a) a set screw for fixedly holding said handle in a defined position.

5. The chafer heater of claim 3 wherein
   (a) said handle has a longitudinal edge for insertion into said longitudinal channel.

6. The chafer heater of claim 1 wherein
   (a) said handle further comprises a downwardly extending leg for supplemental support of said handle on a surface.

7. The chafer heater of claim 6 which further comprises
   (a) a selectively positionable switch for varying the amount of power supplied to said heating element.

8. The chafer heater of claim 1 which further comprises
   (a) a weight positioned at a bottom of said outer housing.

9. The chafer heater of claim 8 which further comprises
   (a) an external weight means for insertion about a diameter of a bottom of said outer housing.
10. The chafer heater of claim 1 wherein
   (a) a diameter of said ceramic top is greater than a diameter of a base of said chafer heater.

11. A rechargeable electric chafer heater which comprises:
   (a) a cylindrical outer housing having an exterior height positioning means for a detachable handle,
       (i) said handle further comprises a downwardly extending leg for supplemental support of said handle on a surface;
   (b) a closely-fitting outwardly-biased telescoping cylindrical inner housing having a heatable ceramic top; and
   (c) a rechargeable electrical means positioned within said handle with said rechargeable electrical means in electronic communication with a heating element on an inner surface of said ceramic top,
       (i) and wherein said handle further comprises a selectively positionable switch for varying the amount of power supplied to said heating element.

12. The chafer heater of claim 11 wherein
   (a) a biasing means for said outwardly-biased telescoping cylindrical inner housing is selected from the group consisting of a spring and a gas piston.

13. The chafer heater of claim 11 wherein
   (a) said exterior height positioning means is a longitudinal channel affixed to an exterior longitudinal side of said outer housing.

14. The chafer heater of claim 13 which further comprises
   (a) a set screw for fixedly holding said handle in a defined position.

15. The chafer heater of claim 13 wherein
   (a) said handle has a longitudinal edge for insertion into said longitudinal channel.

16. The chafer heater of claim 11 which further comprises
   (a) a weight positioned at a bottom of said outer housing.

17. The chafer heater of claim 11 which further comprises
   (a) an external weight means for insertion about a diameter of a bottom of said outer housing
18. The chafer heater of claim 11 wherein
   (a) a diameter of said ceramic top is greater than a diameter of a base of said chafer heater.
19. A rechargeable electric chafer heater which comprises:
   (a) a cylindrical outer housing having an exterior height positioning means for a detachable handle,
       (i) said handle further comprises a downwardly extending leg for supplemental support of said handle on a surface;
   (b) a closely-fitting outwardly-biased telescoping cylindrical inner housing having a ceramic top;
   (c) a rechargeable electrical means positioned within said handle with said rechargeable electrical means in electronic communication with a heating element on an inner surface of said ceramic top,
       (i) and wherein said handle further comprises a selectively positionable switch for varying the amount of power supplied to said heating element; and
   (d) a weight positioned at a bottom of said outer housing.
20. The chafer heater of claim 19 wherein
   (a) a biasing means for said outwardly-biased telescoping cylindrical inner housing is selected from the group consisting of a spring and a gas piston.
21. The chafer heater of claim 19 wherein
   (a) said exterior height positioning means is a longitudinal channel affixed to an exterior longitudinal side of said outer housing.
22. The chafer heater of claim 21 which further comprises
   (a) a set screw for fixedly holding said handle in a defined position.
23. The chafer heater of claim 21 wherein
   (a) said handle has a longitudinal edge for insertion into said longitudinal channel.
24. The chafer heater of claim 19 which further comprises
   (a) an external weight means for insertion about a diameter of a bottom of said outer housing.
25. The chafer heater of claim 24 wherein
   (a) diameter of said ceramic top is greater than a diameter of a base of said chafer
       heater.

26. A rechargeable electric chafer heater which comprises:
   (a) a cylindrical outer housing having an exterior height positioning means for a
       detachable handle,
       (i) said handle further comprises a downwardly extending leg for supplemental
           support of said handle on a surface;
   (b) a closely-fitting outwardly-biased telescoping cylindrical inner housing having a
       ceramic top;
   (c) a rechargeable electrical means positioned within said handle with said
       rechargeable electrical means in electronic communication with a heating
       element on an inner surface of said ceramic top,
       (i) and wherein said handle further comprises a selectively positionable switch
           for varying the amount of power supplied to said heating element;
   (d) a weight positioned at a bottom of said outer housing; and
   (e) a diameter of said ceramic top is greater than a diameter of a base of said
       chafer heater.

27. The chafer heater of claim 26 wherein
   (a) a biasing means for said outwardly-biased telescoping cylindrical inner housing
       is selected from the group consisting of a spring and a gas piston.

28. The chafer heater of claim 26 wherein
   (a) said exterior height positioning means is a longitudinal channel affixed to an
       exterior longitudinal side of said outer housing.

29. The chafer heater of claim 28 which further comprises
   (a) a set screw for fixedly holding said handle in a defined position.

30. The chafer heater of claim 28 wherein
   (a) said handle has a longitudinal edge for insertion into said longitudinal channel.

31. The chafer heater of claim 26 which further comprises
   (a) an external weight means for insertion about a diameter of a bottom of said
       outer housing.