BURNER FOR HAND WARMER

Filed Aug. 28, 1967

INVENTOR.

DONALD E. WINTZ

INVENTOR.

DONALD E. WINTZ

BY

Burd. MacEachern, Bradock.
Bentz & Schwartz
ATTORNEYS
ABSTRACT OF THE DISCLOSURE

A hand warmer equipped with a removable burner having a single fibrous catalytic combustion promoting member located within a housing removably attached to a body enclosing fuel impregnated absorbent material. The combustion promoting member is made of a plurality of woven strands of glass fibers entwined with cords of asbestos located in a two-directional diagonal ribbed pattern.

Background of invention

Prior art burners for hand warmers as shown in the patents to Smith, No. 2,670,728, and Wilcox, No. 2,914,060, have wire coil springs carrying combustion promoting asbestos members. Encircling both the combustion promoting members and the springs are sleeves of air pervious and noncombustible fibrous material. These two independent members and sleeves function together to control nonflame combustion of the burner. Other burners utilize screens, metal clips, and coil springs for closing and retaining asbestos-like material in the housings of the burners. In burners that separate the asbestos combustion promoting material from the air there is a marked reduction in combustion and heating efficiency. In burners that use only asbestos materials as the combustion promoting material there is a tendency for the materials to deteriorate, fall apart, and flake away during use. In addition, there is considerable amount of time and labor utilized in manufacturing burners having the asbestos material either wound around the wire spring or located within a screened or slotted chamber. The burner of this invention is a one-piece fibrous catalytic combustion promoting member having combustion promoting material exposed to air to provide for maximum efficiency of nonflame combustion. This fibrous catalytic combustion promoting member is assembled in the burner housing with a minimum of time and labor at relatively low cost.

Summary of invention

The invention relates to a flameless burner for a hand warmer and more particularly to a fibrous catalytic combustion promoting material located within a burner housing. The combustion promoting material is retained in the housing adjacent side openings in the housing where it is exposed to air in a chamber formed by the cap of the hand warmer. The combustion promoting material comprises woven strands of non-combustible fibers entwined with spaced cords of combustion promoting material forming a one-piece fabric. The fabric provides a continuous and air pervious support carrying interlaced cords of combustion promoting material.

In the drawing

FIGURE 1 is an elevational view partly in section of a hand warmer equipped with the burner of the invention; FIGURE 2 is an enlarged sectional view taken along the line 2—2 of FIGURE 1; FIGURE 3 is an enlarged longitudinal sectional view of the burner of FIGURE 1; and FIGURE 4 is a prospective view of the tubular fibrous catalytic combustion promoting member of the burner of FIGURE 1; and FIGURE 5 is a sectional view similar to FIGURE 2 of a modified burner.

Referring to the drawing, there is shown in FIGURE 1, a hand warmer indicated generally at 10 having a body or receptacle 11 carrying absorbent material 12 for storing liquid fuel, as naphtha benzene, heptane or related compounds or alcohol. Referring to FIGURE 2, the top wall of body 11 has an upright neck 13 having an elongated opening 14 facing a burner indicated generally at 16. Burner 16 is located on neck 13 adjacent a wick 17 used to initially heat the burner to commence combustion of the vaporized fuel. A cover or cap 18 (frictionally mounted on the upper portion of body 11) encloses the burner 16 and provides an air chamber 21 around the burner. Cover 18 has a plurality of ventilating openings 19 providing passageways for movement of air into chamber 21 to control flameless combustion of the fuel at the burner.

Referring to FIGURES 2 and 3, there is shown burner 16 comprising a housing indicated generally at 22 having an ovoid-shaped upright base 23 telescoped with a friction fit on neck 13 of the body 11. Projected upwardly from opposite ends of base 23 are semicircular shaped end walls 24 and 26 connected with an elongated narrow top rib 27. The housing 22 has generally rectangular side openings 28 and 29. Extended between the end walls 24 and 26 within housing 22 is an elongated continuous combustion promoting member indicated generally at 31. Substantial portions of the sides of the combustion promoting member 31 face the side openings 28 and 29 to expose the combustion promoting member to the air in chamber 21. An elongated coil spring 32 provides circumferential support for the combustion promoting member and permanently mounts the member 31 in the housing 22.

As shown in FIGURES 2, 3, and 4, the combustion promoting member 31 is a sleeve constructed with a sleeve surrounding the coil spring 32 so that the coil spring holds the sleeve in alignment with the side openings 28 and 29. The end walls 24 and 26 have inwardly directed tabs 33 and 34 which engage both the combustion promoting member 31 and coil spring 32 to permanently mount the combustion promoting member and coil spring housing 22. Spring 32 is a helical coil of wire having adjacent turns at each end. The turns at the ends of the spring cooperate with the tabs 33 and 34 to hold the combustion promoting member 31 and spring 32 in assembled relation with the housing 22. The midportion of the spring 32 maintains the combustion promoting member 31 in a generally cylindrical shape and provides an elongated air space within the combustion promoting member above the opening 14. The air space promotes dispersion of vaporized fuel to all parts of the combustion promoting member.

Referring to FIGURE 4, there is shown the cylindrical combustion promoting member 31 comprised of interlaced strands of noncombustible fibers 36 forming an elongated continuous cylindrical support carrying oppositely wound interesting helical cords of combustion material 37. Strands 36 are preferably a plurality of continuous strands of glass fibers or fiber glass or similar synthetic and non-synthetic weavable and noncombustible material. Cords 37 are continuous strands of noncombustible and chemically resistant material capable of holding and evenly dispersing vaporized fuel. The cords 37 are of asbestos, asbestos-like material, or other suitable fibrous material. The entire member is impregnated and treated with a catalytic agent which aids in maintaining combustion, causes flameless combustion to take place at a relatively slow rate, and aids in the oxidation of the fuel fumes. The catalytic agent and the method of cooperating the catalytic agent with strands 36 and cords 37 may be the same described in the patent to Smith, No. 2,670,728,
3

The cylindrical sleeve forming combustion member 31 is formed by a braid in the nature of a twill weave using a plurality of strands of fibers 36 and the cords 37. The cords passing through the braided strands in left and right helical directions to give the appearance of spaced crossing diagonal ribs as shown in FIGURE 4. The strands 36 and cords 37 are interlaced and entwined together to form a continuous air pervious sheet member containing intersecting and evenly spaced combustion material.

In the assembly of burner 16 the sleeve of combustion promoting member 31 is initially placed over coil spring 32. The sleeve and spring are then inserted into the housing 22 and retained there by the punching of the tabs 33 and 34 inwardly from the end walls 24 and 26.

In use, the wick 17 is initially ignited to heat the combustion promoting member 31 along with the side openings 28 and 29. The fumes of the fuel which evaporate from the upper portion of the absorbent material 12 combine with the oxygen of air in the presence of the catalyst incorporated in the combustion promoting member. This combination of heat, fuel fumes, combustion promoting member and catalyst results in flameless combustion of the fuel fumes and development and dissipation of heat. The heat generated by the combustion aids in further evaporation of the fuel thereby providing a continuous source of fuel for the burner. Once the burner is sufficiently heated it continuously emanates a dull red glow without the propagation of a flame. The combustion is continuous until the supply of fuel is exhausted or the burner removed from body 11.

Referring to FIGURE 5, there is shown a modified burner indicated generally at 28 frictionally mounted on the neck 39 of the body 41 storing fuel absorbent material 42. Burner 28 has a U-shaped housing 43 identical to the housing 22 fractionally mounted on neck 39. Housing 43 has side openings 44 and 46 providing air openings for a combustion promoting member 47 retained in assembled relation within the housing by a coil spring 48. Tabs 49 holds the spring 48 in housing 43 with member 47 covering side openings 44 and 46. The member 47 is made of material identical to the material 31. This material has strands of noncombustible fiber interwoven with cords of combustion promoting material. The material is draped over the spring 48 and covers the entire side openings 44 and 46. In cross-section the material has a generally inverted U-shape which is held against the end walls and top bar of the housing by the coil spring 48.

While there have been shown and described the preferred embodiments of the burner it is understood that various changes in the shape and design of the combustion promoting material and housing as well as the support for holding the combustion promoting material in the housing may be made by those skilled in the art without departing from the spirit of the invention. The invention is defined in the following claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A burner for a hand warmer comprising a housing, a combustion promoting member located within said housing, means for retaining said member in said housing, said combustion promoting member comprising woven strands of a noncombustible material entwined with cords of combustion promoting material.

2. The burner of claim 1 wherein the strands of noncombustible material each comprise a plurality of fibers.

3. The burner of claim 1 wherein said woven strands of noncombustible material are a plurality of glass fibers and said cords of combustion promoting member is of asbestine-like material.

4. The burner of claim 1 wherein said strands are braided together with the cords of combustion promoting material interwoven with the braided strands in a pattern providing the member with intersecting ribs of combustion promoting material.

5. The burner of claim 1 wherein said means for retaining said member in said housing is a coil spring clamped to opposite ends of the housing and said combustion promoting member is a sleeve positioned about the coil spring.

6. The burner of claim 5 wherein said woven strands of noncombustible material are a plurality of glass fibers and said cords of combustion promoting member is of asbestine-like material.

7. The burner of claim 5 wherein said strands are braided together with the cords of combustion promoting material interwoven with the braided strands in a pattern providing the member with intersecting ribs of combustion promoting material.

8. The burner of claim 1 wherein the means for retaining the member in said housing is a coil spring clamped to the ends of the housing, said combustion promoting member comprising a sheet of woven base fabric entwined with cords of combustion promoting material positioned between the spring and the housing to expose substantial portions of the combustion promoting member to the air surrounding the burner.

9. A combustion promoting member for a hand warmer burner comprising woven strands of noncombustible material entwined with cords of combustion promoting material.

10. The combustion promoting member of claim 9 wherein said strands are braided together with the cords of combustion promoting material interwoven with the braided strands in a pattern providing the member with intersecting ribs of combustion promoting material.

11. The combustion promoting member of claim 9 wherein said member is a cylindrical sleeve.

12. The combustion promoting member of claim 9 wherein said woven strands of noncombustible material are a plurality of glass fibers and said cords of combustion promoting member is of asbestine-like material.

References Cited

UNITED STATES PATENTS

2,579,620 12/1951 Smith ----------------- 158—96
2,670,728 3/1954 Smith ----------------- 126—208
3,254,966 6/1966 Bloch et al. --------- 252—477

JAMES W. WESTHIAVER, Primary Examiner.
E. G. FAVORS, Assistant Examiner.