Oct. 15, 1968 D. E. WINTZ 3,405,704

BURNER FOR HAND WARMER

Filed Aug. 28, 1967

FIG. 1

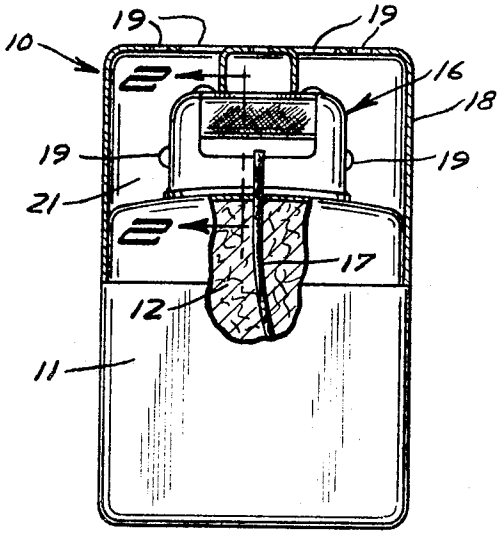


FIG. 3

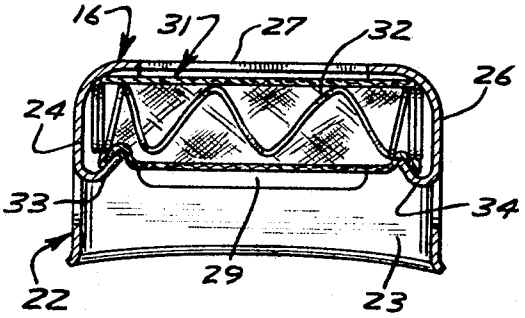


FIG. 4

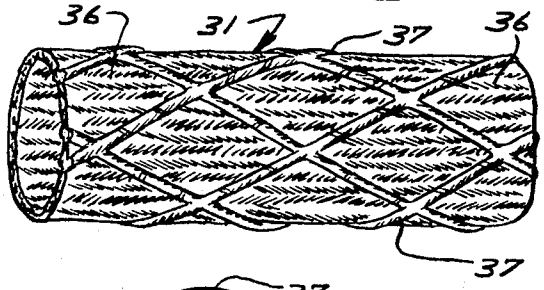
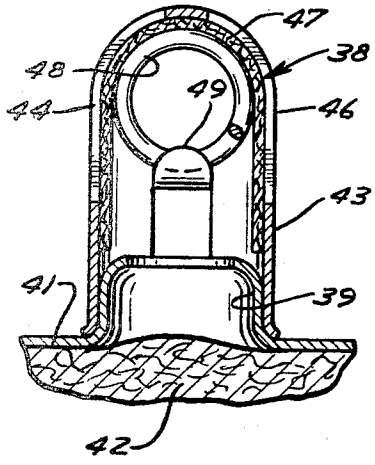


FIG. 5



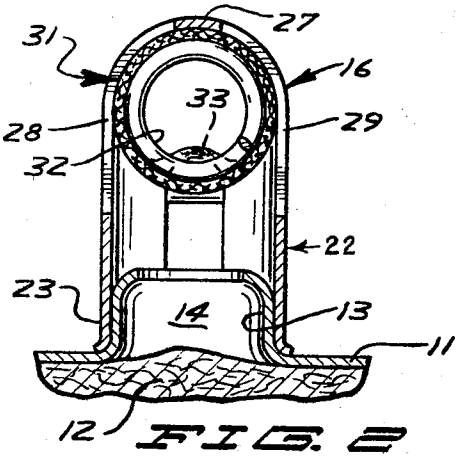


FIG. 2

INVENTOR.
DONALD E. WINTZ

BY
Burd, MacEachron, Braddock,
Bartz & Schwartz
ATTORNEYS

United States Patent Office 3,405,704 Patented Oct. 15, 1968

3,405,704

BURNER FOR HAND WARMER

Donald E. Wintz, St. Paul, Minn., assignor to Aladdin Manufacturing Company, Minneapolis, Minn., a corporation of Minnesota

Filed Aug. 28, 1967, Ser. No. 663,786
12 Claims. (Cl. 126—208)

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 asbestine-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 tendancy 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 slipped 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;

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 naphthabenzene, 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 oblong-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 coextensive with and 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 in 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 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 intersecting 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 nonsynthetic 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, asbestine-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.

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** aligned 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 **38** frictionally mounted on the neck **39** of the body **41** storing fuel absorbent material **42**. Burner **38** has a U-shaped housing **43** identical to the housing **22** frictionally 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 intertwined 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. WESTHAVER, *Primary Examiner.*

E. G. FAVORS, *Assistant Examiner.*