

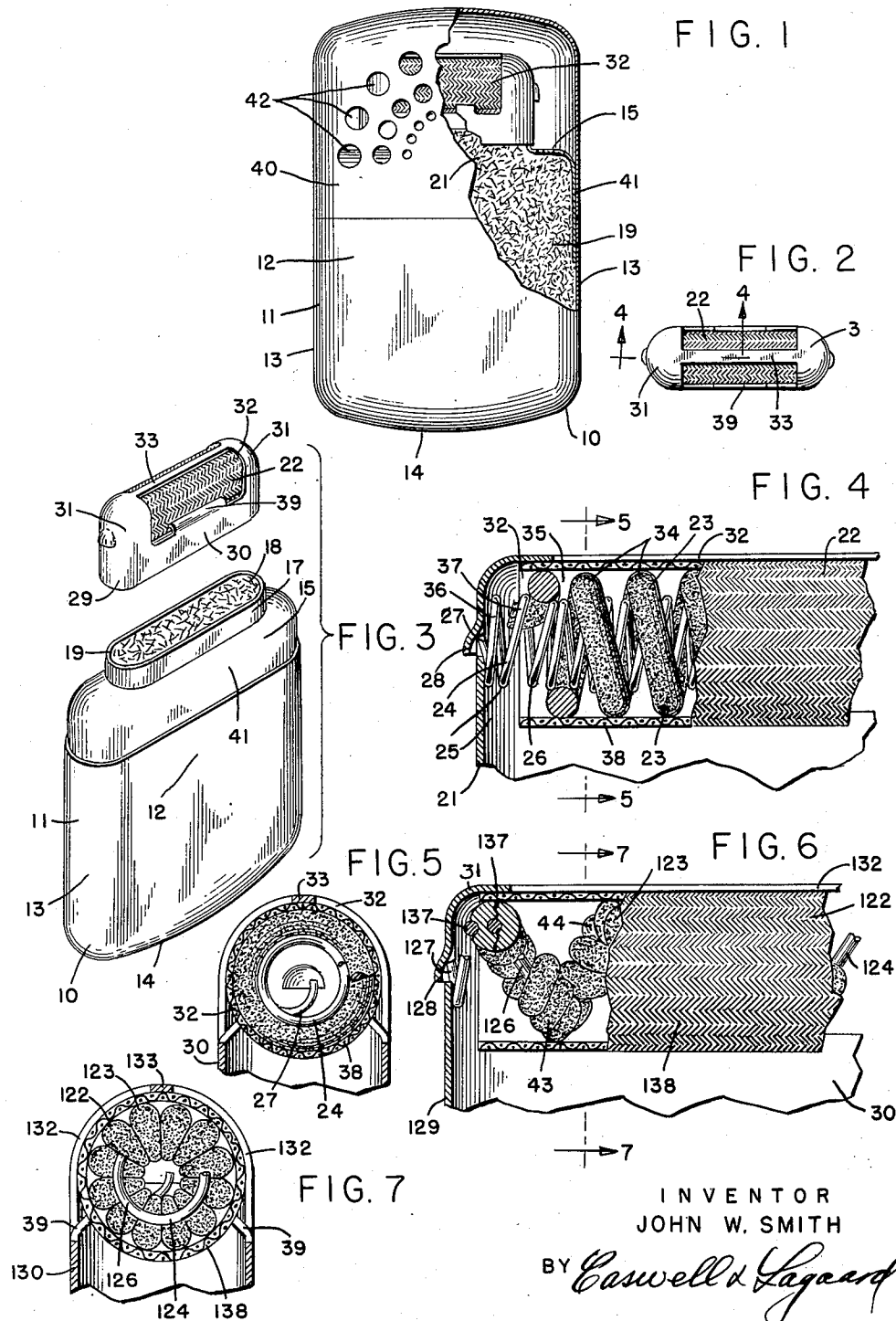
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HAND WARMER

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HAND WARMER

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My invention relates to hand warmers and has for an object to provide a warmer adapted to produce heat at a moderate temperature.

A still further object of the invention resides in providing a warmer which is easy to start and which will continue to function without interruption.

Another object of the invention resides in providing a burner in which combustion occurs uniformly throughout the extent thereof.

A still further object of the invention resides in providing a burner having a core helical in form and formed with spaced convolutions and on the convolutions of which is wound an elongated flexible fibrous combustion promoting member containing a catalytic agent and enveloped by a pervious tubular fibrous combustion member having interstices therein communicating with the spaces between said convolutions.

Other objects of the invention reside in the novel combination and arrangement of parts and in the details of construction hereinafter illustrated and/or described.

In the drawings:

Fig. 1 is a front elevational view of a hand warmer illustrating an embodiment of my invention with a portion thereof broken away.

Fig. 2 is a plan view of the burner removed from the hand warmer.

Fig. 3 is a perspective view of the parts of the invention detached from one another.

Fig. 4 is an enlarged elevational sectional view of a portion of the burner taken on line 4—4 of Fig. 2.

Fig. 5 is a cross sectional view taken on line 5—5 of Fig. 4.

Fig. 6 is a view similar to Fig. 4 of a modification of the invention.

Fig. 7 is a cross sectional view similar to Fig. 5 taken on line 7—7 of Fig. 6.

The construction shown in the drawings consists of a receptacle for liquid fuel constructed with a body formed with a neck and containing an absorbent adapted to hold a quantity of liquid fuel. On the neck is mounted a housing supporting the burner of the invention. The burner consists of a core constructed of wire and wound with spaced convolutions. In one form of the invention an elongated combustion promoting member constructed from asbestos, or some similar material, is impregnated with a catalytic agent and wound on the exterior of the core. In another form of the invention an elongated flexible combustion promoting member is wound directly on the convolutions of the core to enclose

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the same. In both cases spaces are formed between the convolutions through which air and fumes from the liquid fuel may pass. Encircling the combustion promoting member so formed is a second combustion promoting member constructed of pervious tubular fibrous material having interstices therein communicating with the spaces between the convolutions of the first named combustion promoting member. A cap encloses the burner and is mounted on the top of the receptacle.

The instant invention comprises a receptacle 10 for liquid fuel which consists of a body 11 stamped from sheet metal and formed with sides 12, ends 13 and a bottom 14. The upper end of the body 11 is open and has attached to it a top 15 which has a flange 41 of the same configuration as the body 11 but slightly smaller in dimensions and which is pressed into the upper end of the body 11 to frictionally hold the parts attached to one another. The top 15 has formed on it a neck 17 which has an opening 18 in the same serving as an outlet for the fumes from the liquid fuel contained within the receptacle 10. The interior of the receptacle 10 is filled with absorbent, such as cotton, which is indicated at 19 and which holds the liquid fuel introduced into the receptacle through the opening 18. The absorbent prevents the fuel from spilling. The fuel travels by capillary attraction to the upper portion of the cotton where the fumes from the liquid fuel pass outwardly through the opening 18 in the neck 17.

The invention includes a burner 22 which, in the form of the invention shown in Fig. 4, consists of an elongated flexible combustion promoting member 23 which is constructed of asbestos or some other similar fibrous material. This combustion promoting member is provided with a catalytic agent which is incorporated therein. This may be accomplished in several ways. The combustion promoting members may be tumbled in a tumbler or pebble mill with powdered palladium oxide, also known as palladium black, until the particles of the palladium are well interspersed with the fibers of the combustion promoting members. If desired, platinum oxide, also known as platinum black, may be used. The fibers of the combustion promoting members may also be coated with the catalytic agent. The asbestos is immersed in a five to ten percent solution of platinic chloride or palladium chloride. After saturation the asbestos is heated to a temperature of about 1200 degrees Fahrenheit which evaporates the water and converts the res-

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idue into a substance ordinarily known as platinum black or palladium black. This substance serves as a catalytic agent which aids in oxidation of the fumes from the liquid fuel and causes combustion at a relatively slow rate and at a low temperature.

The combustion promoting member 23 is mounted upon a core 24. Core 24 is constructed of wire which is coiled to form a helix 25 having spaced convolutions 26. For supporting the core 24 a housing 29 is employed which is mounted on the neck 17 of body 11. This housing is tubular in form having a tubular skirt 30 which fits over and frictionally engages the neck 17 of top 15 to hold the burner detachably secured to the receptacle 10. The housing 29 is formed with arms 31 at its ends which extend upwardly therefrom. These arms are spaced from one another to provide openings 32 in the housing 29 and which serve to admit air to the combustion promoting member. The two arms are connected together at their upper ends by means of a bar 33. Louvers 28 are provided in the arms 31 for entry of air to the burner 22 and which are struck out of the arms 31 of the housing. These louvers also form projections which assist in removal of the burner. The core 24 is normally compressed so that the resiliency of the same urges the ends 27 of the same against the arms 31. The combustion promoting member 23 is wound upon the exterior of the convolutions 26 of core 24. If the helix 25 is a right-hand helix the convolutions are wound in a manner to form a left-hand helix whereby convolutions 34 are formed on the combustion promoting member 23 and which cross the convolutions 26. The convolutions 34 are also spaced from one another to provide passageways 35 therebetween and through which air may circulate about said convolutions. The ends of the combustion promoting member 23 are held attached to the core 24 by pinching the same between the end convolutions 36 and 37 of the core 24.

Encircling the combustion promoting member 23 is a second combustion promoting member 38 which is tubular in form. This combustion promoting member is constructed of woven strands of high temperature spun glass and of asbestos or asbestos alone formed with interstices or meshes therebetween. The tube is immersed for about ten minutes in a ten percent solution of platinic chloride dissolved in isopropynol alcohol. The tube is then removed and air dried till dry. After drying by air the tube is baked in an oven at about 1000 degrees Fahrenheit until the chloride becomes converted into metallic platinum, also known as platinum black. Palladium chloride may also be used. After the tube has been so prepared a length of the same is cut off to form the combustion promoting member 38 which is then slipped over the combustion promoting member 23. The entire burner is then inserted into the housing 29 with the ends 27 of the core 24 engaging arms 31. The burner is additionally supported by means of two flanges 39 which are bent inwardly from the upper ends of the skirt 30 at the openings 32 and which engage the undersides of the said burner. The burner is forced through the space between these flanges which is made possible through the resiliency of the combustion promoting members 23 and 38, and when properly inserted becomes securely lodged in position.

For enclosing the burner 22 a cap 40 is employed which is constructed similar to the body

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11. This cap fits over the protruding portion 41 of the top 15 and frictionally engages the same and is thus held detachably mounted thereon. This cap has a number of ventilating openings 42 therein by means of which air may reach the burner to support combustion of the fuel at the burner.

In use the receptacle 10 is filled with a suitable liquid fuel such as naphtha, benzene, heptane or related compounds or alcohol. This fuel is filled through the opening 18 in neck 17 and absorbed by the cotton 19. The burner 22 mounted in housing 29 is mounted on the neck 17 by forcing the skirt 30 over said neck. The burner 22 is next heated by a match or a cigarette lighter until the fumes of the fuel which evaporates from the upper portion of the cotton 19 combine with the oxygen of the air by combustion in the presence of the catalyst. The heat so generated aids in vaporizing the fuel and after ignition the heat produced by the burning fuel aids vaporization and the vapor continues to burn in the presence of the catalyst giving the burner a dull red glow. The catalytic agent formed on the combustion members aids in maintaining combustion and causes combustion to take place at a slow rate. Combustion is supported by the air entering the interior of the cap 40 through the openings 42. The heat produced by the combustion element warms the cap 40 and also the receptacle 10 giving off heat at a very low temperature so that the device can be readily held in the hand without danger of burning or excessive discomfort. The hand warmer may be placed in the pocket or glove of the user and produces sufficient heat to prevent numbness or discomfort to the user in cool weather.

In Figs. 6 and 7 a modification of the invention has been shown. Due to the similarity of the construction of this form of the invention with that previously described, the description of the similar parts thereof will not be repeated and the same reference numerals preceded by the digit "1" will be used to designate corresponding parts.

In this form of the invention the convolutions 126 of the core 124 are considerably spaced and the combustion member 123 wound directly upon these convolutions. In this manner the combustion member is formed with convolutions 43 which conjointly form a helix 44. The end convolution 137 of the core 124 is brought into close proximity next to the end convolution 137 permitting of pinching the end of the combustion member 123 therebetween and holding the same attached to the core. Core 124 in this form of the invention is attached to the housing 129 in the same manner as in the other form of the invention. The second combustion member 138 encircles the helix 44 and is constructed the same as described in conjunction with the invention shown in Fig. 4.

The advantages of the invention are manifest. The burner is extremely simple in construction and can readily be manufactured at an economical cost. By the use of the two combustion members greater area is procured without changing the size of the burner. With the herein disclosed invention combustion is more readily maintained and occurs uniformly throughout the burner, thereby giving off more heat and operating in a more highly efficient manner.

Changes in the specific form of the invention, as herein described, may be made within the scope of what is claimed without departing from the spirit of the invention.

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Having described the invention, what is claimed as new and desired to be protected by Letters Patent is:

1. In a hand warmer, a receptacle for a volatile liquid fuel and having a discharge outlet for the fumes emanating from the fuel, a burner superimposing the outlet of said receptacle, said burner including a support, an elongated fibrous catalytic combustion promoting member mounted on said support and formed with convolutions providing passageways therebetween and through which the fumes may pass and a pervious tubular fibrous catalytic combustion promoting member having interstices therein and enveloping said first named combustion promoting member, said interstices communicating with said passageways.

2. In a hand warmer, a receptacle for a volatile liquid fuel and having a discharge outlet for the fumes emanating from the fuel, a burner superimposing the outlet of said receptacle, said burner including a support, a core mounted on said support, an elongated flexible fibrous catalytic combustion promoting member wound on said core to form spaced convolutions providing passageways therebetween and through which fumes may pass and a pervious tubular fibrous catalytic combustion promoting member having meshes therein and enveloping said convolutions, said meshes communicating with said passageways.

3. In a hand warmer, a receptacle for a volatile liquid fuel and having a discharge outlet for the fumes emanating from the fuel, a burner superimposing the outlet of said receptacle, said burner including a frame supported on said receptacle and having arms extending outwardly therefrom, a helical core carried by said support and extending between said arms said core having spaced convolutions, an elongated flexible fibrous catalytic combustion promoting member wound about the individual convolutions of the core to form a helix encircling said convolutions and providing passageways therebetween through which the fumes may pass and a pervious tubular fibrous catalytic combustion promoting member having meshes therein and enveloping said convolutions, said meshes communicating with said passageways.

4. A burner for hand warmers comprising a core, an elongated flexible fibrous catalytic combustion promoting member wound on said core to form spaced convolutions providing passageways therebetween and through which fumes may pass, and a pervious tubular fibrous catalytic combustion promoting member having meshes therein and enveloping said convolutions, said meshes communicating with said passageways.

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5. A burner for hand warmers comprising a support, an elongated fibrous catalytic combustion promoting member mounted on said support and formed with convolutions providing passageways therebetween and through which the fumes may pass and a pervious tubular fibrous catalytic combustion promoting member having interstices therein and enveloping said first named combustion promoting member, said interstices communicating with said passageways.

6. A burner for hand warmers comprising a core constructed from a wire in the form of a helix with widely spaced convolutions, an elongated flexible rope like fibrous catalytic strip of material closely wound about the individual convolutions of the core to form on the core a helical combustion member, helical with respect to the axis of the core and also with respect to the axis of the wire and having spaced convolutions providing spaces therebetween approximating the diameter of the convolutions and through which the fumes may pass and a pervious tubular fibrous catalytic combustion promoting member having interstices therein and enveloping said first named combustion promoting member, said interstices communicating with said passageways.

7. In a hand warmer, a receptacle for a volatile liquid fuel and having a discharge outlet for the fumes emanating from the fuel, a burner superimposing the outlet of said receptacle, said burner including a support, an elongated fibrous catalytic combustion promoting member mounted on said support and formed with convolutions providing passageways therebetween and through which the fumes may pass, said passageways being of a width approximating the longitudinal dimensions of said convolutions and a pervious tubular fibrous catalytic combustion promoting member having interstices therein and enveloping said first named combustion promoting member, said interstices communicating with said passageways.

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