May 22, 1956 J. W. SMITH 2,746,138

HAND WARMER CONSTRUCTION METHOD

Filed Sept. 28, 1950

FIG. 1

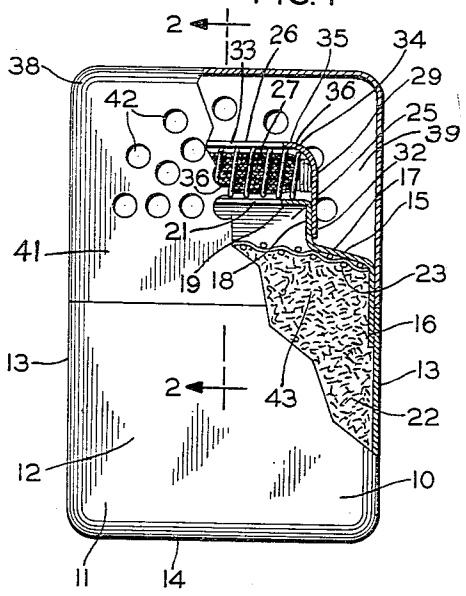


FIG. 2

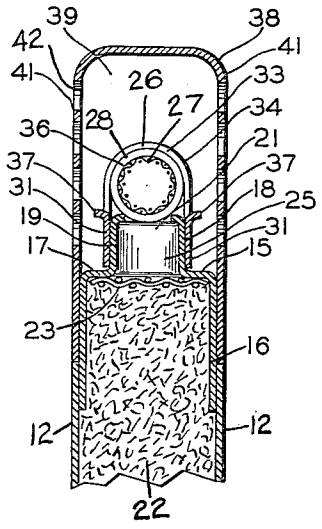


FIG. 4

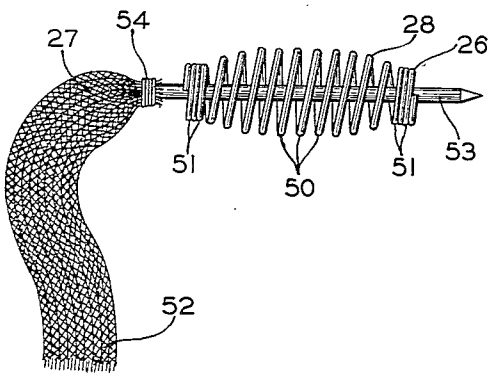


FIG. 5

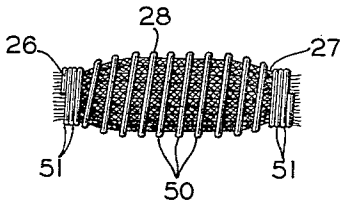


FIG. 3

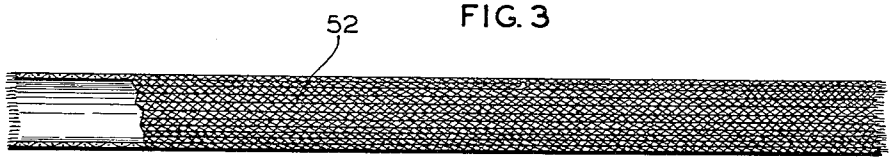
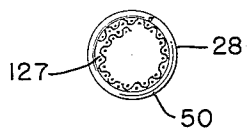


FIG. 6



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HAND WARMER CONSTRUCTION METHOD

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2 Claims. (Cl. 29—451)

The herein disclosed invention relates to hand warmers and has for an object to provide a warmer adapted to produce heat at a moderate rate.

Another object of the invention resides in providing a warmer which will be economical to manufacture and efficient in operation.

A still further object of the invention resides in providing a warmer having a receptacle for liquid fuel and in employing a burner utilizing a flexible fibrous combustion member containing a catalytic agent and disposed in a position above the fuel receptacle.

An object of the invention resides in constructing the combustion member with a cage in the form of a coil of wire and having a core formed of fibrous material containing the catalytic agent and disposed within the coil.

Another object of the invention resides in constructing the core tubular in form.

A still further object of the invention resides in utilizing tubular stock for the core and of a woven material of a diameter greater than that of the cage and so that when the core is inserted in the cage the same may be expanded and to fit against the inner surface of the cage.

An object of the invention resides in constructing the cage with its ends reduced in diameter to further assist in retaining the core within the cage.

Another object of the invention resides in the method of fabricating and installing the core.

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 the invention, a portion thereof being broken away.

Fig. 2 is an elevational sectional view of the hand warmer taken on line 2—2 of Fig. 1 and drawn to a greater scale.

Fig. 3 is an elevational view of a portion of tubing stock from which the core is constructed.

Fig. 4 is an elevational view of the burner of the invention illustrating the method of applying the core thereto.

Fig. 5 is an elevational view of the finished burner.

Fig. 6 is a cross sectional view of the burner illustrating a modification of the combustion member.

The structure illustrated in this application includes a receptacle for liquid fuel having an absorbent therein extending up toward the upper end of the receptacle and in which the fuel is contained. Above this absorbent is a burner comprising a cage constructed of convolutions of wire spaced from one another and in which is received a combustion member constructed of spun glass and asbestos woven into tubular form and coated with metallic platinum. The tube is normally of greater diameter than the cage and is flexible and when inserted into the cage may be expanded to fit against the inner surface thereof. The ends of the cage are reduced in diameter to further assist in supporting the core within the cage.

The invention comprises a receptacle **10** which consists of a body **11** stamped from sheet metal and formed with sides **12**, ends **13** and a bottom **14** connected thereto. The upper end of the body **11** is open and has attached to it a top **15** which has a flange **16** of the same configuration as the body **11**, but slightly smaller in dimensions and which is pressed into the upper end of the body to frictionally hold the parts attached to one another. The top **15** has an upper wall **17** extending inwardly from said flange. Issuing upwardly from the wall **17** is a neck **18** which again has an upper wall **19** issuing inwardly from said neck. The wall **19** has an elongated opening **21** in the same and through which access into the interior of the receptacle **10** may be had.

Within the interior of the receptacle **10** is placed an absorbent such as cotton or the like which is indicated at **22**. This absorbent holds the liquid fuel which is placed in the receptacle **10** through the opening **21**. To retain the absorbent **22** within the confines of the receptacle **10**, a wire screen **23** is employed which overlies the upper portion of the absorbent and which fits within the interior of the top **15**. By means of the construction disclosed, a chamber **25** is formed in the neck **18** and above the absorbent **22** which serves as a funnel for filling the receptacle with the liquid fuel and directing the same to the absorbent. To prevent leakage the top **15** is soldered to the receptacle **10** after the absorbent **22** and the screen **23** are in position.

The invention includes a burner **26** which consists of a combustion member **27** mounted in a cage **28**. The combustion member **27** is supported by a housing **29** which is stamped from sheet metal and which has side walls **31** and end walls **32**. The housing **29** is of such dimensions that the walls **31** and **32** snugly receive the neck **18** and closely fit the same to frictionally hold the housing mounted on said neck. The upper ends of the walls **31** are cut away as indicated at **33** in Fig. 2 to form the ends of the housing with arms **34** extending upwardly therefrom and spaced from one another. The extreme ends **35** of the said arms are bent inwardly toward one another to form sockets **36** in the upper parts of the said arms. The upper edges of the walls **31** at the localities of the openings **33** are bent outwardly to form flanges **37**. The ends of the cage **28** are received within the sockets **36** while the cage rests on the wall **19** of neck **18** above the opening **21**.

The cage **28** is constructed of resilient wire which is coiled to form a number of spaced intermediate convolutions **50** of the same diameter. Toward the ends of the cage the convolutions are reduced in diameter and at the extreme ends of the same are formed a few closely spaced convolutions **51** of lesser diameter than the convolutions **50**.

The material from which one form of the combustion member **27** is constructed consists of a tube **52** such as shown in Figs. 3 and 4 which is woven from strands of high temperature spun glass and of asbestos or of asbestos alone. Such material is quite resilient and the diameter of the tube readily changes upon change in the length of the tube. The tube is first soaked in a five percent to seven percent solution of ethyl silicate in isopropynol alcohol for about five minutes. The alcohol is then ignited and burned off. The tube is then 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.

After the tube has been so prepared the same is inserted into the cages **28** and formed into combustion members in the following manner. A pin constructed of wood or any other suitable material is first inserted into the end of the

tube 27 and the tube bound on said pin by means of a thread 54 which is wrapped about the tube and pin. The pin 53 is of considerably smaller diameter than the holes through the convolutions 51 of cage 28 and of a greater length than said cage so that said pin with the tube attached may be threaded through said cage. The tube is threaded to the free end thereof and then compressed slightly in a longitudinal direction. This aids in causing the tube to expand and fit against the inner surfaces of the convolutions of the cage. The tube is now cut off leaving a small amount of material projecting beyond the ends of the cage. The natural resilience of the strands of glass in the tube together with the reduction in the diameter of the convolution 51 of cage 28 maintains the combustion member within the confines of the cage.

In Fig. 6 a modification of the burner is shown. In this form of the invention the burner is identical with that previously described except that the combustion member 127 is constructed from a flat sheet of material instead of a tube. This sheet is treated in the same manner as the tube and cut off in appropriate lengths. The sheet is first wrapped about a pair of long nose pliers, and then inserted into the cage 28. Upon opening up the pliers the sheet is expanded until it fills the interior of the cage.

In the assembly of the burner, the combustion member 27 is inserted in the cage 28 and the same compressed sufficiently to permit of insertion of the same into the housing 29 and between arms 34. The cage 28 is preferably constructed of resilient wire and upon release of the same, expands to bring the ends of the said cage into the sockets 36. This holds the combustion member in position within the housing of the burner with the cage 28 resting on the wall 19 of neck 18.

The burner 26 and associated parts are enclosed by means of a cap 38 which is of similar construction to the body 11 of receptacle 10. This cap fits snugly over the protruding portion of flange 17 of top 15 and frictionally engages said flange to hold the cap detachably mounted on the receptacle. The cap 38 has front and rear walls 41 and is provided with a chamber 39 within the same which receives the burner 26. The parts are so proportioned that the said burner and associated parts are held in spaced relation to the walls 41 whereby undue heating of the cap is prevented. In the front and rear walls 41 of cap 38 are formed a number of air inlets 42 by means of which air may be introduced into the chamber 39 for the purpose of supporting combustion at the burner 22 and by means of which the products of combustion may escape.

The method of using the invention is as follows: Cap 38 is first removed and the burner 26 subsequently removed. A volatile liquid fuel such as naptha, high test gasoline, benzine, heptane or related compounds or alcohol is poured in the receptacle 10 through the opening 21 in the wall 19 of neck 18. The said neck directs the said fuel into the interior of the receptacle 10 where the same is absorbed by the absorbent 22. Capillary attraction causes the liquid fuel to be dispersed throughout the absorbent and to be maintained in the portion 43 of said absorbent disposed in the top 15. When enough fuel has been poured into the receptacle, the burner 26 is again mounted on the neck 18. The device is then ready for use. In starting the warmer, the combustion member 27 is heated with a match or cigarette lighter. The heat so produced causes the liquid to evaporate and the fumes from the said liquid pass through the opening 21 in the top 15. When leaving the neck 18, the fumes pass between the flanges 37 of the housing 29 and between the convolutions 50 of the cage 28 and through the combustion member 27. The fuel then becomes ignited and combines with the oxygen of the air surrounding the burner. Combustion is assisted by means of the catalytic agent formed on the combustion member 27 and maintains combustion as long as the fuel remains in the absorbent. After the burner has been started in operation, cap 38 is replaced and the device then continues to operate. In operation, the combustion member 27 glows at a relatively low temperature without the production of any flame. The heat produced by such combustion warms the cap 38 and also the receptacle 10, giving off heat at a fairly low temperature so that the device can be readily held in the hand without danger or discomfort. The hand warmer can be placed in the pocket or mitten of the user and will produce sufficient heat to keep the hands comfortably warm.

The advantages of the invention are manifest. By the use of a tubular combustion member the fumes pass through the openings between the fibers of the same and not merely over the outer surface of the combustion member. In this manner the fumes reach a greater portion of the area of the combustion member than would be possible with devices in which the entire space in the cage is filled with porous material. In starting the heater there is less material to be heated and the warmer can be started in much less time. With this form of the invention less material is employed and particularly the platinum chloride which is relatively expensive.

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.

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

1. The method of forming burners for hand warmers which consists in utilizing a tubular cage, in employing tubular flexible combustion member stock of a normal diameter greater than that of the inner surface of the cage, in inserting said combustion member stock into the cage by stretching the same lengthwise and drawing it through the cage, in compressing the portion received within the cage and in shearing off the portion of the stock retained within the cage.

2. The method of forming burners for hand warmers which consists in utilizing a tubular cage, in employing tubular flexibile combustion member stock of a normal diameter greater than that of the inner surface of the cage, in contracting and attaching one end of the stock to a pin of lesser diameter than the minimum internal diameter of said tubular cage, in drawing said pin through said cage to stretch said stock and contract it sufficiently to enter into said cage, in terminating the drawing movement of the stock into the cage when the free end of the stock reaches approximately the end of the cage into which the pin was first inserted in compressing the portion of the stock received within the cage and in shearing off the portion of the stock received in the cage at the other end of the cage.

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