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D. M. STADD ET AL

2,627,306

CATALYTIC HEATER

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Fig. 1

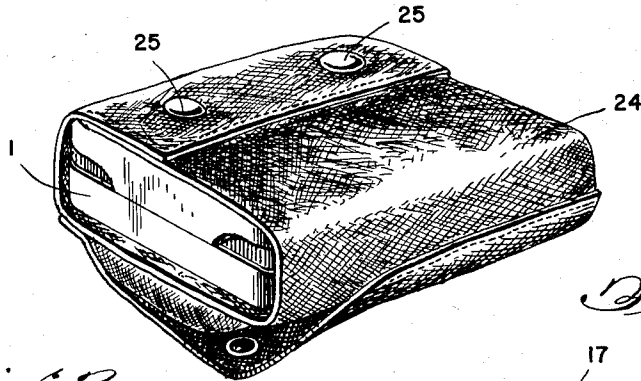


Fig. 2

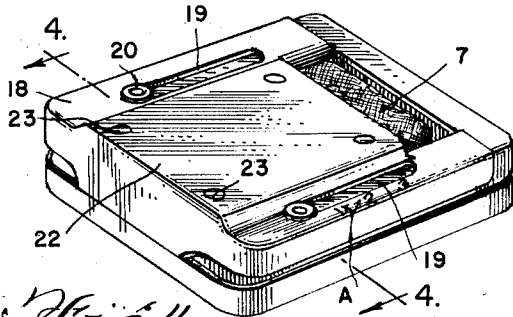


Fig. 3

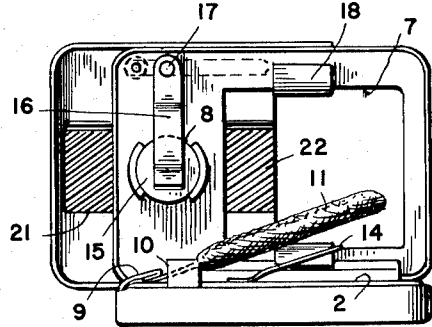


Fig. 4

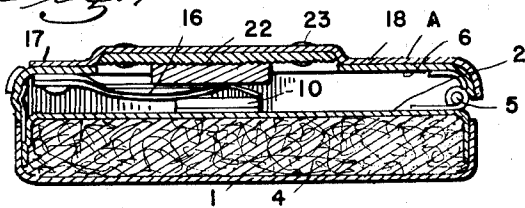


Fig. 5

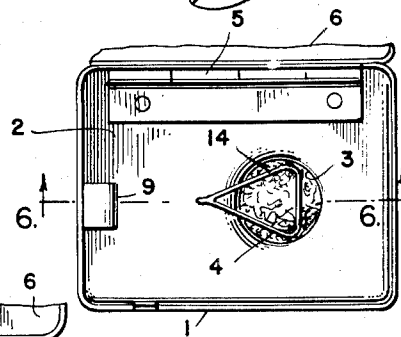
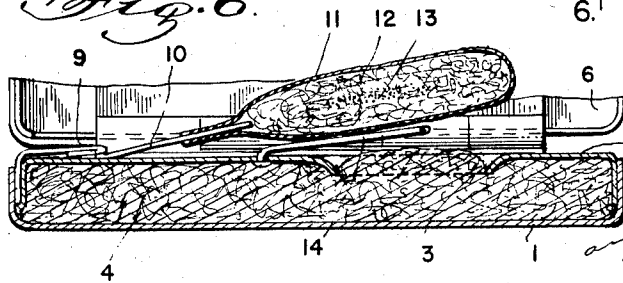


Fig. 6



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CATALYTIC HEATER

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7 Claims. (Cl. 158-96)

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This invention relates to catalytic heaters generally, but is especially adapted for use as a hand warmer, as will appear from the present illustrations and the following description.

An object of the invention is to mount the catalytic agent at the approximate center of a fibrous mass to provide a catalyst bed such that the fibrous mass serves as a heat insulating medium.

Another object of the invention is to so mount the catalyst bed with respect to the fuel supply that an intervening vapor space is provided, and yet the bed may be readily brought into contact with the fuel supply when initiating the heating operation.

A further object of the invention is to provide a pyrophoric igniter for the fuel in the catalyst bed.

A still further object of the invention is to provide a novel means associated with the igniter by means of which the rate of catalytic combustion may be varied as desired.

Other objects and advantages of the invention will be apparent from the following description when taken in connection with the accompanying drawings, in which:

Figure 1 is a perspective view of one of the novel heaters disposed in its flexible casing or envelope;

Figure 2 is a perspective view of the heater apart from its envelope;

Figure 3 is a front elevation of the heater with its hinged cover in open position;

Figure 4 is an enlarged transverse sectional view taken on line 4-4 of Figure 2;

Figure 5 is a plan view of the body portion of the heater with the detachable catalyst bed removed; and

Figure 6 is an enlarged longitudinal view of the body portion, taken on line 6-6 of Figure 5, the catalyst bed being in position therein.

The body of the heater consists of a shallow rectangular reservoir 1, provided with a rectangular top 2, having a circular opening 3. This reservoir for the fuel, which may be gasoline or the like, is preferably formed of aluminum or other light-weight metal and is filled with a charge of fiber glass 4. The reservoir may be charged with fuel by pouring the same through the opening 3, where it is absorbed by the mass of fiber glass.

Hinged to one side of the reservoir 1, as indicated by the numeral 5, is a closure 6, provided with a relatively large rectangular opening 7, and a relatively small opening 8, for purposes to be hereinafter described.

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Fixed to the top 2 of the reservoir 1, is a clip 9, adapted to removably hold a spring tongue 10, fixed to a catalyst bed 11. This bed comprises a bag or casing formed of woven fiber glass and in which is mounted a mass of loose fiber glass 12. Disposed at the approximate center of the mass of fiber glass 12 is a charge of catalytic material 13, preferably palladium black. By thus positioning the catalyst at or adjacent the center of the fibrous mass, the latter performs the dual function of supporting the catalyst and at the same time, serves as a heat insulating medium.

Fixed to the top 2 of the reservoir at one side of the opening 3 is a spring 14, preferably formed of spring wire shaped to provide a bearing surface for the catalyst bed 11, and as shown in Figure 5, the free end of the spring is disposed in line with the opening 3, and spaced slightly above the same, as indicated in Figure 6. It will thus be seen that normally the catalyst bed 11 is held in spaced vertical relation to the charge of fiber glass and fuel in the reservoir 1 by both the spring 10 and the spring 14.

Removably mounted in the opening 3 of the closure 6, is a piece of pyrophoric material, here shown in the form of a disc 15. This disc may be removably held in its operative position exposed to the outer side of the closure 6 by means of a leaf spring 16, which is pivotally mounted on the inner surface of the closure 6, as indicated by the numeral 17. Slidably mounted on the exterior of the closure 6 is a cover 18, provided with longitudinal slots 19 at each side thereof for the reception of pins or rivets 20 which are fixed to the closure 6, and extend upwardly through the slots 19. The cover is formed with downwardly and inwardly turned fingers 18', which aid in slidably mounting the cover on the exterior of the closure 6. This cover or slide 18 is provided with a longitudinally extending slot 21, which is spanned by a file or other sparking device 22, secured to the cover by rivets 23. This sparking element is thus positioned in cooperative relationship with the disc of pyrophoric material which extends through the opening 3 of the closure 6 and is removably held in position against the sparking element by the leaf spring 16.

The heater as structurally described above may be and preferably is placed in a fabric covering 24, provided with conventional snap fasteners 25.

In the operation of the catalytic heater, the reservoir 1 is first charged by gradually pouring the desired amount of gasoline or other pre-

ferred fuel through the opening 3 in the top of the reservoir, so that it may be absorbed by the layer of fiber glass therein. A finger of the operator is then pressed on the catalyst bed or heating element 11, against the pressure of springs 10 and 14, so as to bring it into contact with the gasoline-carrying fiber glass in the opening 3. By holding the catalyst bed in that position momentarily, the gasoline will travel by capillary attraction into the body of the catalytic bed. Thereafter, by operating the sparking device 22, carried by the slidably mounted cover 13, the vapors or fumes from the catalyst bed will be ignited and a flame will be propagated for a few seconds or so, so as to heat the catalytic material 13 on the interior of the bed 11. The closure 6 is now moved about its hinge 5 into closed position, thereby depressing the catalyst bed 11 toward the exposed gasoline charged fiber glass in the opening 3. The spring 14, however, will maintain the bed out of direct contact with the charged fiber glass in the reservoir 1, thereby providing a vapor space between the fuel and the catalyst bed, so as to prevent transfer of the fuel by capillary action and excessive consumption of fuel. As the fuel vapors travel from the reservoir into the catalyst bed, the vapors passing over the catalyst 13 will maintain it in an incandescent state, thereby providing the desired heat for warming the hands or for other purposes. The amount of heat, which of course, is dependent upon the rapidity of combustion, may be varied by adjusting the position of cover 23 across the opening 7 in the closure 6. For this purpose, indicia "A" is provided on the slide for cooperation with one of the rivets 20 on the closure so as to visually indicate three different adjustments. By this means, the amount of atmospheric air entering the interior of the heater is varied, and it will be obvious that in fairly moderate temperatures, the cover would be adjusted to the point "1," while in extremely cold weather, the cover would be adjusted to the point indicated by the number "2" or the numeral "3," so as to admit a greater amount of atmospheric air into the interior of the heater and thereby increase the rapidity of combustion. It will be understood, of course, that after the heater is set in operation, it may be enveloped in its casing 24, and placed in the wearer's pocket, in the back of a glove or in any other preferred position for accomplishing the desired purpose of heating the wearer's hands or other parts of his anatomy.

When the use of the heater is discontinued, the same is removed from the envelope 24, and the closure 6 is opened. As soon as this operation is performed, the springs 10 and 14 will elevate the catalyst bed or heating element 11, thereby preventing further transfer of fuel to the catalyst and further combustion is automatically discontinued.

From the foregoing description and the attached drawings, it will be apparent to those skilled in the art that we have devised a relatively simple construction of a catalytic type of heater in which the catalyst is disposed in the approximate center of a bed of fibrous material so that the material serves not only as a support for the catalyst but also as a heat insulating medium; that a pyrophoric igniter is provided for initiating the operation of the heater; that the catalyst bed is resiliently mounted so that it is automatically moved to inoperative position

by a mere opening of the closure of the heater; that spring means are provided for maintaining the catalyst bed in spaced relation to the fuel reservoir when the closure is brought to its operative position; and that a slidable cover or valve is provided for regulating the amount of heat generated within the heater.

While various structural details have been shown and described herein, it is to be understood that such details are merely for the purpose of illustrating one form of the invention, and are not intended to be used in a limiting sense; the scope of the invention being defined by the appended claims.

We claim:

1. A catalytic heater including a reservoir adapted to receive liquid fuel and provided with an opening in its top, an upwardly inclined spring mounted adjacent said opening and extending over the same, and a movably mounted catalyst bed disposed above said spring and normally held thereby in spaced relation to said reservoir.

2. A catalytic heater including a reservoir adapted to receive liquid fuel and provided with an opening in its top, an upwardly inclined spring wire mounted adjacent said opening and extending over the same, and a movably mounted catalyst bed disposed above said opening in cooperative relation to said spring and normally spaced from said reservoir.

3. A catalytic heater including a reservoir adapted to receive liquid fuel and provided with an opening in its top, a clip secured to the top of the reservoir adjacent said opening, a catalyst bed, and a spring tongue secured to one end of the catalyst bed and adapted to be received by said clip, whereby the catalyst bed is normally held in spaced relation to said reservoir.

4. A catalytic heater including a reservoir adapted to receive liquid fuel and provided with an opening in its top, a clip secured to the top of the reservoir adjacent an edge thereof, a spring wire secured to said top adjacent the opening and extending over the same, and a catalyst bed detachably connected to said clip and extending over said opening and spring wire and in cooperative relation to the latter and normally spaced from said reservoir.

5. A catalytic heater including a fuel-holding reservoir provided with an opening in its top, a closure hinged to one side of the reservoir and provided with an opening, a catalyst bed extending over the opening in the reservoir, and a slidably-mounted cover for varying the effective size of the opening in the closure.

6. A catalytic heater including a fuel-holding reservoir provided with an opening in its top, a closure hinged to one side of the reservoir and provided with an opening, pyrophoric material mounted in the opening of said closure, a sparking device movably mounted on said closure for cooperation with said pyrophoric material, and a catalyst bed disposed between said closure and the top of the reservoir.

7. A catalytic heater including a fuel-holding reservoir provided with an opening in its top, a closure hinged to one side of the reservoir and provided with a relatively large rectangular opening and a relatively small opening, pyrophoric material mounted in the smaller opening, a catalyst bed extending over the opening in the reservoir, a slidably-mounted cover on the closure for varying the effective size of the rectangular opening, and a sparking device on the under side of

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the cover for cooperation with said pyrophoric material.

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