

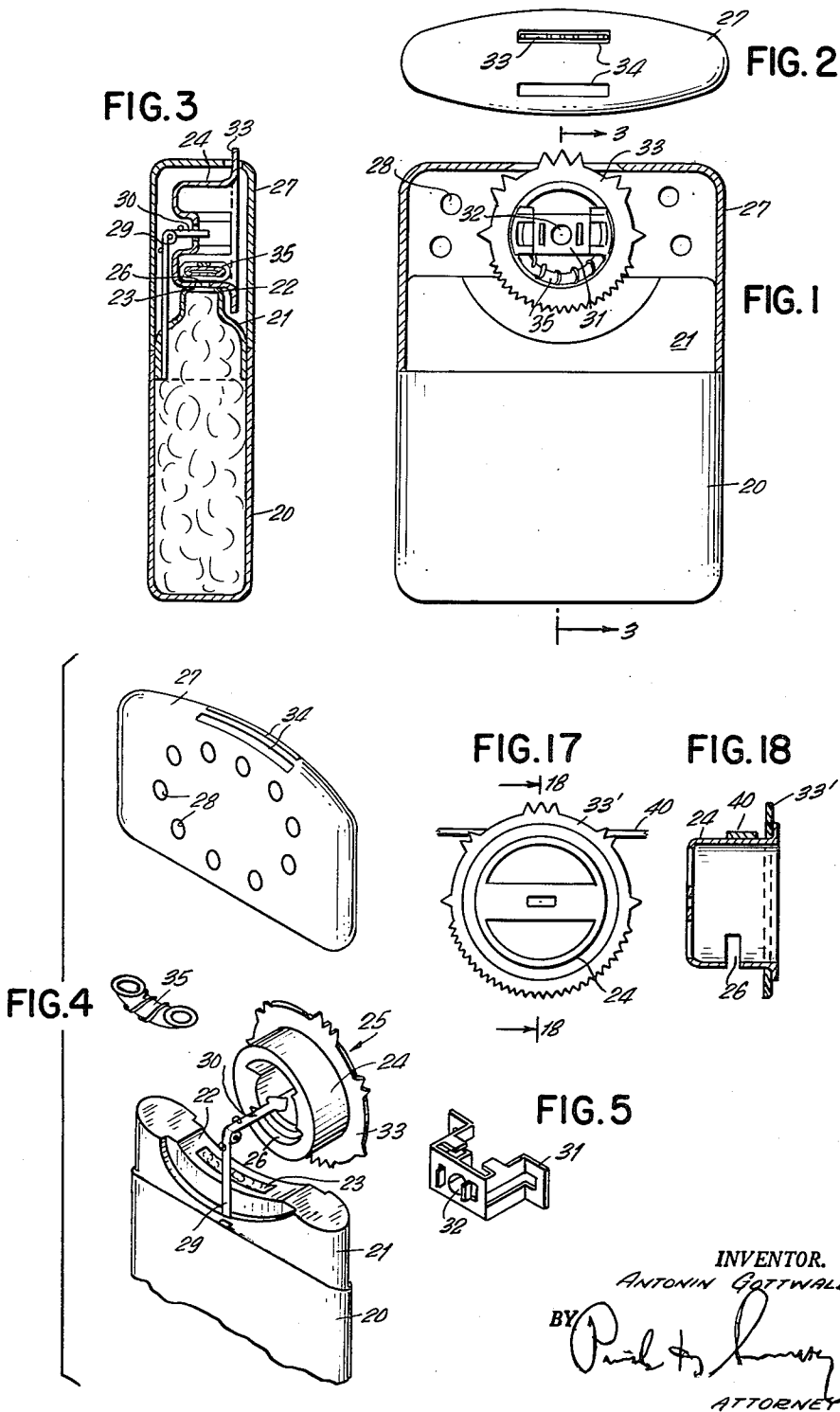
July 31, 1962

A. GOTTWALD
CATALYTIC HAND WARMER

3,046,975

Filed Feb. 20, 1961

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

FIG. 7

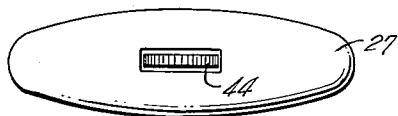


FIG. 6

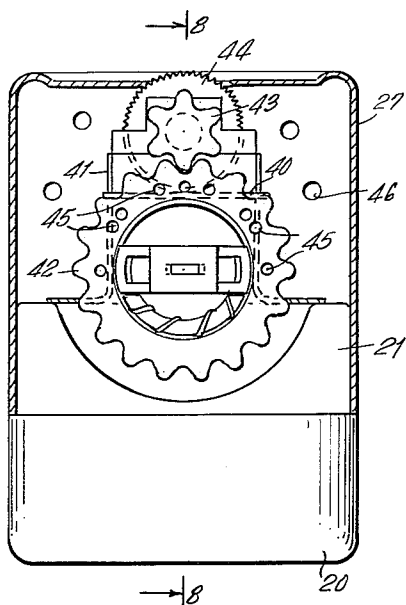


FIG. 8

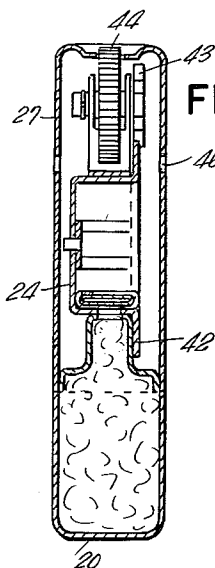


FIG. 9

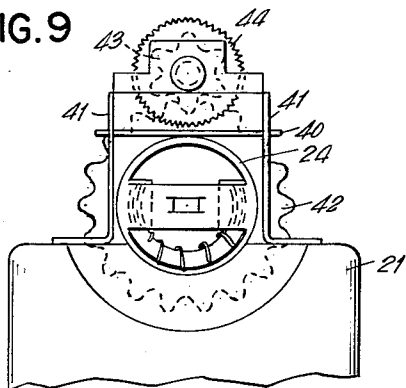
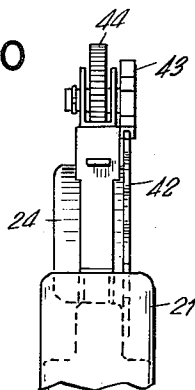


FIG. 10



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4 Sheets-Sheet 3

FIG. 12

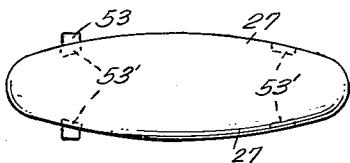


FIG. 11

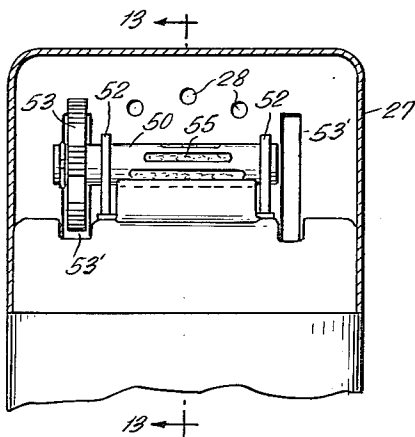


FIG. 13

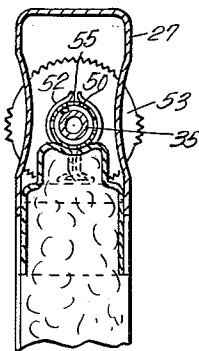


FIG. 15

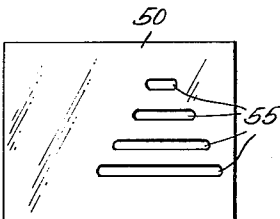


FIG. 16

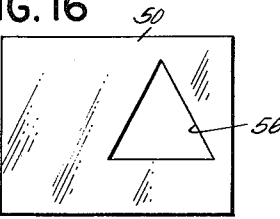
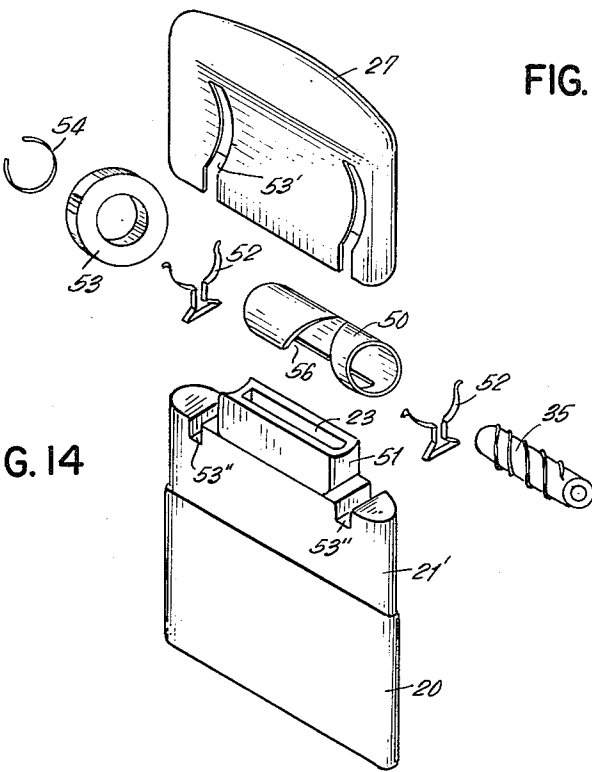


FIG. 14



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CATALYTIC HAND WARMER

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Filed Feb. 20, 1961

4 Sheets-Sheet 4

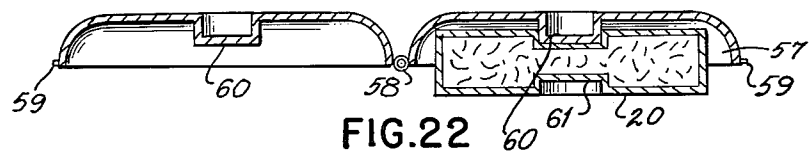


FIG. 22

FIG. 19

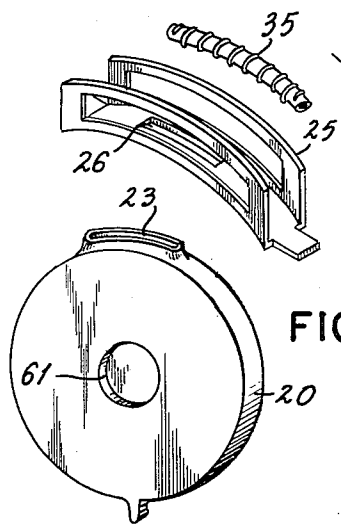
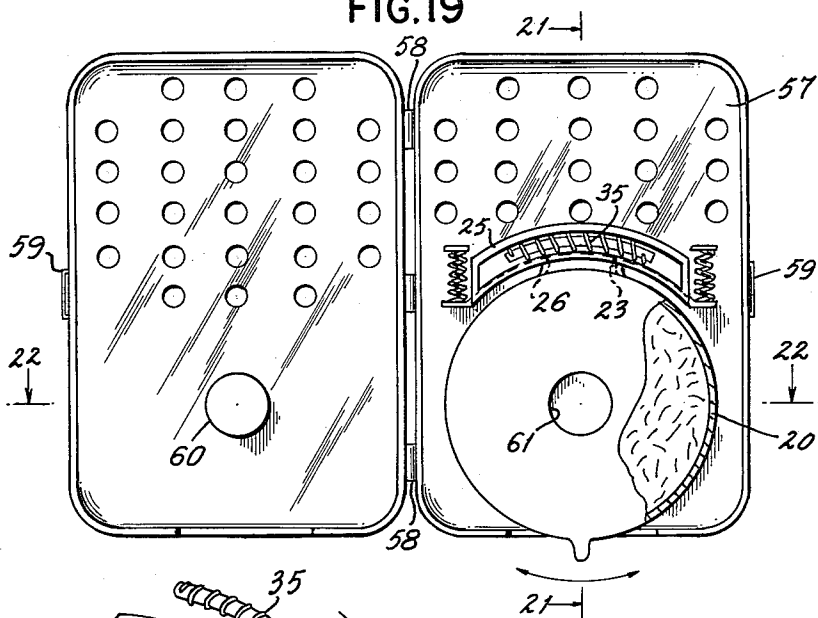


FIG. 20

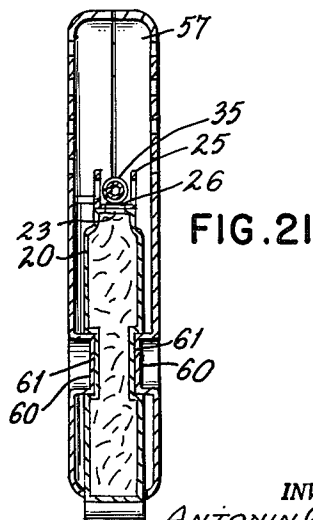


FIG. 21

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1

3,046,975

CATALYTIC HAND WARMER

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Filed Feb. 20, 1961, Ser. No. 90,371

7 Claims. (Cl. 126-208)

My invention relates to catalytic heaters particularly of the type suitable for use as pocket heaters, hand warmers or the like.

The known heaters of that type are substantially composed of a receptacle for a volatile liquid fuel and a burner housing a catalytic combustion element, said burner being mounted above a discharge outlet in said receptacle permitting fumes of the volatile liquid to emanate from the receptacle and to enter the burner.

The heat development in the known heaters could not be efficiently controlled and particularly not while the heater was in operation.

It is an object of my invention to overcome the said and other disadvantages of the known catalytic heaters. According to my invention the burner and the said receptacle are adjustable relative to each other, one of them preferably being in fixed position, and the burner is provided with at least one inlet opening for the fumes emanating from the receptacle to reach said catalytic heating element, said inlet opening being adapted to be brought by said relative adjustment of the burner and/or receptacle into varying degrees of registration with the discharge outlet thus regulating i.e. interrupting or increasing or decreasing the flow of fuel fumes from the receptacle into the burner and to the catalytic combustion element mounted therein. Actuating means to move, for example rotate, the burner and/or the receptacle relative to each other to effect the said varying degrees of registrations of the outlet and inlet openings are so provided that they may be operated when the burner and its associated elements are enclosed within a casing cover cap or the like.

The objects and principles of my invention will be more fully understood from the following specification when read with the accompanying drawing in which four embodiments are illustrated.

In the drawing

FIG. 1 is a front view, partially in section, of a first embodiment of my new heater;

FIG. 2 is a top view thereof;

FIG. 3 is a cross sectional view taken on line 3-3 of FIG. 2;

FIG. 4 is a perspective view of parts of the heater detached from each other;

FIG. 5 is a perspective view of another part of the heater;

FIG. 6 is a front view, partially in section, of a second embodiment of my new heater;

FIG. 7 is a top view thereof;

FIG. 8 is a cross sectional view taken on line 8-8 of FIG. 6;

FIG. 9 is a front view of the burner of the heater and of parts associated therewith;

FIG. 10 is a side view thereof;

FIG. 11 is a longitudinal sectional view of the upper portion of a third embodiment of my new heater;

FIG. 12 is a top view thereof;

FIG. 13 is a cross sectional view thereof taken along line 13-13 in FIG. 11;

FIG. 14 is a perspective view of parts thereof detached from each other;

FIGS. 15 and 16 show, respectively, an expanded view of the surface of the burner body of said third embodiment in two different constructions,

FIGS. 17 and 18, show respectively, a front view and

2

a cross sectional view taken along line 18-18 of FIG. 17 of an amended construction of the burner body;

FIG. 19 shows a front view of still another embodiment of my new heater with its casing in open position;

FIG. 20 is a perspective view of two superimposed elements thereof;

FIG. 21 shows a longitudinal cross sectional view taken along line 21-21 in FIG. 19; and

FIG. 22 is a top plan view corresponding to FIG. 19.

The same reference numerals indicate the same or equivalent elements in all figures of the drawing.

The embodiment illustrated in FIGS. 1 to 5 comprises a flat cupshaped metallic receptacle 20 for evaporable liquid fuel such as gasoline. This receptacle is closed by a tightly fitting top 21 which is provided on its upper face with a cylindrical depression 22 which contains an elongated discharge outlet 23 and in which rotatably rests the cylindrical hollow body 24 of a burner 25. The body 24 contains an elongated inlet opening 26 which may be brought out of and in varying degrees into registration with the discharge outlet 23 to cooperate therewith in a manner and for the purpose described hereinafter.

The space enclosed by the receptacle 20 and its top 21 is filled with an absorbent material such as cotton to hold liquid fuel introduced into said space through the opening 23. It will be well understood that the liquid fuel in the container 21 will rise by capillary action up to said opening 23 and that fumes of said fuel will enter through the opening 26, when these two openings are in full or partial registering position, into the hollow burner body 24.

A cap 27 which tightly fits upon the upper portion of the top 21 encloses the burner 25 and the parts associated therewith. Air inlets 28 permit air required for the combustion of the fuel fumes to reach the burner 25.

The burner body 24 which, as stated above, rests rotatably in the depression 22, is as tightly as possible pressed into said depression to permit the discharge opening 23 and the inlet opening 26 to operate in the manner of a slide valve. This may be achieved by a great variety of means. In the embodiment illustrated in FIGS. 1 to 5 an angle piece is used which comprises an upstanding arm 29 firmly attached to the top 21 and a horizontal arm 30 elastically connected thereto to exert a downwardly directed pressure. The free end portion of said horizontal arm 30 is inserted through an opening 32 into a holding member 31 which is secured in the hollow burner body 24. The rotation of the burner body 24 is effected by a toothed rim 33 which partly extends outwardly through one or the other slit 34 of the cap 27. Two slits 34 are provided so that the cap 27 may be placed upon the receptacle 20 in one or the other reversed position, one of the two slits 34 remaining free and serving as an additional air inlet. The teeth on rim 33 are so arranged in different groupings that each grouping corresponds to and indicates to the operator of the heater whether and if so to what extent the openings 23 and 26 register. Of course other conventional indicating means may be used as well.

Within the burner body 24 is mounted an elongated catalytic combustion element 35 which is substantially coextending with and covers the inlet opening 26 and which may be of any known construction for example as described in my Patent No. 2,821,510 or in Patent No. 2,579,620 and in others.

FIGS. 6 to 10 illustrate another embodiment of my invention which includes substantially the same parts as the first embodiment. Therefore the foregoing description of the first embodiment may be referred to, particularly as the same reference numerals are used for the same or equivalent parts.

In this second embodiment the hollow cylindrical burner body 24 is rotatably held in and pressed into the

cylindrical depression 22 by a horizontal spring 40 which rests with its ends in upstanding brackets 41 attached to the top 21. The burner body 24 is provided with a toothed rim 42 which is engaged by a pinion 43 mounted on the same axle as the rifled operating disc or knob 44. This disc 44 partially extends outwardly from the space enclosed by the cap 27 and may thus be actuated when the heater is in use to turn the burner body 24 and to bring the openings 23 and 26 out of and in varying degrees into registration thus either preventing fumes of the fuel to reach the catalytic combustion element 35 or to make such access possible in varying degrees by bringing the said openings 23, 26 into full or partial registration. The rim 42 is provided with markings 45 which indicate the position of the openings 23, 26 relative to each other and which may be observed through an inspection opening 46 in one of the side walls of the cap 27. However, advantageously such inspection opening 46 is provided in each side wall of the cap 27 so that the same may be placed upon the receptacle 20 in one or the other reverse position.

FIGS. 11 to 16 illustrate a third embodiment of my invention and again the same reference numerals as in FIGS. 1-5 are used to indicate the same or equivalent parts. Thus the above description of the first embodiment may be referred to.

In this third embodiment the rotatable burner comprises a body 50 having the shape of a longitudinally extending roller. This burner body 50 rests in a neck 51 formed on the top 21. The upper concave end of this neck 51 snugly receives and rotatably supports said burner body 50. The elongated discharge opening 23 in the neck 51 permits fuel fumes to emanate from the receptacle 20. The burner body 50 is rotatably held by a pair of elastic clamping members 52 which are firmly seated on the top 21. An outwardly rifled actuating disc 53 is attached to the burner body 50 and held in position thereupon by a retaining member 54. Said disc 53 is freely rotatable within the notches 53' in the top 21 and extends outwardly from the cover 27 through the opening 53' therein. Within the burner body 50 is again mounted the catalytic combustion element 35.

In this third embodiment the discharge outlet 23 cooperates either with a plurality of elongated parallel inlet openings 55 of different length arranged in the burner body 50 as shown in FIGS. 11 and 15, or with a triangular inlet opening 56 as shown in FIGS. 14 and 16. In the first case (FIGS. 11 and 15) one or the other inlet opening 55, or none at all, will register with the discharge opening 23 when the burner body 50 is turned by means of the disc 53; in the other case (FIGS. 14 and 16) either the wall of the burner body 50 will close the discharge opening 23 or different width of the triangular inlet opening 56 will register therewith when the burner body is turned. Thus again the combustion in the burner may be fully stopped by closing the flow of fuel fumes into the burner or the said flow and thereby the amount of heat development may be regulated by bringing the discharge opening 23 into registration with one or the other of the inlet openings 55, or with differently wide portions of the triangular inlet opening 56.

As shown in FIGS. 11 to 13 the operating disc 53 extends partially through a pair of openings 53' in the sidewalls of the cap 27 so that the heater may be operated when the burner is enclosed by the cap 27. The said disc 53 is provided with indication marks, for example with a changing rifling as illustrated, to show the position of the burner body 50 relative to the discharge opening 23. Advantageously, two pairs of openings 53' are provided symmetrically on each side of the cap 27 so that the same may be reversibly positioned.

FIGS. 17 and 18 show a slightly amended construction of the burner body 24. The same is held in position by a flat spring 40 as used in the embodiment shown in FIGS. 6 to 10 and is rotatably actuated by a toothed

disc 33' mounted upon the burner body 24 and made of insulating material; said disc 33' is equivalent to the rim 33 used in the embodiment shown in FIGS. 1 to 5.

The embodiment illustrated in FIGS. 19 to 22 comprises a casing 57 composed of two halves connected by hinges 58 on one side thereof and provided with locking or closure means 59 to hold said casing in closed position. A cylindrical receptacle 20 for the liquid fuel is rotatably and removably mounted in the casing 57. For example the receptacle 20 is provided with circular depression 61 which fits upon cylindrical pins or journals 60 which are formed in or attached to the inner surfaces of the halves of the casing 57. The receptacle 20 extends partially through the bottom wall of the casing 57 and is there provided with a knob or the like to be rotated. The receptacle 20 is further provided on its cylindrical surface with an elongated discharge outlet 23, or the same may be arranged as shown upon a neck 51. A burner 25 mounted above the receptacle 20 is provided with an elongated inlet opening 26 adapted to register in varying degrees with said discharge outlet 23. The burner 25 houses above said inlet opening 26 a catalytic combustion element 35. The burner 25 is resiliently mounted in one half of the casing 57 and is pressed by springs 62 against the receptacle 20 to bring said openings 23 and 26 in as tight sliding contact as possible. Air required for the burning of the fumes of the fuel is supplied through the openings 28. The operation of this embodiment is certainly fully apparent from the foregoing description of the operation of the other embodiments.

Having shown and described several embodiments of my invention to illustrate the principles of its construction and operation, it will be well understood that my invention may be embodied in many different ways without departing from said principles and without avoiding the scope of the appended claims.

What I claim as my invention is:

1. In a catalytic heater suitable for use as a pocket heater, hand warmer or the like the improvement comprising in combination
 - (a) a receptacle for a volatile fuel having a wall formed with an arcuate surface and a discharge outlet opening therein for the fumes emanating from the fuel;
 - (b) a burner having a wall formed with an arcuate surface concentric with the arcuate surface of said receptacle and provided with at least one inlet opening selectively registrable with said discharge outlet opening;
 - (c) a catalytic heating element mounted within said burner and covering said inlet opening;
 - (d) means supporting said receptacle and said burner for relative rotation about the common axis of said arcuate surfaces and with said arcuate surfaces in engagement;
 - (e) at least one of said outlet and inlet openings being elongated in the direction of such relative rotation so that the degree of registry of said outlet and inlet openings is variable by relative rotation of said burner and said receptacle to vary the effective area of the flow path between said receptacle and said burner.
2. In a catalytic heater, as claimed in claim 1, actuating means for said burner to effect such relative rotation to vary the degree of registration between the discharge outlet opening and the inlet opening.
3. A catalytic heater according to claim 1 wherein the inlet opening in the burner has the shape of a triangle having its base line parallel to the common axis of said arcuate surfaces and altitudinally extending in the direction of its rotation so that different lengths of strip portions of said triangle may be successively brought into registration with the discharge outlet of the receptacle extending parallel to said rotational axis.
4. A catalytic heater according to claim 3 comprising

5

parallel strips within said triangular opening defining and separating said different lengths of strip portions of the opening.

5. In a catalytic heater suitable for use as a pocket heater, hand warmer or the like the improvement comprising in combination

- (a) a rotatably mounted receptacle for a volatile fuel having a wall formed with an arcuate surface and a discharge outlet opening therein for the fumes emanating from the fuel;
- (b) a burner having a wall formed with an arcuate surface concentric with the arcuate surface of said receptacle and provided with at least one inlet opening selectively registrable with said discharge outlet opening;
- (c) a catalytic heating element mounted within said burner and covering said inlet opening;
- (d) means supporting said receptacle for rotation relative to said burner about the common axis of said arcuate surfaces and with said arcuate surfaces in engagement;
- (e) at least one of said outlet and inlet openings being elongated in the direction of such relative rotation so that the degree of registry of said outlet and inlet openings is variable by relative rotation of said burner and said receptacle to control the effective area of the flow path between said receptacle and said burner.

6. A catalytic heater according to claim 5 comprising means supporting the burner displaceably relative to the receptacle and elastic means holding their arcuate sur-

6

faces and thus their cylindrical contact surfaces and thus the cooperating discharge and inlet openings in tight contact.

7. In a catalytic heater suitable for use as a pocket heater, hand warmer or the like the improvement comprising in combination a receptacle for a volatile liquid fuel; a bearing face upon said receptacle having a substantially part cylindrical surface; an elongated discharge outlet in said bearing face for fumes emanating from the receptacle; said elongated discharge outlet extending in its longitudinal direction circumferentially in said bearing face; a burner having a substantially cylindrical wall rotatably and with sliding contact resting on said bearing face; at least one inlet opening in the cylindrical wall of the burner adapted to be brought out of and into varying degrees of registration with said discharge outlet to regulate the flow of said fumes from the receptacle into the burner; and actuating means for said rotatable burner to effect said varying degrees of registration between the discharge outlet and the inlet opening.

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