

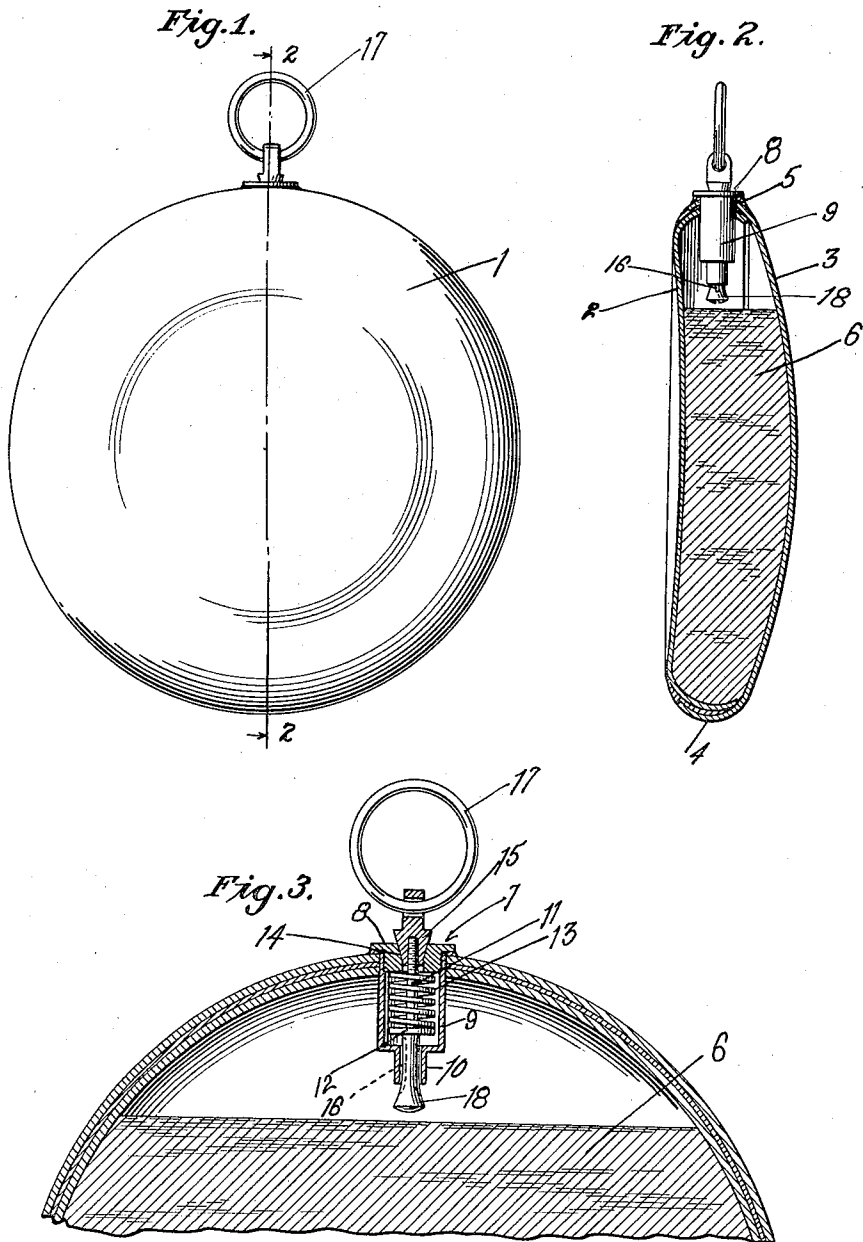
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HEAT FLASK

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HEAT FLASK

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2 Claims. (Cl. 126—263)

This invention relates to heat flasks for therapeutic and other uses, and it has for its general object the provision of a normally hermetic casing containing a chemical normally in liquid state, having the property of changing its state with evolution of comparatively great heat when brought into contact with air, in conjunction with means controlling the access of air to the chemical at the will of the user, and automatically performing the necessary functions incident to the restoral of the flask to its potential condition.

Other objects of the invention will appear as the following description of a preferred and practical embodiment thereof proceeds.

The exemplary form of the invention is shown in the accompanying drawing in which

Figure 1 is a front elevation;

Figure 2 is a vertical section taken along the line 2—2 of Figure 1; and

Figure 3 is an enlarged vertical sectional view through the upper part of the flask including the valve means.

Referring now in detail to the several figures in which the same characters of reference have been employed throughout to designate identical parts, the numeral 1 represents a casing preferably formed of a conductive material such as metal and being preferably constructed in two concave or dished halves, 2 and 3, with their open faces confronting and with a marginal portion, 4, of one half, peened or turned over the marginal portion of the other half. The angular joint between the two halves is brazed or otherwise hermetically sealed. Its construction is such that if pressure is at any time generated within the casing the expansive stress is borne not by the solder or brazing compound but by the over-turned marginal edge 4, so that bursting of the casing is impossible with any pressure such as it is possible to generate, as will presently be more fully explained.

At one point, preferably in its peripheral edge the casing is provided with an opening 5, into which the active chemical, represented by the mass 6, was initially introduced. This chemical is of such a nature that when reduced to liquid state and kept excluded from air it will remain in liquid state and inert in so far as the evolution of latent heat is concerned. When air is brought into contact with said chemical it crystallizes with a marked evolution of heat and when the mass of the chemical immediately contacted by the air is minimized, crystallization takes place instantaneously beginning at the point of initial air contact and being immediately transmitted through

the entire liquid mass, evolving a heat which can hardly be borne by the hand and which persists in proportion to the mass of chemical employed, lasting a great deal longer than would the same degree of heat in an equal amount of water. One of the preferred uses of the invention therefore, is as a substitute for a hot water bottle in therapeutic practise.

While there are a number of known chemicals and compounds capable of giving up heat under the conditions specified in connection with the present invention, I have found that a mixture of sodium acetate with a small proportion of water is best suited to produce the desired result. In practice fourteen ounces of sodium acetate are liquefied by heat and mixed with from two thirds of an ounce to one ounce of water. It is to be understood that these proportions are empirical and that other proportions of water and sodium acetate may be used with satisfactory results.

Valve mechanism, which is generally designated by the reference character 7, is disposed in the opening 5, said mechanism comprising a shell including a bushing 8, brazed or otherwise hermetically secured to the casing. A cylindrical cup 9, is soldered or otherwise secured to the bushing 8, the lower end of the cup having a cylindrical extension 10, of reduced diameter. A stem 11, passes through the bushing, cup, and cylindrical extension, having a collar 12, fixed thereto and a spring 13, housed within the cup 9 and held in compression between the lower end of the bushing 8 and said collar. The bushing 8 is provided with an internal valve seat 14 and the stem is provided with a tapered valve 15 cooperating with said seat. The stem 11 is provided with at least one, and preferably a plurality of shallow longitudinal grooves 16 forming air passages through the shell 7.

The spring 13 normally holds valve 15 against this seat 14 excluding air from the interior of the casing. When the stem is pulled outwardly by any convenient means, such for instance as the ring 17, the valve 15 opens against the tension of the spring and permits a small quantity of air to flow through the grooves 16 into the chamber of the casing 1. The lower end of the stem 11 is provided with a flared head 18 of such diameter and external proportion as to engage the annular edge of the extension 10, closing the air passage and at the same time providing a stop to limit the outward pull of the stem 11. It will thus be understood that the period during which the small quantity of air is admitted to the casing 1 is extremely short, for if the valve stem 11 is

pulled out to its limit, the passage of air to the chemical is cut off by the head 18, while if the valve stem is released the spring 13 immediately pulls the valve 15 back to its closed position.

5 The valve structure projects a sufficient distance into the casing to be immersed in the mass of liquid chemical 6 so that when the valve stem 11 is drawn out to the limit of its outward movement until the flared head 18 engages the end
10 of the edge of the extension 10, a slight rubbing between said head and extension will occur, wiping off the surplus liquid, inducing the immediate formation of a crystal at the point of rubbing, through the liquid chemical which has just been
15 contacted by air admitted through the valve 15. The formation of the initial crystal at once affects the stability of the liquid chemical and it immediately crystallizes throughout, generating the heat in a manner previously referred to. It is not
20 necessary that the flared head 18 be so constructed as to provide for rubbing in the axial direction of movement of the valve stem. It has been found by careful experimentation that it is practically impossible for a person to pull the stem 11
25 out to its limit without at the same time unconsciously and without actual intent to slightly rotate the stem 11 providing the wiping action necessary to minimize the amount of chemical immediately contacted by the air.

30 When once the air has been admitted, the crystallization taken place, and the heat generated, the ring 17 may be let go so as to close the valve 15 and prevent the escape of any volatile product of the reaction. In view of the large
35 mass of chemical used in the flask the heat will persist for several hours. When the flask cools the chemical will still be in a solidified state and once again inert to the evolution of latent heat. The chemical is restored to its original potential
40 condition by placing the flask in boiling water and boiling it for a while. The chemical liquefies again, absorbing heat with great rapidity while liquefying. When the boiling has reached the point at which a slight pressure, generally not exceeding
45 two pounds above atmospheric pressure, has been generated in the casing the valve 15 will open slightly under pressure upon the flared head 18 permitting the outward passage of enough vapor to relieve the excess pressure. As
50 soon as this release has taken place the valve 15 snaps shut under the urge of the spring 13.

Thus a bursting pressure cannot be realized in the flask. When the boiling has been carried on to the point at which the valve 15 is opened by the internal pressure the air admitted from the preceding operation of the device is driven out, its place being taken by vapors from the chemical
80 eventuating from the boiling. After a period of boiling, the length of which is indeterminate and may be ascertained by experiment, the chemical in liquefying has again stored the amount of
85 heat which it had previously evolved in crystallizing, the flask may then be taken from the boiling water and permitted to cool and just so long as air is excluded from the flask the liquid will remain inert, and at atmospheric temperature,
90 ready to be started again into heat evolution whenever the valve is reciprocally operated.

While I have in the above description disclosed what I believe to be a preferred and practical form of the invention, it is to be understood that the details of construction as shown and described are merely by way of example and not to be construed as limitative in their fact upon the scope of the invention as claimed.

What I claim as my invention is

1. Heat flask comprising a casing, means in said casing having the property of changing its state with evolution of heat when contacted by air, said casing being provided with valve structure for controlling the admission of air to said casing, said valve structure comprising a shell having an external valve seat, and an annular edge at its inner end, a stem reciprocally mounted in said shell and extending there-through, having a valve engaging said seat and having a flared inner end extending beyond said shell adapted to engage the inner end of said shell in valve relation when said external valve is opened, said stem and shell providing an air passage communicating between the exterior of the casing and the interior of said casing in intermediate positions of said valve stem, a spring mounted in said shell normally holding said external valve closed, the means for operating said valve.

2. Heat flask as claimed in claim 1, the shell comprising a bushing hermetically secured to said casing and a cup member constituting a spring housing screwed to said bushing.

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