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VALVE MECHANISM FOR HEAT FLASKS

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Fig. 1.

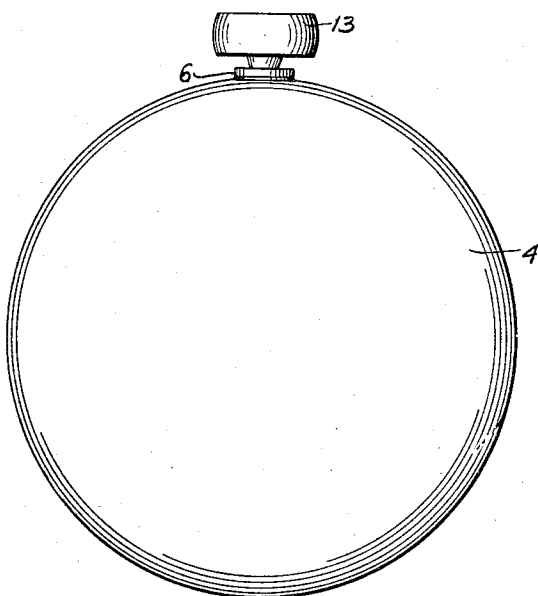


Fig. 2.

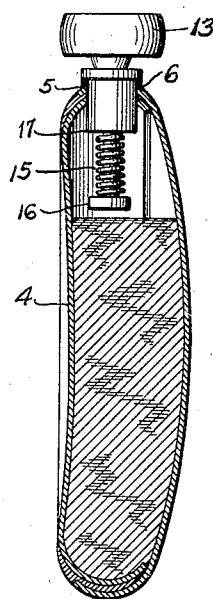
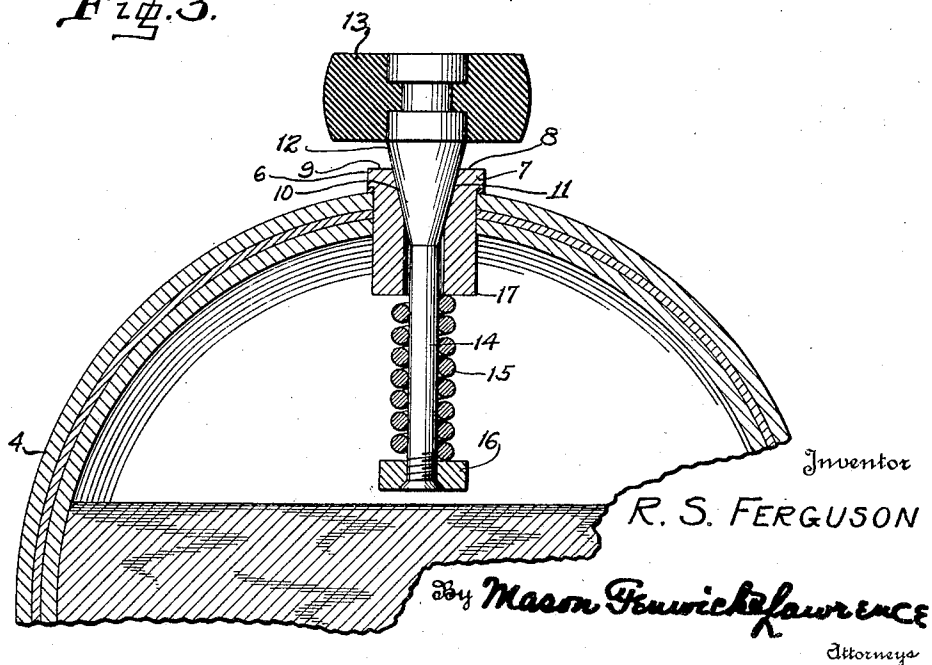


Fig. 3.



UNITED STATES PATENT OFFICE

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VALVE MECHANISM FOR HEAT FLASKS

Application filed October 13, 1931. Serial No. 568,639.

This invention relates to heat flasks for therapeutics and other uses; and more particularly, to a flask containing a chemical normally in liquid state having the property of changing its state with evolution of heat when brought into contact with air. This type of flask is described in my application bearing Serial No. 538,387, the chemical specified being sodium acetate in mixture with a small proportion of water, and which is merely exemplary of other substances which may be used with like effect.

Since the chemical contained in the flask is to be controlled by contact with air, it is essentially important that the control means be positive and efficient under all circumstances. It is further desirable that this control means be of simple construction. Heretofore manually operated pet cocks have been used which are generally objectionable as it is very difficult to control the amount of air entering the flask and also the exit of the air which is necessary during the reactivation.

The prime object of my invention is to provide a valve of simple construction that is semiautomatic in operation during certain phases of the use of such a flask.

Another object of the invention is to provide a wiping action in the initial operation of the valve wherein the liquid will be removed from the valve stem during the admission of air. It seems that the liquid chemical used in flasks of this sort are in a state of stability so that the formation of a crystal due to contact with the air will upset the stability causing a gradual crystallization of the liquid throughout, and resulting in the generation of heat. This process, however, is slow unless some initial impetus is given at the commencement of the operation which is at the time of first admitting air to the flask.

I have discovered, as outlined in my application Serial No. 538,387 that this crystallizing operation is expedited by a wiping action which removes the first formed crystal from the valve stem.

Still another object is to provide means in the valve structure for returning the valve

to its valve seat after having been removed therefrom manually, and the valve adapted to be removed from the valve seat during the reactivating process which is necessary to permit the escape of air which initially caused the crystallization of the liquid chemical.

Other objects of the invention will appear from the specification and claim forming a part of this application.

In the drawing:

Figure 1 is a side elevation of the flask;

Figure 2 is a vertical section taken through the flask; and

Figure 3 is a detailed fragmentary vertical section taken through the valve construction.

Referring to the drawing in which like parts are designated with similar numerals:

Numeral 4 designates a casing preferably formed of a conductive material such as metal, and being constructed in conformity with the disclosure set forth in my application Serial No. 538,387.

Valve mechanism which is generally designated by the reference character 5 is disposed in an opening 6, said mechanism comprising a valve housing 7 brazed or otherwise hermetically secured to the casing 4, and having a passage 8 extending therethrough, the upper inner portion of the passage 8 forming a valve seat 9, the valve seat 9 having inwardly sloping walls 10 and 11. A tapered valve 12 is adapted to seat in the valve seat 9, said valve 12 having at its upper end a knob 13 and at its lower end a valve stem 14. Surrounding the valve stem 14 is a coil spring 15 adapted to bear against a stop member 16 at the lower end of the valve stem and against the underside 17 of the valve housing 7.

As actually used, the flask will be filled with chemical liquid through the opening 6 and the valve construction placed in position.

The normal position of the valve 12 is closed being held firmly seated against the valve seat 9 by the spring 15 excluding air from the interior of the casing. When it is desired to heat the flask, the knob 13 is pulled outwardly, unseating the valve 12, and permitting a small quantity of air to flow through

the passage 8. Since the valve construction, particularly the valve stem 14, extends into the casing 4, some of the liquid will accumulate on the valve stem 14. As the valve 12 is
5 unseated, the valve stem 14 will be drawn outwardly and produce a wiping movement against the coils of the spring 15, which are closely wound against the valve stem 14. This operation is performed at the same
10 time that air is admitted into the casing and results in the immediate formation of a crystal at the point of wiping or rubbing. The formation of the initial crystal at once effects the stability of the liquid chemical
15 and it immediately crystallizes throughout, generating heat in the flask. Upon the air having been once admitted, and the crystallization started, at the point of wiping or rubbing which is instantaneous with the ad-
20 mission of air, the knob 13 will be released so as to seat the valve 12 and prevent the escape of any volatile product of the reaction. In view of the large amount of chemical present, the heat will persist for
25 several hours, and upon the flask cooling, the chemical will be in a solidified state.

The chemical is restored to its original potential condition by placing the flask in boiling water and boiling it for a while,
30 which liquefies the chemical and results in the absorption of heat with great rapidity during this process. When the boiling has reached a point at which a slight pressure, generally not exceeding two pounds, has been
35 generated in the casing, the valve 12 will open slightly under pressure exerted upon it and the stop member 16, sufficiently to relieve this pressure and will return to a closed condition upon the pressure being relieved. Thus
40 there is no danger of the flask bursting during this heating process. As the solidified mass continues to liquefy, the flask will be filled with gaseous vapor which will tend to drive the air which has previously been admitted
45 upwardly, and will finally force the same out through the valve as previously described, after which the valve 12 will again be seated in closed position. Upon the solidified mass being reduced to a liquid, it may
50 then be removed from the boiling water and allowed to cool after which it will be ready for use again. As long as air is excluded, the chemical will remain in a liquid state and in a stable condition.

55 It is obvious from my description that I have disclosed a valve to be used in connection with a heat flask of the type described which is simple and positive in operation and that will automatically close the opening
60 after air has been admitted and automatically relieve the internal pressure during the boiling step and automatically close the opening after the pressure during this operation has been relieved.

65 What I claim is:

Chemical heater comprising a flask partially filled with a chemical, normally liquid, but which crystallizes upon contact with air with evolution of heat, a valve closure comprising seat structure in the wall of said flask,
70 a valve seating externally on said seat structure, a valve stem projecting inwardly from said valve and adapted to be contacted by said liquid, and a spring for closing said
75 valve, surrounding said valve stem and held in compression against an abutment on said stem, the helices of said spring closely embracing said stem in wiping contact therewith, for initiating crystallization of the
80 liquid chemical.

In testimony whereof I affix my signature.
RALPH S. FERGUSON.

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