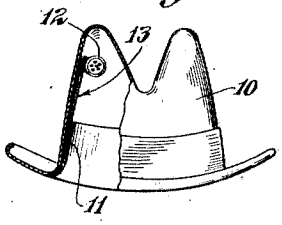
Aug. 6, 1929. J. D. SMALL 1,723,633

METHOD AND DEVICE FOR PROTECTING THE HEAD

Filed Aug. 17, 1927

Fig. 1.



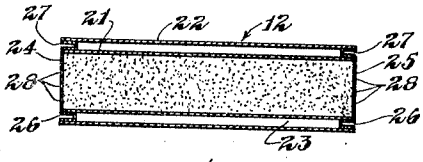


Fig. 2.

Fig. 3.

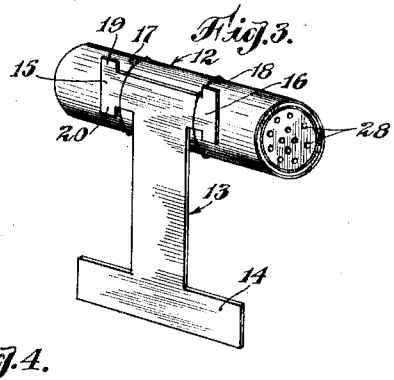


Fig. 4.

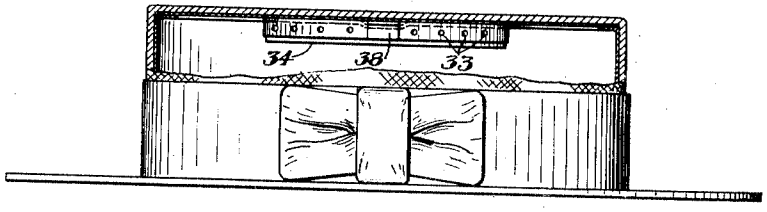


Fig. 5.

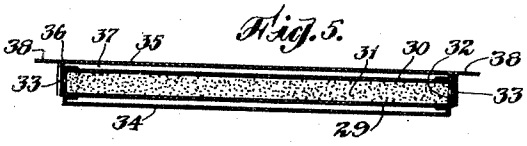
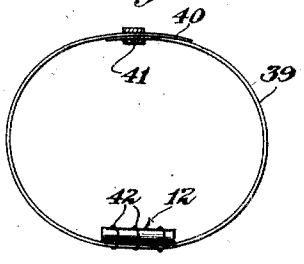


Fig. 7.



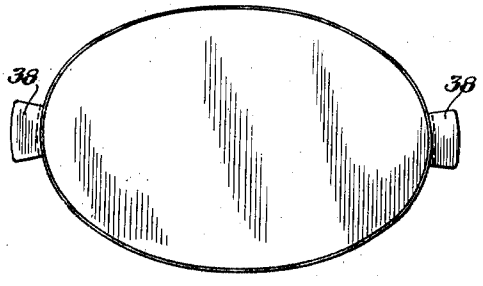


Fig. 6.

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Patented Aug. 6, 1929. 1,723,633

UNITED STATES PATENT OFFICE.

JOHN D. SMALL, OF NEW YORK, N. Y.

METHOD AND DEVICE FOR PROTECTING THE HEAD.

Application filed August 17, 1927. Serial No. 213,460.

This invention relates to methods and devices for protecting the head and scalp against high temperatures and the effects of the sun. Also the use of this invention in certain of its phases is accompanied by other beneficial effects.

The objects of the invention include the provision of efficient, simple and convenient methods and devices for applying a refrigerating or protective medium to the head. Further and more specific objects, features and advantages will more clearly appear from the detailed description given below taken in connection with the accompanying drawings.

The invention consists in the novel features, arrangements and combinations of parts and materials embodied by way of example in the apparatus herein described as illustrating preferred forms of construction, together with such novel processes and steps of processes as are hereinafter described.

In the drawings:—

Fig. 1 illustrates a hat of conventional form shown partly in section, to which is applied a device comprising one embodiment of this invention;

Fig. 2 is a longitudinal sectional view of a refrigerant capsule comprising one embodiment of the invention;

Fig. 3 is a perspective view of a refrigerant capsule as of Fig. 2 and also showing a detachable supporting member for securing the same within a hat according to the arrangement of Fig. 1;

Figs. 4, 5 and 6 respectively are views similar to Figs. 1, 2 and 3, but illustrating another embodiment of the invention; and

Fig. 7 illustrates a further modification of a detachable supporting means for securing a refrigerant capsule.

Referring to the drawings in further detail, a hat of a conventional form is indicated at 10 having the usual form of lining members including the interior hat band 11. A refrigerant capsule or cartridge 12 of a construction hereinafter described in detail is supported within the hat in a position where it will not interfere with the head of the wearer by a supporting member 13. The support 13 may comprise a strip of relatively stiff cardboard or fibrous material having a base portion 14 of considerable area extending along and beneath the hat band 11 and held between the hat band and the side of the hat by the pressure against the wearer's head. At the upper end of the support 13 a pair of arms 15 and 16 may be provided to extend along the capsule. Rubber bands or other retaining means as at 17 and 18 embrace the capsule and the arms 15 and 16 to securely but detachably affix the capsule to the support. Each of the arms 15 and 16 may be formed with vertical extensions as at 19 and 20 if desired, for preventing the bands 17 and 18 from accidentally sliding off the ends of the arms and to add rigidity to the support.

The capsule or cartridge 12 in the particular form shown in Fig. 2 may comprise an inner container member 21 formed of cardboard or other suitable material which preferably is a poor conductor of heat. This container is initially filled or partly filled with a quantity of a refrigerant material. Such refrigerant preferably comprises a material which will vaporize directly from the solidified state, for example, compressed carbon dioxide snow. I have found it to be particularly advantageous to use carbon dioxide for this purpose, not only for the reason that it is an effective dry refrigerant, but the resulting carbon dioxide gas substantially fills the hat to the exclusion of air and provides a highly efficient heat insulating barrier substantially more effective than air.

Furthermore, the body of carbon dioxide gas as thus provided being heavier than air, has no substantial tendency to escape through the interstices of the material at the top of the hat and its moisture absorbing, insulating and cooling effect is thereby maintained within the hat for a considerable time. That is, as the solid carbon dioxide sublimes, the hat becomes substantially filled with the cold heavy gas. This gas in addition to being a highly efficient heat insulator, provides a "reservoir" of "cold." Any heat passing through the walls of the hat either by conduction or slow convection, must of course traverse this body of gas before reaching the head. However, it is possible for only a very small quantity of such heat to traverse this body of gas by reason of its heat insulating value and by reason of its gradual replacement or replenishment

by additional cold gas evolved from the refrigerant. Thus, by retaining this body of gas within the hat, the various properties of the solidified carbon dioxide may be utilized economically. On the other hand, if this body of gas were dissipated rapidly or as soon as formed, the refrigerant would of course sublime very rapidly and disappear too quickly, and would also give excessive cooling action. According to my invention, these undesirable results are avoided and the refrigerant is permitted to sublime slowly, giving a moderate cooling action which may be maintained for at least several hours. It is further of course evident that the gradual sublimation causes a small but effective gas pressure to exist within the head gear, tending to cause small amounts of the gas to be continually exuded from the pores of the head gear material. Thus, heating of the interior of the hat by convection of gases is substantially minimized, since the exuded gas will of course substantially preclude the entrance of warm air through the interstices of the head gear material. It will be understood, however, that the gas is exuded in this manner only at a very slow rate and that the main body of the moisture absorbing refrigerant gas within the hat is relatively motionless. With the gradual sublimation of the refrigerant, however, the cold carbon dioxide is replenished at a rate sufficient to displace any warmer gases tending to accumulate as at the top of the hat. Also carbon dioxide, when used in this manner, has no detrimental or toxic effect on the wearer of the hat, but on the other hand, the antiseptic or bactericidal properties of the gas in certain instances may be beneficial to the scalp, in the treatment of dandruff, etc. Furthermore, the carbon dioxide gas which has the property of absorbing moisture, will tend to absorb and gradually carry away and eliminate all noticeable perspiration at the hat band and other parts of the headgear, thus greatly adding to the comfort of the wearer.

In order that the rate at which the refrigerant becomes effective may be controlled within desired limits, the container 21 is preferably surrounded by an outer casing 22, providing an insulating air space as at 23 between the two containers. The ends 24 and 25 of the container 21 may be formed with flanges as at 26 firmly fitting against the exterior wall surfaces of the container 21. If desired, such flanges may be reflexed outwardly to form flanges 27 engaging the interior wall surfaces of the outer container 22, thereby forming means for retaining the two containers in proper relative positions and at the same time closing off the air space 23. The ends 24 and 25 may be suitably perforated as at 28 to permit the escape of carbon dioxide or other cooling gas evolved from the refrigerant. Such perforations may be provided so as to permit the gas to escape at a predetermined rate depending upon the desired rate of refrigeration. That is, if very little cooling effect is desired, a relatively small number of perforations small in area are provided and if more effective cooling is desired, the perforations are either made larger or more numerous. The cooling effect may therefore be largely controlled by the form of construction of the end pieces 24 and 25, since radiation through the side walls is substantially precluded by the double walls with the intervening air space. The sublimation is further controlled by the action of the body of gas within the head gear as above explained, and of course if the hat is momentarily removed, the rate of sublimation will be increased until the temperature of the head gear is restored.

It will be understood that the parts of the capsule and its support may be made in various other forms and shapes and of other materials than above described. For example, paper, wood, metal, cellulosic or condensation products, or other materials may be used depending upon commercial considerations and the degree of permanence desired; also, the method and degree of insulation of the refrigerant are otherwise variable and may be controlled within wide limits so that a given amount of refrigerant may be utilized within a predetermined time.

In Figs. 4, 5 and 6 a further modification of the invention is illustrated. This form, which may take the shape of a relatively flat disc, is particularly adapted for use in hats or other headgear in which very little space is available. As indicated, in Fig. 5, this construction may comprise bottom and top discs 29 and 30 respectively, between which a quantity of the refrigerant material as at 31 is placed. The discs 29 and 30 may be formed with coperating engaging flanges as at 32 forming side walls and suitably perforated as at 33 to permit the escape of refrigerant gas as evolved. Insulating discs 34 and 35 respectively may be placed over the bottom and top surfaces, the outer edges of such discs being turned in as at 36 and affixed to the discs 29 and 30 so as to provide a thin insulating air space as at 37. Such a disc-like container for the refrigerant may be of such area as to require no retaining means within the hat or may be held in place merely by contact with the head when the hat is in place. If desired, a plurality of attaching tabs or strips may be provided as at 38 to engage the pleated joining portions as usually provided in conventional straw hat lining constructions. Or if desired, such attaching tabs may be pinned or otherwise detachably secured.

In Fig. 7 another detachable supporting

and securing device is illustrated in the form of a flexible expansible gromet 39 to which may be attached a capsule 12 similar to the capsule described in connection with Figs. 1, 2 and 3. The gromet member 39 may be formed of metal, rattan or other suitable material, the ends being secured together to provide an expansible joint as at 40. One form of such joint may comprise merely a ring member 41 closely embracing the two ends of the member in slidable relation. The capsule 12 may be secured to the member 39 as by elastic bands 42 or otherwise.

From the above it will be observed that a simple and convenient means is provided for applying a desired amount of refrigerant to a hat or other headgear, the container for the refrigerant or the supporting means therefor being detachable and removable from the hat to facilitate refilling or replacement by the user. Furthermore, the container and the supporting means therefor may, according to this invention, be secured to hats or other headgear of conventional forms without alteration. It has been found that refrigerant as thus applied to the head offers effective insurance against sun stroke or heat prostration, and the physiological effect of cooling one spot on the body to a relatively low temperature is that the whole body of the user feels cooler to an extent greater than is accounted for by the direct refrigerating action.

This invention may also be utilized in hospitals for the relief of patients during hot weather and for special treatments. Also the invention in certain of its embodiments is adapted to be used by industrial workers who are exposed to high temperature processes and by professional men or workers who are required to wear helmets or other head coverings which have heretofore caused excessive and very bothersome perspiration.

It will be understood that various known materials other than carbon dioxide may be solidified according to well known processes and utilized according to certain phases of this invention to provide a dry refrigerating medium.

While I have described my invention in considerable detail with respect to certain preferred embodiments thereof, it will be understood by those skilled in the art after understanding my invention that various changes and modifications may be made without departing from the spirit and scope of the invention and I aim in the appended claims to cover all such modifications and changes as come within the spirit of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In combination, a hat or other headgear of a conventional form, a capsular enclosure mounted therein and containing a quantity of a dry refrigerant material comprising solidified carbon dioxide in sufficient quantities to comprise an effective moisture absorbent for the head and to provide an effective heat insulating body of carbon dioxide gas substantially filling the headgear, said enclosure being formed with restricted gas outlets cooperating with the body of carbon dioxide gas accumulating within the headgear for controlling the rate of sublimation of the carbon dioxide to prolong the cooling effect and limit its intensity.

2. In combination, a hat or other headgear of a conventional form, a capsular enclosure mounted therein and containing a quantity of a dry refrigerant material comprising solidified carbon dioxide in sufficient quantities to comprise an effective moisture absorbent for the head and to provide an effective heat insulating body of carbon dioxide gas substantially filling the headgear, said enclosure being formed with restricted gas outlets cooperating with the body of carbon dioxide gas accumulating within the headgear for controlling the rate of sublimation of the carbon dioxide to prolong the cooling effect and limit its intensity, means being provided for detachably securing said capsular enclosure in respect to the inside hat band.

In testimony whereof I have signed my name to this specification.

JOHN D. SMALL.