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FREDERICK C. WEBER, OF EASTCHESTER, NEW YORK

## DEODORANT POWDER

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The object is to provide a harmless, non-irritating preparation in powder form, which when dusted upon the surface of the skin, will prevent or render inoffensive, the odors arising from the cutaneous secretions, and to a certain extent, depending upon the quantities used, will check excessive secretions, notably the perspiration.

The cutaneous secretions are of two entirely different kinds, produced by two different sets of glands located near the surface of the skin.

The perspiration, or sweat, secreted by the perspiratory or sweat glands, is a water liquid containing a relatively small amount of solids, composed in large part of inorganic salts and some nitrogenous material. The amount of the perspiration varies greatly in different individuals. The individual variation is also quite extensive and is dependent upon exercise, emotions, climatic conditions, clothing and related functions in other parts of the body. A wide variation in the quantity of the perspiration also exists in different parts of the body depending on the number and activity of the sweat glands in a particular locality. The sweat glands are most numerous and active on the soles of the feet and the palms of the hands.

There is always a certain definite amount of perspiration, commonly called insensible perspiration, which is constantly secreted over practically the entire surface of the body, serving to keep the skin moist, and by evaporation to cool and maintain the body at a uniform temperature. It carries with it a small proportion of solid material which gradually accumulates on the surface of the skin. The natural odor of the perspiration is quite characteristic, varies greatly in individuals and also shows considerable variation in different parts of the body from which it arises.

The sebacious secretion, or the sebum, is produced by the sebaceous glands. These glands are generally associated with the hair follicles, though in some parts of the body entirely devoid of hair the sebacious glands are quite numerous.

The sebum differs markedly from the perspiration in amount, character and composition. It is an oily, semi-liquid material which on exposure to the air hardens into a more or less firm pasty mass. It forms a thin protective layer on the surface of the body that assists in preventing unnecessary loss of heat by the evaporation of too large an amount of perspiration, since excessive perspiration readily runs off the oily surface of the skin. Associated with the hair follicles as these glands are, the sebaceous secretion also serves to keep the hair oily. This is an aid in the more rapid elimination of copious perspiration from the body. The perspiration is always mixed with the sebaceous secretion.

The secretion of the sweat glands and the sebaceous glands are also mixed with the epidermal cells which are constantly being eliminated from the surface of the skin. In reality the continual shedding of the epidermal cells can be regarded as a secretion. These cells are chiefly composed of keratin, which is rich in sulphur, thus serving as one of the means through which sulphur is eliminated.

In addition to the normal odor of the perspiration there is the more objectionable odor arising from the decomposition by bacteria of a part or the whole of the accumulated material deposited on the surface of the skin by the secretion of the sweat glands and the sebaceous glands together with the cast off epidermal cells. The organic or nitrogenous constituents of the perspiration which include urea, uric acid, creatinin, oxy-acids, ethereal sulphates of skatol and phenol, serin and albumin, are readily decomposed by bacteria and are known for the objectionable character of their products of decomposition.

Decomposition occurs and the odors therefrom arise more particularly from those portions of the body which are protected by folds of skin or by the clothing, and from where the normal or insensible perspiration is prevented from readily evaporating. As a result sufficient moisture is present in these localities together with the body heat to form ideal conditons for the development of bacteria with the resultant products of decomposition, which are mainly responsible for

the objectionable body odors commonly attributed to the perspiration.

I have found that the odors arising from the secretions, as described, that is, the natural odor of the perspiration and the odors produced by bacterial decomposition as well, and also the body odors from other sources, can be prevented, destroyed, or rendered inoffensive by the use of a powder comprising a mixture of talcum powder and/or oxid of zinc, as an emollient vehicle, and a minor proportion of a solid aldehyde or aldehydic compound or compounds or derivatives which are capable of yielding formaldehyde at body temperature. The aldehydes or aldehydic compounds which may be employed may be in the form of aldehydic condensation products, compounds of aldehydes and ammonia, polymerides of formaldehyde, polymerized derivatives of aldehydes, or other aldehyde compounds or derivatives having the property stated. Paraformaldehyde and/or hexamethylenetetramine are aldehydic compounds which are suitable, though I do not necessarily confine myself to these as other aldehydic compounds or derivatives of formaldehyde giving a like result might be used.

In order to overcome the odor of formaldehyde, and to cause the deodorant to keep well and to work over a long period when used, I include in the powder a stabilizer for the formaldehyde, this stabilizer serving to reduce loss of formaldehyde in storage and to retard or govern the rate at which formaldehyde is liberated when the powder is subjected to the conditions of heat, moisture, etc. of the skin of the human body. The most suitable stabilizer is ammonia in a combined form. The ammonia constituent may be in chemical combination or association with aldehyde, or it may be combined in the form of an ammonium salt, which is mixed with the aldehyde compound and the emollient vehicle. Hexamethylenetetramine is an example of a compound of aldehyde and ammonia which is well adapted for my purpose, the stabilizer in this instance being in chemical combination with the formaldehyde constituent. Formaldehyde is given off more slowly from hexamethylenetetramine than it is from paraformaldehyde, for example.

The ammonium salts which may be employed include, as examples, ammonium chlorid and ammonium carbonate, the chlorid being preferable. In the case of an aldehydic compound which does not have ammonia chemically combined or similarly associated with it,—a compound or polymerid such as paraformaldehyde, for example,—an ammonium salt has the effect of stabilizing the formaldehyde, which, as it is evolved in minute amounts during storage, and in larger amounts when used, is converted, more or less, into hexamethylenetetramine and other compounds some of which, as amines and formic acid, may be considered intermediate products between formaldehyde and more complex compounds, as pentamethylenetetramine and dimethylpentamethylenetetramine, which in turn are capable, like hexamethylenetetramine, of yielding formaldehyde on decomposition, but more slowly than paraformaldehyde. By so combining with liberated formaldehyde, or acting as a control or intermediary affecting the rate of liberation, the ammonia suppresses or eliminates odor of formaldehyde in the powder as sold and kept, and when it is used, prevents loss of formaldehyde in storage, and prevents too rapid or copious liberation of formaldehyde when the powder is applied to the person.

Another function of the ammonia, whether combined with formaldehyde or in the form of a salt mixed with a formaldehyde-yielding compound, polymerid or derivative, is to react with certain substances contained in the perspiration, thereby aiding in destroying body odors and promoting cleanliness. Also, it prevents accumulation of excessive quantities of formaldehyde, which would be irritating to delicate skins.

In either case it stabilizes the formaldehyde, thus preventing deterioration of the powder as a commercial article, which might otherwise occur through loss of the active principle, formaldehyde. In either case, also, it enables the powder to perform its deodorizing function for a very considerable length of time after being applied to the body, by retarding and governing the rate at which formaldehyde is evolved. By preventing too much from being given off at any one time it enables more of the formaldehyde-yielding material to be incorporated in the powder than would otherwise be permissible. Thus, the inclusion of a suitable amount of stabilizer makes it possible to use as much of the formaldehyde active ingredient as is desirable to give sufficient deodorizing effect and to insure the effect being extended. The result is an efficient and long-keeping personal deodorant in powder form.

Whether combined with the formaldehyde or not, ammonia eliminates, or very largely eliminates any formaldehyde odor or acridity, the noticeable presence of which would render the product unsatisfactory as far as acceptability to most users is concerned.

By incorporating in the powder as compounded both hexamethylenetetramine and an aldehydic substance which liberates formaldehyde more rapidly than hexamethylenetramine, as does formaldehyde, for example, certain advantages are to be secured, more especially for average conditions of perspiration and body odor. Thus, the paraformaldehyde ingredient will give off formaldehyde more readily for prompt effect, while the hexamethylenetetramine, from

which formaldehyde is evolved more slowly, will prolong the deodorizing action with sufficient efficacy for a considerable period after odor has been initially suppressed. By suitably adjusting the proportions of hexamethylenetetramine and paraformaldehyde, the greater liberation of formaldehyde in the beginning and for a time thereafter can be regulated.

Finally, when an additional stabilizer such as an ammonium salt is used in conjunction with hexamethylenetetramine and paraformaldehyde, or their equivalents, both originally present in the composition, a further means of control is afforded.

For certain body conditions, the powder may be compounded with hexamethylenetetramine, or its equivalent, and a distinct stabilizing ingredient, such as an ammonium salt or its equivalent, paraformaldehyde or the like being omitted, a milder action and a still more prolonged effect thus being obtainable.

Where paraformaldehyde or the like is present in the powder in conjunction with an ammonium salt, hexamethylenetetramine as a constituent of the powder may be obtained from the reaction between ammonia and/or an ammonium salt and formaldehyde.

The chief active constituent in such a powder for the prevention and destruction of body odors is the aldehyde compounds which may be used. These are compounds of aldehydes which when exposed to a slight temperature, that of the body being sufficient, have the property of slowly giving off a small quantity of formaldehyde, the bactericidal and antiseptic properties of which are well known. As a germicide and a compound capable of entering into chemical combination with other compounds such as would be found in the body secretions, the formaldehyde thus liberated is, under these conditions of use, very active.

A relatively small quantity of the aldehyde is required in the mixture of a powder as described. The mixture may be composed in large part of talcum powder, which serves as the vehicle or carrier for the other ingredients, together with a comparatively small proportion of oxide of zinc, which is employed to give the combined powder better adhering qualities, or talcum powder may be used without oxide of zinc, or oxide of zinc may be used in large proportion as the main emollient vehicle, or may be used without talcum powder; in fact any vehicle in powder form suitable for application to the skin may be employed.

As examples of the ingredients and proportions of the ingredients which may be used in a deodorant powder I submit the following as forms suitable for the purpose as described.

For 100 parts of powder there may be used:

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| Hexamethylenetetramine (hexamethyleneamine) | 2 to 5 parts. |
| Oxide of zinc | 10 parts. |
| Talcum powder | 85 to 88 parts. |

Or for 100 parts of the powder there may be used:

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| Paraformaldehyde, (polyoxymethylene, trioxymethylene) | 1 to 3 parts. |
| Oxide of zinc | 10 parts. |
| Ammonium chloride or carbonate | 1 to 2 parts. |
| Talcum powder | 85 to 88 parts. |

Or for 100 parts of the powder there may be used:

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|---|---|
| Hexamethylenetetramine, (hexamethyleneamine) | 1 to 2 parts. |
| Paraformaldehyde (polyoxymethylene, trioxymethylene) | 1 to 2 parts. |
| Ammonium chloride or carbonate | 1 to 2 parts. |
| Oxide of zinc | 10 parts. |
| Talcum powder | 84 to 87 parts. |

These three mixtures, or similar mixtures, are available for use as needs may require. When there is but slight production of personal perspiration and odor, the first formula, with its slight evolution of formaldehyde, will be suitable; for conditions or persons with relatively larger quantities of perspiration or odor, the second formula, which will produce a more copious evolution of formaldehyde, will be available; whereas the third formula is adapted to conditions intermediate between the two.

Manifestly the powder may be suitably perfumed if desired, but with a suitable ammonium constituent perfume is not necessary as far as overcoming the formaldehyde smell is concerned.

It is evident that various other combinations of the ingredients, in the forms or chemical compounds given, and also in other forms or chemical compounds, may be made without altering the effectiveness of the mixture and be within the scope of the invention. It is evident, also, the invention is not limited to the precise method of manufacture.

I claim:

1. A deodorant powder for application to the skin, comprising dry powdered emollient material, paraformaldehyde, and hexamethylenetetramine.

2. A deodorant powder for application to the skin, comprising dry powdered emollient material, and hexamethylenetetramine.

3. A deodorant powder for application to the skin, comprising dry powdered emollient material, and a solid aldehydic compound capable of giving off small quantities of formaldehyde at body temperature, the deodorant powder also containing solid ammonium compound capable of stabilizing formaldehyde.

4. A deodorant powder for application to the skin, comprising dry powdered emollient material, a solid polymerized aldehyde, capable of giving off small quantities of formaldehyde at body temperature, and a solid in-

organic ammonium salt capable of stabilizing formaldehyde.

5. A deodorant powder for application to the skin, comprising dry powdered emollient material, a solid polymerized aldehyde capable of yielding formaldehyde at body temperature, and ammonium chlorid.

6. A deodorant powder for application to the skin, comprising dry powdered emollient material, paraformaldehyde, hexamethylenetetramine, and a solid inorganic ammonium salt capable of stabilizing formaldehyde.

7. A deodorant powder for application to the skin, comprising dry powdered emollient material, paraformaldehyde, hexamethylenetetramine, and ammonium chlorid.

8. A deodorant powder for application to the skin compounded with dry powdered emollient material, hexamethylenetetramine and a solid inorganic ammonium salt.

9. A deodorant powder for application to the skin, comprising dry powdered emollient material, a solid aldehydic compound capable of giving off small quantities of formaldehyde at body temperature, and a solid ammonium salt capable of stabilizing formaldehyde.

FREDERICK C. WEBER.