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COMPOSITE CREAM WHICH, WHEN APPLIED TO THE SKIN, FORMS A PROTECTIVE COATING AGAINST FLASHBURNS

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This invention relates to a cream or ointment which forms a protective coating on the skin. This coating is effective against burning by sparks, hot objects, or sudden heat waves, as well as against frostbite caused by the handling of cold objects.

Many attempts have heretofore been made to provide an ointment of this character. While many of the materials suggested have offered some protection, all have possessed one or more physical deficiencies which limited their utility. For example, some of the proposed ointments rubbed off too easily, while others were unduly tacky, or formed a stiff film which cracked on movement of the underlying body member. Aside from such deficiencies, none of the materials hitherto proposed has provided adequate protection against flash burning resulting from exposure to the heat wave of an explosion. The temperature of such heat waves is often very high, especially in the immediate vicinity of the blast, and protection can only be afforded by a preparation which provides an extremely tough and heat resistant coating.

It is accordingly an object of this invention to provide a preparation which will protect the exposed skin from sudden change in environmental temperature which might result in burns or wounds. Another object of this invention is to provide a flexible protective film which can be worn on the exposed parts of the body such as the hands to protect them against sparks and hot chips of metal which would ordinarily cause severe burns. Still another object of this invention is to provide a flexible protective coating which will allow individuals to handle for longer periods of time objects which, because of their extreme cold or hotness, would ordinarily frostbite or burn the hands.

A further object of this invention is to provide a cream which will dry to a water insoluble coating, and which will withstand the action of rain and sea water, but which can be removed by vigorous washing with soap and water. A still further object of this invention is to provide a workable cream which will harden into a tough protective coating which will prevent flashburns from explosions aboard ships and in other confined spaces such as the interior of armored tanks and gun turrets.

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The preparation which we have found will attain these and other desired objects comprises an ointment incorporating a number of ingredients. These include a solvent such as an isopropanol, a film forming material such as shellac, a lubricant such as magnesium stearate or other water insoluble metallic soap, a chemical light filter such as menthyl salicylate which is capable of absorbing actinic rays, a plasticizing ingredient such as linseed oil or triethylene glycol di-2-ethylbutyrate, a wetting agent such as diethylene glycol monoethyl ether or long chain alcohol sulfate which is miscible with both water and oil, a neutralizing ingredient, and a relatively large proportion of titanium dioxide or its equivalent. Carbon black or other coloring matter may be added if desired. This ointment will be described in greater detail in succeeding paragraphs, wherein the amount of each ingredient employed is expressed in terms of the per cent by weight of the ointment as a whole.

The solvent preferably employed is an alcohol such as isopropanol or ethanol, the amount used preferably ranging from about 20 to 35 per cent. This material serves as a vehicle for the other constituents of the ointment, and it readily evaporates once the material has been applied to the skin.

As a film forming substance we prefer to use a quantity of about 10 to 20 per cent of a water insoluble gum or resin such as shellac or gum benzoin. This ingredient provides a tough coating, thereby causing the other materials incorporated in the ointment to adhere to the skin.

In order that the film formed by the shellac or equivalent ingredients be supple enough to permit normal bending and flexing of the underlying body members without the cracking of the film, it is advisable to incorporate in the ointment a quantity of about 2 to 10 per cent linseed oil, either with or without a quantity of about 1 per cent of a compound known as triethylene glycol di-2-ethylbutyrate. These substances act as plasticizers for the shellac or other film forming ingredients.

As a lubricant, to impart the desired degree of slip to the ointment, we incorporate a quantity of about 5 to 10 per cent of a water insoluble metallic soap such as magnesium stearate. Op-

tionally, about 1 per cent of stearic acid or a similar compound may also be added.

About 1 to 5 per cent of a substance such as menthyl salicylate, isobutyl aminobenzoate, or other chemical light filtering compound is employed to filter out the actinic rays of light. The presence of this compound in the ointment is particularly important when dealing with heat waves resulting from explosions, for the burning powder emits large quantities of actinic light rays.

The most important single ingredient in the ointment from the standpoint of protection against flash burns resulting from explosions is titanium dioxide, which compound should be present in an amount which may vary from about 25 to 50 per cent by weight. Zinc oxide or aluminum oxide may be employed together with, or even as a replacement for, the titanium dioxide, but it is preferable to use only the latter compound. An ointment containing aluminum oxide is harder to remove from the skin than is one containing only titanium oxide; further, aluminum oxide sometimes proves irritating to wounded flesh areas. Zinc oxide has been noted to give generally poorer results than either titanium dioxide or aluminum oxide.

A quantity of about 0.1 to 3 per cent of a wetting agent such as diethylene glycol monoethyl ether or long chain alcohol sulfate is usually incorporated in the ointment. The more of the ingredient added, the easier it becomes to remove the material from the skin with water.

A sufficient quantity of borax is employed to make the substance substantially neutral. Bicarbonates may be employed in the case of ointments which are to be used in colder climates though we prefer not to employ such neutralizing ingredients in warm zones since they tend to liberate carbon dioxide and thereby damage the containers which are employed to hold the ointment, usually sealed tubes. A quantity of about 1 to 5 per cent borax will usually suffice.

When for camouflage purposes it is desired that a gray or black color be imparted to the ointment, we effect this result by the incorporation of one or more compounds such as mineral or carbon black.

The ointment described above possesses many advantageous properties. For example, it makes a smooth, even coating which adheres well and does not rub off. The solvent employed normally evaporates in a period of less than 5 minutes after the application of the ointment, with the resulting production of a hard but flexible film which is free of all tackiness. The preparation is non-toxic, non-allergenic and non-irritating to the human skin. The carbon black or other color matter incorporated gives the preparation camouflage value. When the need to keep the ointment on the skin no longer exists, it may be removed by the vigorous application of soap and water.

The value of this preparation has been abundantly proven by means of actual tests in which body members bearing the protective cream disclosed herein were exposed to an artificially generated heat wave. Further, the ointment has proven its utility in battle. In the experimental tests, a cannon was constructed which was capable of throwing a heat wave having a temperature of 1500° C. at a distance of 24 cm. from the cannon orifice. This heat was sufficient to burn ordinary clothing and when allowed to act on the unprotected skin caused second degree burns. A single application of the protective film generally described above, and compounded in accordance with the formula given below, served to afford complete protection for more than two hours under all environmental conditions, including those as a result of which large amounts of perspiration were generated during the period of the test.

The following formula is one which we have found to yield a particularly effective ointment:

	Percent by weight
Isopropanol	28.5
Shellac	13.7
Linseed oil	3.5
Triethylene glycol di-2-ethylbutyrate	0.8
Magnesium stearate	8.0
Stearic acid	0.2
Diethylene glycol monoethyl ether	1.1
Duponol	0.3
Menthyl salicylate	2.5
Titanium dioxide	37.0
Borax	2.2
Mineral black	2.2

This invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

Within the scope of the appended claims, various modifications and changes in the nature and proportion of the ingredients may be made by those skilled in the art without departing from the nature of the invention.

Having therefore described our invention, we claim:

1. A protective ointment containing about 20 to 35 per cent by weight of a volatile solvent, about 10 to 20 per cent by weight of a water insoluble film forming ingredient, about 2 to 10 per cent by weight of a plasticizing ingredient, about 5 to 10 per cent by weight of a water insoluble metallic soap, about 1 to 5 percent by weight of a chemical light filtering compound, about 25 to 50 per cent by weight titanium dioxide, about 0.1 to 3 per cent by weight of a wetting agent, and about 1 to 5 per cent by weight of a neutralizing ingredient, said ointment being characterized by the ability to protect the skin from burns and frostbite.

2. An ointment adapted to protect the skin against burning on exposure to heat waves from an explosion, consisting of 28.5 per cent isopropanol, 13.7 per cent shellac, 3.5 per cent linseed oil, 0.8 per cent triethylene glycol di-2-ethyl butyrate, 8.0 magnesium stearate, 0.2 per cent stearic acid, 1.1 per cent diethylene glycol monoethyl ether, 0.3 long chain alcohol sulfate, 2.5 menthyl salicylate, 37.0 per cent titanium dioxide, 2.2 borax, 2.2 per cent mineral black, said ointment being characterized by the ability to form a tough, pliable film of low thermal conductivity when applied to the skin.

3. An ointment adapted to protect the skin against burning on exposure to heat waves from an explosion consisting of 28.5 percent of ethanol, 13.7 percent shellac, 3.5 percent linseed oil, 0.8 percent triethylene glycol di-2-ethyl butyrate, 8.0 percent magnesium stearate, 0.2 percent stearic acid, 1.1 percent diethylene glycol monoethyl ether, 0.3 percent long chain alcohol sulphate, 2.5 percent menthyl salicylate, 37.0 percent titanium dioxide, 2.2 percent borax and 2.2 percent mineral black, said onitment being characterized by the ability to form a tough, pliable film of low thermal conductivity when applied to the skin.

4. An ointment adapted to protect the skin against burning on exposure to heat waves from an explosion consisting of 28.5 percent isopropanol, 13.7 percent gum benzoin, 3.5 percent linseed oil, 0.8 percent triethylene glycol di-2-ethyl butyrate, 8.0 percent magnesium stearate, 0.2 percent stearic acid, 1.1 percent diethylene glycol monoethyl ether, 0.3 percent long chain alcohol sulphate, 2.5 menthyl salicylate, 37.0 percent titanium dioxide, 2.2 percent borax and 2.2 percent mineral black, said ointment being characterized by the ability to form a tough, pliable film of low thermal conductivity when applied to the skin.

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