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PROTECTIVE GREASE

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This invention relates to protective greases. More particularly the invention relates to greases useful for protecting the parts of ocean-going vessels, such as submarines, from corrosion and at the same time providing a grease which when submerged in the water will not separate or give off a material which will make an oil film or "slick" on the surface of the water.

A moist atmosphere, water mists and ocean water are very corrosive to metal parts. Many parts may be protected by covering with paints or varnishes but there are other parts which cannot be covered with such coatings. Mechanical gears, slides and other movable parts are usually coated with a grease to protect them from corrosion and at the same time lubricate such parts for mechanical movement. A large amount of machinery, guns and other movable parts are mounted on the deck or top of a submarine which comes directly into contact with the water when the submarine is submerged.

The primary object of the present invention is to provide a water-insoluble grease for protecting mechanical parts from corrosion and at the same time acting as a lubricant when the parts are moved.

Most of the lubricating greases now in use have mineral oil lubricants in them and when these greases are submerged in water they separate so that the oil is released and comes to the surface of the water. This separation is injurious to the grease, but more important, however, is the fact that the released oil (whether it is a mineral or vegetable oil) spreads a film or slick on the surface of the water and gives an indication of the location of the submerged submarine.

Another object of the invention is to provide a grease which will not separate when submerged in the water and will not produce an oil slick.

The top or deck of the submarine has a large area or large number of mechanical parts mounted on it. This surface and machinery must be thoroughly coated with grease to protect it. When the submarine with its coated deck and machinery is submerged the movement of the submarine and the movement of the water act to wash off and remove grease from the parts. Although this grease may be insoluble, if it comes to the surface and floats on the surface of the water it will act as a telltale even though it is not as easy to see the grease as it is to see an oil film.

Accordingly another object of the invention is to provide a protective grease which is water-insoluble and which is heavier than the water

so that, if the grease becomes detached from the parts to which it is applied, it will sink in the water and not give any indication on the surface of the water.

5 With these and other objects in view the invention consists in the protective grease hereinafter described and particularly defined in the claims.

A grease which is water-insoluble and will not separate upon standing and which has a gravity heavier than water has the following formula:

	Percent by weight
Dark green petrolatum	68.64
15 Lithium stearate	8.80
Aluminum tristearate	1.76
Lead oleate (anhydrous)	0.40
Tributyl phosphite	0.40
Leaf lead	20.00

20 This same type of grease, but which has a gravity less than the gravity of water so that it will float, has the following composition:

	Percent by weight
25 Dark green petrolatum	85.00
Lithium stearate	11.00
Aluminum tristearate	2.20
Lead oleate (anhydrous)	0.50
Tributyl phosphite	0.50

30 The grease having the leaf lead has a high gravity and will sink in water. Such a grease is very desirable for coating the mechanical parts on the deck of a submarine. On the other hand the grease described above which does not have any leaf lead is a very desirable grease to place on the deck of other seagoing vessels which are not submerged because this grease is very adhesive. It has good lubricating qualities and is very effective in preventing corrosion of the mechanical parts.

40 In order to make the greases described above, the dark green petrolatum, which is a crude unrefined petrolatum, is melted and heated to a temperature of about 170° F. when the aluminum tristearate, lead oleate and tributyl phosphite are added and thoroughly blended in a mixture. This mixture while being thoroughly stirred is then heated at from 325° to 350° F. and the lithium stearate is added. This mixture is thoroughly kneaded and mixed until it becomes a homogeneous mixture. The mixture is then allowed to cool, preferably artificial cooling being used. When it has reached a temperature below 150° F. the leaf lead is added and thoroughly worked through the grease.

The basis of the grease is the petrolatum, the aluminum stearate and the lithium stearate. The lead oleate acts as a lubricant and has the property of modifying the consistency or penetration point of the grease. A small amount of lead oleate tends to make the grease more fluent so that it can be readily applied to the machinery parts. The tributyl phosphite is added as an antioxidant to maintain a uniform composition of the grease so that the grease will not in itself act as a corrosive agent for the mechanical parts. The leaf lead which is in the form of small, thin scalelike pieces of lead, acts as a weighting agent to increase the gravity of the grease. At the same time this finely divided lead gives extreme pressure characteristics to the grease and is a rust preventing agent. When the lead is incorporated in the grease it does not separate and the lead will carry the grease to the bottom of a body of water and hold it there.

The greases have the following physical characteristics:

Grease containing leaf lead

Melting point.....°F.....	400
Oil separation when standing under water.....	0
Water absorbed at 70° F.....per cent.....	20
Penetration.....mm.....	162.5
Corrosion to copper.....	0
Specific gravity.....	1.048

Grease lighter than water

Melting point.....°F.....	400
Oil separation when standing under water.....	0
Water absorbed at 70° F.....per cent.....	20
Penetration.....mm.....	185.0
Corrosion to copper.....	0
Specific gravity.....	0.868

The dark green petrolatum is a semi-refined petrolatum having a melting point of between 118° to 122° F. and a viscosity of 115 to 122 at 210° F.

The preferred form of the invention having been thus described what is claimed as new is:

1. A protective grease for coating and protecting the mechanical equipment and other exposed metal parts on the outside of a submarine, comprising approximately 68% of crude petrolatum, approximately 8% of a lithium soap, approximately 2% of aluminum soap, a small proportion of a lead soap, and approximately 20% of finely divided metallic lead.

2. A protective grease for coating and protecting the mechanical equipment and other exposed metal parts on the outside of a submarine, com-

prising from about 8% to 11% of lithium stearate, approximately 2% of aluminum stearate, a small proportion of a lead soap, and sufficient finely divided lead to make the grease of greater density than that of sea water, the remainder of the protective grease coating being essentially crude petrolatum.

3. A protective grease coating composition for coating exposed mechanical equipment and other metal parts, comprising from about 9% to about 11% of lithium stearate, approximately 2% of aluminum stearate, a small proportion of a lead soap, the remainder of the composition being essentially crude petrolatum.

4. A protective grease coating composition for coating exposed mechanical equipment and other metal parts, comprising approximately 85% of crude petrolatum, approximately 11% of lithium stearate, a small proportion of lead oleate, and approximately 2% of aluminum stearate.

5. A submarine grease comprising:

	Percent by weight
Dark green petrolatum.....	68.64
Lithium stearate.....	8.80
Aluminum tristearate.....	1.76
Lead oleate (anhydrous).....	0.40
Tributyl phosphite.....	0.40
Leaf lead.....	20.00

6. A protective coating grease comprising:

	Percent by weight
Dark green petrolatum.....	85.80
Lithium stearate.....	11.00
Aluminum tristearate.....	2.20
Anhydrous lead oleate.....	0.50
Tributyl phosphite.....	0.50

7. The method of protecting the external mechanical equipment and other metal parts of a submarine where such parts are exposed to the action of sea water, which comprises applying to the metal parts to be exposed a protective coating comprising an intimately blended mixture of approximately 9% of lithium stearate, approximately 2% of aluminum stearate, a small proportion of a lead soap, and approximately 20% of finely divided metallic lead, the remainder of the coating consisting essentially of crude petrolatum, said coating material having a specific gravity greater than that of sea water whereby any of the coating removed from the submarine will sink and thereby avoid disclosing the location of the submarine.

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