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LUBRICANT COMPOSITION

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This application is a continuation-in-part of our application filed July 18, 1960, Ser. No. 43,335, now abandoned.

This invention relates to a novel lubricant composition particularly useful in molding and extrusion dies. More particularly, this invention relates to a novel dry composition capable of being admixed with water or similar solvent for subsequent use as a mold release or extrusion die lubricant.

Heretofore, lubricants of the type to which this invention relates have commonly been sold as dilute aqueous solutions of graphite or other solid lubricant. The manufacturer generally suspended the solid lubricant in a colloidal solution and sold it in that form to the user. Transportation costs, as well as handling costs to provide the care necessary to preserve the stability of the colloid, were high for this type of material. In effect, the shipper was paying freight or ordinary water. In addition, the handling of the colloidal solutions caused many difficulties because breaking of the colloid by freezing, loss of volatile ingredients, contamination or rough handling had to be avoided.

These undesirable factors indicated a need for a dry powder form of lubricant which could be mixed with water at the site of use without the need for specialized equipment. This was never heretofore possible because either a very unstable lubricant solution was formed or else the ingredients tended to "ball" when admixed at the site of the user. This balling results from the formation of agglomerates of the powders as the suspending agents rapidly take up water to form a sticky film of hydrated material, which resists further rapid solution or dispersion, either by agitation or by raising temperatures. Intense and fast agitation, coupled with high shear and controlled heat were required to disperse the dry ingredients. Obviously, the specialized apparatus needed to perform such an operation was not readily available, especially in small shops where the composition is frequently used. Thus, the practice of shipping dilute solutions persisted.

In accordance with this invention, a dry mix form of lubricant suitable for subsequent dilution by the mere addition of water or other solvent is now possible. The novel composition of this dry lubricant comprises graphite, vermiculite or other similar solid lubricant admixed with certain wetting agents and suspending agents and, if desired and necessary, bonding agents and fungicide/bactericides. This admixture is capable of being easily diluted by the user to an aqueous lubricant solution. The proper selection and proportions of wetting and suspending agents prevents formation of agglomerates, which are difficult to disperse without loss of the performance characteristics of the suspending agents.

Thus, transportation of dilute solutions is substantially avoided. In addition, the necessary precautions for maintaining the former colloidal lubricant solutions in an operable condition are also avoided. And, unexpectedly, dilution can be carried out to any desired degree, thereby

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enabling custom formulation of a lubricant at the site of use for the user's specific needs. This latter unexpected advantage broadens the scope of use for the basic lubricant composition and, therefore, a warehousing advantage also arises.

More particularly, the composition of this invention comprises a physical admixture of micronized graphite or expanded vermiculite with a wetting agent and a suspending agent. If needed for the proposed end use of the lubricant composition, a bonding agent to prevent "popping off" in hot lubricant work and a fungicide/bactericide to combat mold growth may also be incorporated into the composition. The ingredients are mixed together by a unique process which provides for subsequent uniform, stable dilute suspension of the lubricant when diluted, without balling or undesirable agglomeration of the solid lubricant particles. This process involves premixing the wetting, suspending, bonding and fungicide ingredients and then adding the solid lubricant thereto with continued agitation. Uniformly coated lubricant particles are thereby produced in a dry form.

Since the largest concentration of the solid lubricant tolerable is desired, its preferred concentration range can be stated as up to about 100%. It is understood, of course, that some small portion of the product of this invention must always be made up of the additives necessary for proper dispersion in an aqueous liquid. The graphite used as the solid lubricant preferably has a particle size less than about 2.5 microns. If vermiculite is used as a substitute, it should be of the finely powdered expanded type and should preferably have a particle size less than about 45 mircons. (Whenever reference is made in this specification and claims to the "particle size" of certain material, this is employed to mean maximum particle size.)

Where a powdered chlorinated hydrocarbon is used to impart greater extreme pressure properties, the additive is to be used in a proportion up to 30% by weight of the dry lubricant.

Where borax is used to enhance certain features of the dry lubricant, a range from about 2% to about 15% by weight is operable and 10% is preferred.

The wetting agents capable of use in the composition of this invention are those which do not act to pit or dull the surfaces of the extruded or molded work. Such pitting or dulling is normally caused by corrosive residues formed by the thermic decomposition, frequently encountered during extruding operations, of the dilute lubricant solution. Among the wetting agents that have been found particularly useful are (1) the anionics of the alkyl, alkaryl sulphate and sulphonate type having a minimum alkyl chain length of 8 carbon atoms and the aryl sulphonate type such as the alkyl isothionates, the alkyl sulphosuccinates, the N-alkyl taurates and the alkyl aryl sulphonates, (2) the cationic imidazoline salts of the phosphoric acids, (3) the nonionic condensation products of the alkylene oxides such as the condensation products of ethylene or propylene oxide, and mixtures thereof, with long chain alkyl or alkaryl fatty acids (such as lauric, palmitic, myristic and oleic acids), long chain alcohols having 6 to 22 carbon atoms in the chain, fatty amines, fatty amides, alkyl phenols, or their derivatives, (4) high titer soaps of a high titer fatty material and an organic base or an alkali metal base, and (5) fatty alkanol amides

Specific examples of group 1 of the wetting agents recited above are sodium dodecyl benzene sulphonate, sodium lauryl taurate, sodium lauryl isothionate, sodium xylene sulphonate, sodium lauryl sulphate, and the sodium salt of alpha sulfo-palmitic acid.

For group 2, specific examples are 1(2-hydroxyethyl)-2-heptadecyl 2-imidazoline, 1(2-hydroxyethyl)-2-undecyl-2-imidazoline, and 1(2-hydroxyethyl)-2-heptadecenyl-2-imidazoline; mono, di and tri basic phosphates.

For group 3, specific examples are

$$C_{11}H_{23}-\overset{O}{\overset{\|}{C}}-O-(C_2H_4O)_nH$$

(the lauroyl condensate);

$$C_{17}H_{33}\overset{O}{\overset{\|}{C}}-O-(C_2H_4O)_nH$$

(the oleoyl condensate); $C_{12}H_{25}-O-(C_2H_4O)_nH$ (the lauryl condensate); $C_{13}H_{27}-O-(C_2H_4O)_nH$ (the tridecyl condensate); $R-C_6H_4-O-(C_2H_4O)_nH$ (the alkyl phenol condensates);

$$R-\overset{X}{\overset{|}{N}}-(C_2H_4O)_nH$$

(the alkyl amine condensates); and

$$R-\overset{O}{\overset{\|}{C}}-\overset{X}{\overset{|}{N}}-(C_2H_4O)_nH$$

(the alkoylamide condensates), where n is an integer not less than 6, R is an alkyl group with a chain length of 6 to 20 carbon atoms, and X is hydrogen or

$$(C_2H_5O)_nH$$

Examples of group 4 are ammonium stearate, ammonium laurate, triethanolammonium laurate, sodium laurate, sodium hydrogenated tallowate, and the sodium salt of hydrogenated fish oil acids.

Examples of group 5 are lauroyl diethanolamide, oleoyl diethanolamide, lauroyl monoethylanolamide, stearoyl diethanolamide, and lauroyl monoethanolamide.

The concentration of wetting agent utilized is up to about 2% by weight and preferably from about 0.5% to about 1.5%. The extreme lower limit is utilized where the suspending agent employed also functions as a wetting agent.

The suspending agent in the composition of this invention causes uniform dispersal of the active ingredients when the concentrated mixture is subsequently diluted into an aqueous lubricant solution. It is preferred that such compounds have a high potential and uniform dispersion ability with a minimum need for agitation. While some settling of the ingredients of the lubricant solution may occur, the amount should be substantially negligible so that the lubricating performance thereof will not be altered to any substantial degree. If undue settling occurs, it may cause agglomeration of the lubricant particles which subsequently might gall or scratch the work upon which the lubricant is being used. Among the suspending agents found to possess these attributes are: the animal and vegtable gums, such as agar-agar, guar gum, gum tragacanth, gum elemi, gum karaya and locust bean gum; the polyvinyl lactams having a molecular weight of 50,000 to 400,000; the bentonitic clays, preferably those of high montmorillonite content; the alkyl celluloses, such as methyl cellulose, carboxymethyl cellulose, hydroxyethyl cellulose; the polyacrylic acids having a molecular weight of 18,000 to 100,000 and their alkali metal and ammonium salts (such as sodium polyacrylate), and pectin. They should have a concentration of from about 10% to about 40% by weight and preferably about 15% to about 40%, with the optimum concentration being about 32%.

In some instances certain suspending agents, when in aqueous suspension or solution, are subject to attack by fungi and bacteria. To avoid this undesirable possibility, resort is made to the inclusion of the fungicide/bactericide in a concentration range of up to about 5% by weight and preferably from about 0.5% to about 4%. Among the fungicide/bactericides found to be particularly effective in combating mold growth are: monochlorophenol, pentachlorophenol, ortho phenyl phenol, and their alkali metal salts.

In the use of the diluted lubricant composition of this invention, especially during extrusion and molding, high temperatures are frequently encountered. Such high temperatures sometimes cause "poping off" of the aqueous lubricant from the hot die or mold face or from the workpiece itself. This is exemplified by the phenomenon encountered when drops of water are sprinkled upon a hot plate—balls of water run off the plate or else almost explosively vaporize. To provide for sufficient retention of the lubricant ingredients during any such hot molding or extrusion, a bonding agent is incorporated into the mixture. Such bonding agent imparts a momentary adhering ability to the ingredients, sufficient to prevent their instantaneous "poping off" at high temperatures. Such agents include the sugars such as dextrin, sucrose, molasses and glucose, the vegetable gums, the seaweed gums and the polyacrylates. They should constitute up to about 20% by weight of the concentrate and preferably up to about 15%.

It has been found that on hard alloys of aluminum the use of graphite alone as the load carrier in the dry lubricant is not as efficient as would be desired. Even the use of borax in the formulation does not satisfy the requirements for extremely hard alloys. By including up to 30% of a powdered resinous chlorinated paraffin it has been found that the lubricant requirements of even the hardest alloys are satisfactorily met. The powdered resinous chlorinated paraffin preferred is known to the trade as Chlorowax 70 supplied by the Diamond Alkali Company. This resin is a cream colored, non-toxic, resinous, chlorinated paraffin, containing about 70% by weight of chlorine. Actually, Chlorowax 70–S which is described as similar to Chlorowax 70 but specially stabilized for high temperature processing is even more suitable.

Use of the several embodiments of the composition of this invention, imparts a high order of lubrication to the articles being lubricated. In addition, the ability to dilute the composition at the site of use permits custom formulation. For example, concentrations ranging from 0.25% to 15% by weight can be made with equal ease for applications including use for extrusions (dies and dummy blocks), glassmaking molds lubricants, skid conveyors lubricants, chain lubricants, aluminum and brass ingot mold lubricants, forging die lubricants, mandrel lubricant for hot piercing, and gasket lubricants.

No occupational hazards such as dermatitis caused by irritation or sensitization, or burning caused by splattering of the hot aqueous lubricant in the vicinity of the work piece, is encountered. And neither the equipment nor the finished work, whether extruded, molded or otherwise formed, evidences damage by scratching, galling, or similar undesirable action of the lubricant. This is in contrast to the highly alkaline lubricant compositions heretofore used. To summarize, a highly effective non-toxic lubricant solution capable of dilution has resulted from the discovery of the composition of this invention.

It is to be noted that the formulation presented in Example I is extremely stable to modification by the user, if it is desired to use some highly alkaline additives, although we have shown that the necessity of this addition is obviated by the present invention. This is in contrast to the graphite and micaceous dispersions presently available, which are sensitive to the addition of electrolytes.

The following examples serve as more specific illustrations of the invention:

Example I

A dry mix of the following composition is made:

	Percent
Graphite (natural type having a maximum particle size of about 2.5 microns and having less than 2% ash when fired)	63.56
Powdered sodium monochlorophenate	3.89
Powdered sodium dodecylbenzene sulphonate (90% active and having a particle size which passes through a No. 30 sieve and is 80% retained on a No. 100 sieve, U.S. Standard Screen)	0.92
Carboxymethylcellulose (Grade 7H supplied by the Hercules Powder Co. of Wilmington, Del.)	31.63

The bactericide sodium monochlorophenate, the wetting agent sodium dodecyl benzene sulphonate, and the suspending agent carboxymethylcellulose are intimately mixed in a double helical ribbon mixer. After such premixing, the lubricant graphite is added and the whole mass further tumbled. It is subsequently sieved to assure complete dispersal of all the ingredients. The resultant mixture consists of a dry composition of graphite coated with the premix.

It might be here noted that when all the constituents are mixed at the same time, that is, not in the order indicated above, the product resulting therefrom does not disperse uniformly upon dilution with water. The suspending agent, carboxymethylcellulose, tends to "ball up" and the mixture is extremely difficult to disperse in water. In fact, even after employing special mixing apparatus, agitation and heat for over 45 minutes, only a fair aqueous lubricant solution results. It is evident that the order of mixing is critical.

The dry mix made as indicated in the second paragraph above may be diluted for the following uses:

	Percent
Extrusions (dies and dummy blocks)	.25–1
Glassmaking molds lubricant	1–5
Skid conveyors lubricant	1–5
Chain lubricant	1–5
Aluminum and brass ingot mold lubricant	1–5
Forging die lubricant	1–5
Mandrel lubricant for hot piercing	5–15
Gasket lubricant	1–15

In all instances the lubricant composition is very satisfactory for the use indicated. Thus, custom formulation is possible and the dry mix, obviously, has extensive use possibilities.

Example II

The following dry composition, using the mixing procedure of Example I, is prepared:

	Percent
Graphite (synthetic type having a maximum particle size of about 2.5 microns)	59.0
Borax (powdered)	10.0
Powdered sodium monochlorophenate	3.0
Powdered sodium dodecyl benzene sulphonate	1.0
Carboxymethylcellulose	27.0

The borax additive of this example is an auxiliary lubricant in that it provides an adherent lubrication film property to the mixture.

The above composition is diluted for similar usage as indicated in Example I. In all instances, the diluted lubricant solution is satisfactory for the uses indicated.

Example III

	Percent
Graphite	49
"Chlorowax 70–S"	15
Powdered sodium monochlorophenate	3
Powdered sodium dodecyl benzene sulphonate	1
Carboxy methyl cellulose	32

The Chlorowax 70–S is blended into the mix at the same time as the graphite, as described in Example I. The resultant composition is diluted similarly to Example I for the uses indicated.

Example IV

	Percent
Graphite	63.5
Sodium monochlorophenate	3.0
Sodium dodecyl benzene sulphonate	1.0
Carboxymethylcellulose	32.0
The condensation product of 20 moles of ethylene oxide and dodecyl phenol	0.5

Example V

Graphite	63.56
Sodium pentachlorophenate	3.89
Sodium dodecylbenzene sulphonate	0.92
Carboxymethylcellulose	31.63

Example VI

Graphite	63.56
Sodium o-phenylphenate	3.89
Sodium dodecyl benzene sulphonate	0.92
Carboxymethylcellulose	31.63

Example VII

Graphite	59.0
Borax	10.0
Sodium pentachlorophenate	3.0
Sodium dodecyl benzene sulphonate	1.0
Carboxymethylcellulose	27.0

Example VIII

Graphite	54.0
Powdered borax	10.0
Powdered sodium o-phenylphenate	3.0
Powdered sodium dodecyl benzene sulphonate	0.92
Carboxymethylcellulose	31.63

Example IX

Expanded vermiculite (having a particle size from 0.25 to 45 microns)	63.56
Powdered sodium monochlorophenate	3.89
Powdered sodium dodecyl benzene sulphonate	0.92
Carboxymethylcellulose	31.63

Example X

Vermiculite (expanded)	59.0
Powdered borax	10.0
Powdered sodium monochlorophenate	3.0
Powdered dodecyl benzene sulphonate	1.0
Carboxymethylcellulose	27.0

Example XI

Graphite	64
Sodium monochlorophenate	3
Sodium dodecyl benzene sulphonate	1
Powdered polyvinyl carboxylic acid	15
Powdered borax	17

Examples IV through XI are compounded as in Example I, with the lubricant portion being added as the last part of the mix. The resultant composition is diluted similarly to Example I for the uses indicated.

Example XII

	Percent
Graphite	71
Sodium alkyl aryl sulphonate	1
Sodium monochlorophenate	3
Carboxymethylcellulose	25

Example XIII

Graphite	76
Sodium alkyl aryl sulphonate	1
Sodium monochlorophenate	3
Carboxymethylcellulose	20

Example XIV

Graphite	80
Sodium alkyl aryl sulphonate	1
Sodium monochlorophenate	3
Carboxymethylcellulose	16

Example XV

Graphite	84
Sodium alkyl aryl sulphonate	1
Sodium monochlorophenate	3
Carboxymethylcellulose	12

The compositions of Examples XII through XV are dispersed in water by dissolving one part of the dry concentrate to 120 parts of water. Samples are taken of the supernatant portions over periodic intervals as indicated in the table below and the suspended solids content determined. The results are as follows:

TABLE I

Ex.	Percent Soilds in Supernatant Liquid			Percent Sedimentation	
	Original Suspension	After 16 Hours	After 48 Hours	16 Hours	48 Hours
XII	0.590	0.581	0.578	1.5	2.0
XIII	0.636	0.616	0.610	1.6	2.6
XIV	0.661	0.648	0.642	1.8	2.7
XV	0.703	0.679	0.656	3.4	6.6

This table indicates that the concentration range set forth is entirely satisfactory.

Examples XVI through XXXV are compounded as in Example I, with the lubricant portion being added as the last part of the mix. The resultant composition is diluted similarly to Example I for the uses indicated.

Example XVI

	Percent
Graphite	64.0
Sodium monochlorophenate	3.0
1(2-hydroxy ethyl)-2-heptadecyl-2-imidazolinium monophosphate	1.0
Carboxymethylcellulose	32.0

Example XVII

Graphite	64.0
Sodium monochlorophenate	3.0
1(2-hydroxy ethyl)-2-heptadecyl-2-imidazolinium diphosphate	1.0
Carboxymethylcellulose	32.0

Example XVIII

Graphite	64.0
Sodium-o-phenyl phenate	3.0
1(2-hydroxy ethyl)-2-heptadecyl-2-imidazolinium triphosphate	1.0
Carboxymethylcellulose	32.0

Example XIX

Graphite	64.0
Sodium pentachlorophenate	3.0
Oleoyl condensate of 12 moles ethylene oxide	2.0
Carboxymethylcellulose	31.0

Example XX

Graphite	62.0
Sodium monochlorophenate	3.0
Triethanolamine stearate	3.0
Carboxymethylcellulose	32.0

Example XXI

Graphite	62.0
Sodium monochlorophenate	3.0
Sodium stearate	3.0
Carboxymethylcellulose	32.0

Example XXII

Graphite	64.0
Sodium monochlorophenate	3.0
Sodium dodecylbenzene sulphonate	1.0
Guar gum	32.0

Example XXIII

Graphite	64.0
Sodium monochlorophenate	3.0
Sodium dodecylbenzene sulphonate	1.0
Locust bean gum	32.0

Example XXIV

Graphite	64.0
Sodium monochlorophenate	3.0
Sodium dodecylbenzene sulphonate	1.0
Sodium alginate	32.0

Example XXV

Graphite	64.0
Sodium monochlorophenate	3.0
Sodium dodecylbenzene sulphonate	1.0
Polyvinyl pyrrolidone (3,000–18,000 M.W.)	32.0

Example XXVI

Graphite	64.0
Sodium pentachlorophenate	3.0
Sodium dodecylbenzene sulphonate	1.0
Hydroxyethylcellulose	32.0

Example XXVII

Graphite	64.0
Sodium monochlorophenate	3.0
Sodium dodecylbenzene sulphonate	1.0
Methylcellulose	32.0

Example XXVIII

Graphite	64.0
Sodium monochlorophenate	3.0
Sodium dodecylbenzene sulphonate	1.0
Pectin	32.0

Example XXIX

Graphite	86.0
Sodium monochlorophenate	3.0
Sodium dodecylbenzene sulphonate	1.0
Bentonite (40–100% sodium montmorillonite)	10.0

Example XXX

Graphite	76.0
Sodium monochlorophenate	3.0
Sodium dodecylbenzene sulphonate	1.0
Ammonium polyacrylate	20.0

Example XXXI

Graphite	76.0
Sodium monochlorophenate	3.0
Sodium dodecylbenzene sulphonate	1.0
Sodium polyacrylate	20.0

Example XXXII

Graphite	64.0
Sodium pentachlorophenate	3.0
Sodium dodecylbenzene sulphonate	1.0
Carboxymethylcellulose	20.0
Dextrin	12.0

Example XXXIII

Graphite	63.0
Sodium monochlorophenate	3.0
Lauroyl diethanolamide	2.0
Carboxymethylcellulose	32.0

Example XXXIV

Graphite	63.0
Sodium monochlorophenate	3.0
Lauroyl amido condensate with 20 moles ethylene oxide	2.0
Carboxymethylcellulose	32.0

Example XXXV

Graphite	64.0
Sodium monochlorophenate	3.0
Condensation of octylphenol with 12 moles ethylene oxide	1.0
Carboxymethylcellulose	32.0

It is found that for certain use conditions, some of the suspending agents indicated above impart a desirable adhesion of the lubricant to the dies during high temperature work. For example, the natural gums such as the vegetable and the seaweed gums will impart both a bonding and a suspending function. And the dextrins, the sugars and the polyacrylates impart a partial suspending function to the mixture and therefore may be increased in concentration up to 25% of the suspending agent. However, a more powerful supplementary suspending agent must be used in such instances. Alternatively, the suspending agent, hydroxyethyl cellulose also imparts a bonding agent function and, therefore, it could be used alone as both a suspending and a bonding agent.

It is understood, of course, that other modifications in the composition of this invention may be made without departing from the true spirit and scope of the novel concepts and principles of this invention.

We claim:

1. A lubricant preparation in particulate form suitable for subsequent mixing with aqueous media to produce an aqueous lubricant comprising about 64% by weight of graphite, about 1% by weight of sodium dodecyl benzene sulphonate, about 31% by weight carboxymethylcellulose and about 4% by weight of sodium monochlorophenate, said concentrate being essentially anhydrous and said graphite being maintained in particulate form by being coated with dry premixture of said other named components.

2. A lubricant preparation in particulate form suitable for subsequent mixing with aqueous media to produce an aqueous lubricant comprising about 60% graphite, about 10% borax, about 3% sodium monochlorophenate, about 26% carboxymethylcellulose and about 1% sodium dodecyl benzene sulphonate, said concentrate being essentially anhydrous and said graphite being maintained in particulate form by being coated with dry premixture of said other named components.

3. A lubricant preparation in particulate form suitable for subsequent mixing with aqueous madia to produce an aqueous lubricant comprising about 63.5% graphite, a mixture comprising about 0.5% of the condensation product of 20 moles of ethylene oxide and dodecyl phenol and about 1% sodium dodecyl benzene sulphonate, about 32% carboxymethylcellulose and about 3% sodium monochlorophenate, said concentrate being essentially anhydrous and said graphite being maintained in particulate form by being coated with dry premixture of said other named components.

4. A lubricant preparation in particulate form suitable for subsequent mixing with aqueous media to produce an aqueous lubricant comprising about 64% expanded vermiculite, about 1% sodium dodecyl benzene sulphonate, about 31% carboxymethylcellulose and about 4% sodium monochlorophenate, said concentrate being essentially anhydrous and said vermiculite being maintained in particulate form by being coated with dry premixture of said other named components.

5. A lubricant preparation in particulate form suitable for subsequent mixing with aqueous media to produce an aqueous lubricant comprising about 63% by weight of graphite, about 2% by weight of lauroyl diethanolamide, about 32% by weight of carboxymethylcellulose and about 3% by weight of sodium monochlorophenate, said concentrate being essentially anhydrous and said graphite being maintained in particulate form by being coated with dry premixture of said other named components.

6. A lubricant preparation in anhydrous particulate form suitable for subsequent mixing with aqueous media consisting essentially of 0.5% to 2% by weight of the dry solids of a water soluble non-corrosive wetting agent selected from the class consisting of (1) the anionic alkyl, alkaryl sulphates and sulphonates in which the alkyl radical has a chain length of 8 to 12 carbon atoms and aryl sulphonates, (2) the cationic imidazoline salts of the phosphoric acids, (3) the nonionic condensation products of polyalkylene oxide and mixtures thereof with a member selected from the group consisting of long chain hydrocargon fatty acids, fatty alcohols, fatty amines, fatty amides and alkyl phenols, (4) high titer soaps of a high titer faty material and a base selected from the group consisting of organic bases and alkali metal bases, and (5) fatty alkanol amides; from about 10% to about 40% by weight of a suspending agent comprising a member of the class consisting of the animal and vegetable gums, the polyvinyl lactams having a molecular weight in the range between 50,000 and 400,000, the bentonitic clays, the alkyl celluloses, the polyacrylic acids having a molecular weight of 18,000 to 100,000 and their alkali metal and ammonium salts and pectin; and the balance comprising particulate solid lubricant selected from the class consisting of graphite and vermiculite maintained in particulate form by being coated with dry premixture of said wetting and suspended agents.

7. A lubricant preparation in anhydrous particulate form suitable for subsequent mixing with aqueous media consisting essentially of 0.5% to 2% by weight of the dry solids of a water soluble non-corrosive wetting agent selected from the class consisting of (1) the anionic alkyl, alkaryl sulphates and sulphonates in which the alkyl radical has a chain length of 8 to 12 carbon atoms and aryl sulphonates, (2) the cationic imidazoline salts of the phosphoric acids, (3) the nonionic condensation products of polyalkylene oxide and mixtures thereof with a member selected from the group consisting of long chain hydrocarbon fatty acids, fatty alcohols, fatty amines, fatty amides and alkyl phenols, (4) high titer soaps of a high titer fatty material and a base selected from the group consisting of organic bases and alkali metal bases, and (5) fatty alkanol amides; from about 10% to about 40% by weight of a suspending agent comprising a member of the class consisting of the animal and vegetable gums, the polyvinyl lactams having a molecular weight in the range between 50,000 and 400,000, the bentonitic clays, the alkyl celluloses, the polyacrylic acids having a molecular weight of 18,000 to 100,000 and their alkali metal and ammonium salts, and pectin; 0.5% to 5% by weight of a fungicide/bactericide selected from the group consisting of monohydroxy mononuclear aromatic compounds, halogenated monohydroxy mononuclear aromatic compounds and the alkali salts thereof and the balance comprising a solid lubricant selected from the class consisting of graphite and vermiculite maintained in particulate form by being coated with dry premixture of said wetting and suspended agents.

8. A lubricant preparation in anhydrous particulate form suitable for subsequent mixing with aqueous media consisting essentially of 0.5% to 1.5% by weight of the dry solids of a water soluble non-corrosive wetting agent selected from the class consisting of (1) the anionic alkyl, alkaryl sulphates and sulphonates in which the alkyl radical has a chain length of 8 to 12 carbon atoms and aryl sulphonates, (2) the cationic imidazoline salts of the phosphoric acids, (3) the nonionic condensation products of polyalkylene oxide and mixtures thereof with a member selected from the group consisting of long chain

hydrocarbon fatty acids, fatty alcohols, fatty amines, fatty amides and alkyl phenols, (4) high titer soaps of a high titer fatty material and a base selected from the group consisting of organic bases and alkali metal bases, and (5) fatty alkanol amides; from about 15% to 40% of a suspending agent comprising a member of the class consisting of the animal, and vegetable gums, the polyvinyl lactams having a molecular weight of 50,000 to 400,000 and their alkali metal and ammonium salts, the alkyl celluloses, the polyacrylic acids having a molecular weight of 18,000 to 100,000 and their alkali metal and ammonium salts and pectin; and the balance comprising a solid lubricant selected from the class consisting of graphite and vermiculite maintained in particulate form by being coated with dry premixture of said wetting and suspended agents.

9. A lubricant preparation in anhydrous particulate form suitable for subsequent mixing with aqueous media consisting essentially of .5% to 1.5% by weight of the dry solids of a water soluble non-corrosive wetting agent selected from the class consisting of (1) the anionic alkyl, alkaryl sulphates and sulphonates in which the alkyl radical has a chain length of 8 to 12 carbon atoms and aryl sulphonates, (2) the cationic imidazoline salts of the phosphoric acids, (3) the nonionic polyalkylene oxide condensation products of the fatty acids and their derivatives, (4) high titer soaps of a high titer fatty material and a base selected from the group consisting of organic bases and alkali metal bases, and (5) fatty alkanol amides; from about 15% to 40% of a suspending agent comprising a member of the class consisting of the animal and vegetable gums, the polyvinyl lactams having a molecular weight in the range between 50,000 and 400,000, the bentonite clays, the alkyl celluloses, the polyacrylic acids having a molecular weight of 18,000 to 100,000 and their alkali metal and ammonium salts, and pectin; 0.5% to 5% by weight of a fungicide/bactericide selected from the group consisting of monohydroxy mononuclear aromatic compounds, halogenated monohydroxy mononuclear aromatic compounds and the alkali salts thereof and the balance comprising a solid lubricant selected from the class consisting of graphite and vermiculite maintained in particulate form by being coated with dry premixture of said wetting and suspended agents.

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