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(54) Title: SOAP-BASED LUBRICANT COMPOSITION FREE FROM COMPLEXING AGENTS (57) Abstract A lubricant composition, particularly for use in belt or chain conveyors, comprises a soap component together with further usual lubricant components, being characterized in that this is substantially free from hardness ion complexing or sequestering agents and comprises a substantially biodegradable, non-ionic, anionic or amphoteric soap dispersant.		

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SOAP-BASED LUBRICANT COMPOSITION FREE FROM COMPLEXING AGENTS.

The invention relates to lubricant compositions which contain soap, yet are free from complexing agents and suitable, in particular, for lubricating conveyor belts in the food and beverage industry.

In the food and beverage industry, e.g. in breweries or bottling operations at mineral water sources, bottle cleaning, filling and labelling is carried out mainly by automation. As a rule, high-performance lubricants need to be used on the bottle conveyor facilities to guarantee problem-free conveying of the bottles. The filling performance of filling equipment has increased over the years as a result of technological progress. Requirements regarding the performance of the belt lubricants have increased correspondingly. In parallel, greater environmental awareness of the users has resulted in a demand for more environmentally and userfriendly chemicals particularly when these are sprayed openly in premises, as is the case with belt lubricants, and where the lubricant liquid dripping off the belt may pass directly into the effluent (waste water) from the plant.

State-of-the-art lubricants for conveyor belts in the food and beverage industry are mainly prepared by diluting, with water, concentrates containing soap, surfactants, fatty acids, alkanol amines and complexing agents.

Such soap-based lubricants are e.g. disclosed in US patents Nos. 3 860 521 and 4 274 973. In US patent 4 604 220, a soap-based conveyor cleaner and conveyor belt lubricant concentrate is disclosed, which bases on C_{12} to C_{18} alpha olefin sulfonates and corresponding polyether derivatives. This alpha olefin sulfonate can be combined with anionic or nonionic surfactants, or can be combined with fatty acid soap lubricant compositions to enhance the acid resistance of such soaps.

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Combinations of fatty acid soap and alpha olefin sulfonates are, however, not suitable for applications where hard water must be used. This combination appears not to have had any commercial success. Combinations of soaps and alpha olefin sulfonates or alpha olefin polyether sulfonates are not claimed as forming part of the instant invention.

More recently, it has been suggested in WO 92/13049, that fatty acid salts of specific fatty acid diamines can be used in combination with anionic and/or nonionic surfactants, complexing agents or alkyl sulfonates as belt conveyor lubricants, specifically for PET and PC containers, but not for glass. These compounds can contain fatty acid soaps as a solidifying agent, where solid combinations are desired. In these compositions, the diamine and fatty acid contents must be carefully balanced, to provide overall neutralization. All compositions exemplified in WO 92/13049 comprise substantial amounts of EDTA, as a sequestrant or complexing agent. Based on this art, it would appear that generally, and specifically for hard water applications, use of a sequestrant in soap-containing lubricants is unavoidable.

A major disadvantage of soap-containing lubricants is their sensitivity to hard water. Soaps tend to react with water hardness forming salts (mainly Ca^{2+} or Mg^{2+} salts) to form the so-called lime soaps which are difficult to dissolve or even insoluble and strongly reduce the lubrication performance of the lubricant. Frequently, this leads to the formation of deposits on the conveyor belts and finally to operating problems. To avoid this precipitation of lime soap, strong complexing agents (such as EDTA) are added to soap-containing lubricants or the application needs to be restricted to very soft water (which, however, is not generally available). For ecological reasons, the use of strong complexing agents in

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lubricants which pass into the waste water discharged from the plant is undesirable, since these complexing agents have poor biological degradability. EDTA especially is practically not biodegradable.

There have been attempts in the art at solving this problem, either by use of biodegradable, yet sufficiently strong complexing agents for soap-based lubricants, or through alternative lubricants which comprise no soap. Generally, these alternative lubricants attempt to replace soap with specific amino compounds.

In EP-B1 0 044 458, a soap-free lubricant composition is disclosed which contains no complexing agent. The lubricant composition comprises alkyl polyether carboxylic acid salts combined with acyl sarcosinates.

From EP-B1 0 260 508, a method for lubricating a conveyor belt is known, which comprises the steps of lubricating the belt with a soap-free lubricant based on neutralized primary fatty amines, and cleaning the belt with cationic cleaning agents or organic acids. The reason for this is that the amines used for lubrication form precipitates with anions, which strongly reduce the lubricating effect and can clogg spray nozzles etc.

From EP-B1 0 372 628, and EP-A1 0 538 916 another substitute for soap-based lubricants is known, which is based on di- or polyalkyl amines or corresponding di- or polyalkyl aminoalkyl carboxylic acids. The aqueous lubricating solutions made from these compounds are used at pH-values between 5 and 8. The compositions contain no soap and thus require no complexing agent.

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EP-B1 0 384 282 (which has been consolidated with EP 0 593 420) discloses the use of secondary and/or tertiary amines and/or salts thereof in lubricating formulations for PET or PC bottles. Generally, the amines are used as such, without the addition of surfactant, complexing agent or cosolvent.

WO 94/03562 discloses the use of polyamine derivatives of fatty amines and/or salts thereof. It is claimed that these amines are per se not very sensitive to process water anions such as sulfate, bicarbonate etc. The examples show that the lubricants of WO 94/03562 were only tested at low alkalinity (pH below 8), and were not tested with respect to their water hardness cation resistance. As such, the fatty amine salt-based lubricants of this art would not be expected to provide sufficient lubrication combined with the absence of precipitation problems in hard water application.

In DE-C2 42 44 536, it is suggested to base a soap-free lubricant on mainly two components, one of which is an alkyl diamine, optionally neutralized with an organic acid, and the other of which is a polyether carboxylic acid. The lubricants can be used between pH 6.5 and 7. The lubricant solution is made from a corresponding concentrate by adding water, from which the hardness forming ions have, before, been removed. It does not appear likely that such a composition could be used at typical application conditions, with pH > 7, to achieve the necessary lubricating effect and, at the same time, avoid precipitation of solids from the lubricant solution.

DE-A1 43 11 237 proposes a specific sequestrant, based on polyasparagic acid and copolymerisates thereof, to overcome the problem that typical complexing agent such as EDTA are not biodegradable.

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In DE-A1 43 15 21 (and corresponding EP 0 623 666) of the present applicant, it has been suggested to prepare soap-free lubricants on the basis of polyamines, which can optionally be combined with organic acids, to adjust the pH of the concentrate to between 4 and 8.

The lubricant performance of soap products is usually better as compared to the so-called "synthetic" lubricants based on surfactants, fatty amine acetates etc.

In addition, when used appropriately under open conditions (e.g. in bottle conveyor facilities) soaps have found a high degree of acceptance by the user because of their operating safety. Several of the prior art amino compounds have a microbicidal effect and have not yet been assessed in view of human toxicology. Cases of incompatibility and undesirable odour as well as problems in plant or communal effluent treatment facilities have arisen.

The invention is based on the object of providing lubricants for conveyor belts and claims which are toxicologically and ecologically safe from the user point of view and which, on the one hand, are free from polymers or complexing agents which are not, or only poorly, biodegradable and yet, on the other hand, form no deposits or precipitates even with very hard water. Another object of the invention is to find lubricant compositions that are suitable both for lubricating conveyor belts for glass containers (e.g. beverage bottles) and for conveying plastic containers (e.g. beverage bottles made of PET or PC). The lubricating performance of such lubricants should correspond at least to that provided by state-of-the-art lubricants. The use of the lubricants should be possible, largely independent of the hardness of the water used for the preparing the aqueous lubricating composition.

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The invention is inter alia based on the finding that surprisingly, the consistant approach of the prior art in this field is wrong. In the whole of the art, it has been maintained that there are only two kinds of useful lubricant compositions: One is soap-based, but can only be used with typical hardness - containing process waters when combined with substantial amounts of complexing agents; the other is based on amino derivatives and avoids the use of soap completely, at the cost of anion sensitivity of the composition and general lower lubricating performance.

Surprisingly, it has now been found that this prior art prejudice is not supported by the facts. According to the invention, a soap-based lubricant, with the high lubricating efficiency typical of such soap-based products, can be formulated without complexing agents, when instead, the further components claimed and described hereinafter, are used. Some of these are, per se, components of prior art soap-free lubricant compositions; others have never before been disclosed in the art as components of such lubricant compositions.

In the absence of sufficient scientific research, the present inventors do not want to speculate on the exact mechanism by which these co-components prevent the formation of lime soap precipitates or even turbidity without, at the same time, negatively affecting the lubricating efficiency of the soap-based composition. Seeing that the prior art soap-free lubricants are generally markedly inferior to soaps in lubricating efficiency, one would have expected a notable decrease in lubricating efficiency when adding such substances to a soap-based lubricant. No such effect is, however, observed. The effectiveness of the inventive preparations is even more surprising seeing that the co-component used is

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generally not a sequestrant or complexing agent for water hardness ions such as Ca^{2+} and Mg^{2+} . This could lead one to assume that there is a completely different mechanism involved. It is presently assumed that all co-components of this invention are capable of acting as dispersants for soaps which could be formed, especially at higher pH and high degrees of water hardness, from the soap component of the invention's lubricants. The invention's co-components, which are combined with soap based lubricant components, are therefore hereinafter referred to as "soap dispersants".

Thus, the invention makes it possible, for the first time, to obtain the benefits of a soap-based lubricant without incurring the disadvantage of having to use a complexing agent or sequestrant to prevent precipitation of poorly soluble or even insoluble compounds formed from the soap component and water hardness ions, especially calcium ions and magnesium ions.

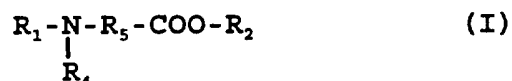
The invention achieves this by providing a lubricant concentrate, especially for preparing an aqueous lubricant composition for belt or chain conveyors as used in the bottling industry, which concentrate comprises a soap component, especially a fatty acid alkali or amino soap, in an amount sufficient to provide lubricating properties to the aqueous lubricant composition, said concentrate further comprising a functional amount of at least one substantially biodegradable nonionic, anionic or amphoteric soap dispersant, which is capable of preventing the precipitation of poorly soluble or insoluble hardness ion compounds of the soap component, without having, itself, any substantial hardness ion complexing or sequestering properties. The inventive concentrate is thus substantially free from hardness ion complexing or sequestering agents.

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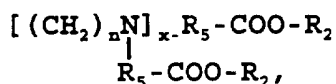
In preferred embodiments, the biodegradable soap dispersant of the lubricant concentrate is at least one of an amphoteric alkyl (monoamine or polyamine) carboxylate, or a betaine, especially an alkyl or an alkylamido betaine or sulfobetaine.

Specifically, alkyl monoamine carboxylates and alkyl sulfobetaines as well as alkylamido sulfobetaines have been shown, as will be described in more detail hereinafter, to be highly effective co-components in the invention's soap-based lubricants.

These lubricant concentrates preferably comprise at least one soap dispersant which comprises at least one compound of the general formula (I)



wherein R_1 is a linear, branched, saturated or unsaturated alkyl residue having 8 to 22 carbon atoms or a corresponding alkoxy residue, R_2 is Na, K or $N(R_3)_3$, wherein R_3 is H, alkyl or hydroxyalkyl, R_4 is H, an alkyl, hydroxyalkyl, $R_5-COO-R_2$ or



wherein R_5 is alkyl or hydroxyalkyl, h is an integer from 1 to 10 and x is an integer from 1 to 50.

More specifically, a presently especially preferred soap dispersant comprises an alkyl monoamine carboxylate corresponding to the general formula (I), wherein R_1 is cocoalkyl, R_4 is H, R_5 is ethylene and R_2 is triethanolammonium ion.

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Such alkyl monoamine carboxylates can be obtained under the tradename Amphoram CP1 from CECA S.A., France.

Another more specific preferred soap dispersant comprises an alkyl polyamine carboxylate corresponding to the general formula (I), wherein R_4 is $[(CH_2)_n N]_x R_5 - COO - R_2$ and

$$R_5 - COO - R_2$$

and wherein R_5 is methylene or ethylene, preferably methylene

R_2 is Na or K, preferably Na
 n is 2 to 4, preferably 3 and
 x is 1 to 5, preferably 1 to 3.

Such a dispersant can be obtained, under the tradename Amphionic SFB, from Rhone Poulenc, France.

An alternatively especially preferred soap dispersant comprises a betaine of the general formula (II),

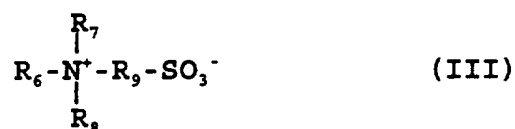


wherein R_6 is R_1 or $R_1 - CONH - (CH_2)_n$, R_1 and n having the same meaning as in formula (I), and R_7 and R_8 are equal or different alkyl or hydroxyalkyl substituents. Of these betaines, some compounds have been found to be specifically advantageous. In these, R_6 is cocoalkyl and R_7 and R_8 are hydroxyethyl, or R_6 is cocoamidopropyl and R_7 and R_8 are methyl.

Such dispersants can be obtained under the tradenames Tegotain N192 from Goldschmidt, Germany and Amphotensid B4 from Zschimmer und Schwarz, also Germany.

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Also alternatively, the soap dispersant can advantageously comprise a sulfobetaine corresponding to the general formula (III)



wherein R_6 , R_7 and R_8 have the same meaning as in formula (II), and R_9 is linear or branched alkyl or hydroxyalkyl. Preferably, R_6 is lauryl, R_7 and R_8 are methyl and R_9 is 2-hydroxypropyl, or R_6 is cocoamidopropyl, R_7 and R_8 are methyl and R_9 is 2-hydroxypropyl.

Such sulfobetaines (or sultaines) can be obtained from Witco/Rewo Chemische Werke GmbH, Germany, under the tradename Rewoteric AM HC, and from Rhone Poulenc, France, under the Mirataine CBS tradename.

In another preferred embodiment, the biodegradable soap dispersant is formed by at least one of a nonionic fatty alcohol alkoxylate or an alkyl polyglucoside. The fatty alcohol alkoxylate is presently preferred. C_{11} - C_{17} alkanol alkoxylates with C_2 - C_5 alkoxylate groups are specifically preferred. These can be obtained under the trade name Synperonic LF/RA, from ICI. Suitable alkyl polyglucosides can be obtained from Henkel, Germany, under the "Glucopon" TM.

In a further preferred embodiment, the biodegradable soap dispersant is formed by at least one anionic polyether compound. Suitable such polyether compounds comprise alkyl polyether carbonic acids, alkyl polyether sulfates and sulfosuccinates, and alkyl polyether phosphates. Instead of an alkyl group, the polyether compound can have a comparable

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alkylamido group.

The preferred compounds of this embodiment are presently the alkyl polyether carbonic acids and alkyl polyether sulfates.

In this embodiment, it is preferred that the soap dispersant comprises an alkyl polyether compound corresponding to the general formula (IV)

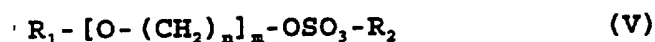


wherein R_1 and R_2 have the same meaning as in formula (I), R_{10} and R_{11} are alkyl residues, and m is an integer from 1 - 20.

More specifically, R_1 is $C_9 - C_{11}$ alkyl, R_{10} is ethylene and R_{11} is methylene or ethylene, m is 3 - 5 and R_2 is triethanolammonium.

Such dispersants can be obtained from Chem-Y GmbH, Germany, under the tradename Akypo.

In another preferred variety of this embodiment, the soap dispersant comprises a compound of the general formula (V)



wherein R_1 , R_2 , n and m have the same meaning as in formula (I). More specifically preferred, R_1 is a natural, a Ziegler synthetic, or an oxosynthetic alkyl, n is 2, m is 1, 2 or 3 and R_2 is sodium.

Such compounds can be obtained from Manro Products Ltd, England, under the Manro BES tradename.

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Suitable alkylpolyether phosphates comprise Marlopor FC from Hüls, Germany.

Suitable alkyl polyether sulfosuccinates comprise Tensuccin HM 935 from ICI.

Suitable alkylamido polyether sulfosuccinates comprise Lankropol KS6, from Akcros.

The soap component of the inventive concentrate is generally formed by at least one compound corresponding to the general formula (VI)



wherein R_1 is a linear, branched, saturated or unsaturated C_8 to C_{22} alkyl residue, and R_2 is Na, K or $N(R_3)_3$, wherein R_3 is H, alkyl or hydroxyalkyl. Long linear chain aliphatic acid salts such as oleic acid triethanolamine salt are preferred.

To obtain permanently clear application solutions in hard water, it is advantageous for the soap dispersant to be present in excess, in comparison with the soap component. The best results are often achieved by using one or more soap dispersant compounds in a 2 to 4 fold excess over the soap component in the lubricant concentrate. The soap dispersant components are often present in a ratio of approximately 1:1 since then these components develop their maximum activity for the prevention of lime-soap precipitation.

To vary the cleaning effect and the foaming properties of the lubricant compositions according to the invention, the formulations may additionally contain surfactants (usually nonionic or anionic surfactants).

To be able to provide the lubricants according to the invention with germ-reducing properties, the formulation may contain disinfectant or preservatives. To advantageously influence the storage stability and flow properties of the lubricant concentrates, the formulations may additionally contain solubilisers in the form of mono or polyhydric alcohols (usually lower aliphatic alcohols or glycols).

As a rule, the pH of the concentrate is above neutrality. To obtain clear application solutions, it may be advantageous to use alkanol amines such as triethanol amine in a slight excess as the base. The excess base simultaneously has the effect of preventing the pH of the highly dilute lubricant solutions from decreasing too strongly in acidic process water. The pH of the application solutions is usually also in the alkaline range and often above 8. When the soap dispersant comprises a di- or polyamino compound as claimed in EP-B1 0 372 628, the pH is always 8 or higher.

For the preparation of the lubricant concentrates according to the invention, the individual components can generally be used in acid or salt form.

The appropriate amount of water (hard or, where easily available; demineralised water) is introduced into a mixing vessel equipped with a stirrer. Subsequently, the components in the acid or the salt form are added. Generally, this takes the form of addition of a preformed concentrate comprising all components. However, it is of course possible to prepare an aqueous lubricant composition of this invention by adding the individual components to the water one by one. By adding the corresponding base, the dispersion is converted into a clear solution of the concentrate.

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Surprisingly, the poor inherent lubricant properties of those inventive soap dispersants which have been used in the art as soap-free lubricants do not negatively affect the good lubricant properties of the soap component while nevertheless preventing the undesirable formation of lime-soap and thus the formation of precipitates and deposits.

Because of the above-mentioned properties, lubricant compositions according to the invention are suitable for the use also outside the food and beverage industry when lubricating problems arise in cases where physiological safety and high biodegradability in association with excellent lubricating properties are desirable or necessary.

The superior properties of the lubricant composition according to the invention, in comparison with the properties of their components, and thus the synergistic effect thus achieved, will now be shown in further detail by way of the following examples, in association with the attached drawing. In the drawing

Fig. 1 represents a diagrammatic representation of a bottle conveyor facility on which the reported experiments were carried out

Fig. 2 shows a graphic representation of the sliding friction coefficients achieved with different lubricants and lubricant compositions.

For the turbidity tests reported below, a synthetic water with a hardness of 25° German hardness was used which was prepared as follows:

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Stock solution 1: 23.63 g $\text{CaCl}_2 \cdot 2 \text{H}_2\text{O}$ (0.161 mole) and 3.63 g $\text{MgCl}_2 \cdot 6 \text{H}_2\text{O}$ (0.018 mole) were dissolved in 1000 ml of distilled water.

Stock solution 2: 22.50 g NaHCO_3 (0.268 mole) and 12.32 g NaHSO_4 (0.089 mole) were dissolved in 1000 ml of distilled water.

25° German hardness: 25 ml of stock solution 1 and 25 ml of stock solution 2 were diluted with demineralised water to 1000 ml in a measuring flask.

This synthetic hard water had a pH of approximately 8.3. The water hardness consisted of carbonate hardness (approximately 50%) and of non-carbonate hardness (the remaining 50%).

To determine the lubricating performance of the lubricants according to the invention and their individual components, an in-house bottle conveyor facility was used which is illustrated in the diagrammatic representation in fig. 1. The belt speed and the spray volume per unit of time were kept constant during the measurements. The lubricant solutions were prepared using local (Ladenburg) town water (24° German hardness). 0.2% of the lubricant concentrate were used for the comparative measurements.

Example I

A lubricant composition according to the invention was made up to have the following composition:

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Component

- A 2% oleic fatty acid triethanol amine salt (soap component according to formula VI)
- B 5% N-coconut alkyl- β -alanine triethanol amine salt (first soap dispersant, according to formula I)
- C 5% alkyl (C9/11) polyether (5EO) carboxylic acid triethanol amine salt (second soap dispersant, according to formula IV)
- D 88% demineralised water.

(B is "Amporam CP1" from CECA S.A., C is "Akypo RO 50" from Chem-Y GmbH).

The above-mentioned lubricant composition did not exhibit any turbidity when diluted in any proportion with the synthetic water at 25° German hardness as described above, over a period of several weeks. Solutions of soap component A only, on the other hand, formed milky turbid precipitates within a short time.

The lubricating effect of the lubricant composition of the Example I (solution 4 in Talbe 1) was determined using the bottle conveying facility (Fig. 1) and compared with the lubricating effect of the individual components and the lubricating effect of an amine acetate, which is a representative belt lubricant according to the state of the art.

Table 1

Component	Solution 1	Solution 2	Solution 3	Solution 4	Solution 5
A	2%			2%	
B		5%		5%	
C			5%	5%	
Water	98%	95%	95%	88%	95%
Amine acetate*					5%

*N-coconutalkyl propylene diamine diacetate.

Fig. 2 show the sliding friction coefficient of 0.2% dilutions of solutions 1 to 5. The sliding friction coefficient K represents a measure of the performance of the lubricant and is calculated using the formula

$$K=F/G$$

- K sliding friction coefficient
 F force measured on the measuring facility of the bottle conveying plant (Fig. 1)
 G weight of the bottles used in the test.

The lower the sliding friction coefficient, the greater the lubricating effect. The dilution value of soap solution A was measured with fully demineralised water, whilst the values for solution B, C and D and for the solution of amine acetate were measured using Ladenburg tap water (24° German hardness). Fig. 2 clearly shows that pure soap solution has the lowest

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sliding friction coefficient ($K = 0.11$). Whereas solution C of polyether carboxylic acid salt exhibits practically no relevant lubricating effect ($K > 0.2$), solution B of amphoteric surfactant has a low lubricating effect ($K = 0.152$) which is insufficient for the purpose of the application according to the invention.

As shown in Fig. 2, the sliding friction coefficient ($K = 0.12$) of the inventive solution 4 was practically as high as that of soap solution. This value is comparable to the sliding friction coefficient of a commercial quality amine acetate which represents the present state of the art in this field.

Examples II - XIV

Corresponding tests were made, using the following individual soap dispersants of the instant invention, combined singly with a soap component as in Example I:

Example	Soap dispersant	Tradename	Soap Dispersing Effect
II	fatty alcohol alkoxylate	Synperonic LF/RA 30	++
III	alkyl poly-glucoside	Glucopon CSUP	+
IV	alkyl polyether carbonic acid	Akypo RO 50	++

V	alkyl polyether sulfate	Manro BES	++
VI	alkyl polyether phosphate	Marlopor FC	+
VII	alkyl polyether sulfosuccinate	Tensuccin HM935	+
VIII	alkylamido polyether sulfosuccinate	Lankropol KS6	+
IX	alkyl mono- amine carboxy- late	Amphoram CP1	++
X	alkyl poly- amine carboxy- late	Amphionic SFB	+
XI	alkyl betaine	Tegotain N192	+
XII	alkylamido betaine	Amphotensid B4	+
XIII	alkyl sulfo- betaine	Rewoteric AM HC	++
XIV	alkylamido sulfobetaine	Mirataine CBS	++

All Examples exhibited good to very good soap dispersing effect, shown by very slight or no turbidity after several weeks, even when rather alkaline, very hard local tap water was used. The lubricating properties of the combinations of

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soap and soap dispersant of Examples II to XIV were generally comparable to those of the soap component as such.

CLAIMS

1. Lubricant concentrate, especially for preparing an aqueous lubricant composition for belt or chain conveyors used in the bottling industry, comprising a soap component, especially a fatty acid alkaly or amino soap, in an amount sufficient provide lubricating properties to the aqueous lubricant composition, and, in case, comprising minor amounts of further customary lubricant concentrate components, characterized in that the concentrate is substantially free from hardness ion complexing or sequestering agents, and that the lubricant concentrate comprises a substantially biodegradable, nonionic, anionic or amphoteric soap dispersant preventing the precipitation of poorly soluble or insoluble hardness ion compounds of the soap component without having any substantial hardness ion complexing or sequestering properties.
2. The lubricant concentrate according to claim 1, characterized in that the concentrate comprises, as the biodegradable soap dispersant, at least one of an amphoteric alkyl monoamine or polyamine carboxylate, or a betaine, especially an alkyl or alkylamido betaine or sulfobetaine.
3. The lubricant concentrate according to claim 1, characterized in that the concentrate comprises, as the biodegradable soap dispersant, at least one of a nonionic fatty alcohol alkoxylate or alkyl polyglucoside.

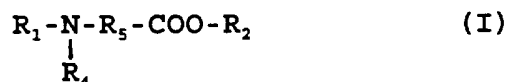
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4. The lubricant concentrate according to claim 1, characterized in that the concentrate comprises, as the biodegradable soap dispersant, at least one anionic polyether compound other than an alpha olefin polyether sulfonate, especially at least one of

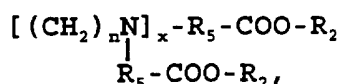
- an alkyl polyether carbonic acid,
- an alkyl polyether sulfate,
- an alkyl polyether sulfosuccinate,
- an alkyl polyether phosphate or

a corresponding alkylamido polyether compound.

5. The lubricant concentrate according to claim 2, characterized in that the soap dispersant comprises at least one compound of the general formula (I)



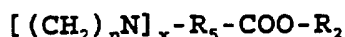
wherein R_1 is a linear, branched, saturated or unsaturated alkyl residue having 8 to 22 carbon atoms or a corresponding alkoxy residue, R_2 is Na, K or $N(R_3)_3$, wherein R_3 is H, alkyl or hydroxyalkyl, R_4 is H, alkyl, hydroxyalkyl, $R_5-COO-R_2$ or



R_5 is alkyl or hydroxyalkyl, n is an integer from 1 to 10 and x is an integer from 1 to 50.

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6. The lubricant concentrate according to claim 5, characterized in that the soap dispersant comprises an alkyl monoamine carboxylate corresponding to the general formula (I) wherein R_1 is cocoalkyl, R_4 is H, R_5 is ethylene and R_2 is triethanolammonium ion.
7. The lubricant concentrate according to claim 5, characterized in that the soap dispersant comprises an alkyl polyamine carboxylate corresponding to the general formula (I), wherein R_4 is



and wherein R_5 is methylene or ethylene, preferably methylene; R_2 is Na or K, preferably Na; n is 2 to 4, preferably 3, and x is 1 to 5, preferably 1 to 3.

8. The lubricant concentrate according to claim 2, characterized in that the soap dispersant comprises a betaine of the general formula (II)

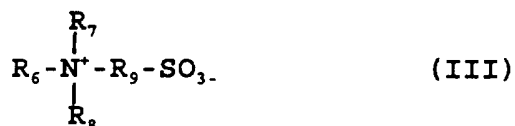


wherein R_6 is R_1 or $R_1CONH-(CH_2)_n$, with R_1 and n having the same meaning as in formula (I), and R_7 and R_8 are equal or different alkyl or hydroxyalkyl substituents.

9. The lubricant concentrate according to claim 8, characterized in that R_6 is cocoalkyl and R_7 and R_8 are hydroxyethyl.

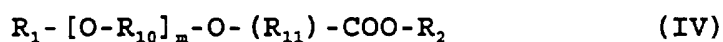
- 24 -

10. The lubricant concentrate according to claim 8, characterized in that R_6 is cocoamidopropyl, and R_7 and R_8 are methyl.
11. The lubricant concentrate according to claim 2, characterized in that the soap dispersant comprises a sulfobetaine corresponding to the general formula (III)



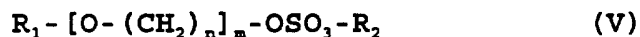
wherein R_6 , R_7 and R_8 have the same meaning as in formula (II), and R_9 is linear or branched alkyl or hydroxyalkyl.

12. The lubricant concentrate according to claim 11, characterized in that R_6 is lauryl, R_7 and R_8 are methyl and R_9 is 2-hydroxypropyl.
13. The lubricant concentrate according to claim 11, characterized in that R_6 is cocoamidopropyl, R_7 and R_8 are methyl, and R_9 is 2-hydroxypropyl.
14. The lubricant concentrate according to claim 3, characterized in that the soap dispersant comprises a C_{11} - C_{17} alkanolalkoxylate, especially a C_2 - C_5 alkoxylate.
15. The lubricant concentrate according to claim 4, characterized in that the soap dispersant comprises an alkyl polyether compound corresponding to the general formula (IV)



wherein R_1 and R_2 have the same meaning as in formula (I), R_{10} and R_{11} are alkyl residues, and m is an integer from 1 - 20.

16. The lubricant concentrate according to claim 15, characterized in that R_1 is C_9 - C_{11} alkyl, R_{10} is ethylene, R_{11} is methylene or ethylene, m is 3 - 5 and R_2 is triethanolammoniumion.
17. The lubricant concentrate according to claim 4, characterized in that the soap dispersant comprises a compound of the general formula (V)



wherein R_1 , R_2 , n and m have the same meaning as in formula (I).

18. The lubricant concentrate according to claim 17, characterized in that R_1 is a natural, a Ziegler synthetic, or an oxosynthetic alkyl, n is 2, m is 1, 2 or 3 and R_2 is sodium.
19. The lubricant concentrate according to any one of the preceding claims, characterized in that the soap component comprises a compound corresponding to the general formula (VI)



wherein R_1 and R_2 have the same meaning as in formula (I).

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20. The lubricant concentrate according to any one of claims 1 - 19,
characterized in that the amount of soap dispersant in the concentrate is larger than that of soap component.
21. The lubricant concentrate according to any one of the preceding claims,
characterized in that the concentrate additionally contains an alkanolamine.
22. The lubricant concentrate according to any one of the preceding claims,
characterized in that it contains at least one monovalent or multivalent alcohol as a dissolving promoter.
23. The lubricant concentrate according to any one the preceding claims,
characterized in that it contains a disinfectant or a preservative, such as 4,4 -dimethyl oxazolidine, as a microbicidal component.
24. An aqueous lubricant composition, especially for belt or chain conveyors in the bottling industry,
characterized in that it comprises the concentrate ingredients defined in any one of claims 1 to 23 plus a major amount of water.
25. Use of a lubricant concentrate a defined in any one of claims 1 to 23 for the preparation of a lubricant composition having a pH of 8 or higher when used to lubricate a conveyor belt or chain.

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26. Use of an aqueous lubricant composition as defined in claim 24, and having a pH of 8 or higher, to lubricate a conveyor belt or chain.

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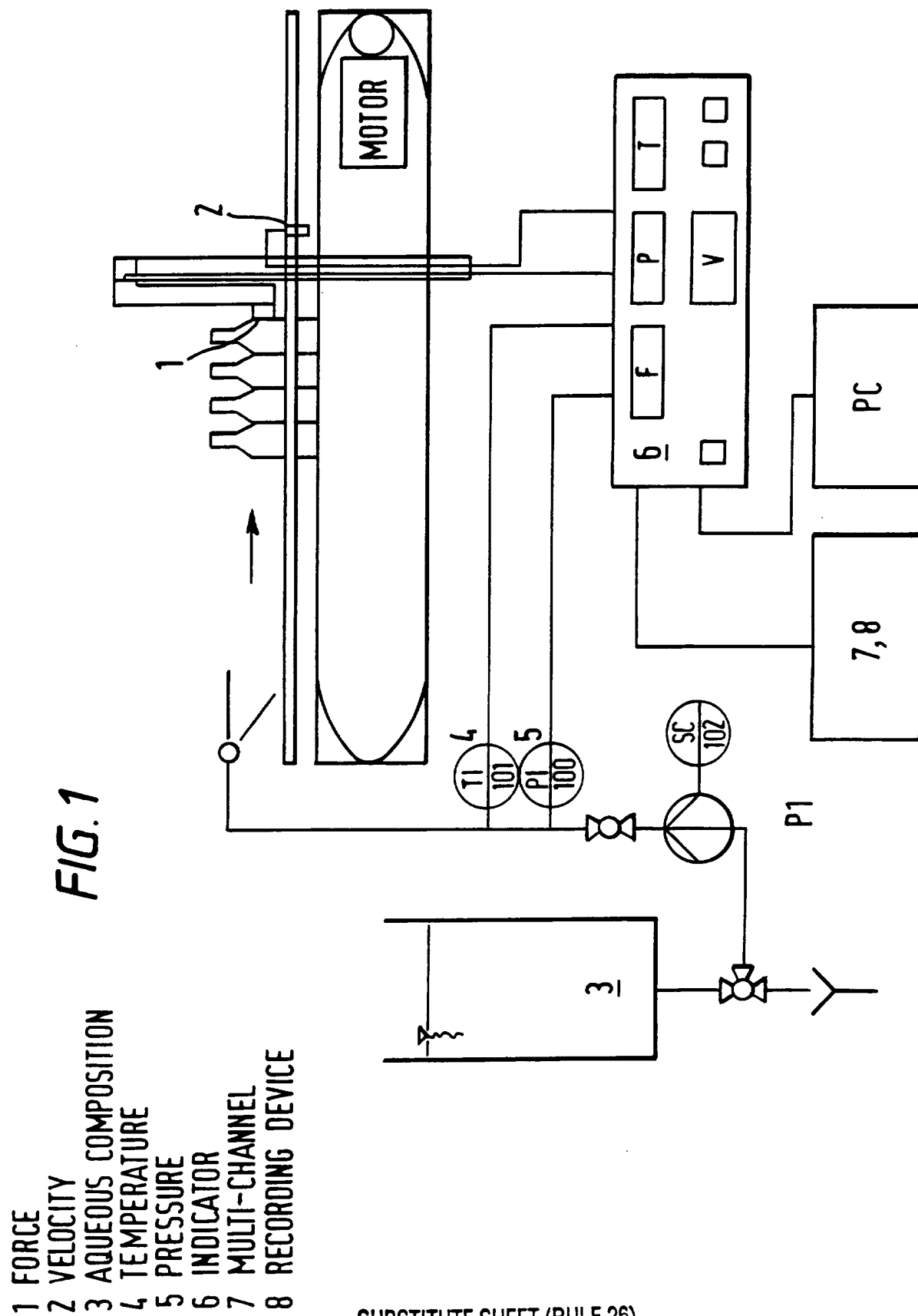
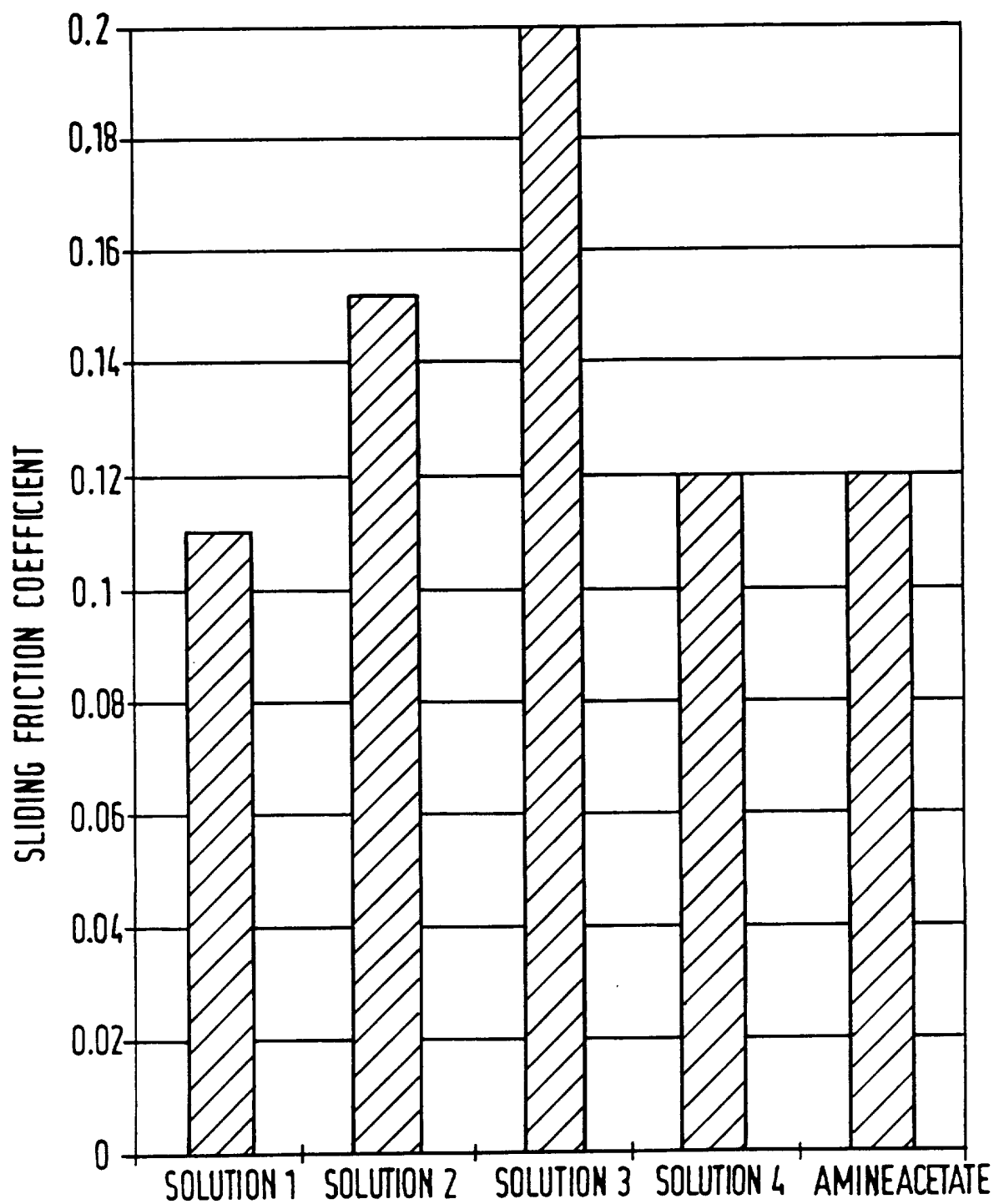


FIG. 2

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SLIDING FRICTION COEFFICIENT OF 0.2% APPLICATION SOLUTIONS



INTERNATIONAL SEARCH REPORT

International Application No.
PCT/EP 95/04935

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C10M173/02 //(C10M173/02,129:40,133:08),C10N30:04,40:00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C10M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	US,A,5 352 376 (GUTZMANN T A) 4 October 1994 see claims 1-4,12,13; examples I-VI ---	1,3,4, 14,17, 19,20, 22-26
X	DE,A,23 02 367 (BIESTERFELD AND CO NEDER) 26 July 1973 see page 3, paragraph 4; example 3 see page 5, paragraph 2 ---	1,3,4, 17-21, 24-26
X	WO,A,93 18120 (HENKEL KGAA) 16 September 1993 see page 10, paragraph 2; claims 1-12 --- -/-	1-3,5,6, 14,19, 23,24

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

26 April 1996

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International Application No.
PCT/EP 95/04935

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X	DATABASE WPI Section Ch, Week 9329 Derwent Publications Ltd., London, GB; Class D21, AN 93-232642 & JP,A,05 156 282 (KAO CORP) , 22 June 1993 see abstract ---	1,2,8-13
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International Publication No
PCT/EP 95/04935

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US-A-3594411	20-07-71	NONE	