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54 Coating composition for lubrication.

57 A coating composition to be used for lubrication, which comprises a synthetic resin, a solid lubricant and a friction coefficient adjuster.

**COATING COMPOSITION FOR LUBRICATION**

FILED OF THE INVENTION AND RELATED ART STATEMENT

5 The present invention relates to a coating composition to be used for lubrication. In particular, it relates to a coating composition for lubrication which is capable of providing an optimum friction coefficient to places to which it is applied and, at the same time, is capable of lowering abrasion loss.

Lubricants are supplied to surfaces of machines, devices, etc., so as to protect their surfaces from seizure and abrasion loss by replacing the dry friction between two surfaces by fluid friction or boundary friction.

10 Among hitherto employed lubrication compositions are of coating type comprising synthetic resins and solid lubricants, such as those described, e.g., in Japanese Patent Application (Laid Open) Nos. 86,764/88; 157,664/80 and 200,463/82; and Japanese Patent Publication No. 1,314/80. Major objects of producing, and using, such lubrication compositions are, among others, as follows:

- 15 1) improvement of lubrication, namely, lowering of friction coefficient of sliding surfaces, and reduction of abrasion loss;
- 2) prevention of scuffing; and
- 3) improvement of corrosion resistance.

20 There are parts which must have a relatively high, but a moderate friction coefficient and, at the same time, a low friction loss. For example, if the friction coefficient between a belt and a pulley is too small, the belt will slip on the pulley. In the case where the friction coefficient between a bolt, screw or the like and a surface with which it contacts is too small, the bolt tends to become loose. In addition, clutch plates, friction discs of differential-limiting differential gears, etc., which are used under wet conditions, also require a high abrasion resistance and a moderately high friction coefficient.

25 When prior coating compositions are applied to parts which require a moderately high friction coefficient and a low abrasion loss, there will be resulted an undesirably low friction coefficient, although a low level of abrasion can be attained because of the characteristic mentioned in 1) above. In particular, when prior lubrication coating compositions are used for clutch plates, friction discs of differential-limiting differential gears, etc., which are used under wet conditions, the friction coefficient between their sliding surfaces becomes too low [friction coefficient ( $\mu$ ) will be around 0.05], and hence the frictional force  
30 necessary for the transmission of torque will not be attained. Because of this, an increased number of friction plates is required, or an increased pressing load must be applied, so as to attain sufficient frictional force.

35 OBJECTS AND SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a coating composition for lubrication which is capable of providing an appropriate level of friction coefficient ( $\mu = 0.06$  or above) and, at the same time, is  
40 capable of reducing abrasion loss.

It is another object of the present invention to provide a coating composition for lubrication which markedly improves sliding properties, frictional properties and lubricating properties of parts which are required to have a moderately high friction coefficient and a low abrasion loss, so as to secure the transmission of torque in differential-limiting differential gears, clutch discs, pulleys, etc. to be used in oil; or  
45 of parts, such as bolts, which are required to have a moderately high friction coefficient to prevent the loosening thereof.

There is provided by the present invention a coating composition for lubrication which comprises a synthetic resin, a solid lubricant and a friction coefficient adjuster.

50 The coating composition according to the present invention is imparted with excellent lubricating properties by a solid lubricant and, at the same time, its lubrication property is adjusted by a friction coefficient adjuster to a desired moderate level, without any impairment of its abrasion resistant properties.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will be explained hereinbelow in detail.

There is no particular restriction on synthetic resins to be used in the coating composition for lubrication according to the present invention. Any synthetic resins can be used, including thermosetting resins, cold setting resins and two-component curing resins. The resins can be either water miscible or oil miscible.

5 Specific examples of usable synthetic resins include epoxy resins, phenyl resins, amino resins, polyester-alkyd resins, polyurethane resins, vinyl resins, polyamide-imide resins and silicon resins.

These resins can be used either individually or in combination of two or more. To use a combination of an epoxy resin and an amino resin can be particularly preferable since excellent adhesion, corrosion resistance, oil resistance, etc. can be attained with regard to coated films formed therefrom. In this case, 10 amino resins are used preferably in an amount of 20 to 100 parts by weight, per 100 parts by weight of epoxy resins.

Synthetic resins are used preferably in an amount of from 20 to 80% by weight, in particular, from 30 to 60% by weight, based on the total weight of the coating composition. When the amount of synthetic resins used is less than 20% by weight, insufficient adhesion, corrosion resistance, oil resistance, etc. will be 15 resulted, whereas when it exceeds 80% by weight, it becomes difficult to control friction coefficient.

There are no particular restrictions on the kind of solid lubricants to be used. Examples of usable solid lubricants include sulfides, such as molybdenum disulfide and tungsten disulfide; fluorides, such as 20 polytetrafluoroethylene and graphite fluoride; graphite; melamine-cyanuric acid addition products; and boron nitride. These solid lubricants can be used either individually or in combination of two or more. It can be particularly preferable to use a combination of a sulfide and a fluoride because of their excellent withstand load, fitting and feeling. In this case, fluorides are used preferably in an amount of ca. 50 to 200 parts by weight, per 100 parts by weight of sulfides.

Such solid lubricants are used preferably in an amount of 20 to 80% by weight, in particular, 30 to 60% by weight, based on the total weight of the coating composition. When the amount of solid lubricants 25 incorporated is less than 20% by weight, there will be resulted insufficient withstand load, fitting and feeling. In the case where it exceeds 80% by weight, there will be resulted insufficient adhesion, corrosion resistance and oil resistance.

Examples of usable friction coefficient adjusters include carbon fibers; carbon black; silicon compounds, such as silicon dioxide, silicon carbide, silicon nitride and glass fibers; aluminum oxide; potassium titanate 30 fibers; and cellulose fibers. These friction coefficient adjusters can be used either individually or in combination of two or more. In the present invention, it can be particularly preferable to use carbon fibers as a friction coefficient adjuster since the use of carbon fibers can be highly effective not only in the adjustment of friction coefficient, but also in the enhancement of abrasion resistance.

Friction coefficient adjusters, in the case where they are fibrous, preferably have a length of ca. 10  $\mu\text{m}$  35 to 1 mm and, when they are granular, preferably have a diameter of ca. 100  $\mu\text{m}$  or less.

Such friction coefficient adjusters are used preferably in an amount of 50% by weight or less, more preferably from 5 to 30% by weight, based on the weight of the coating composition prepared. When the amount of friction coefficient adjusters incorporated exceeds 50% by weight, there will be resulted low adhesiveness and corrosion resistance of the coated lubricant film, and its abrasion resistance will not be 40 sufficiently improved.

The coating composition according to the present invention can be easily prepared, e.g., by mixing a synthetic resin with a solid lubricant at a prescribed ratio, and then incorporating therein a prescribed amount of a friction coefficient adjuster. In addition, its friction coefficient can be varied over a wide range by adjusting the ratio of the components, while maintaining the abrasion loss at a low level.

45 If desired, an appropriate amount of solvent can be used upon the mixing of a synthetic resin and a solid lubricant or after the mixing of the three components, so as to make their mixing easier and to adjust the viscosity of the composition to a level suited for use.

Any solvent can be used if it is capable of dissolving synthetic resins. Although the amount of solvents to be used varies depending on the viscosity and quantity of synthetic resins used, it can be preferable to 50 use ca. 100 to 300 parts by weight of solvents, per 100 parts by weight of the composition. It is possible to use either one single solvent or a mixture of solvents. Specific examples of usable solvents include methyl ethyl ketone (M.E.K.), xylene, and the like.

If desired, in addition to the above three components, the coating composition according to the present invention can be additionally incorporated with various additives, including quality modifiers. In this case, 55 the amount of the additional additives should be 20% by weight or less, based on the weight of the coating composition.

The coating composition according to the present invention makes it possible to form a lubrication film having a friction coefficient controlled to a relatively high level and at the same time having a markedly

reduced abrasion loss. Accordingly, sliding friction and lubrication properties of such parts as differential-limiting differential gears, clutch discs and pulleys --- which require a low abrasion loss and, at the same time, a relatively high level of friction necessary to secure the transmission of torque --- and of parts which require a moderately high friction coefficient that prevents loosening of bolts etc. can be markedly improved by using the coating composition according to the invention.

The present invention will further be explained hereinbelow by way of examples. It should however be noted that the scope of the present invention will by no means be limited to these.

#### 10 Examples 1 to 21 and Comparative Example 1

Coating compositions for lubrication were prepared by using materials shown in Table 1 in ratios given in Table 2.

To be more specific, 100 parts by weight of a synthetic resin is dissolved in 100 to 200 parts by weight of a solvent (M.E.K., xylene, or the like), and then a solid lubricant is added thereto. The resulting mixture is subjected to pulverization treatment by use of a ball mill, and a prescribed amount of friction coefficient adjuster is added thereto. The thus obtained mixture was stirred to give a sample of coating composition.

Samples of coating compositions obtained were applied to test pieces set forth below, and friction coefficient and abrasion loss were determined in the manner described below. Results obtained are shown in Table 2.

#### (1) Determination of Friction Coefficient

Friction coefficient was determined in the following manner, employing a tester, test pieces and test conditions described below.

To be more specific, a ring and a block are subjected to surface treatment to form thereon a film of zinc phosphate, and then a sample of a coating composition prepared as above was air-sprayed on its surface at a thickness of ca. 20  $\mu$ m, and then the coated film was cured under conditions given in Table 2. Friction coefficient was determined by pressing, with a constant load, the coated surface of the block onto the coated surface of the ring, while rotating the ring at a constant speed.

Upon the determination of friction coefficient, the surface of the ring not contacted with the block was either dipped or not dipped in an oil (mineral oil) used for differential-limiting differential gears.

##### Tester

FALEX #1, Ring and Block Test Machine [manufactured by Faville Le Vally Co. (ASTM D 2714)]

##### Test Pieces

Ring: SAE 4620 Steel, Hrc 58-63, 6-12 rpm.

Block: SAE 0-1 Steel, Hrc 58-63, 4-8 r.p.m.

##### Test Conditions

Load: 100 lbs

Rotation Speed: 30 r.p.m.

#### (2) Determination of Abrasion Loss

Friction Plate A was prepared by coating a coating composition on a surface of a steel plate in the same manner as in the above (1) Determination of Friction Coefficient. Friction Plate B (outer diameter, 120 mm; inner diameter, 100 mm; and thickness, 1.8 mm) was prepared from a quenched and tempered steel plate (made of JIS SK5M steel; hardness, HV 460) having a surface roughness of 0.5  $\mu$ Ra. Friction test was performed by using Friction Plate A in combination with Friction Plate B.

To be more specific, Friction Plate A was pressed with a load of 500 k.g.f. onto Friction Plate B, while rotating Friction Plate B at about 50 r.p.m. in an oil used for differential-limiting differential gears, and its abrasion loss (thickness of wearing) was measured after 200 hours.

It would be apparent from Table 2 that coating compositions for lubrication according to the invention have higher friction coefficients than the prior art composition (Comparative Example 1), and their friction coefficients can be varied over a wide range. In addition, their abrasion losses are extremely small. On the other hand, the prior composition (Comparative Example 1) has an excessively low friction coefficient and exhibits a large abrasion loss.

In addition, in the case of Comparative Example 1, the coated film wore to the extent that part of the base steel was exposed, whereas in the case where the coating compositions according to the present invention were used, the coated films remained almost completely.

In the test using the thrust tester performed in (2) Determination of Abrasion Loss, coating compositions according to the invention formed films having a static friction coefficient ( $\mu_s$ ) smaller than dynamic friction coefficient ( $\mu_d$ ). It was also found that the coated films according to the invention effectively suppress the generation of noises owing to the stick slip phenomenon. On the other hand, in the case of the prior composition (Comparative Example 1), the  $\mu_s$  of the coated film was almost equal to, or a little smaller than, its  $\mu_d$ . In addition, its steel base was exposed during the test since the abrasion resistance of the coated film was not sufficiently high, and noises were generated owing to the stick slip phenomenon.

In Table 1 are shown trade names and manufacturers of the components used in Comparative Example 1 and Examples 1 to 21. It should however be noted that the components used therein are just examples, and the actual practice of the invention is not limited to these.

Table 1

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20	Resin	Epoxy Resin Amino Resin Phenyl Resin Polyester-Alkyd Resin Polyurethane Resin Vinyl Resin Polyamide-Imide Resin Silicone Resin	[Epichlon 7050 manufactured by Dainippon Ink & Chemicals Co., Ltd.] [Epichlon 840 manufactured by Dainippon Ink & Chemicals Co., Ltd.] [Beckamin P-138 manufactured by Dainippon Ink & Chemicals Co., Ltd.] [Phenodur PR401 Hoechst Japan Co., Ltd.] [Bekkosol ER-3400-60 manufactured by Dainippon Ink & Chemicals Co., Ltd.] [Bahnok M-5350 manufactured by Dainippon Ink & Chemicals Co., Ltd.] [Eslek BL-2 manufactured by Sekisui Chemical Industries Co., Ltd.] [HI-400 manufactured by Hitachi Chemical Industries Co., Ltd.] [KR 282 manufactured by Shin-etsu Chemical Industries Co., Ltd.]
30	Solid	Molybdenum Disulfide	[Technical Grade manufactured by Climax Molybdenum Co.] [Technical Fine Grademanufactured by Climax Molybdenum Co.]
35	Lubricant	Polytetrafluoroethylene Graphite Melamine-Cyanuric Acid Addition Product Boron Nitride	[Fluon manufactured by Asahi Glass Co., Ltd.] [SP-10 SP-10 manufactured by Japan Graphite Industries Co., Ltd.] [M.C.A. manufactured by Yuka Melamine Co., Ltd.] [Sho BN manufactured by Japan Graphite Co., Ltd.]
40	Friction	Carbon Fiber	[Kureka Chop M-1009S, M-101S or M-104T manufactured by Kureha Chemical Industries Co., Ltd.]
45	Coefficient Adjuster	Carbon Black Silicon Dioxide Aluminum Oxide Potassium Titanate Fiber Cellulose Fiber	[Raven 1250 manufactured by Combia Carbon Japan Co., Ltd.] [AEROSIL 200 manufactured by Japan Aerosil Co., Ltd.] [Earth Alumina manufactured by Earth Pharmaceuticals Co., Ltd.] [Tismo-D manufactured by Otsuka Chemicals Co., Ltd.] [Kimwipe S-200 manufactured by Jujo Kimberly Co., Ltd.]

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Table 2

	Synthetic Resin		Solid Lubricant		Friction Coefficient			Under Dry Lubricant	
	Type of Setting (200°C, 30 min.)	Kind: Parts by weight	Amount incorporated (% by weight)	Kind(Average particle size in µm):Parts by weight	Amount incorporated (% by weight)	Kind(Average particle size in µm)	Friction Coefficient (µ)	Abrasion Loss (µm)	Friction Coefficient (µ)
Comparative Example 1	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Amino Resin: 80	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	60	None	0.050	16.5	0.120
Example 1	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Amino Resin: 80	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Carbon Fiber Diameter:14.5 Length: 90	0.105	4.0	0.217
Example 2	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Amino Resin: 80	45	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	45	Carbon Fiber Diameter:14.5 Length: 90	0.101	6.5	0.199
Example 3	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Amino Resin: 80	30	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	30	Carbon Fiber Diameter:14.5 Length: 90	0.103	10.5	0.201
Example 4	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Amino Resin: 80	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Carbon Fiber Diameter:14.5 Length: 90	0.080	4.2	0.173
Example 5	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Amino Resin: 80	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Carbon Fiber Diameter:14.5 Length: 130	0.090	4.3	0.195
Example 6	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Amino Resin: 80	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Carbon Fiber Diameter:18.0 Length: 370	0.105	4.2	0.210
Example 7	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Amino Resin: 80	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Carbon Black (23.0)	0.080	6.9	0.165
Example 8	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Amino Resin: 80	45	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	45	Silicon Dioxide (12 mp)	0.105	9.6	0.187
Example 9	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Amino Resin: 80	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Aluminum Oxide (less than 60)	0.075	10.1	0.161
Example 10	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Amino Resin: 80	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Potassium Titanate Fiber Diameter:0.2-0.5 Length: 10-20	0.070	8.9	0.150

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Table 2 (Continued)

Example	Synthetic Resin		Solid Lubricant		Friction Coefficient		Lubricant Oil		Under Dry Lubricant
	Type of Setting (200°C, 30 min.)	Kind: Parts by weight	Amount incorporated (% by weight)	Kind(Average particle size in um):Parts by weight	Amount incorporated (% by weight)	Kind(Average particle size in um)	Friction Coefficient (u)	Abrasion Loss (um)	Friction Coefficient (u)
Example 11	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Amino Resin: 80	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Cellulose Fiber (Wood pulp)	0.085	8.7	0.166
Example 12	Thermosetting (200°C, 30 min.)	Vinyl Resin:100 Amino Resin:100	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Carbon Fiber Diameter:14.5 Length: 90	0.105	4.9	0.210
Example 13	Cold Setting (Ordinary Temp., 4hrs.)	Polyurethane Resin	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Carbon Fiber Diameter:14.5 Length: 90	0.095	5.3	0.199
Example 14	Two-Component Type (Ordinary temp., 1hr)	Epoxy Resin	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Carbon Fiber Diameter:14.5 Length: 90	0.100	5.7	0.207
Example 15	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Phenyl Resin:80	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Carbon Fiber Diameter:14.5 Length: 90	0.090	4.7	0.179
Example 16	Thermosetting (200°C, 30 min.)	Amino Resin:100 Polyester-Alkyd Resin: 80	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Carbon Fiber Diameter:14.5 Length: 90	0.095	5.9	0.188
Example 17	Thermosetting (250°C, 1hr)	Polyamide-Imide Resin	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Carbon Fiber Diameter:14.5 Length: 90	0.080	6.3	0.156
Example 18	Thermosetting (200°C, 30 min.)	Silicone Resin	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Carbon Fiber Diameter:14.5 Length: 90	0.080	6.7	0.181
Example 19	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Amino Resin: 80	40	Molybdenum Disulfide (5.0):100 Polytetrafluoroethylene (5.0):100	40	Carbon Fiber Diameter:14.5 Length: 90	0.105	4.2	0.192
Example 20	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Amino Resin: 80	40	Graphite (10.0): 30 Molybdenum Disulfide (5.0):100 Melamine-Cyanuric Acid Addition Product (3.0):100	40	Carbon Fiber Diameter:14.5 Length: 90	0.100	5.3	0.204
Example 21	Thermosetting (200°C, 30 min.)	Epoxy Resin:100 Amino Resin: 80	40	Boron Nitride (2.0):100 Polytetrafluoroethylene (5.0):100	40	Carbon Fiber Diameter:14.5 Length: 90	0.100	4.9	0.199

**Claims**

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1. A coating composition for lubrication which comprises a synthetic resin, a solid lubricant and a friction coefficient adjuster.

2. A composition as defined in claim 1, wherein said synthetic resin is a member selected from the group consisting of epoxy resins, phenyl resins, amino resins, polyester-alkyd resins, polyurethane resins, vinyl resins, polyamide-imide resins and silicone resins.

3. A composition as defined in claim 2, wherein said synthetic resin is a mixture of an epoxy resin and an amino resin, containing the latter in an amount of 20 to 100 parts by weight, per 100 parts by weight of the former.

4. A composition as defined in claim 1, wherein the content of said synthetic resin is from 20 to 80% by weight.

5. A composition as defined in claim 1, wherein said solid lubricant is a member selected from the group consisting of sulfides, fluorides, graphite, melamine-cyanuric acid addition products and boron nitride.

6. A composition as defined in claim 5, wherein said solid lubricant is a mixture of a sulfide and a fluoride, containing the latter in an amount of 50 to 200 parts by weight, per 100 parts by weight of the former.

7. A composition as defined in claim 1, wherein the content of said solid lubricant is from 20 to 80% by weight.

8. A composition as defined in claim 1, wherein said friction coefficient adjuster is one or more members selected from the group consisting of carbon fibers, carbon black, silicon compounds, aluminum oxide, potassium titanate fibers and cellulose fibers.

9. A composition as defined in claim 8, wherein said friction coefficient adjuster is carbon fibers.

10. A composition as defined in claim 9, wherein said carbon fibers have a length of 10  $\mu\text{m}$  to 1 mm and a diameter of 10 to 50  $\mu\text{m}$ .

11. A composition as defined in claim 1, wherein the content of said friction coefficient adjuster is 50% by weight or less.

12. A composition as defined in claim 11, wherein the content of said friction coefficient adjuster is from 5 to 30% by weight.

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EINSCHLÄGIGE DOKUMENTE			
Kategorie	Kennzeichnung des Dokuments mit Angabe, soweit erforderlich, der maßgeblichen Teile	Betrifft Anspruch	KLASSIFIKATION DER ANMELDUNG (Int. Cl.5)
X	US-A-3 717 576 (T. HIRATSUKA) * Column 1, line 59 - column 2, line 3; column 3, lines 21-75; examples 6-10 * ---	1,2,4,5 ,7	C 10 M 111/04 C 10 M 169/04 // (C 10 M 111/04 C 10 M 103:00
X	US-A-4 438 004 (P.A. MYERS) * Column 3, line 30 - column 4, line 19 *	1,2,5,8 ,11	C 10 M 103:02 C 10 M 103:06 C 10 M 107:00 )
A	---	9,11,12	(C 10 M 169/04 C 10 M 107:00
A	US-A-4 770 797 (A.J. SYRACUSE) * Column 3, lines 28-44 * ---	1,2,4-7	C 10 M 125:00 C 10 M 125:02 C 10 M 125:10
A	JAPANESE PATENT REPORTS, section CH, vol. 76, no 49, 27th November 1976, class H, page 2-3, no. J76044268-B, Derwent Publications Ltd, London, GB; & JP-B-76 044 268 (OILESS IND. CO.) 28-11-1976; & JP-A-51 042 868 (OILESS IND. CO.) 13-04-1976 * Abstract * ---	5,6	C 10 M 125:18 C 10 M 125:22 C 10 M 125:26 ) C 10 N 20:06 C 10 N 50:08
X	FR-A-2 317 342 (SEB SA) * Page 2, lines 16-26; page 5, lines 9-18; page 6, example 3 * ---	1,2,4-8 ,11,12	RECHERCHIERTE SACHGEBIETE (Int. Cl.5)
A	US-A-4 329 238 (A.K. MITROFAROVA) * Claims 1,7 * -----	3	
Der vorliegende Recherchenbericht wurde für alle Patentansprüche erstellt			
Recherchenort DEN HAAG		Abschlußdatum der Recherche 14-03-1990	Prüfer HILGENGA K. J.
KATEGORIE DER GENANNTEN DOKUMENTE		T : der Erfindung zugrunde liegende Theorien oder Grundsätze E : älteres Patentedokument, das jedoch erst am oder nach dem Anmeldedatum veröffentlicht worden ist D : in der Anmeldung angeführtes Dokument L : aus andern Gründen angeführtes Dokument ..... & : Mitglied der gleichen Patentfamilie, übereinstimmendes Dokument	
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