



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 080 943 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.03.2001 Bulletin 2001/10

(51) Int. Cl.⁷: **B41N 3/08**

(21) Application number: **00118277.3**

(22) Date of filing: **05.09.2000**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **06.09.1999 JP 25179899**

(71) Applicant:
**FUJI PHOTO FILM CO., LTD.
Kanagawa 250-01 (JP)**

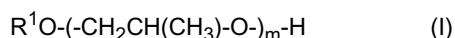
(72) Inventors:
• **Matsumoto, Hiroshi**
Yoshida-cho, Haibara-gun, Shizuoka (JP)
• **Watanabe, Kuniharu**
Yoshida-cho, Haibara-gun, Shizuoka (JP)
• **Uesugi, Toshio**
Yoshida-cho, Haibara-gun, Shizuoka (JP)

(74) Representative: **HOFFMANN - EITLE**
Patent- und Rechtsanwälte
Arabellastrasse 4
81925 München (DE)

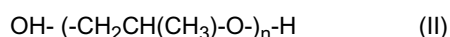
(54) **Fountain solution composition for lithographic printing plate**

(57) Fountain solution compositions for lithographic printing plate which can be favorably and safely used in a working environment as a substitute for isopropyl alcohol, show low dynamic surface tension, exert good and stable printability even in case where printing units rotate at a high speed, and show good printability for various inks, thereby giving printed matters with high qualities.

The fountain solution composition for lithographic printing plate comprises at least one compound represented by the following formula (I) and at least one compound represented by the following formula (II):



wherein R¹ represents a linear or branched alkyl group having 4 carbon atoms, and m is an integer of 1 to 3;



wherein n is an integer of 1 to 5.

EP 1 080 943 A1

DescriptionFIELD OF THE INVENTION

5 [0001] The present invention relates to a fountain solution composition for lithographic printing plate. More particularly, it relates to a fountain solution composition which is useful in an offset printing method of a lithographic printing plate.

BACKGROUND OF THE INVENTION

10 [0002] Lithographic printing is a printing system skillfully utilizing the property such that water is inherently immiscible with oils. A lithographic printing plate surface is constituted of water-receiving but oily ink-repellent regions and water-repellent but oily ink-receiving regions. The water-receiving but oily ink-repellent regions serve as non-image regions and the water-repellent but oily ink-receiving regions serve as image regions.

15 [0003] The lithographic printing is such that the non-image regions are wetted with a fountain solution to enlarge the surface chemical difference between the image regions and the non-image regions thereby increasing ink-repellency of the non-image regions and ink-receptivity of the image regions.

[0004] Heretofore, as the fountain solution, there have been generally known aqueous solutions containing alkali metal salts or ammonium salts of bichromic acid, phosphoric acid or its salts such as ammonium salt, and colloidal substances such as gum arabic and carboxymethyl cellulose (CMC).

20 [0005] However, fountain solutions containing only these compounds suffer from a disadvantage that non-image areas of a printing plate can be hardly uniformly wetted thereby. As a result, there arise problems such that printed matters are sometimes stained or such a fountain solution should be supplied at a skillfully controlled rate.

[0006] To overcome these problems, Dahlgren's system has been proposed wherein an aqueous solution containing about 20 to 25% of isopropyl alcohol is used as a fountain solution. According to this system, a number of merits can be achieved both in the working properties and the precision of the printed matters thus obtained, for example, improvement in the wettability of the non-image areas, reduction in the amount of the fountain solution needed, easiness in controlling the supply of a printing ink and water, reduction in the amount of the fountain solution to be emulsified into the printing ink, and improvement in the printing ink transfer onto a rubber blanket.

30 [0007] However, isopropyl alcohol easily vaporizes and thus a special apparatus is needed to maintain the isopropyl alcohol concentration in the fountain solution at a constant level, which brings about an increase in the cost. In addition, isopropyl alcohol has an inherent offensive odor and suffers from a problem of toxicity, which makes it unfavorable from the viewpoint of working environment. When such a fountain solution containing isopropyl alcohol is applied to the common offset printing system with the use of a damper, a problem arises that the desired effects cannot be achieved due to the evaporation of isopropyl alcohol on the roller and the plate.

35 [0008] Because of the recent growing social interest in the environmental pollution, regulation of chromium ion in waste water has been intensified. Moreover, there is a tendency toward regulation of the use of organic solvents including isopropyl alcohol from the viewpoint of safety and sanitation.

[0009] Under these circumstances, fountain solution compositions for lithographic printing plate have been required which are safe from the viewpoint of the environmental sanitation, can be supplied in an easily controlled manner without resort to any professional skill, and are excellent in the fountain solution properties such as preventing printing stains and being applicable to high-speed printing, thereby providing printed matters with high qualities.

SUMMARY OF THE INVENTION

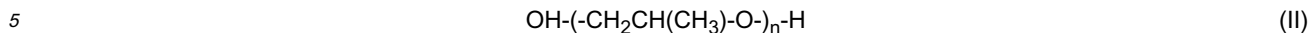
45 [0010] An object of the present invention is to provide a fountain solution composition for a lithographic printing plate which can be favorably and safely used in a working environment as a substitute for isopropyl alcohol, show low dynamic surface tension, exert good and stable printability even in case where printing units rotate at a high speed, and show good printability for various inks, thereby giving printed matters with high qualities.

50 [0011] To achieve the above object, the inventors have conducted intensive studies on a fountain solution composition for a lithographic printing plate. As a result, they have found that the combined use of a compound represented by the following formula (I) with a compound represented by the following formula (II) makes it possible to provide an excellent fountain solution composition which has a largely improved printability for various inks and, in particular, achieves a high printing stability specifically in cases with the use of inks containing metallic pigments and UV inks having been considered as less suitable in printing. The present invention has been completed based on this finding.

55 [0012] Accordingly, the present invention relates to a fountain solution composition for a lithographic printing plate, which comprises at least one compound represented by the following formula (I) and at least one compound represented by the following formula (II):



wherein R^1 represents a linear or branched alkyl group having 4 carbon atoms, and m is an integer of 1 to 3;



wherein n is an integer of 1 to 5.

DETAILED DESCRIPTION OF THE INVENTION

[0013] The fountain solution composition for a lithographic printing plate according to the present invention will be described in detail below. When the fountain solution composition is commercially sold, such is generally concentrated to form a commercially available product. In using, the concentrate is appropriately diluted. Unless otherwise indicated, the contents of various components and amounts thereof added given hereinafter are based on the amount of the whole fountain solution compositions at the time of using the same.

[0014] In the compound represented by the formula (I) to be used in the fountain solution composition for a lithographic printing plate according to the present invention, R^1 represents a linear or branched alkyl group having 4 carbon atoms and m is an integer of from 1 to 3. These compounds have conventionally been known as wettability improvers.

[0015] Examples of the compound represented by the formula (I) include propylene glycol monobutyl ether, dipropylene glycol monobutyl ether, tripropylene glycol monobutyl ether, propylene glycol monoisobutyl ether, dipropylene glycol monoisobutyl ether, tripropylene glycol monoisobutyl ether, propylene glycol mono-tert-butyl ether, dipropylene glycol mono-tert-butyl ether and tripropylene glycol mono-tert-butyl ether. Those compounds can be used alone or as mixtures of two or more thereof.

[0016] Of those, n-butyl or t-butyl ethers of propylene glycol and dipropylene glycol are preferably used.

[0017] The content of the compound represented by the formula (I) in the fountain solution composition is preferably 0.2 to 8% by weight, more preferably 0.5 to 5% by weight, based on the weight of the whole fountain solution composition. If the content of the compound (I) is less than 0.2% by weight, the obtained fountain solution has a poor wettability to a printing plate. On the other hand, if the content of the compound (I) exceeds 8% by weight, it tends to cause roller stripping or poor press life of a printing plate.

[0018] In the compound represented by the formula (II) used in the fountain solution composition of the present invention, n is an integer of from 1 to 5. Therefore, examples of the compound represented by the formula (II) include propylene glycol, dipropylene glycol, tripropylene glycol, tetrapropylene glycol and pentapropylene glycol. Those compounds can be used alone or as or mixtures of two or more thereof, Of those, propylene glycol, dipropylene glycol and tripropylene glycol are preferably used.

[0019] The content of the compound represented by the formula (II) in the fountain solution composition is preferably 0.05 to 7% by weight, more preferably 0.1 to 5% by weight, based on the weight of the whole fountain solution composition. If the content of the compound (II) is less than 0.05% by weight, the obtained fountain solution has poor emulsification properties to an ink and the printing plate tends to stain. On the other hand, if the content of the compound (II) exceeds 7% by weight, it tends to cause a printing ink concentration being unstable and roller stripping.

[0020] The fountain solution composition according to the present invention may contain the following components.

- (a) Wettability-improving auxiliaries.
- (b) Water-soluble polymer compounds.
- (c) pH regulating agents.
- (d) Odor-masking agents.
- (e) Other additives (e.g., (1) preservatives, (2) colorants, (3) rust preventives, (4) defoaming agents).

[0021] The wettability-improving auxiliaries (a) that can be used are surfactants and other solvents.

[0022] Of the surfactants, examples of anionic surfactants include fatty acid salts, abietic acid salts, hydroxylalkanesulfonic acid salts, alkanesulfonic acid salts, dialkylsulfosuccinic acid salts, linear alkylbenzenesulfonic acid salts, branched alkylbenzenesulfonic acid salts, alkylnaphthalenesulfonic acid salts, alkylphenoxypolyoxyethylene propylsulfonic acid salts, polyoxyethylene alkylsulfenyl ether salts, N-methyl-N-oleyltaurine sodium salts, N-alkylsulfosuccinic acid monoamide disodium salts, petroleum sulfonic acid salts, sulfated castor oil, sulfated beef tallow, sulfate salts of fatty acid alkyl esters, alkyl sulfate salts, polyoxyethylene alkyl ether sulfate salts, fatty acid monoglyceride sulfate salts, polyoxyethylene alkylphenyl ether sulfate salts, polyoxyethylene styrylphenyl ether sulfate salts, alkyl phosphate salts, polyoxyethylene alkyl ether phosphate salts, polyoxyethylene alkylphenyl ether phosphate salts, partly saponified styrene-maleic anhydride copolymer, partly saponified olefin-maleic anhydride copolymer and naphthalenesulfonate-formalin condensation products. Of those, dialkylsulfosuccinic acid salts, alkyl sulfate salts and alkylnaphthalenesulfonic

acid salts are particularly preferably used.

[0023] Examples of nonionic surfactants include polyoxyethylene alkyl ethers, polyoxyethylene alkylphenyl ethers, polyoxyethylene polystyrylphenyl ethers, polyoxyethylene polyoxypropylene alkyl ethers, partial esters of glycerol fatty acids, partial esters of sorbitan fatty acids, partial esters of pentaerythritol fatty acids, propylene glycol monofatty acid esters, partial esters of sucrose fatty acids, partial esters of polyoxyethylene sorbitan fatty acids, polyethylene glycol fatty acid esters, partial esters of polyglycerol fatty acids, polyoxyethylene castor oils, partial esters of polyoxyethylene glycerol fatty acids, fatty acid diethanolamides, N,N-bis-2-hydroxyalkylamines, polyoxyethylene alkylamines, triethanolamine fatty acid esters, and trialkylamine oxides. It is also possible to use fluorine-type surfactants and silicone-type surfactants. Of those, polyoxyethylene alkylphenyl ethers and polyoxyethylene-polyoxypropylene block copolymers are particularly preferably used.

[0024] Other surfactants such as silicone derivatives and fluorine derivatives are also used.

[0025] In case where the surfactant is used, the content thereof is 1.0% by weight or less, preferably from 0.001 to 0.5% by weight, considering the foaming properties. It is also possible to use two or more surfactants together.

[0026] Examples of other auxiliaries or wetting solvents that can be used in the present invention include: propylene glycol monomethyl ether, dipropylene glycol monomethyl ether, tripropylene glycol monomethyl ether, propylene glycol monoethyl ether, dipropylene glycol monoethyl ether, tripropylene glycol monoethyl ether, tetrapropylene glycol monoethyl ether, propylene glycol monopropyl ether, dipropylene glycol monopropyl ether, tripropylene glycol monopropyl ether, propylene glycol monoisopropyl ether, dipropylene glycol monoisopropyl ether, tripropylene glycol monoisopropyl ether, ethylene glycol monomethyl ether, diethylene glycol monomethyl ether, triethylene glycol monomethyl ether, polyethylene glycol monomethyl ether, ethylene glycol monoethyl ether, diethylene glycol monoethyl ether, triethylene glycol monoethyl ether, ethylene glycol monoisobutyl ether, diethylene glycol monoisobutyl ether, triethylene glycol monoisobutyl ether, ethylene glycol monopropyl ether, diethylene glycol monopropyl ether, triethylene glycol monopropyl ether, ethylene glycol monobutyl ether, ethylene glycol mono-tert-butyl ether, diethylene glycol monobutyl ether, triethylene glycol monobutyl ether, triethylene glycol mono-tert-butyl ether, 3-methoxy-3-methylbutanol, 3-methoxybutanol, ethylene glycol, diethylene glycol, triethylene glycol, butylene glycol, hexylene glycol, glycerol, diglycerol, polyglycerol and trimethylolpropane. These solvents can be used alone or as mixtures of two or more thereof. Those solvents are generally used in an amount of 0.1 to 3% by weight, preferably 0.3 to 2% by weight, based on the weight of the whole fountain solution composition.

[0027] Examples of the water-soluble polymer compounds (b) used in the fountain solution composition of the present invention include natural substances and denatured products thereof, such as gum arabic, starch derivatives (for example, dextrin, enzymatically digested dextrin, hydroxypropylated enzymatically digested dextrin, carboxymethylated starch, starch phosphate, starch octenyl succinate), alginate, and cellulose derivatives (for example, carboxymethylcellulose, carboxyethylcellulose, methyl cellulose), and synthetic substances such as polyethylene glycol and copolymers thereof, polyvinyl alcohol and derivatives thereof, polyvinyl pyrrolidone, polyacrylamide and copolymers thereof, polyacrylic acid and copolymers thereof, vinyl methyl ether/maleic anhydride copolymer, vinyl acetate/maleic anhydride copolymer, and polystyrenesulfonic acid and copolymers thereof.

[0028] The content of such a water-soluble polymer compound is 0.0001 to 0.1% by weight, preferably 0.0005 to 0.05% by weight, based on the weight of the whole fountain solution composition.

[0029] The pH regulating agents (c) that can be used in the fountain solution composition of the present invention are water-soluble organic acids and/or inorganic acids or salts thereof. Those compounds are effective in regulating or buffering pH of the fountain solution, appropriately etching a support of a lithographic printing plate or preventing the support from corrosion. Preferable examples of the organic acids include citric acid, ascorbic acid, malic acid, tartaric acid, lactic acid, acetic acid, gluconic acid, hydroxyacetic acid, oxalic acid, malonic acid, levulinic acid, sulfanilic acid, p-toluenesulfonic acid, phytic acid and organic phosphonic acid. Examples of the inorganic acids include phosphoric acid, nitric acid, sulfuric acid and polyphosphoric acid. Further, alkali metal salts, alkaline earth metal salts, ammonium salts or organic amine salts of these organic acids and/or inorganic acids are also suitably used. Those organic acids, inorganic acids and/or salts thereof can be used alone or as mixtures of two or more thereof.

[0030] Such a pH regulating agent is added to the fountain solution composition of the present invention in an amount of preferably 0.001 to 3% by weight based on the weight of the whole fountain solution composition. Although the fountain solution composition is preferably used in an acidic region having a pH value in the range of 3 to 7, it is also possible to use the fountain solution composition in an alkaline region containing alkali metal hydroxides, phosphoric acid and its alkali metal salt, alkali metal carbonates or silicates at a pH of 7 to 11.

[0031] Examples of the odor-masking agents (d) include esters which have been known as perfumes for its use. For example, there are compounds represented by the following formula (III):



wherein R^2 represents an alkyl, alkenyl or aralkyl group having 1 to 15 carbon atoms or a phenyl group. The alkyl or

alkenyl group preferably has 4 to 8 carbon atoms.

[0032] When R^2 is an alkyl, alkenyl or aralkyl group, it may be either a linear or branched group. The alkenyl group having one double bond is particularly suitable. Examples of the aralkyl group include benzyl and phenylethyl groups.

[0033] At least one hydrogen atom in an alkyl, alkenyl, aralkyl or phenyl group may be substituted by hydroxyl group or acetyl group.

[0034] R^3 represents a linear or branched alkyl or aralkyl group having from 3 to 10 carbon atoms or a phenyl group. When R^3 is an alkyl group, it preferably has 3 to 9 carbon atoms. Examples of the aralkyl group include benzyl and phenylethyl groups.

[0035] Examples of the odor-masking agents (d) that can be used include esters of formic acid, acetic acid, propionic acid, butyric acid, isobutyric acid, 2-ethylbutyric acid, valeric acid, isovaleric acid, 2-methylvaleric acid, hexanoic acid (caproic acid), 4-methylpentanoic acid (isohexanoic acid), 2-hexenoic acid, 4-pentenoic acid, heptanoic acid, 2-methylheptanoic acid, octanoic acid (caprylic acid), nonanoic acid, decanoic acid (capric acid), 2-decenoic acid, lauric acid and myristic acid. It is also possible to use benzyl phenylacetate and acetoacetic acid esters such as ethyl acetoacetate and 2-hexyl acetoacetate.

[0036] Of those, n-pentyl acetate, isopentyl acetate, n-butyl butyrate, n-pentyl butyrate and isopentyl butyrate are preferable, and n-butyl butyrate, n-pentyl butyrate and isopentyl butyrate are particularly preferable.

[0037] The content of the odor-masking agent (d) in the fountain solution composition is preferably 0.0001 to 10% by weight, more preferably 0.001 to 1% by weight, based on the weight of the whole fountain solution composition. Using the odor-masking agents can further improve the working environment. The odor-masking agents may be used together with, for example, vanillin or ethyl vanillin.

[0038] Examples of the preservatives (e-1) used in the fountain solution composition according to the present invention include phenol and its derivatives, formalin, imidazole derivatives, sodium dehydroacetate, 4-isothiazolin-3-one derivatives, benzotriazole derivatives, amidine or guanine derivatives, quaternary ammonium salts, pyridine, quinoline or guanidine derivatives, diazine or triazole derivatives, oxazole or oxazine derivatives, and bromonitroalcohols (for example, bromonitropropanol, 1,1-dibromo-1-nitro-2-ethanol, 3-bromo-3-nitropentane, 2,4-diol). Such a preservative is added in an amount that stably exhibits its effect against bacteria, molds and yeasts. Although varying depending on the type of the bacteria, molds and yeast, the amount of the preservative added is 0.001 to 1.0% by weight based on the weight of the whole fountain solution composition. Further, it is preferable to use two or more preservatives in combination which are effective against various bacteria, molds and yeasts.

[0039] The colorants (e-2) that are preferably used in the present invention are, for example, edible dyestuffs. Examples of the edible dyestuff include yellow dyestuffs such as CI Nos. 19140 and 15985, red dyestuffs such as CI Nos. 16185, 45430, 16255, 45380 and 45100, purple dyestuffs such as CI No. 42460, blue dyestuffs such as CI Nos. 42090 and 73015 and green dyestuffs such as CI No. 42095.

[0040] Examples of the rust preventives (e-3) that can be used in the present invention include benzotriazole, 5-methylbenzotriazole, thiosalicylic acid, benzimidazole and derivatives thereof.

[0041] The defoaming agents (e-4) that can be used in the present invention are preferably silicone defoaming agents. Of those, either emulsion/dispersion type defoaming agents and solubilization type defoaming agents can be used.

[0042] The fountain solution composition according to the present invention contains water as the remainder.

[0043] When the fountain solution composition is commercially sold, such is generally concentrated to form a commercially available product. Therefore, the fountain solution composition can be obtained by dissolving the above-described various components in water (preferably desalted water, i.e., pure water) to obtain an aqueous solution thereof and then concentrating the solution.

[0044] In using such a concentrate, the concentrate thus obtained is diluted with, for example, tap water or well water 10 to 200 times to obtain a fountain solution composition for use.

[0045] The fountain solution composition for a lithographic printing plate according to the present invention can prevent accumulation of divalent metal ions adhering to a chrome roller and a rubber roller used in a continuous water-supply type fountain solution feeder and supply a uniform fountain solution film to a surface of a lithographic printing plate in a stable state. The fountain solution composition of the present invention can also provide a pleasant and highly safe working environment. Because of having low dynamic surface tension, furthermore, the fountain solution composition exhibits good and stable printability even under the condition that printing units rotate at high speed, making it possible to obtain printed matters with high qualities in a stable manner. In particular, the fountain solution composition can improve the printability in case of using metallic pigment inks which have been considered to be difficult to print with a fountain solution. In addition, the fountain solution composition can be used in a stable state over a long period of time, thereby contributing to the improvement in productivity.

[0046] The present invention will be described in greater detail by reference to the following Examples, but it should be understood that the invention is not construed as being limited thereto. Unless otherwise indicated, all percents are by weight.

EXAMPLES 1 TO 6 AND COMPARATIVE EXAMPLES 1 TO 3

[0047] Compositions were prepared according to the formulation shown in Tables 1 to 3. The compositions of Examples 1 to 3 are fountain solution compositions, those of Examples 4 to 6 are liquid additive compositions, the one of Comparative Example 1 is a fountain solution composition, and those of Comparative Examples 2 and 3 are liquid additive compositions. In those Tables, values are expressed in "g". The volume of each composition was finally adjusted to 1,000 ml by adding water. Those compositions were all in the form of concentrated products to be diluted before using.

Table 1

Component	Example		
	1	2	3
	Fountain solution composition		
Compound of formula (I):			
Propylene glycol mono-n-butyl ether	250.0	200.0	150.0
Propylene glycol mono-t-butyl ether	-	50.0	50.0
Dipropylene glycol mono-n-butyl ether	-	-	50.0
Compound of formula (II):			
Propylene glycol	200.0	100.0	100.0
Tripropylene glycol	-	-	100.0
Wettability-improving auxiliary:			
Ethylene glycol mono-t-butyl ether	-	100.0	-
Polyoxyethylene/polyoxypropylene copolymer	-	-	-
Odor-masking agent:			
n-Butyl butyrate	0.5	0.5	0.5
Isoamyl butyrate	0.5	0.5	0.5
Water-soluble polymer compound:			
Hydroxypropyl cellulose	2.0	2.0	2.0
pH-regulating agent:			
Citric acid	3.0	3.0	3.0
Diammonium citrate	5.0	5.0	5.0
Monoammonium phosphate	3.0	3.0	3.0
Preservative:			
Bronopol	2.0	2.0	2.0
4-Isothiazolin-3-one derivative	2.0	2.0	2.0
Pure water to make	1,000 ml in total		

Table 2

Component	Example		
	4	5	6
	Liquid additive composition		
Compound of formula (I):			
Propylene glycol mono-n-butyl ether	650.0	500.0	650.0
Propylene glycol mono-t-butyl ether	-	100.0	50.0
Dipropylene glycol mono-n-butyl ether	-	-	50.0
Compound of formula (II):			
Propylene glycol	200.0	-	100.0
Tripropylene glycol	-	200.0	100.0
Wettability-improving auxiliary:			
Ethylene glycol mono-t-butyl ether	-	50.0	-
Polyoxyethylene/polyoxypropylene copolymer	1.0	1.0	1.0
Odor-masking agent:			
n-Butyl butyrate	0.5	0.5	0.5
Isoamyl butyrate	0.5	0.5	0.5
Water-soluble polymer compound:			
Hydroxypropyl cellulose	-	-	-
pH-regulating agent:			
Citric acid	-	-	-
Diammonium citrate	-	-	-
Monoammonium phosphate	-	-	-
Preservative:			
Bronopol	2.0	2.0	2.0
4-Isothiazolin-3-one derivative	2.0	2.0	2.0
Pure water to make	1,000 ml in total		

Table 3

Component	Comparative Example		
	1	2	3
	Fountain solution	Liquid additive composition	
Compound of formula (I):			
Propylene glycol mono-n-butyl ether	250.0	650.0	-
Propylene glycol mono-t-butyl ether	-	-	-
Dipropylene glycol mono-n-butyl ether	-	-	-
Compound of formula (II):			
Propylene glycol	-	-	650.0
Tripropylene glycol	-	-	-
Wettability-improving auxiliary:			
Ethylene glycol mono-t-butyl ether	200.0	200.0	200.0
Polyoxyethylene/polyoxypropylene copolymer	-	1.0	1.0
Odor-masking agent:			
n-Butyl butyrate	0.5	0.5	0.5
Isoamyl butyrate	0.5	0.5	0.5
Water-soluble polymer compound:			
Hydroxypropyl cellulose	2.0	-	-
pH-regulating agent:			
Citric acid	3.0	-	-
Diammonium citrate	5.0	-	-
Monoammonium phosphate	3.0		
Preservative:			
Bronopol	2.0	2.0	2.0
4-Isotiazolin-3-one derivative	2.0	2.0	2.0
Pure water to make	1,000 ml in total		

[0048] The compositions of Examples 1 to 3 and Comparative Example 1 prepared above were each diluted 40-fold with simulated hard water (hardness: 400 ppm). The obtained dilution was regulated to pH 4.8 to 5.3 with NaOH/phosphoric acid (85%) to obtain a fountain solution composition usable in practice which was then subjected to a printing test. The compositions of Examples 4 to 6 and Comparative Examples 2 and 3 were each diluted 50-fold and 0.5% of a fountain solution IF-202 (H solution, manufactured by Fuji Photo Film Co., Ltd.) was added to obtain a fountain solution composition usable in practice which was then subjected to a printing test.

[0049] The printing test was performed using a Dia Water Feeder (manufactured by Mitsubishi Insatsuki), a cyan ink (HYECHO; manufactured by Toyo Ink Mfg. Co., Ltd.) and, as a printing plate, one prepared by processing VPS (manufactured by Fuji Photo Film Co., Ltd.) under standard conditions.

[0050] The results obtained are shown in Table 4.

(a) Continuous printability and water-feeding roller stability

[0051] Printing (10,000 sheets/day) was carried out continuously for 7 days.

(1) Continuous printability

[0052] Changes were monitored on the basis of the water-feeding scale (1 to 100, also serving as an indication of the rotation speed of the water-feeding roller) of the printing machine at the initiation of the printing.

- : Change within scale 5
 △: Change over scale 5 to 10
 x: Change over scale 10 or more

(b) Water-feeding roller stability

[0053] On the first day (after printing 10,000 sheets), the third day (after printing 30,000 sheets), the fifth day (after printing 50,000 sheets) and the seventh day (after printing 70,000 sheets), stains on the water-feeding roller were evaluated (whether or not a uniform water film could be formed on the roller).

- : Almost not stained
 △: Somewhat stained
 x: Stained

(b) Bleeding

[0054] After printing 5,000 sheets and 10,000 sheets, the printing machine was stopped and the extent of bleeding of the ink from the image areas into the non-image areas was examined.

- : Almost no bleeding
 △: Somewhat bleeding
 x: Serious bleeding

(c) Stability to printing with metallic pigment ink and UV ink

[0055] Inks used: Gold ink (blue tone, manufactured by Megami Mfg. Co., Ltd.) and UV ink (Best Cure; manufactured by T & K TOKA Co., Ltd.)

- : Good after printing 5,000 sheets
 △: Stained with ink on rubber blanket (washing the plate once during the test)
 x: Stained with ink after printing about 1,000 sheets (washing the plate and the rubber blanket twice during the test)

[Table 4]

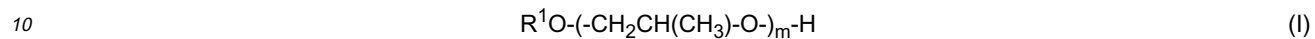
Test item		Example						Comp. Example		
		1	2	3	4	5	6	1	2	3
Continuous printability	First Day	○	○	○	○	○	○	○	○	x
	Third Day	○	○	○	○	○	○	○	○	-
	Seventh Day	○	○	○	○	○	○	△	△	-
Water-feeding roller stability	First Day	○	○	○	○	○	○	○	○	x
	Third Day	○	○	○	○	○	○	○	○	-
	Seventh Day	○	○	○	○	○	○	△	△	-
Bleeding		○	○	○	○	○	○	○	○	○
Applicability to metallic pigment ink		○	○	○	○	○	○	△	△	x
Applicability to UV ink		○	○	○	○	○	○	△	△	x

-: Not measurable.

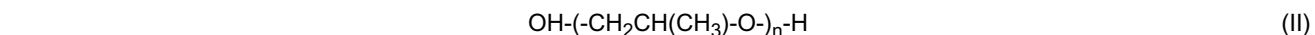
[0056] Thus, it is understood that the fountain solution compositions according to the present invention show good results in all of the test items, namely, providing printed matters with high qualities and having favorable fountain solution properties.

5 Claims

1. A fountain solution composition for lithographic printing plate, which comprises at least one compound represented by the following formula (I) and at least one compound represented by the following formula (II):



wherein R^1 represents a linear or branched alkyl group having 4 carbon atoms, and m is an integer of 1 to 3;



wherein n is an integer of 1 to 5.

2. The fountain solution composition for lithographic printing plate as claimed in claim 1, wherein an amount of the compound represented by the formula (I) is 0.2 to 8% by weight based on the weight of the whole fountain solution composition.
3. The fountain solution composition for lithographic printing plate as claimed in claim 1, wherein an amount of the compound represented by the formula (II) is 0.05 to 7% by weight based on the weight of the whole fountain solution composition.



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 11 8277

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CI.7)
X	US 5 338 344 A (BONDURANT) 16 August 1994 (1994-08-16) * column 3, line 28 - line 51 * ----	1-3	B41N3/08
X	DE 196 23 813 A (FUJI) 19 December 1996 (1996-12-19) * page 4, line 18 - line 25 * * page 4, line 40 - line 42 * ----	1-3	
X	DE 195 35 364 A (FUJI) 18 April 1996 (1996-04-18) * page 5, line 21 - line 28 * * page 5, line 33 - line 36 * -----	1-3	
			TECHNICAL FIELDS SEARCHED (Int.CI.7)
			B41N
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 8 November 2000	Examiner Magrizos, S
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 11 8277

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

08-11-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5338344 A	16-08-1994	US 5268025 A	07-12-1993
		CA 2090955 A	06-09-1993
		US 5336302 A	09-08-1994
DE 19623813 A	19-12-1996	JP 8337073 A	24-12-1996
		US 5720800 A	24-02-1998
DE 19535364 A	18-04-1996	JP 8112980 A	07-05-1996
		US 5637444 A	10-06-1997