

UNITED STATES PATENT OFFICE

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DEVELOPER FOR DIAZOTYPE MATERIALS

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12 Claims. (Cl. 95—88)

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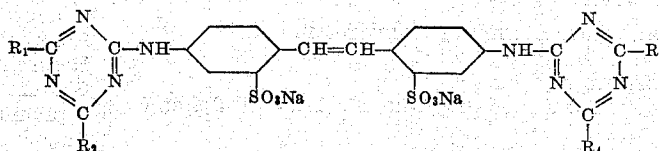
The invention relates to a developer for diazotype printing materials referred to hereinafter as a "diazotype developer." By this expression is to be understood a mixture (either a dry mixture to be dissolved, or a solution) containing as essential constituents one or more azo dyestuff coupling components and one or more potassium and/or sodium salts of weak acids, such as carbonic acid, boric acid, formic acid, acetic acid, benzoic acid, tartaric acid and citric acid. Azo dyestuff components of good coupling activity are used and the alkali salts are so chosen that, in the slight excess used, they ensure sufficient azo dyestuff coupling between the azo dyestuff coupling components and the diazo compound used in the diazotype image the unexposed areas of which contain a para-amino-diazo-benzene compound, with the usual quantities of acid constituents. Azo dyestuff components of good coupling activity are, for example β -naphthol, the β -hydroxy-ethyl amide of 2-hydroxy-3-naphthoic acid, phloroglucinol, and resorcinol; an azo dyestuff component of insufficient coupling activity is, for example, 2:3-dihydroxy-naphthalene-6-

2

count of their absorbing power for light of short wave lengths, they cannot be used in the light-sensitive diazotype layers—in contrast to their inclusion in photographic layers according to French patent specification No. 878,823—without impairing the light-sensitivity of the layers. Interfering reactions between the optical bleaching agents and the diazo compounds also frequently take place.

The diazotype developers according to the invention contain as optical bleaching agent a blue-fluorescent salt of a p,p'-diaminostilbene-o,o'-disulphonic acid with one or more 1,3,5-triazine rings attached to the amino groups. This type of optical bleaching agent with at least one triazine ring was found to be more suitable for the above-mentioned application in diazotype developers and to have a greater or more lasting effect than optical bleaching agents without a triazine ring derived from p,p'-diaminostilbene-o,o'-disulphonic acid (cf. for example French patent specification No. 878,155).

Examples of optical bleaching agents used according to the invention are:



sulphonic acid. Diazotype developers are applied practically exclusively in such a manner that their aqueous solution is applied on the diazotype copy in a layer of, for example, 8 to 12 g./sq. metre. In addition to the above-mentioned essential constituents, diazotype developers generally also contain substances such as thiourea, alkali thiosulphate, wetting agents, aliphatic polyhydroxy compounds and the like. Diazotype developers with borates are to be preferred to those with carbonates. Diazotype developers that have to serve for the development of diazotype copies in which the diazo compound is a para-alkylamino-diazobenzene usually have a pH above 7; those used for diazotype copies containing para-acylamino-diazo-benzene compounds may have a pH a little below 7, while their concentration of buffer salts, such as formates, benzoates, and the like is generally higher.

According to the present invention diazotype developers contain optical bleaching agents known per se (cf. for example Netherlands patent specification No. 55,370). By the use of such developers there is obtained an improvement in the appearance of the diazotype copies developed therewith.

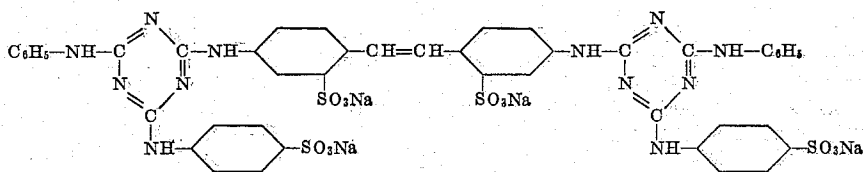
The application of optical bleaching agents in diazotype developers is of special importance from a technical point of view because, on ac-

in which R₁, R₂, R₃ and R₄ stand for amino or aliphatically or aromatically substituted amino groups. Particularly good results are obtained with compounds in which the substituents R₁, R₂, R₃ and R₄ are amino groups at least one of which is aromatically substituted, and even better results when one or more of these aromatically substituted amino groups have a sulphonic acid or a carboxyl group attached to the aromatic radicle. Many of these can be dissolved in aqueous diazotype developers without any previous treatment. Less soluble optical bleaching agents of the type preferred for the invention may be finely distributed or emulsified in the aqueous developer.

The effect of the addition of the aforesaid optical bleaching agents to diazotype developers is that, in the diazotype copies produced therewith, the areas of the image contrast better with the exposed background. The results are most striking when the exposed background contains matter having a yellow or brown tint, such as the azo component β -hydroxy-ethyl amide of 2-hydroxy-naphthalene-3-carboxylic acid, the photochemical decomposition product of a diazo-compound, a stabiliser such as, for example, naphthalene-1,3,6-trisulphonic acid, and also when the diazotype copies begin to show the familiar discolouration upon ageing. It has

also been found that the optical bleaching agents, applied to the diazotype copy via the diazotype developer, reduce the discolouration of the copy in daylight, a result which is particularly valuable when the diazotype copy is exposed to light that is relatively rich in rays of short wave lengths. Diazotype copies on coloured bases, for example buff, blue, green or red paper, also have a finer appearance when developed with a diazotype developer according to the invention.

The following are representative diazotype materials that can be developed with the diazotype developers of this invention.



Diazotype paper A

Base paper of 110 g./sq. metre is coated with about 8 g./sq. metre of the following solution in water:

Para-diazo-ethyl benzyl aniline nitrate 1.6%
Potash alum 1%
Thiourea 2%
Ammonium oxalate 2%
Gelatin 0.1%

and dried.

Diazotype paper B

Base paper of 80 g./sq. metre is coated with about 12 g./sq. metre of the following solution in water:

Para-diazo-diethyl orthochloroaniline, zinc chloride double salt 3%
Tartaric acid 1.5%
Sodium salt of naphthalene-1.3.6-trisulphonic acid 1.5%
Ammonium sulphate 1.5%
Gelatin 0.3%

and dried.

Diazotype paper C

Base paper of 110 g./sq. metre is coated with about 10 g./sq. metre of the following solution in water:

Para-diazo-2,5-diethoxy-benzanilide-ZnCl₂ double salt 3%
Tartaric acid 1%
Sodium salt of naphthalene-1.3.6-trisulphonic acid 0.5%
Thiourea 0.2%
Gelatin 0.2%

and dried.

The following examples will serve to illustrate the invention, but are not to be regarded as limiting it in any way:

EXAMPLE 1

A developer suitable for the development of diazotype paper B is composed as follows:

5	Sodium thiosulphate	g	55
	Thiourea	g	24
	Borax	g	8
	Phloroglucinol	g	10
10	Sodium salt of isopropyl-naphthalene-sulphonic acid	g	3
	Soda ash, anhydrous	g	22
	The optical bleaching agent	g	1

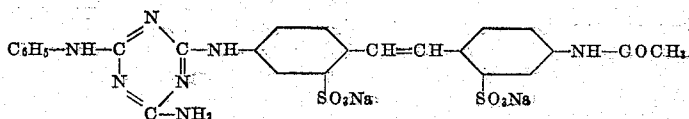
25	Water	g	1000
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A copy on the diazotype material B is developed by the application of about 10 g./sq. metre of the above developer. A dark brown copy is obtained in which the dark brown dyestuff is in high contrast with the clear white ground. If the optical bleaching agent had been omitted from the composition of the developer, a copy would have been obtained with a somewhat dingy background, with which the image would contrast considerably less.

EXAMPLE 2

A developer suitable for the development of diazotype paper A is composed as follows:

40	Thiourea	g	33
	Phloroglucinol	g	6.5
	Resorcinol	g	6.5
	Sodium salt of isopropyl-naphthalene-sulphonic acid	g	2
45	Sugar	g	50
	Potassium tetraborate pentahydrate	g	80
	Potassium carbonate	g	20
	Optical bleaching agent	g	1



60	Water	g	1000
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A copy on diazotype material A is developed by the application of about 10 g./sq. metre of the above developer. A black copy is obtained in which the dyestuff is in strong contrast with the clear white ground. If the optical bleaching agent had been omitted from the composition of the developer, a copy would have been obtained with a somewhat dingy background, with which the image would contrast considerably less strongly.

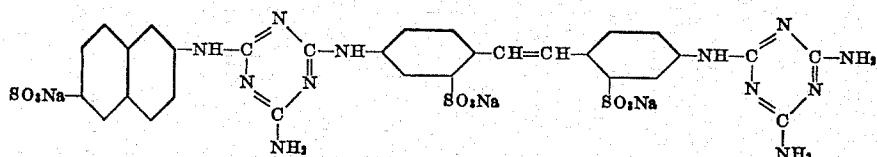
EXAMPLE 3

A developer suitable for the development of diazotype paper C is composed as follows:

75	Thiourea	g	20
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Phloroglucinol	g	3
Sodium mono-2-ethyl-hexyl sulphate	g	2
Benzoic acid	g	2.5
Sodium benzoate	g	14.3
Sodium formate	g	146
Optical bleaching agent	g	1



Water -----g----- 1000

A copy on diazotype material C is developed by the application of about 10 g./sq. metre of the above developer. A brownish-black copy is obtained in which the brownish-black dyestuff is in high contrast with the clear white ground. If the optical bleaching agent had been omitted from the composition of the developer, a copy would have been obtained with a somewhat dingy background, with which the image would contrast considerably less.

EXAMPLE 4

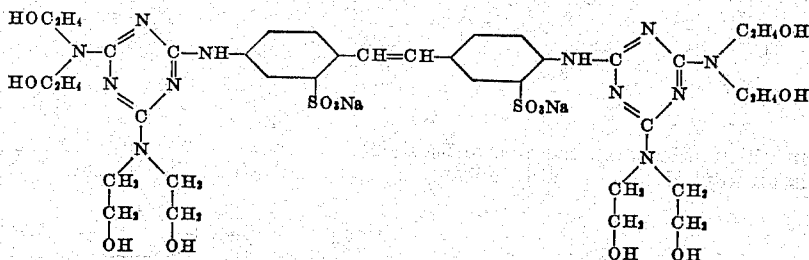
A developer suitable for the development of diazotype paper A is composed as follows:

EXAMPLE 5

A developer suitable for the development of diazotype paper C is composed as follows:

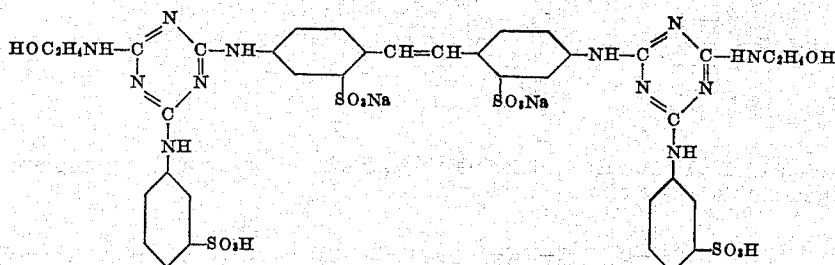
Thiourea	g	20
Phloroglucinol	g	3
Sodium mono-2-ethyl-hexyl sulphate	g	2
Benzoic acid	g	2.5
Sodium benzoate	g	14.3
Sodium formate	g	146
Water	g	1000

In this there are dispersed 5 g. of the optical bleaching agent:



Thiourea	g	20
Sodium thiosulphate	g	50
β -naphthol	g	15
Sodium salt of isopropyl-naphthalene-sulphonic acid	g	3
Tri-sodium phosphate	g	60
Soda ash anhydrous	g	20
Caffeine	g	10
Optical bleaching agent	g	1

A copy on diazotype material C is developed by the application of about 10 g./sq. metre of the above developer. A brownish-black copy is obtained in which the brownish-black dyestuff is in strong contrast with the clear white ground. If the optical bleaching agent had been omitted from the composition of the developer a copy would have been obtained with a somewhat dingy ground, with which the image would contrast considerably less.



Water -----g----- 1000

A copy on diazotype material A is developed by the application of about 10 g./sq. metre of the above developer. A brown copy is obtained, in which the brown dyestuff is in high contrast with

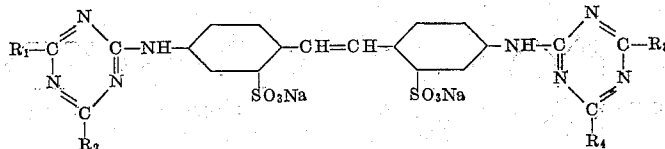
What I claim is:

1. A developer for diazotype printing materials comprising at least one azo dyestuff coupling component, at least one alkaline metal salt of a weak acid and a small amount of a salt of a blue-

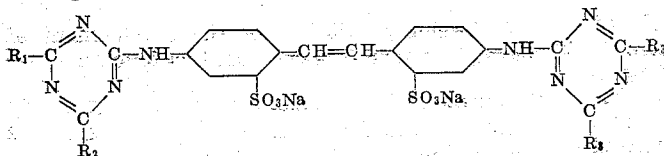
fluorescent, p,p'-diaminostilbene-o,o'-disulphonic acid in which at least one of the amino groups carries a 1:3:5-triazine ring.

2. A developer for diazotype printing materials comprising at least one azo dyestuff coupling component, at least one alkaline metal salt of a weak acid and a p,p'-diaminostilbene-o,o'-di-

comprising at least one azo dyestuff coupling component, at least one alkaline metal salt of a weak acid and a p,p'-diaminostilbene-o,o'-disulphonic acid compound containing one 1:3:5-triazine ring attached to each amino group and having the formula:



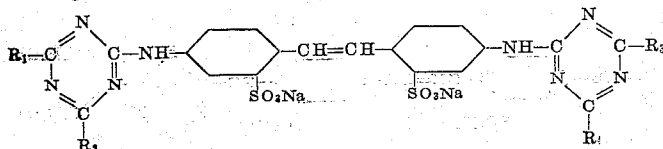
sulphonic acid compound containing one 1:3:5-triazine ring attached to each amino group and having the formula:



in which at least one of R₁, R₂, R₃ and R₄ is an aromatically substituted amino group, at least one member of R₁, R₂, R₃ and R₄ is an aliphatic-

in which R₁, R₂, R₃ and R₄ are amino groups.

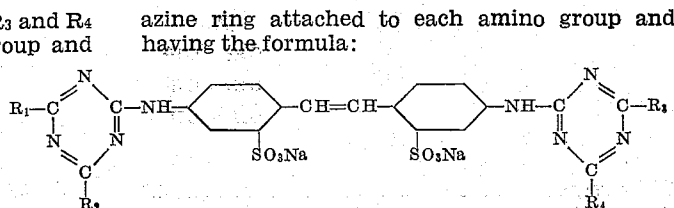
3. A developer for diazotype printing materials comprising at least one azo dyestuff coupling component, at least one alkaline metal salt of a weak acid and a p,p'-diaminostilbene-o,o'-disulphonic acid compound containing one 1:3:5-triazine ring attached to each amino group and having the formula:



in which at least one member of R₁, R₂, R₃ and R₄ is an aliphatically substituted amino group and

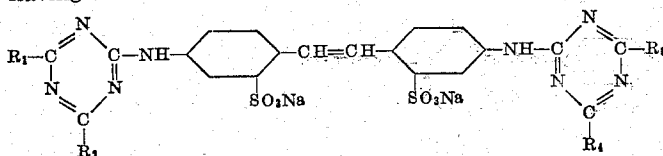
ically substituted amino group and any remaining members of R₁, R₂, R₃ and R₄ are amino groups.

6. A developer for diazotype printing materials comprising at least one azo dyestuff coupling component, at least one alkaline metal salt of a weak acid and a p,p'-diaminostilbene-o,o'-disulphonic acid compound containing one 1:3:5-triazine ring attached to each amino group and having the formula:



any remaining members of R₁, R₂, R₃ and R₄ are amino groups.

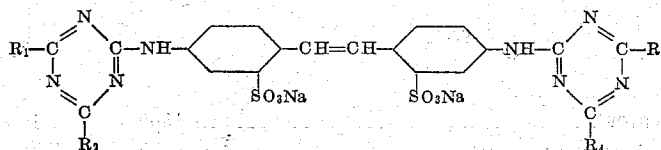
4. A developer for diazotype printing materials comprising at least one azo dyestuff coupling component, at least one alkaline metal salt of a weak acid and a p,p'-diaminostilbene-o,o'-disulphonic acid compound containing one 1:3:5-triazine ring attached to each amino group and having the formula:



in which at least one member of R₁, R₂, R₃ and R₄ is an aromatically substituted amino group and

in which R₁ and R₃ are hydroxy ethyl amino groups and R₂ and R₄ represent phenyl amino groups which are substituted by a sulphonic acid group.

7. A developer for diazotype printing materials comprising at least one azo dyestuff coupling component, at least one alkaline metal salt of a weak acid and a p,p'-diaminostilbene-o,o'-disulphonic acid compound containing one 1:3:5-triazine ring attached to each amino group and having the formula:

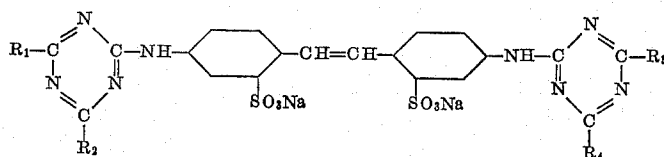


any remaining members of R₁, R₂, R₃ and R₄ are amino groups.

5. A developer for diazotype printing materials

in which R₁ and R₃ are phenylamino groups and R₂ and R₄ are phenylamino groups which are substituted by a sulphonic acid group.

8. A developer for diazotype printing materials comprising at least one azo dyestuff coupling component, at least one alkaline metal salt of a weak acid and a p,p'-diaminostilbene-o,o'-disulphonic acid compound containing one 1:3:5-triazine ring attached to each amino group and having the formula:



in which R₁, R₂, R₃ and R₄ are di(hydroxyethyl) amino groups.

9. A developer as claimed in claim 4 in which at least one of the aromatic substituents carries a sulphonic acid group as a substituent.

10. A developer as claimed in claim 4 in which at least one of the aromatic substituents carries a carboxylic acid group as a substituent.

11. A process for developing light sensitive sheet material which, at least in the unexposed condition, contains a diazo compound as the light sensitive material comprising applying to the said

sheet material a thin film layer of a developer as claimed in claim 1.

12. A process as claimed in claim 11 in which the light sensitive sheet material is diazotype paper.

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