

UNITED STATES PATENT OFFICE

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PHOTOGRAPHIC MATERIAL FOR COLOR
PHOTOGRAPHY

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2 Claims. (Cl. 95—2)

My present invention relates to an improved
photographic material for color photography.

One of its objects is to provide a photographic
material for multi-color photography having sensi-
5 tized silver halide emulsion layers of high sensi-
tivity to red and low sensitivity to blue-green.
Further objects will be seen from the detailed
specification following hereafter.

In certain processes of subtractive multi-color
10 photography a multi-layer photographic mate-
rial is used in which the lowest light-sensitive
layer is sensitive only for red above 6000 Å. U.
(in the region of the threshold of sensitivity).
This red-sensitive layer must always fulfill the
15 fundamental condition that it is insensitive to
blue-green light since the presence of blue-green
sensitivity gives rise to falsification of color. In
all color-photography processes in which the
color of the component pictures is produced by
20 chromogenic development or the like, for example
with aid of leuco bases or anti-diazotates there
may be present in the photographic layer in
addition to the sensitizer a dyestuff former which
when the exposed silver halide emulsion is devel-
25 oped combines with the oxidation product of the
developer to form a sparingly soluble dyestuff
distributed in the layer proportionately to the
quantity of silver image. In this case a sensitizer
must be selected the effect of which is not en-
30 feebled by the presence of the dye component.
Sensitizers are already known which have a high
intensity in the red region of the spectrum but
these for the most part have also very high sen-
sitivity to green. Such dyestuffs are, for example
35 the carbocyanines which are formed from α -
naphthothiazole (thiazole from α -naphthyl-
amine) by condensation with ortho-acetic acid
ester. There are also sensitizers which have a
wide gap in the blue-green, for example pinacy-
40 anol blue (carbocyanine from β -naphtho-quinol-
dine) but their sensitivity to red is comparatively
small.

The present invention is based on the observa-
tion that symmetrical and unsymmetrical dial-
45 kylaminobenzthiazole-trimethinecyanines, dial-
kylaminobenzselenazole-trimethinecyanines and
dialkylaminoindolenine-trimethinecyanines are
suitable dyes for sensitizing silver halide emul-
sion layers, which should be of high red sensi-
50 tivity and low blue-green sensitivity. The dye-
stuffs of the two first named classes may, if de-
sired, contain alkyl-groups as substituents in the
polymethine chain. The dyestuffs for sensitizing
the red-sensitive layer are described in U. S.
55 Patent 2,020,636; U. S. Patent 2,066,966; U. S.

Patent 2,086,689; French specifications Nos.
43,345 (addition to Patent No. 730,966) and 42,256
(addition to Patent No. 734,200). These dyestuffs
in outstanding manner fulfil the requirement for
lack of sensitivity to blue-green and very high
5 sensitivity to red. At the same time these sen-
sitizer have the advantage that their sensitivity
is not depressed by the presence of dyestuff
formers.

The following examples illustrate the invention 10
but they are not intended to limit it thereto:

Example 1

To 1 kilo of a silver halide gelatin emulsion are
added 8 mg. of the dyestuff para-diethylamino- 15
benzthiazole-trimethinecyanine dissolved in
methanol. The gap in the blue-green extends
in medium exposure, about 5 times the initial
sensitivity (threshold) between about 5000 and
5500 Å. U. 20

Example 2

To the silver halide gelatin emulsion sensitized
as described in Example 1 there is further added
a methanol solution of 5 grams of 1-hydroxy-2,4'- 25
dibromonaphthalene (dye former for blue-green
development).

Example 3

To 1 kilo of a silver halide gelatin emulsion are
added 6 mg. of the dyestuff para-diethylamino- 30
benzselenazole-trimethinecyanine. The gap in
the blue-green at medium exposure, about 5
times the initial sensitivity (threshold) extends
from about 5000 to about 5500 Å. U.

Example 4

To the silver halide gelatin emulsion sensi-
tized as described in Example 3 there are added
4 grams of octodecyl-1-hydroxy-2-naphthoyl- 40
amine (dye former for blue-green development).

Example 5

To 1 kilo of a silver halide gelatin emulsion are
added 5 mg. of the dyestuff para-diethylamino- 45
indolenine-trimethinecyanine. The gap in the
blue-green at medium exposure, about 5 times
the initial sensitivity (threshold) extends from
5000 to about 5600 Å. U.

Example 6

To 1 kilo of a silver halide gelatin emulsion are
added 6 mg. of 3,3'-diethyl-6-diethylaminobenz- 50
thiazole-trimethinecyanine iodide. The emulsion
has a sensibility maximum at about 6400 Å. U.
and a range of sensibility from about 5200 to 55

about 7000 Å. U. and shows a gap in the blue-green from about 4900 to about 5200 Å. U. at medium exposure.

Example 7

To 1 kilo of a silver halide gelatin emulsion are added 8 mg. of 3,3'-diethyl-5',6-diethoxy-6-diethylaminobenzthiazole-trimethinecyanine iodide. The emulsion has a sensibility maximum at about 6500 Å. U. and a range of sensibility from about 5300 to about 7200 Å. U. and shows a gap in the blue-green between about 4900 and about 5300 Å. U. at medium exposure.

Example 8

To 1 kilo of a silver halide gelatin emulsion are added 5 mg. of 3-ethyl-6-diethylaminobenzthiazole-1',-1',3'-trimethyl-6'-methoxyindolenine-trimethinecyanine. The emulsion having a sensibility maximum at about 6300 Å. U. and a range of sensibility from about 5200 to about 6800 Å. U. shows a gap in the blue-green from about 4900 to about 5200 Å. U. at medium exposure.

Example 9

To 1 kilo of a silver halide gelatin emulsion are added 8 mg. of the dyestuff para-dimethylaminobenzthiazole-trimethinecyanine in a solution of methanol. The gap in the blue-green extends between about 5000 and about 5500 Å. U. at medium exposure.

Example 10

To the silver halide gelatin emulsion sensitized as described in Example 9 there are added 5 grams of 1-hydroxy-2,4'-dibromo-naphthalene (dye former for blue-green development) dissolved in methanol.

Example 11

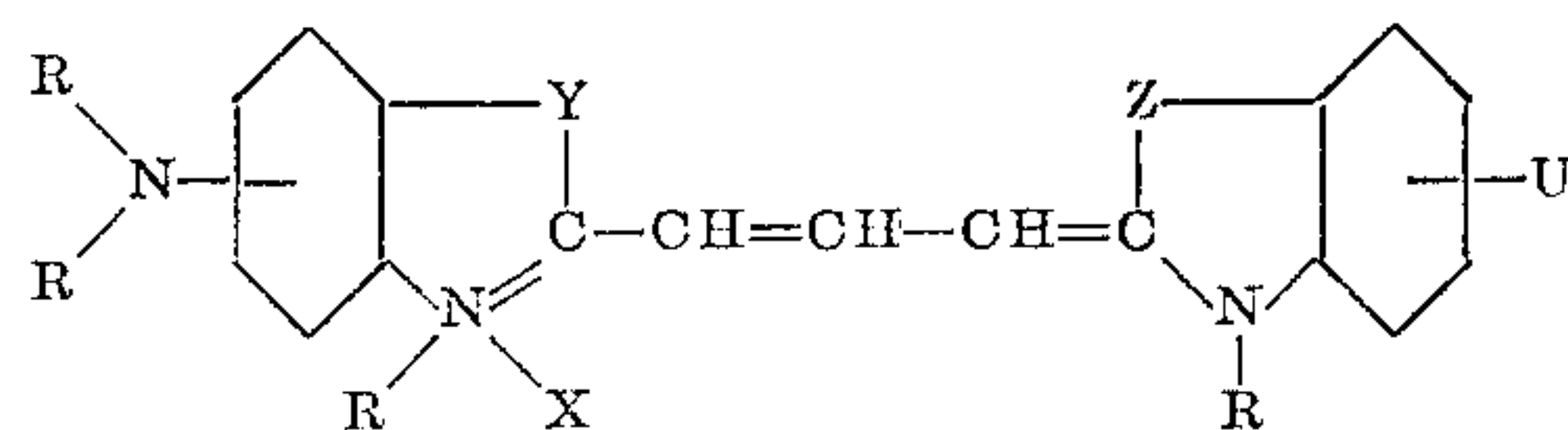
To 1 kilo of a silver halide gelatin emulsion are added 8 mg. of para-diethylaminobenzthiazole-β-methyl-trimethine cyanine dissolved in methanol. The gap in the blue-green extends between about 5000 and about 5500 Å. U. at medium exposure.

Example 12

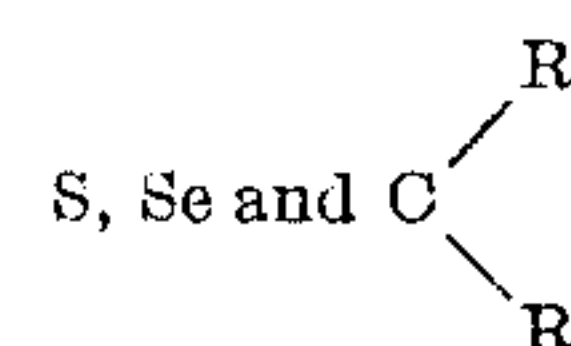
To 1 kilo of the silver halide emulsion sensitized as described in Example 11 there are added 5 grams of 1-hydroxy-2,4'-dibromo-naphthalene in a solution of methanol.

What I claim is:

1. A photographic material for color photography which comprises a red-sensitive silver halide gelatin emulsion layer containing a dyestuff-former capable of forming a blue-green picture and a dye corresponding with the following general formula

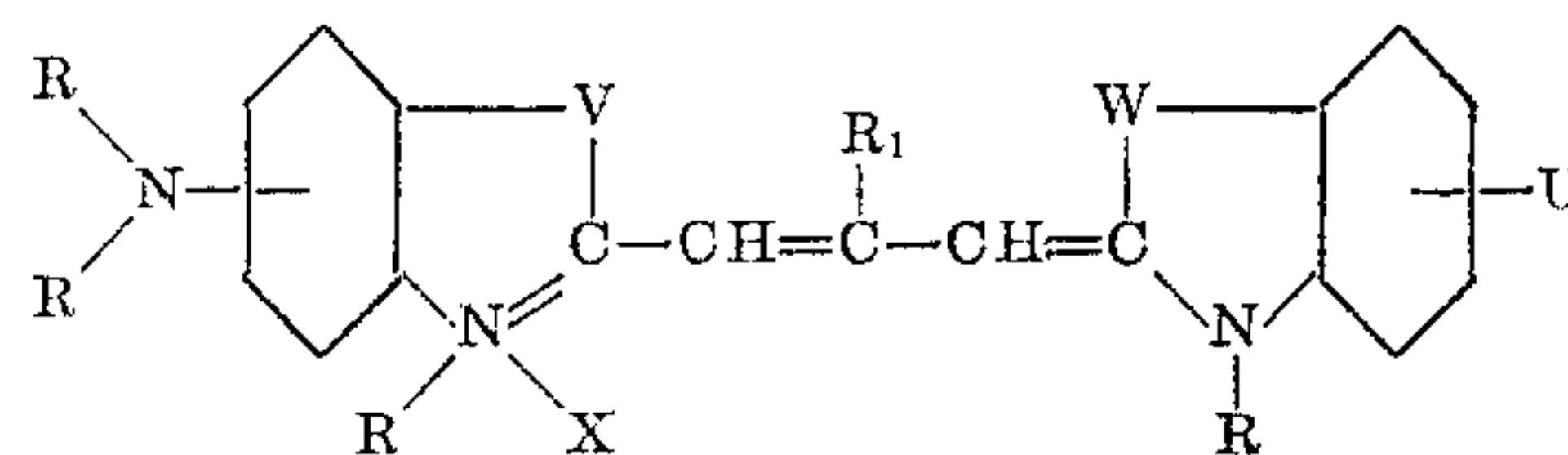


wherein Y and Z stands for a member of the group consisting of



R stands for alkyl, X stands for an anion, U stands for a member of the group consisting of dialkylamino radical, alkyl, alkoxy and a fused-on benzene nucleus.

2. A photographic material for color photography which comprises a red-sensitive silver halide gelatin emulsion layer containing a dyestuff-former capable of forming a blue-green picture and a dye corresponding with the following general formula



wherein V and W stand for a member of the group consisting of S and Se, R and R₁ stand for alkyl, X stands for an anion, U stands for a member of the group consisting of dialkylamino radical, alkyl, alkoxy and a fused-on benzene nucleus.

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