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(54) ID card legible with IR light.

(57) An ID card consisting essentially of a support and provided thereon, a silver halide color photosensitive material is disclosed. The ID card comprises an area (A) in which data are recorded by color images, and an area (B) in which data are recorded by images legible with infrared light.

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ID CARD LEGIBLE WITH IR LIGHT

FIELD OF THE INVENTION

The present invention relates to the ID card in the form of a staff ID card, a student ID card or the like for identifying a person.

BACKFROUND OF THE INVENTION

Hitherto, it is a common practice that a silver halide color photosensitive material is subjected to imagewise exposing and then to developing, and, according to a specific requirement, to a laminating process in order to obtain an ID card. Such an ID card is used, for example, to certify or identify personal data as in the case of a staff ID card and a student ID card. In order to expedite identification of the above-mentioned data and eliminate erroneous reading, reading is usually performed with a reading machine. A reading means most commonly used is an optical reading means, and recently, a system using an infrared (IR) light source such as a semiconductor laser or a light emitting diode (LED) is used as a preferred system.

Though having satisfactory spectral absorption in a visible wavelength region, the dye image formed from the foregoing silver halide color photosensitive material has virtually no absorption in an IR region. Therefore, it is necessary to use a means such as typing or printing in addition to the above-mentioned exposing and developing in order to prepare an ID card having both a color image and an image legible with IR light; however, this technique incurs problems such as a complicated finishing process of an ID card.

SUMMARY OF THE INVENTION

Therefore, the object of the invention is to solve the problems exemplified above of the prior art.

In other words, an object of the invention is to provide an ID card that is capable of forming and bearing not only an image legible with IR light but also a visual color image.

Another object of the invention is to provide an ID card that can be prepared by a simple procedure.

Still another object of the invention is to provide an ID booklet that integrates an identification function of the ID card and a function of a handbook.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates one embodiment of an image recording material for an ID card of the invention;

FIG. 2 is a block diagram schematically illustrating a laser exposing apparatus used in Examples 1, 2 and 3;

FIG. 3 is a cross-sectional view illustrating one mode where an image recording material for an ID card of the invention is sandwiched between two sheets of lamination material in order to form a laminated ID card.

DETAILED DESCRIPTION OF THE INVENTION

The foregoing objects of the invention are achieved by providing an IR absorbing property to an image that is formed by subjecting a silver halide color photosensitive material at least to imagewise exposing and developing.

Therefore, the ID card of the invention, which is prepared by subjecting a silver halide color photosensitive material at least to imagewise exposing and developing, is characterized by that the ID card at least comprises an area where the data are recorded in a form of a color image and another area where the data are recorded in a form of an image which is formed by the above-mentioned color developing and can be identified by IR light.

A visual image obtainable from a silver halide color photosensitive material is formed by three types of dyes, i.e. yellow, magenta and cyan dyes, that are usually generated by a color developing process. These dyes have extremely small spectral absorption in an IR wavelength region. Therefore, it is difficult for an IR-light image reader to identify a visual image.

Meanwhile, metal silver in an image pattern that is formed by reduction of silver halide in developing is oxidized usually in a bleaching process and is converted to silver ions, which are removed during a fixing process. Such metal silver exhibits large spectral absorption also in the IR wavelength region.

Therefore, one preferred mode of embodying the present invention is a technique, as a means for forming an image legible with IR light, where at least a portion of metal silver in an image pattern which is otherwise to be removed by bleaching and fixing process is allowed to remain in the image.

An amount of metal silver allowed to remain according to the above-mentioned mode of the invention is not limited to a specific scope. However, an amount of residual metal silver is arbitrarily determined so that only permissible color stain, if any, occurs in a color image area, while the area other than the color image area may retain an arbitrary amount of metal silver independently from the color image area.

The preferred methods according to the invention for forming both a silver image and a dye image in an image area are (1) a silver image and a dye image are allowed to remain in a black area, while a dye image area in a non-black area is allowed to retain a dye image alone, and (2) an area that is essentially subjected to reading with IR light is allowed to retain both a silver image and a dye image, while a silver image in an area not necessary to be read with IR light is removed.

The method (1) is fulfilled usually by retarding a desilvering process in order to lower desilvering action. Generally, a high degree of silver developing is in progress in a black area in each of yellow, magenta and cyan colored layers, and a large amount of metal silver is generated in this area. On the other hand, in a non-black area, an amount of generated metal silver is smaller than that of the above-mentioned black area. Therefore, it is possible after a desilvering process under a slow condition, that metal silver in the non-black is eliminated, and a portion alone of developed silver in a maximum black density area is left unremoved.

In a usual method for selectively retaining a portion alone of developed silver in the maximum black density area, a developed silver halide color photosensitive material is processed with a bleaching solution or bleach-fix solution each having a weak desilvering action.

In order to decrease the desilvering action of a bleaching solution or bleach-fix solution, there are methods which may be arbitrarily used; a method where the concentrations of a bleaching agent and a fixing agent contained in the respective processing solutions are lowered; a method where a processing temperature is lower; a method where a weaker bleaching agent is used; a method where pH of the processing solution is increased; and a method where a bleach-retarder is incorporated into a bleaching solution or bleach-fix solution.

It is, of course, practical that a photosensitive material be processed by an ordinary bleaching solution or bleach-fix solution in a shorter processing time than a normal bleaching or bleach-fix time, in order to allow a portion of developed silver to remain in the maximum black density area.

The method (2) mentioned previously is effected by first bleaching an area other than what is subjected to reading with IR light, and then by providing a whole area with a fixing treatment. Otherwise, this method may be effected by processing an area subjected to reading with IR light in a fixing solution, and then by processing an area subjected to no reading with IR light in a bleach-fix solution (or in a bleaching solution followed by a fixing solution).

Alternatively, the method (2) is satisfied by a mode where an area subjected to reading with IR light is preliminarily coated with a chemical (such as a water-soluble iodide and a nitrogen-mercapto compound) that prevents desilvering, and then a whole are of a photosensitive material is subjected to bleaching and fixing (otherwise, bleach-fix).

Optionally, in another useful method, a whole area of a silver halide photosensitive material is first subjected to bleaching, and then a portion thereof is subjected once again to develpment and to fixing.

In still another useful method, there can be used a silver halide color photosensitive material comprising a plurality of silver halide emulsions with the same color sensitivities and the quite different sensitivities.

In the case of a photosensitive material comprising negative-type silver halide emulsions, a color image forming area is exposed to relatively weak light in order to selectively expose a high sensitivity emulsion alone, and an area subjected to reading with IR light is exposed with relatively intense light in order to expose both a high sensitivity emulsion and a low sensitivity emulsion.

The foregoing procedure generates different amounts of silver in developing. A photosensitive material is bleached with a bleaching solution having a relevant bleaching action to almost completely bleach a color image forming area, while another area subjected to reading with IR light is insufficiently bleached in order to retain a silver image.

In the case of a photosensitive material comprising direct positive-type silver halide emulsions, imagewise exposing is performed in such a manner that in an area subjected to reading with IR light, a high sensitivity emulsion alone is sensitive to exposure but a low sensitivity emulsion is not sensitive, while in a color image forming area, both a high sensitivity emulsion and a low sensitivity emulsion are sensitive to exposure, in order to retain the same effect as that of the above-described photosensitive material comprising negative-type silver halide emulsions.

Any of a plurality of the preceding silver halide emulsions each having different sensitivity may be incorporated either into the different layers that form a silver halide photosensitive material or into one single layer.

There are also preferably used the emulsions of different sensitivities, which can be differently bleached because of their different silver halide compositions.

Any processing step in the above-described methods (1) and (2) is performed either by immersing a photosensitive material in a processing solution bath or by coating a bleaching solution, a bleach-fix solution, a fixing solution, or other processing chemicals on a photosensitive material.

Other than a silver halide emulsion layer that contains dye-providing material for forming a visible color image, a silver halide color photosensitive material in the present invention may also have a silver halide emulsion layer for forming and retaining a silver image legible with IR light.

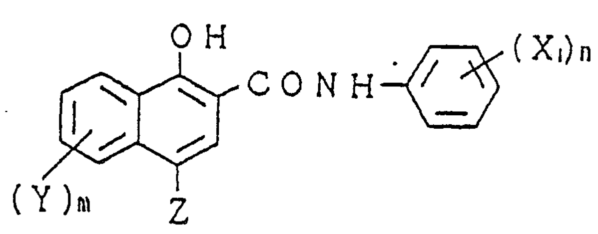
In another preferred mode of the invention for forming an image that is legible with IR light, an IR dye-providing material is used. An IR dye-providing material is capable of releasing or forming in color developing an IR dye having positive absorption in an IR spectral region. Such a dye is virtually invisible to human vision if it has little absorption in a visible spectral region, so that this dye scarecely affects a color image. Therefore, it is possible that a silver halide color photosensitive material containing an IR dye-providing material in arbitrary layers composing a photosensitive material is subjected at least to exposing and developing so as to obtain an image legible with IR light.

Such an IR dye-providing material may be either incorporated into the layers that contain yellow, magenta and cyan dye-providing materials, or into another independent layer.

Such an IR dye-providing material is essentially a compound that, in correspondence or inversely in correspondence with developing of silver, is capable of releasing or forming an IR dye, and the examples thereof include reductive dye releasing compounds described in U.S. Patent Nos. 4,463,079 and 4,439,513; coupling dye releasing compounds designated as IR dyes, described in U.S. Patent No. 4,474,867 and Japanese Patent O.P.I. Publication No. 12431/1984. A particularly preferred compound is a coupling dye forming compound.

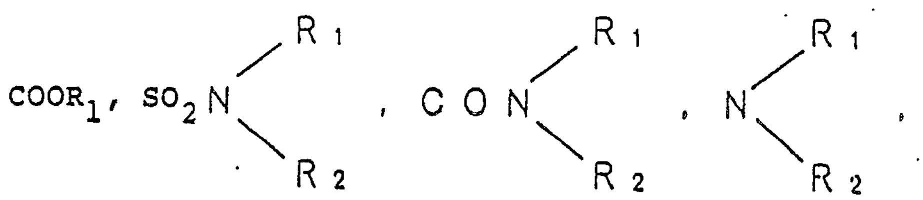
A preferable coupling dye forming compound (hereinafter called an IR coupler) is a naphthol coupler represented by Formula (1) or (2) below;

Formula (1)



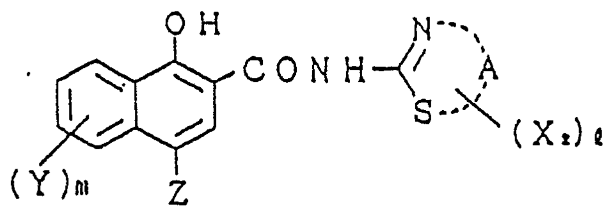
wherein X_1 represents an electron attracting group such as a halogen atom (e.g., chlorine, bromine and fluorine), a cyano group, a carboxylic ester group, an amide carboxylate group and an amide sulfonate group; m represents 0 or 1; n represents an integer 1 to 3, provided that when n is 2 or 3, X_1 may be identical to or different from each other;

Y represents



NR_1COR_2, $NR_1SO_2R_2$ or a halogen atom, provided that R_1 and R_2 independently represent an alkyl group or an aryl group;
Z represents a hydrogen atom, or a group capable of splitting off by coupling reaction.

Formula (2)



wherein Y, Z and m are synonymous with those defined in Formula (1), respectively; A represents an atomic group (preferably, carbon atoms or nitrogen atoms) for forming a 5-membered ring (possibly substituted), and such a ring may form a condensed ring together with another ring (e.g., benzene ring).

X_2 represents a substituent and ℓ represents an integer of 0 to 2. The examples of X_2 include, for example, an alkyl group, an aryl group, an alkoxy group, an aryloxy group, an alkylthio group, an arylthio group, an acyl group, an alkoxy carbonyl group, an amino group, a N-substituted amino group, an acylamino group, a carbamoyl group, a N-substituted carbamoyl group, an alkylsulfonyl group, an arylsulfonyl group, an alkylsulfonylamino group, an arylsulfonylamino group, a sufamoyl gropu, a cyano group, a hydroxy group, a mercapto group, and a halogen atom.

An IR coupler represented by Formula (1) or (2) preferably has, in order to improve its immobility in a photosensitive layer or to enhance its solubility in a solvent for coupler, a ballast group (preferably an organic group having 8 or more carbon atoms or a polymer residue), wherein the ballast group preferably substitutes X_1, X_2 or Y.

Z represents a hydrogen atom, or a group capable of splitting off by coupling reaction, preferably a group capable of splitting off by coupling reaction. The examples thereof include a halogen atom (e.g., chlorine, bromine, iodine), a sulfo group, an alkoxy group, an aryloxy group, a thiocyano group, an acyloxy group, an arylthio group and a nitrogen containing hetorocycle residue.

A means for forming an image legible with IR light in the invention includes a method where an IR dye-providing material is used, in combination with the preceding method where at least a portion of a silver image is allowed to remain unremoved.

In other words, an ID card of the invention can also be prepared as follows; an IR dye-providing material is incorporated into a silver halide color photosensitive material in advance in order to form an IR dye as well as a visible dye image in color developing, and then a portion of developed silver is allowed to remain unremoved in a maximum density black area by the method (1) or (2) mentioned previously.

A silver halide color photographic material of the invention usually comprises a constitution where silver halide emulsion layers containing magenta, yellow and cyan couplers, and non-sensitive layers are provided on a support in an arbitary number and order of layers. A number and order of these layers may be arbitrarily selected according to an important performance criterion as well an intended application.

Such magenta, yellow and cyan couplers can be various couplers conventionally known in the photographic art.

A silver halide emulsion to be incorporated into a silver halide color photosensitive material of the invention can arbitrarily incorporate silver halides that are incorporated into ordinary silver halide emulsions, and the examples of such silver halide include silver bromide, silver bromoiodide, silver chloroiodide, silver bromochloride and silver chloride.

The preceding silver halide emulsions are chemically sensitized by a sulfur sensitization method, a selenium sensitization method, a reduction sensitization method or a noble metal sensitization method.

Further, the silver halide emulsions can be spectrally sensitized to have sensitivity in an intended spectral region by using a dye known as a sensitizing dye in the photographic art.

A silver halide color photographic material of the invention can arbitrarily incorporate an anti-fogging agent, a hardener, a plasticizer, a polymer latex, a UV absorbent, a formalin scavenger, a mordant, a development accelerator, a development retarder, a fluorescent whitening agent, a matting agent, a lubricant, an antistatic agent, a surfactant and the like.

A color developing method for a silver halide color photosensitive material of the invention is not limited to a specific scope, and various known methods can be used for this purpose. The typical examples of such a method are as follows; a method where a photographic material is first subjected to color developing and bleach-fixing, and then, if required, to washing or stabilizing for an alternative of washing; a method where after color developing, the material is subjected to bleaching and then to fixing, and, if required, to washing or stabilizing for an alternative of washing; a method where the material is subjected to processing in an order of pre-hardening, neutralizing, color developing, stopping-fixing, washing (or stabilizing for an alternative of washing), bleaching, fixing, washing (or stabilizing for an alternative of washing), post-hardening, and washing (or stabilizing for an alternative of washing); and a method where the material is subjected to processing in an order of color developing, washing (or stabilizing for an alternative of washing), supplementary color developing, stopping, bleaching, fixing, washing (or stabilizing for an alternative of washing), and stabilizing. Another useful method is a process based on a diffusible transfer method.

A silver halide color photosensitive material of the invention is subjected to imagewise exposing based on any known method.

The examples of a light source include a tungsten lamp, a halogen lamp, a xenon lamp, a mercury lamp, a laser, a CRT light source, an LED and an FOT, and these light sources are used singly or in combination.

An exposure time applicable is not limited to a specific scope, and ranges from 1/1000 to 1 second that is an exposure time range for ordinary cameras; or an exposure time shorter than 1/1000 second, for example, $1/10^4$ to $1/10^9$ second using a xenon flash lamp or cathode ray tube. A spectral composition of exposing light may be varied by a color filter according to a specific requirement.

From a viewpoint of a high image recording density, a preferred exposing light source for a silver halide color photosensitive material of the invention is a laser or LED.

The most preferred is an exposing technique using a scanner exposing apparatus based on laser light.

The examples of a laser particularly preferred in the invention are semiconductor lasers such as GaAs, GaAℓAs, GaInAsP, Ga(As_xP_{1-x}, CdTe, InP, $In_xGa_{1-x}As$ and InP_xAs_{1-x}; solid state lasers such as YAG:Nd^{3+}, $CaWO_4$:Nd^{3+}, $CaWO_4$:Ho^{3+}, MgF_2:Ni^{2+}, SrF_2:U^{3+}, and CaF_2:Tm^{2+}, liquid lasers $SeOC\ell_2$:Nd^{3+}, $POC\ell_1$:Nd^{3+}, chloroaluminum, phthalocyanine, and 3-3-diethylthiatricarbocyanine; gas lasers such as neutral rare gas atoms, Co-He, CO_2-He, CO_2-Ne, NO-He, N_2O-He, He-Ne, Kr, Ar, and He-Cd. Those preferably used are semiconductor lasers and gas lasers.

Optionally, another useful exposing means is a combination of an IR laser and an SHG element (Second Harmonic Generator) that converts IR laser light to visible light whose wavelength is 1/2 of the IR laser light.

An image recording material provided with the above-mentioned processings can be used as an ID card as it is. However, a preferred ID card is prepared by providing a lamination of a plastic film or the like at least on one face of the image recording material.

This arrangement provides an ID card having excellent scratch resistance and durability, and such an ID card is effective for preventing forgery or alteration.

A typical lamination material usually used for this purpose comprises of a plastic film and a hot-melt layer.

The examples of a hot-melt material for this purpose include those commonly known such as a polyolefine resin, an ethylene-acrylic acid copolymer, and an ethylene-acrylic ester copolymer.

The preferred examples of a plastic film mentioned above include polyethylene terephthalate, polyvinyl chloride, a polyvinyl chloride-vinyl acetate copolymer, polyacrylates, and polystyrenes.

Another example of a useful lamination material comprises of a paper sheet and a hot-melt layer.

In an ID card of the invention, a partial or entire area of image formed by subjecting a silver halide color photosensitive material to exposing and color developing, must be legible with IR light.

In other words, a portion of a recorded image must absorb IR light in a spectral range of 700 nm or higher. Image reading with IR light can be performed either by reflected light or transmitted light, and any image can be read as far as the image has a density to meet a detection sensitivity of an image reading apparatus.

When reading an image with reflected IR light, a maximum difference between a reflective density at 850 nm of an image recording area subjected to reading with IR light and that of a non-recording area is preferably not less than 0.3, more preferably not less than 0.5.

Likewise, when reading an image with transmitted IR light, a maximum difference between a transmittance density at 850 nm of an image recording area subjected to reading with IR light and that of a non-recording area is preferably not less than 0.3, more preferably not less than 0.5.

Images legible with IR light include bar codes, OCR (Optical Character Reading) characters and various other images. In many cases, these images are black/white images; however, they may be color images. The sizes of these images are not limited to a specific range, as far as they are legible with a reading apparatus.

An ID card of the invention comprises not only an image legible with IR light but also a color image that is recognized with human vision. One preferred example of such a color image is a record of personal data as typified by an identification portrait. Such a color image is to be recognizable by human vision, and its size may be such that can be recognized, preferably not less than 1 cm^2.

An ID card of the invention is used as an ID booklet by incorporating it in a booklet comprising a plurality of pages for taking notes.

Such an ID booklet is convenient since it serves in two ways, that is, as a handbook used for a specific purpose as in the case of a staff handbook or student handbook, and as the ID card.

Example 1

1. Preparation of silver halide color photosensitive material

According to a neutral method and a double-jet method, three types of silver halide emulsion specified in Table 1 were prepared.

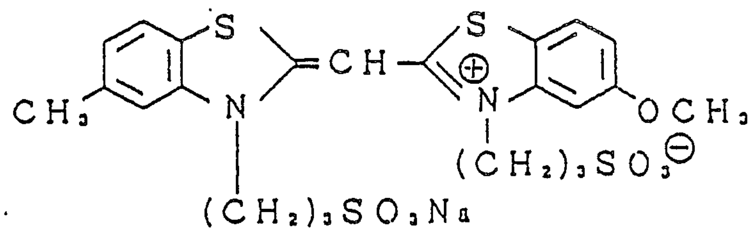
Table 1

Emulsion No.	Ag Cℓ %	Ag Bγ %	Average grain size μ	Chemical sensitizer	Spectral sensitizing dye
Em-1	99.5	0.5	0.67	Sodium	SD-1 *3
Em-2	99.5	0.5	0.46	thiosulfate	SD-2 *4
Em-3	99.5	0.5	0.43	TFR ID=20/011>- *1 Chloroauric acid TFR ID=20/012>- *2	SD-3 *5

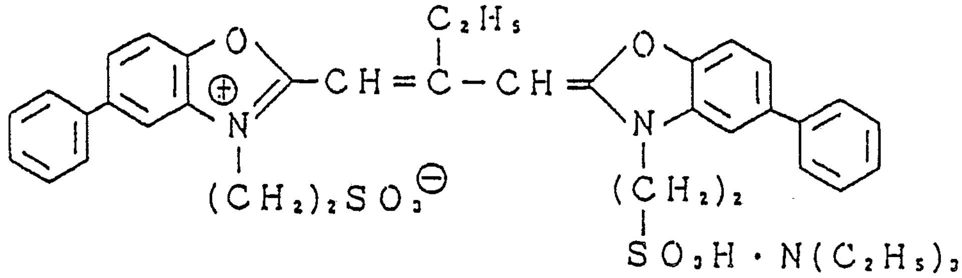
*1 2 mg added per mol silver halide
*2 1 x 10^{-6} mol added per mol silver halide
*3 0.9 mmol added per mol silver halide
*4 0.7 mmol added per mol silver halide
*5 0.2 mmol added per mol silver halide

After chemical sensitization was complete, STB-1 illustrated below was added as an emulsion stabilizer to each silver halide emulsion at a rate of 2 x 10^{-4} mol per mol silver halide.

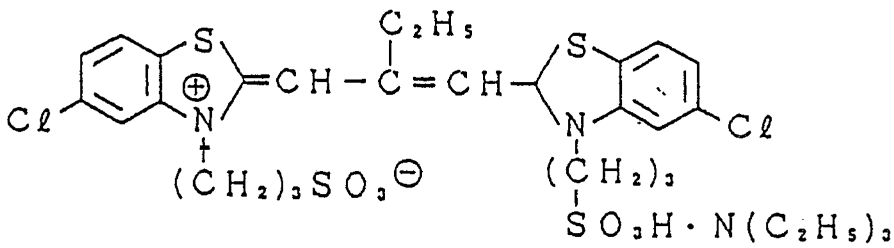
SD-1



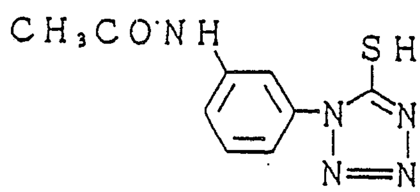
SD-2



SD-3



STB-1



Next, Layers 1 through 7 were sequentially formed by a simultaneous coating technique on a paper support with both faces coated by polyethylene to prepare a silver halide color photosensitive material; the amounts added in the following examples of the invention are per dm^2 of a photosensitive material.

Layer 1

A layer containing 12 mg of gelatin, 2.9 mg (an amount converted to silver, hereafter applicable) of a blue-sensitive silver halide emulsion (Em-1), and 3 mg of dinonylphthalate (DNP) dissolving 7.5 mg of yellow coupler (Y-1), 3 mg of light-stabilizer ST-1 and 0.15 mg of 2,5-dioctylhydroquinone (HQ-1)

Layer 2

A layer containing 9 mg of gelatin, and 2 mg of DOP (diocytylphthalate) dissolving 0.4 mg of HQ-1

Layer 3

A layer containing 14 mg of gelatin, 2 mg of a green-sensitive silver halide emulsion (Em-2), and 3 mg of DOP dissolving 6 mg of magenta coupler (M-1), 2.5 mg of light-stabilizer ST-2, and 0.06 mg of a filter dye AI-1 illustrated below

Layer 4

A layer containing 12 mg of gelatin, and 3 mg of DNP dissolving 6 mg of a UV absorber(UV-1) illustrated below and 0.5 mg of HQ-1

Layer 5

A layer containing 14 mg of gelatin, 2 mg of a red-sensitive silver halide emulsion (Em-3), and 3 mg of DOP dissolving 3.5 mg of a cyan coupler(C-1).

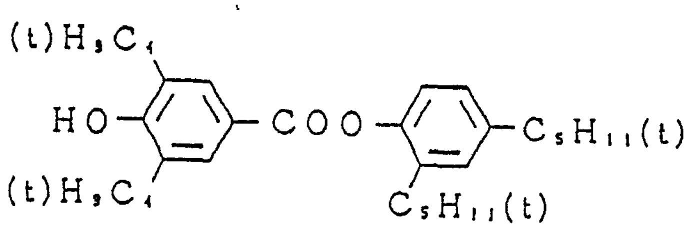
Layer 6

A layer containing 11 mg of gelatin, 2 mg of DOP dissolving 2 mg of UV-1, and 0.05 mg of filter dye AI-2 illustrated below

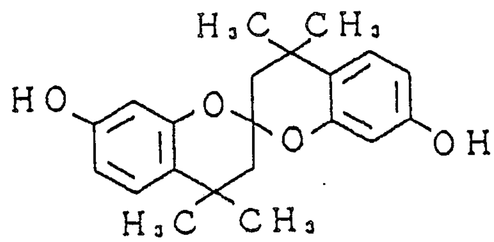
Layer 7

A layer containing gelatin (10 mg),and 0.5 mg of 2,4-dichloro-6-hydroxytriazine sodium

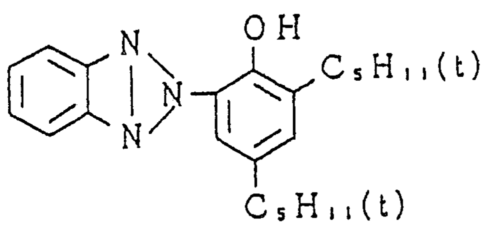
ST - 1



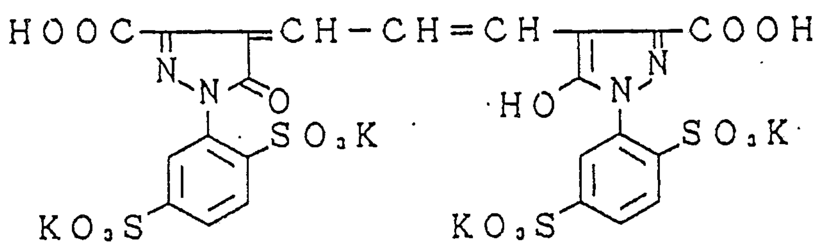
ST-2



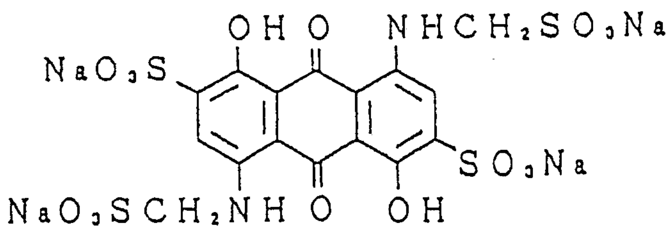
UV-1



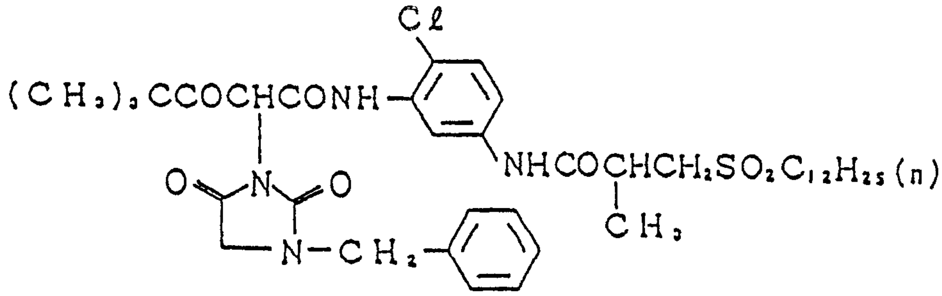
AI-1



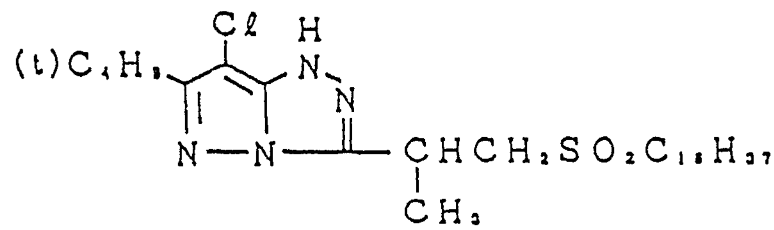
AI-2



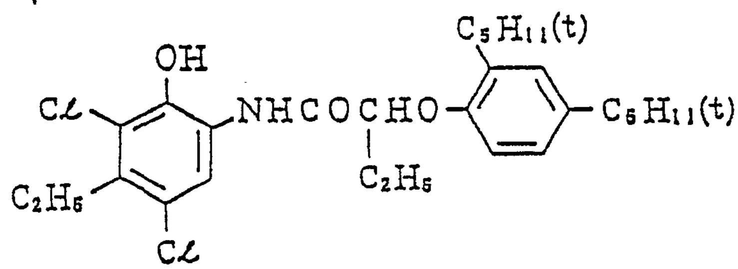
Y - 1



M - 1



C - 1



2. Exposing an image of personal ID data

A personal data image was exposed on the above-described photosensitive material with a scanning type laser exposing apparatus using He-Cd (442 nm), He-Ne (544 nm) and He-Ne (633 nm) laser light sources.

The block diagram for this scanning type laser exposing apparatus is shown in FIG. 2. The exposing apparatus is hereunder described.

Signal R for controlling a cyan dye image is input into a laser light modulation circuit 27. Laser light 34 that is emitted from a He-Ne (wavelength 633 nm) laser 1 based on an output signal 31 is converged by a lens array 5, and then the converged light is reflected to a polygon mirror 19 by a dichroic mirror 6.

Similarly, signal G for controlling a magenta dye image controls He-Ne (wavelength 544 nm) laser, signal B for controlling a yellow dye image controls He-Cd (wavelength 442 nm) laser, thereby red laser and IR laser beams are emitted, respectively.

Laser beam 45 comprising three mixed beams each having a different wavelength is directed to a polygon mirror 19.

A laser beam scanned by the polygon mirror 19 is subjected to fθ conversion by an f-θ lens 20 and is focused onto a photosensitive material 23 via a mirror 21 and a cylindrical lens 22. Thus, a photosensitive material is exposed with a beam of which intensity is modulated correspondingly to signals R, G and B.

A stage 24 for supporting a photosensitive material 23 is reciprocatively movable by cooperative movement of a rack 30 and a gear 25 disposed on a motor 26, wherein retation of the motor 26 is transmitted to the stage 24.

The polygon mirror 19 is arranged so that it is driven by a polygon mirror driving mechanism 47. The motor driving circuit 46 is operated with a signal output from the control signal generator 48 which is controlled by an input SYNC signal synchronizing with signals R, G and B, to drive the motor 26 and move the stage. At the same time, rotation of the polygon mirror 19 is also controlled. As a result, a two-dimensional image is formed on a photosensitive material by exposing.

3. Developing of photosensitive material

Each photosensitive material exposed imagewise according to the above-mentioned procedure was subjected to color developing as follows; provided that prior to bleaching and fixing following color developing, 1% aqueous 1-phenyl-5-mercaptotetrazole solution of pH8 as a desilvering inhibitor was coated on an area which was subjected to image reading with IR light.

[Processing steps]

	Temperature	Time
Color developing	35.0 ± 0.3 °C	45 sec.
Bleach-fix	35.0 ± 0.3 °C	45 sec.
Stabilizing	30 to 34 °C	90 sec.
Drying	60 to 80 °C	60 sec.

[Color developer]

Pure water	800 mℓ
Triethanolamine	10 g
N,N-diethylhydroxyamine	5 g
Potassium bromide	0.02 g
Potassium chloride	2 g
Potassium sulfite	0.3 g
1-hydroxyethylidene-1, 1-diphosphonic acid	1.0 g
Ethylenediaminetetraacetic acid	1.0 g
Disodium catechol-3,5-disulfonate	1.0 g
N-ethyl-N-β-methanesulfonamidoethyl-3-methyl-4-aminoaniline sulfate	4.5 g
Fluorescent whitening agent; 4,4′-diaminostilbenedisulfonate derivative	1.0 g
Potassium carbonate	27 g

Water was added to make total quantity one liter, and pH was adjusted to 10.10.

Bleach-fix solution]

Ferric ammonium ethylenediaminetetraacetate. dihydrate	60 g
Ethylenediaminetetraacetic acid	3 g
Ammonium thiosulfate (70% aqueous solution)	100 mℓ
Ammonium sulfite (40% aqueous solution)	27.5 mℓ

Water was added to make total quantity one liter, and pH was adjusted to 6.2 with potassium carbonate or glacial acetic acid.

[Stabilizing solution

5-chloro-2-methyl-4-isothiazoline-3-one	1.0 g
Ethylene glycol	1.0 g
1-hydroxyethylidene-1,1-diphosphonic acid	2.0 g
Ethylenediamine tetraacetic acid	1.0 g
Ammonium hydroxide (20% aqueous solution)	3.0 g
Ammonium sulfite	3.0 g
Fluorescent whitening agent; 4,4′-diaminostilbenediphosphate derivative	1.5 g

Water was added to make total quantity one liter, and pH was adjusted to 7.0 with sulfuric acid or potassium hydroxide.

4. Preparation of ID card

An ID image shown in FIG. 1 was formed by the above-mentioned treatment.

In FIG. 1, a reference numeral 1 represents a color portrait; 2 represents an area of black image that bears characters including a name, wherein the black image is formed by colored dyes derived from cyan, magenta and yellow couplers, so that, this image has virtually no absorption in an IR wavelength region. Numeral 3 represents a bar code recording personal data and subjected to reading with IR light, which is treated by coating a desilvering inhibitor solution.

The material recorded with an image was sandwiched, as shown in FIG. 3, between two sheets of a laminating material that comprises a transparent plastic film coated with a hot-melt layer, and then, was subjected to a heat/press roller at approx. 120°C to prepare an ID card of the invention.

There was observed a difference of 0.64 in a reflective density measured at 850 nm between black and white areas on a bar code of the preceding ID card.

Accordingly, the personal data in a form of such a bar code was legible with IR light.

A character image formed on the same area in place of the bar code by similarly exposing has an absorption in an IR wavelength region, and it was legible with IR light as an OCR code .

Additionally, the image recording material could be incorporated into an ID booklet by a lamination technique.

Example 2

According to a neutral method and a double-jet method, three types of silver halide emulsions specified in Table 2 were prepared.

Table 2

Emulsion No.	Ag Cℓ %	Ag Bγ %	Average grain size μ	Chemical sensitizer	Spectral sensitizing dye
Em-4	99.5	5	0.23	-	SD-1 *6
Em-5	99.5	5	0.18	-	SD-2 *7
Em-6	99.5	5	0.18	-	SD-3 *8

*6 0.5 mmol added per mol silver halide
*7 0.3 mmol added per mol silver halide
*8 0.1 mmol added per mol silver halide

After chemical sensitization was complete, the previously mentioned STB-1 as an emulsion stabilizer was added to each silver halide emulsion at a rate of 2×10^{-4} mol per mol silver halide.

A photosensitive material was prepared in a manner identical to that of Example 1, except that each 5 mg (an amount converted to silver) of Em-4, Em-5 and Em-6 was added further to layers 1, 3 and 5, respectively.

Next, the photosensitive material was subjected to imagewise exposing in the same manner as in Example 1. An intensity of the most intensive light used for exposing an area that is subjected to reading with IR light was more than 20 times more intensive than that of light used for exposing a color image area of each color.

Then, the photosensitive material was subjected to developing in a manner identical to that of Example 1, except that bleach-fix time was changed to 25 seconds, and an ID card was prepared by laminating in the same manner as Example 1.

There was observed a difference of 0.71 in a reflective density measured at 850 nm between black and white areas on a bar code of the ID card. Accordingly, this bar code was found to be legible with IR light.

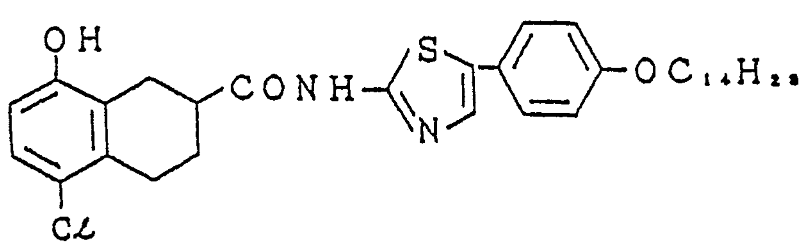
Example 3

A silver halide photosensitive material was prepared in the same manner as Example 1, besides that a composition of layer 5 was changed as follows;

Layer 5:

A layer containing 14 mg of gelatin, 3.0 mg of a red-sensitive silver halid emulsion (EM-3), and 4 mg of DOP dis-solving 3.5 mg of cyan coupler (C-1) and 1.6 mg of an IR coupler (IR-1).

IR-1



Next, the photosensitive material was subjected to imagewise exposing followed by developing in the same manner as Example 1. Then, an ID card was prepared by laminating in the same manner as Example 1.

There was observed a difference of 0.55 in a reflective density measured at 850 nm between black and white areas on a bar code of the ID card. Accordingly, this bar code was legible with an IR light

As described above in detail, according to the present invention, it has been possible to provide an ID card comprising an image legible with IR light and a visible color image, both of which were formed by a single process.

Therefore, according to the invention, it has also been possible to prepare the above-mentioned ID card by a simple process.

Additionally, according to the invention, an ID booklet serving not only an ID card having identification function but also a pocket notebook has been provided.

Reference numerals

1 Portrait
2 Character image
3 Bar code
4, 7, 13 lasers
5, 11, 17 Lenses
6, 12, 18 Dichroic mirrors
19 Polygon mirror
20 f-θ lens
21 Mirror
22 Cylindrical lens
23 Photosensitive material
24 Stage
25 Gear
26 Motor
30 Rack
27, 28, 29 Semiconductor modulation circuits
46 Motor driving circuit
47 Polygon mirror driving mechanism
48 Control-signal generator
50 Image recording material
51 Support
52 Image recording layer
60 Laminating material
61 Plastic film
62 Hot melt layer

Claims

1. An ID card consisting essentially of a support and provided thereon, a silver halide color photosensitive material having at least silver halide emulsion layers, wherein said ID card comprises an area (A) in which data are recorded by color images, and an area (B) in which data are recorded by images legible with infrared light.

2. The ID card of claim 1, wherein said images legible with infrared light are silver images which are formed by allowing at least a part of developed silver to remain after bleaching and fixing processes.

3. The ID card of claim 2, wherein mainly the color images are formed in said area (A), and both color images and silver images are formed in said area (B).

4. The ID card of claim 3, wherein said areas (A) and (B) are subjected to bleaching with a bleaching solution or a bleach-fix solution each having a weaker desilvering capability, after being subjected to exposing and developing.

5. The ID card of claim 3, wherein whole area besides the area (B) is subjected to bleaching, and then, the whole area is subjected to fixing.

6. The ID card of claim 3, wherein said area (A) is subject ed to bleach-fixing or bleaching and then fixing, and said area (B) is subjected to fixing.

7. The ID card of claim 3, wherein the whole area is subjected to bleaching and fixing or bleach-fixing, provided that the area (B) is masked in advance by coating with an agent capable of preventing thc area (B) from desilvering.

8. The ID card of claim 3, wherein said area (B) is subjected again to developing after the whole area is subjected to bleaching, and then, the whole area is subjected to fixing.

9. The ID card of claim 1, wherein said silver halide emulsion layers comprise a high speed-silver halide emulsion and a low speed-silver halide emulsion, each having a same color sensitivity and a significantly different sensitivity.

10. The ID card of claim 9, wherein said area (A) is exposed with relatively weak light to expose mainly the high speed-silver halide emulsion, and said area (B) is exposed with relatively intense light to expose both high speed and low speed-silver halide emulsions, provided that the silver halide color photosensitive material is a negative type.

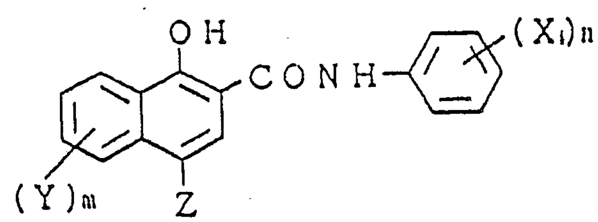
11. The ID card of claim 9, wherein said area (A) is exposed with relatively intense light to expose both high speed and low-speed silver halide emulsions, and said area (B) is exposed with relatively weak light to expose mainly the high speed- silver halide emulsion, provided that the silver halide color photosensitive material is a direct positive type.

12. The ID card of claim 1, wherein said silver halide color photosensitve material comprises an infrared dye-providing material which is capable of releasing or forming in developing an IR dye having substantially an absorption in an infrared wavelength region.

13. The ID card of claim 12, wherein said infrared dye-providing material is a coupling dye-forming compound.

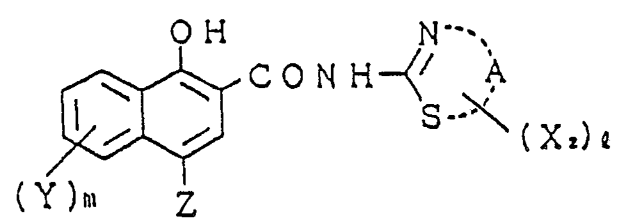
14. The ID card of claim 13, wherein said coupling dye-forming compound is a naphthol coupler represented by Formula [I] or [II];

Formula [I]



wherein X_1 represents an electron attractive group; m represents 0 or 1; n represents an integer of 1 to 3, provided that X_1's are same with or different from each other when n is 2 or 3; Y represents a halogen atom, $-CO_2R_1$, $SO_2N\Theta_1R_2$, $-CONR_1R_2$, $-NR_1R_2$, or $-NR_1SO_2R_2$; R_1 and R_2 represent independently an alkyl group or an aryl group; Z represents a hydrogen atom or a group capable of splitting off by coupling reaction;

Formula [II]



wherein X_2 represents a halogen atom, an alkyl group, an aryl group, an alkoxy group, an aryloxy group, an alkylthio group, an arylthio group, an acyl group, an alkoxycarbonyl group, an amino group, an N-substituted amino group, an acylamino group, a carbamoyl group, an N-substituted carbamoyl group, an alkylsulfonyl group, an arylsulfonyl group, an alkylsulfonylamino group, an arylsulfonylamino group, a sufamoyl group, a cyano group, a hydroxy group, or a mercapto group; ℓ represents an integer of 0 to 2; Y, Z and m are synonymous with those defined in Formula [I], respectively; A represents a group of atoms necessary to form a five-membered ring

15. The ID card of claim 14, wherein said electron attractive group is a halogen atom, a cyano group, a carboxylic ester group, or a sulfonic amide group.

16. The ID card of claim 14, wherein said naphthol coupler comprises a ballast group.

17. The ID card of claim 16, wherein said ballast group is an organic group having not less than eight carbon atoms, or a polymer residue.

18. The ID card of claim 17, wherein said ballast group substitutes X_1, X_2 or Y.

19. The ID card of claim 14, wherein said group capable of splitting off by coupling reaction is a halogen atom, a sulfo group, an alkoxy group, an aryloxy group, a thiocyano group, an acyloxy group, an arylthio group, or a nitrogen containing heterocyclic residue.

20. The ID card of claim 12, wherein said areas (A) and (B) are subjected to bleaching with a bleaching solution or a bleach-fix solution each having a weaker desilvering capability, after being subjected to exposing and developing.

21. The ID card of claim 12, wherein whole area besides the area (B) is subjected to bleaching, and then, the whole area is subjected to fixing.

22. The ID card of claim 12, wherein said area (A) is subjected to bleach-fixing or bleaching and then fixing, and said area (B) is subjected to fixing.

23. The ID card of claim 12, wherein the whole area is subjected to bleaching and fixing or bleach-fixing, provided that the area (B) is masked in advance by coating with an agent capable of preventing the area (B) from desilvering.

24. The ID card of claim 12, wherein said area (B) is sub jected again to developing after the whole area is subjected to bleaching, and then, the whole area is subjected to fixing.

25. The ID card of claim 11, wherein difference of a maximum density and a minimum density in the area (B) at 850 nm is not less than 0.3.

26. The ID card of claim 25, wherein said difference is not less than 0.5.

27. The ID card of claim 1, wherein said imagewise exposure is carried out with a laser light member or a light emitting diode member.

28. The ID card of claim 27, wherein said exposure is carried out with said laser light member mounted in a scanning exposing unit.

29. The ID card of claim 1, comprising a laminating material for covering the ID card after said silver halide color photosensitive material is subjected to exposing, developing, bleaching, fixing and drying.

FIG. 1

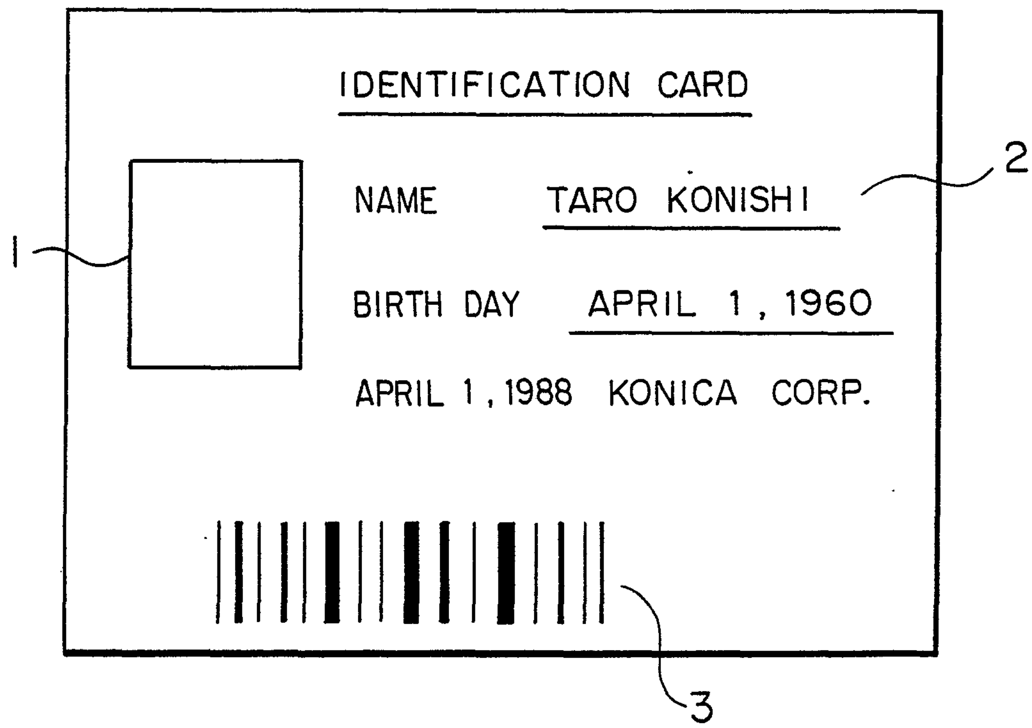
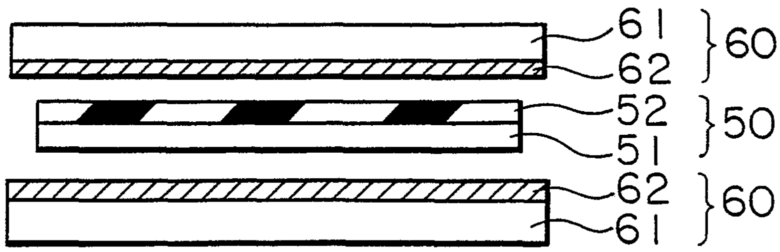

IDENTIFICATION CARD
NAME
TARO KONISHI
BIRTH DAY
APRIL 1, 1960
APRIL 1, 1988 KONICA CORP.
1
2
3

FIG. 3


61
62
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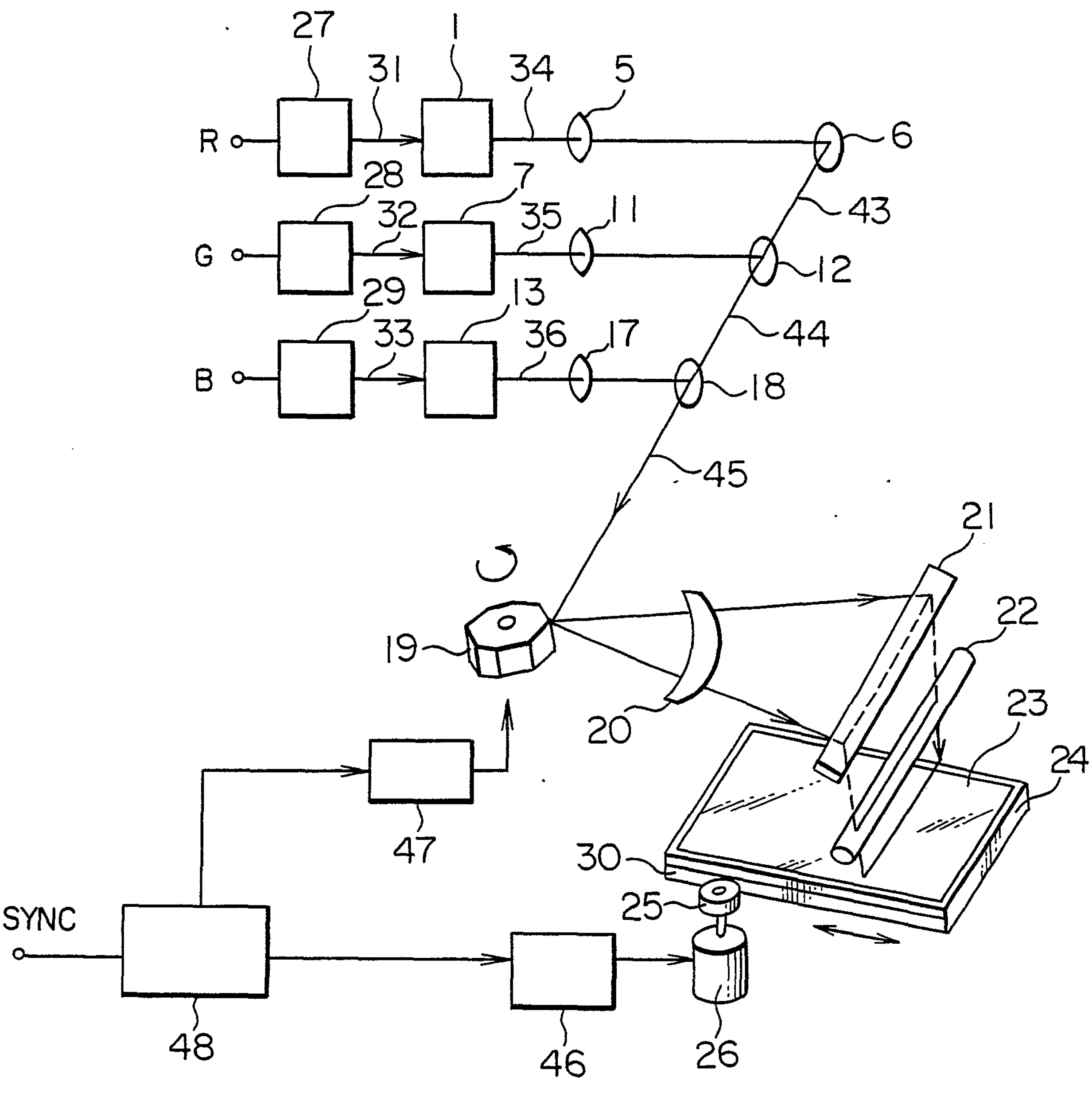
60

FIG. 2


27
31
1
34
5
R
6
28
7
43
32
35
11
G
12
29
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33
36
17
44
B
18
45
21
19
22
20
23
24
47
30
25
SYNC
48
46
26