COLOR PHOTOGRAPHY PATENTS (*cont.*)

WM. V. D. KELLEY*

CLASS 2—COATED ON ONE SIDE OF A BASE

Division A—Where two images are imprinted at the same time, and the two images developed at the same time, and then by fractional toning, each is made a different color.

Leopold D. Mannes, U. S. No. 1,516,824. Nov. 25, 1924

Claim 4: The method of producing a color photograph in two colors comprising forming in layers of emulsion sensitized respectively to record different color values, two superimposed latent images of different color sensations, simultaneously developing and then fixing said two images and then coloring each of said images with that color whose values are recorded by the other image.

Division B—Where the two images are produced by two developments on one face of the base by re-emulsifying.

Gustave Selle, No. 654,766. July 31, 1900

Claim 1: The process of production of multicolored paper photographs consisting in covering the paper with a waterproof layer, then with a sensitive layer, exposing and developing the latter for one color, again covering same with a waterproof layer, then with a sensitive layer, exposing and developing the latter for another color, and repeating the operations of waterproofiing, sensitizing, exposure, and development for each additional color.

Wm. F. Fox, No. 1,166,122. Dec. 28, 1915

Specification, page 4, lines 43 to 49: If single emulsion stock be used, the emulsioned surface of the projection positive is first protected by means of a suitable substance (for example a celluloid solution), after which that surface is re-emulsioned to adapt it to receive the correcting image.

T. A. Mills, No. 1,172,621. Feb. 22, 1916

Specification, page 2, lines 101–120: "Recoating or resensitizing between the printings is in accord with the usages and methods well understood by photographers, a waterproof and chemical

* Kelley Color Laboratory Inc., Palisade, New Jersey.

proof stratum being interposed when necessary, just as is done between the strata in the case of the Lumière Autochrome plates."

This patent was filed Dec. 3, 1912.

Claim 1: Process of producing a color cinematographic picture film for projection without the aid of color screens or filters which consists in making each complete picture of said picture film a composite helichrome, more or less simulating the colors of nature by taking a single original or negative band exposed through recurring color filters, printing on a light sensitive surface from said negative band, treating such surface so that each of the positive images thereon will appear in color complementary to the color of the filter used in taking the corresponding negative image, *printing on a fresh light sensitive surface* from said negative band, said negative band being stepwise shifted in relation to the previous printing, and treating such fresh surface so that each of the second series of positive images thereupon will appear in color complementary to the color of the filter used in taking the corresponding negative image, each positive image in color of the above recited first printing and the above cited first color treatment forming one element of a composite helichrome and each positive image in color of the above recited second printing and the above recited second color treatment forming the other element or another element of a composite helichrome, *a single transparent base* being the final support for all the light sensitive surfaces.

Wm. Francis Fox, No. 1,187,421. June 13, 1916

Specification, page 4, lines 83–91: "The originally emulsioned surface of the positive film having been utilized as above pointed out, it is desirable to form a new emulsioned surface thereon, and this may be done either by applying the emulsion to the reverse side of the film or, if preferred, by varnishing the previously emulsioned surface and then re-emulsioning that surface over the varnish."

R. Fischer, U. S. No. 1,055,155. March 4, 1913

Division C—Where the images are printed in black and white on a single coated film and color added by hand painting, stenciling, or imbibition.

C. Sciamengo, U. S. No. 1,036, 730. Aug. 27, 1912

A. Wykoff and Max Handschlegl, U. S. No. 1,303,836. May 13, 1919

Claim 2: The process of coloring cinematograph films comprising uniformly blocking out with an opaque medium all those portions on a positive print which portions it is desired to color, making a negative from such positive, rendering insoluble all those portions of the negative surface exposed to light in making the negative, applying coloring matter to the portions which have not been exposed to light, and transferring such applied coloring matter to the film to be colored.

A. Wyckoff and Max Handschlegl, U. S. No. 1,303,837. May 13, 1919

Claim 17: In a method of coloring films by subjecting the film to be colored to a pressurable contact with a similar film carrying coloring matter, continuously moving the films, exerting a tension upon a portion of each of the films, and adjusting the tensions separately to bring the films to registering dimensions, and bringing the said film portions together in pressurable contact while under tension.

Max Handschlegl, U. S. No. 1,316,791. Sept. 23, 1919

Claim 2: A process of making colored moving picture films which consists of taking a smooth negative, applying transfer dye to the negative, taking a smooth positive of the negative, softening the coating of the positive, dye toning the positive, placing the positive and negative together face to face, and applying yielding pressure to transfer the dye from the negative to the positive.

Max Handschlegl, U. S. No. 1,295,028. Feb. 18, 1919

Claim 4: An impression drum, means for feeding two films to the impression drum one on top of the other, there being windows through the drum to allow the light to shine through the films to show the registration of one film upon the other.

Frank Wordsworth Donisthrope, U. S. No. 1,517,200. Nov. 25, 1924. Filed Aug. 18, 1920

Claim 1: A process of dye transfer printing from photographic negatives, which consists in immersing the negative in a preparing bath containing acid and then in a dye bath, controlling the penetration of the dyes or dye into the prepared negative by varying the proportion or quantity of said acid contained in said preparing bath, and transferring the dye or dyes from the negative to a printing medium by direct surface contact.

Robert John, U. S. No. 1,374,853. April 12, 1921. Filed May 6, 1916

Claim 26: The process of forming a photographic record of lights and shades capable of use as a transfer printing plate, which comprises hardening portions of emulsion adjacent to the light sensitive content of a photographic emulsion mounted on and exposed through a transparent carrier to lights and shades of a photographic negative, by treating said emulsion with an agent adapted to harden said emulsion by reaction with the light affected sensitive content of the emulsion, and with a neutralizing agent for said hardening agent, the relative proportions of said hardening and neutralizing agents being such as to control selectively the effective area of influence of the hardening agent but to an extent less than the complete neutralization of said hardening agent, removing the unhardened portions of emulsion, coloring said hardened portions, and placing said colored portions in contact with a substance adapted to take the coloring matter from said hardened portions.

Robert John, U. S. No. 1,453,258. April 24, 1923. Filed Oct. 23, 1919

Shepherd and Bartlett, U. S. No. 728, 310. May 19, 1903

William V. D.Kelley, U. S. No. 1,505,787. Aug. 19, 1924

Claim 1: A transparent carrier coated with gelatine having a reduced silver image and a dye impressed color representation of the reds in the original subject.

Loren E. Taylor, U. S. No. 1,518,945. Dec. 9, 1924

Claim 1: The process of coloring motion picture films comprising taking a positive print from an original negative by printing with their emulsion sides in contact, projecting successive views of said positive each on to a mat of non-actinic color in sequence, the emulsion side of said positives being towards the projecting light, making drawings on said mats in actinic colors.

On the areas of said views it is desired to tint with one color, thence exposing successive portions of an unexposed negative film to each of said mats so the successive drawings will be impressed thereon in the sequence in which they were produced, developing said negative and making a positive print therefrom by printing with the celluloid side of the positive in contact with the emulsion side of the negative, developing said positive and treating it so the emulsion over the areas thereon corresponding to those of the drawings will absorb moisture and the remaining areas will be impervious thereto, applying dye to

said absorbent areas, thence subjecting said positive to a pressurable contact with the original positive while in register therewith and with their emulsion side in contact.

Loren E. Taylor, U. S. No. 1,518,946. Dec. 9, 1924

Claim 1: The process of coloring motion picture films comprising producing a negative by exposure of a film predominantly sensitive to certain colors and predominantly insensitive to colors complementary thereto, taking a positive print therefrom, etching out those portions of the sensitized coating of the negative containing the silver affected by exposure to light, applying coloring matter to said etched negative so that it is absorbed by those portions of its gelatinous coating not removed by etching, said color being complementary to the color to which the negative was predominantly sensitive, and transferring said coloring matter to the positive film by bringing it into pressurable facial contact therewith.

F. E. Ives, U. S. No. 1,121,187. Dec. 15, 1914. Filed July 12, 1912

Claim 3: The process of photographic imbibition printing comprising the dyeing of a dye member with an acid dye and thereafter transferring the dye image so formed by imbibition to a gelatine coated print member charged with a mordant of a character capable of converting such dye into an insoluble lake.

Division D—Where two images are produced by two developments without recoating. First, one image is printed and colored or rendered capable of coloring, the film dried without fixing, a second picture printed in the original coating, developed, and colored.

Wm. Francis Fox, U. S. No. 1,166,123. Dec. 28, 1915. Filed Feb. 3, 1913

Claim 1: A photographic process involving the production of a negative of two images from one of which certain color-sensations have been omitted and from the other of which certain other complementary color-sensations have been omitted, imprinting one of said images upon transparent or translucent sensitized material, imprinting the other of said images upon said material in registry with the first image imprinted thereon, coloring one of said images with a color corresponding to the sensations omitted from the corresponding negative, and coloring the other of said images by the use of a basic dye to a color corresponding to the sensations omitted from the corresponding negative, substantially as set forth.

Claim 2: A photographic process involving the production of an image upon transparent or translucent sensitized material, treating the same with vanadium chloride and potassium ferricyanide, and coloring the same by means of a basic dye, substantially as set forth.

Claim 2: A photographic process involving the production of an image upon transparent or translucent sensitized material, treating the same with vanadium chloride and potassium ferricyanide, and coloring the same by means of a basic dye, substantially as set forth.

F. E. Ives, U. S. No. 1,170,540. Feb. 8, 1916. Filed July 1, 1914

W. F. Fox, U. S. No. 1,207,527. Dec. 5, 1916. Filed June 23, 1924

F. E. Ives, U. S. No. 1,278,668. Sept. 10, 1918. Filed Oct. 9, 1917

Claim 4: A color photograph or film comprising a layer of colloid material containing a red copper-toned and mordant-dyed silver image blended with a blue-to-green image.

F. E. Ives, U. S. No. 1,499,930. July 1, 1924. Filed Oct. 25, 1923

Claim 4: The conversion of a photographic silver print in a colloid layer containing also silver bromide to a pigment blue print and silver bromide, by treatment in a bath containing in combination the necessary ingredients for producing the blue image and a bromide and a chloride followed by exposure and development to produce a second image in the same colloid layer.

F. E. Ives, U. S. No. 1,538,816. May 19, 1925. Filed Feb. 15, 1923

Claim 1: In photographic color print making, the production of a silver image which is converted in part to silver ferrocyanide, followed by reconverting the silver ferrocyanide to silver bromide, and then exposed to light under another negative, and developing a second silver print which is subsequently converted into a color print.

CLASS 3

Division A—Methods of producing dye images by means of mordants.

Arthur Traube, U. S. No. 1,093,503. Apr. 14, 1914. Filed May 15, 1907

Claim: The process of converting silver prints into pure color prints, which consists in converting the material of which the picture is composed into substances capable of being colored directly and soluble in fixing compounds, then coloring the pictures with basic dyes, and treating the colored pictures with a mixture

including substances which dissolve the silver salts and also containing substances which produce insoluble lakes with the dyes used for coloring the prints.

Auguste Jean Baptiste Tauleigne and Eline Mazo, U. S. No. 1,059,917. Filed Mar. 23, 1910

Claim 1: The herein described steps in a process for the production of colored photographs from ordinary silver positives, which consists in the treatment of the positive with bichloride of copper, subsequently treating it with iodide of potassium, immersing it in an aniline dye bath, washing with water, fixing the color by immersion in a solution of tannin, washing to eliminate excess of tannin, fixing the print, and finally washing to eliminate the fixing reagent.

Wm. Francis Fox, U. S. No. 1,166,123. Dec. 28, 1915

Vanadium ferrocyanide forms the mordant for basic dyes, (See Class 2).

Hoyt Miller, U. S. No. 1,214,940. Feb. 6, 1917. Filed Feb. 26, 1915

Claim 10: The herein described method, comprising bleaching a photographic image by treatment with iodine and iodide, treating the bleached image with sodium bisulphite to clear the same of iodine, washing out the bisulphite, treating the image with a dye of the desired color, and then washing out the excess dye.

P. D. Brewster, U. S. No. 1,537,524. May 12, 1925. Filed Dec. 6, 1918

Improvement on Hoyt Miller, above.

Jesse M. Blaney, U. S. No. 1,331,092. Feb. 17, 1920. Filed May 22, 1918

Claim 3: The method of producing photographic images which consists in substituting for the silver forming the initial photographic image a salt of tin, removing the silver forming the initial image and treating the tin image forming material with a dye of the desired color to produce a colored image.

Leon F. Douglass, U. S. No. 1,450, 412. Apr. 3, 1923. Filed Oct. 16, 1919

Claim: The process of making a colored photographic image from a black silver image, which consists in replacing the black silver image with an iron blue toned image, treating said converted image with a basic dye, and subsequently causing said image

to mordant basic dyes by treating it with an alkaline solution.

J. Lewisohn, U. S. No. 1,126,495. Jan. 26, 1915. Filed Apr. 3, 1914

Claim 3: A method for producing prints having a plurality of color effects, which consists in forming a blue print, substituting for the blue of the image a different color, coating the so-formed image with a blue print sensitizer, making another blue print, substituting for the blue of the image a color different from the blue and first different color used, coating the so-formed image with a blue print sensitizer and forming a blue image thereon.

J. Lewisohn, U. S. No. 1,071,559. Aug. 26, 1913

J. I. Crabtree, U. S. No. 1,305,962. Filed Jan. 25, 1917

Claim: The method of producing a color photographic image consisting in copper-toning a silver image and subjecting it to a bath of soluble dye capable of being selectively mordanted by the copper image.

F. E. Ives, U. S. No. 1,300,616. Filed Feb. 20, 1917

Similar claim to above for copper mordanting.

CLASS 3

Division B—Methods of producing dye images by treating the gelatine so that it will absorb dyes selectively.

John G. Capstaff, U. S. No. 1,315,464. Sept. 9, 1919. Filed Feb. 14, 1918

Claim 2: The method of preparing for a dyeing operation a gelatine light-sensitive film, which contains a photographic image, which consists in bleaching the silver image and rendering the gelatine differentially permeable to dye, according to the light gradations recorded in the film, the more permeable portions being immediately adjacent the light affected portions of the image.

John G. Capstaff, U. S. No. 1,525,766. Feb. 10, 1925. Filed July 12, 1922

Claim 3: The process of making a colored image that comprises exposing a colloid layer containing a sensitive silver salt to light, developing in said layer a silver image by the agency of a developer that does not render the colloid insoluble, and developing the hitherto undeveloped portions by the agency of a developer that renders the gelatine insoluble, washing off the soluble gelatine, thus leaving a relief image, and dyeing the relief image.

Leonard T. Troland, U. S. No. 1,535,700. Apr. 28, 1925. Filed Sept. 13, 1922

Page 1, lines 9 to 20: This invention relates to the selective treatment of the exposed and unexposed portions of light sensitive films by which one of the portions, for example the exposed portion, is made harder than the other portion, whereby the two portions react differently to subsequent treatment, as for example a hot water etch in which the relative soft portion is dissolved off leaving the other portion in relief, or a dye bath in which the dye is absorbed predominantly by one portion.

Claim 18: The art of treating light sensitive film having exposed and relatively unexposed portions which comprises mixing with pyrogallic acid, sodium hydroxide, and ammonium chloride, thereby to form sodium chloride and ammonium hydroxide, and hardening said exposed portions with the mixture.

Frederick E. Ives, U. S. No. 980,962. Jan. 10, 1911. Filed April 28, 1910

Page 1, lines 75 to 80: I sometimes incorporate a non-actinic dye with the sensitizing solution, *to limit the penetration of light*, this dye being preferably acid, so that it may be discharged by an alkaline developer.

Claim 2: The within described improvement in the process of making colored photographic prints in graduated relief, the same consisting in incorporating a non-actinic coloring medium in the sensitized colloid coating, exposing said sensitized coating to light, developing the print, discharging the coloring medium, treating the developed relief print with a hardening and mordanting agent such as chromic acid, and then dyeing the print.

Jens Herman Christensen, U. S. No. 1,517,049. Nov. 25, 1924. Filed Sept. 6, 1919

Claim 3: A sensitized photographic element comprising a film containing a silver halide and a substantial amount of dye which will be bleached catalytically by reducing agents on places on the said film which after developing will contain silver.

Gustav Kogel and H. Neuenhaus, U. S. No. 1,444,469. Feb. 6, 1923. Filed Sept. 12, 1922

Claim 1: Process for producing layers sensitive to light on a suitable base, consisting in covering the base with diazoanhydrides, bleached on exposure to light.

R. Fischer, U. S. No. 1,055,155. Mar. 4, 1913. Filed July 1, 1912

Claim 1: The herein described process of making colored photographs consisting in producing the various primary colors on an exposed halogen silver film by developing such film by means of such substances as are oxidized by exposed halogen-silver, to colored substances soluble with difficulty.

Rudolph Fischer, U. S. No. 1,102,028. June 30, 1914. Filed Jan. 27, 1913

Claim 1: A process of making colored photographic pictures, consisting in developing pictures on halogen silver films with a developer that contains a substance which in connection with the oxidation product of the developer forms a colored body soluble with difficulty.

DISCUSSION

MR. KELLEY: We have had with us this week the granddaddy of all this work, Mr. F. E. Ives. I am very proud he is here and can help us in it. He has worked in the development of color photography for fifty or sixty years and is still at work.

MR. IVES: Since the subject of color cinematography patents is now being discussed, I wish to call attention to one source of confusion due to quoting patent dates with the implication that they reveal the status of different claimants with respect to substantially the same invention. In England, the date of a provisional patent specification is the first date of record and also the date of the patent finally issued. In the United States, the date when an inventor demonstrates his invention and communicates it to his patent attorneys and business associates corresponds practically to the date of a provisional patent specification in England, though he may not file his application in the patent office until six months later, and his patent may not be (and seldom is) issued and dated until one or more years after that. Six months' delay in filing the application in this country (although unwise) does not invalidate an inventor's claims, else he would file without such delay.

The significance of all this is illustrated in the matter of my U. S. Patent No. 1,170,540, dated February 8, 1916. Cox, in England, disclosed a similar process in a provisional specification July 1, 1914, which thus became the date of his patent, making its date a year and a half in advance of my own; but my communication to my patent attorneys and business associates, which in this country corresponds

legally to Cox's provisional specification, anticipates Cox by five months. I was saved from an interference in the patent office by the fact that my complete patent specification was signed and mailed to the patent office on the same day that Cox filed his provisional specification in England.

This is the first patent taken out on placing the two images on ordinary single coated cine film, and that is the direction in which every one is working today. The results shown by Mr. Kelley last night were on single coated film, and it is the direction in which I have worked from the start, and the reason more has not been heard of it is that I wouldn't put out a process until it was working smoothly and properly, and it takes time to perfect the details in these processes.

There are two or three other interesting points. Fox took out two patents at about the same time that I took out the patent on single coated film in which he suggested putting the images on one film. One of Fox's patent specifications was filed about one week before my application went in, so that it gave Fox a certain advantage in the Patent Office. The Patent Office should have declared an interference, because we made claims that interfered, and the Office issued patents to both of us. That was where Fox suggested vanadium chloride as a mordant for the dye image, and it didn't work because he used a toning solution which was iron and vanadium and put a red dye image in afterward. Almost immediately he discovered it would not work because when he put the red image on the top of the green image, the vanadium in the green image took up the red dye as well as the other image, so that he got a black and red image. Since his claim was for the red and green image which he could not produce, it would not work, and he didn't then prosecute the application but filed another some months after in which he showed how to overcome that difficulty by making a blue image instead of a green one, so that there is some confusion there. I call attention to this question because of the confusion which arises in the law with respect to dates. Here is a case in which an apparently parent patent is not really a parent patent.

With respect to the transfer processes, the Technicolor people have been using such a process, and it is interesting in that the original dye transfer process from relief prints a process of Bartlett and Sanger-Shepherd, made prints on paper which had the defect that the dye color spread in the gelatin to which the dye was trans-

ferred. They specified in the patent that pure, clear gelatin should be used to receive the transfers, the theory being that the gelatin of the relief print was hard, and dye could only be got out by having the gelatin on the paper soft. The dye spreads in the soft gelatin, not enough to prevent good color prints on paper, where sharp definition is not needed, but they are never sharp enough for cinematography. The dye going into the gelatin should be changed immediately to an insoluble compound or lake, and I took out a patent for making these transfers in gelatin containing a mordant, and got prints microscopically sharp. Technicolor and all using a dye process are now using a mordant. I have a master patent on this which I sold to the Eastman Kodak Company. The Technicolor have been making the prints not only with the dye transfer process incorporating a mordant in the film, but they are cementing two films together. I took out a patent on doing that, but I specified that they be cemented face to face, so that the film on both sides should protect the image and not scratch the pictures. If the films are cemented back to back, the pictures are exposed to abrasion, and if you make a scratch on one side, the color on the other side shows through. Technicolor are cementing the films together back to back because I hold the patent for cementing face to face. In the British patent, they specifically mention cementing face to face. They are also coating with celluloid varnish, and I took out a patent on that as applied to paper prints. I have taken out about twenty patents in connection with this problem. I simply make these statements in order to keep the history straight.

I am glad Mr. Kelley is trying to get this matter of history straightened out. The transfer processes all involve making a relief print, dyeing it, and transferring to the mordanted film. You cannot get the relief process image low enough without a yellow dye, and I took out a patent on this.

MR. KELLEY: I should like to add that we are extremely fortunate in having Mr. Ives here. He has covered every angle of this art and is probably one of the best authorities in the world on the subjects we are listing in the form of patents.

MR. IVES: I doubt the wisdom of spreading out all this information; it is so complicated and involved, and I think Mr. Kelley is really going about as far as necessary when he takes care of the patent applications. I don't want to start any controversies, but I would like to have the facts known as they stand.

MR. KELLEY: We can't settle them, but we can put them on record. Have I the patent numbers of all the cases you refer to here?

MR. IVES: I don't know. I have no memory for patent numbers or dates, and I am obliged to go over the list when I want to look them over. I find I have patented things I have forgotten all about when I do go over the list.

MR. KELLEY: One more point: I don't know whether Mr. Ives is aware of it. The gluing of the films together by the Technicolor Company before development is really the ingenious point in their system.

MR. IVES: It is a wonderful achievement, but I think it is labor lost because I think it is too expensive in competition with the processes they will have pretty soon.