

COMMITTEE ACTIVITIES

REPORT OF THE COLOR COMMITTEE*

No radical changes in the production of color prints for motion pictures have come to the attention of this Committee. New variations of well-known principles are being tried and used. The making of prints in large quantities with but little advance in cost over black-and-white prints appears to be the goal to seek.

In connection with making negatives that do not require delicate and special cameras, it may be said that this stage of the art has been advanced by the use of bi-pack negatives. All the makers of studio cameras now adapt their cameras for this kind of work.

Processes not previously listed include:

Coloratura.—This is the process of Pathé Exchange at Bound Brook, N. J. Negatives are made by the bi-pack method. Prints are made on double-sided film and are dye-toned on one side and metallic-toned on the other. The double-sided film, having two developed, silver images is first treated on one side to make it dye-selective and from then on the film is totally submerged to receive both colors, the blue-green tone on one side and red dye on the opposite side, neither color going to the wrong side. The film is treated by machinery so that the work is completed in a single trip of the film through the device.

Thomas Color.—A single strip negative is used, on which the exposures are made in pairs. The projector is likewise equipped to project two images at once. Black-and-white prints are used and color filters supply the color. So far, the method as stated would cover the first Technicolor films. The Thomas method differs from Technicolor in that the pairs are in sequence whereas in the early Technicolor additive system the pairs were four frames apart.

Graphy Color.—Graphy Color claims to operate under the patent application of Luigi Cristiani, an Italian. Sheets of Cellophane or similar material, such as Celite, are dyed magenta, yellow, and blue-

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green and sensitized with bichromate. A sheet of each kind is printed by arc-light under the appropriate three-color separation negative until the faint positive print-out image has attained the proper density. The sheets are then soaked in warm water and developed in dilute acid permanganate solution, which discharges the dyes roughly in inverse ratio to the exposure and produces positive images in three colors. The three sheets, after clearing and washing, are superimposed on gelatin-coated paper and cemented together with gelatin solution, producing a three-color print with either a glossy or matte surface.

Gilmore Color.—This system is said to be additive. Two images are taken in pairs side by side on 35 mm. film by turning the images to lie lengthwise on the film. A projector using color filters then turns and registers the two images on the screen by means of prisms. (*U. S. Pat.* 1,262,954, F. E. Ives, April 16, 1918.)

Magnacolor.—This name has been adopted for a color system by the Consolidated Laboratories. This concern is licensed by the owners of the Prizma patents and is following the system of using bi-packs for the negatives and double-sided film for the positives. One side of the double-sided film is colored blue by an iron solution and the opposite side is colored red by uranium. Operating under the Mason patent, each side is colored without danger of having the color solutions attack more than one side at a time by floating the film across the liquid coloring baths. Single-solution toning baths are used.

Rotocolor.—Harold Muller of New York is the inventor of a color process, Rotocolor, which is said to involve a shutter device attachable to a standard projector and which is easily removable, permitting switching between black and white. (*Film Daily*, April 12, 1931.)

Opticolor.—The Opticolor Corporation has been formed in New York with the studio at Long Island operating a three-color additive process. No details are given as to the system used. (*Motion Picture Herald*, April 11, 1931.)

Spectrocolor.—A German Company has been formed to exploit a color process under the name of "Spectrocolor," an additive system. The company claims control of about forty patents covering the process. (*Film Daily*, March 24, 1931.)

Multicolor.—In a process for producing color images, fixed silver images are treated with a basic dye bath and then with a uranium toning and mordanting bath. Films having color component images

on opposite sides are simultaneously printed in register from color component negatives. The printed positive is developed, fixed, and washed and the side bearing the images printed from the orange-red negative is toned blue by the application of an iron toning solution to that side only. The film is then passed through successive baths containing (1) water; (2) a basic red dye; (3) water; (4) a uranium toning and mordanting solution; (5) water; (6) hypo; (7) water; and dried. (*Brit. Patent 339,323.*)

ADDITIONAL NOTES

Lucas, Mobius, and Noack have patented the plan, for use with additive projection, of having the red and green pictures taken side by side and the blue picture below, whereby the red and green are shown twice as often as the blue during projection. (*Ger. Patent 491,049.*)

F. Wulff and Company make three-color prints by first making a blue picture with blue-print paper and then, by imbibition, transferring the yellow and magenta colors to the blue print. (*Ger. Patent 488,968.*)

An improvement, said to be quite great in additive projection means for color, results from toning the prints and projecting by a rotating two-color disk. (*Ger. Patents 499,012 and 499,013, F. Lierng and L. Pokorny.*)

W. Eibfeldt has taken out a German patent for making a film with an emulsion that contains leuco bases of red, green, and yellow. The colorless dyes are dissolved in alcohol and added to a batch of emulsion. Each color is separately mixed into one lot of emulsion. Four separated lots of emulsion, three with dyes and one without dye, are then joined into one batch. The mixed batch is then coated on the base in one layer as usual.

The silver image that is exposed and developed in this emulsion is reduced to iodide or ferro copper which oxidizes the leuco colors and which are thereby mordanted. The unmordanted dyes are then washed from the emulsion. (*Ger. Patent 400,350.*)

R. Ruth patents the idea of using screen plates or autochrome grain plates for motion pictures by adding a panchromatic emulsion to the opposite side of the film, so that pictures are made on both emulsions, in order to obtain a combination picture in which one picture is a thin black-and-white and the other a very strong color picture. The object of this is to obviate graininess. (*Ger. Patent 489,794.*)

Much activity is apparent in the field of making motion pictures in color by the Keller-Dorian system. Usually an engraved wheel pressed into contact with the celluloid in the heated condition forms the minute lenses on the base.

The Eastman Kodak Co. makes fluted lenses in lines. The lines are produced by winding a mandrel with fine copper wire, which is electroplated with copper. The inside of the wire spool is covered with nickel and a bearing is formed. The copper covering of small wires is etched away leaving a nickel drum with a perfect formation of surfaces for impressing the celluloid base with fine lines. (*Ger. Patent* 495,845; *Fr. Patent* 682,380.)

The Eastman Kodak Co. proposes covering a Kodacolor base with a light absorbing filter color that is easily bleached, in order to prevent halation. (*Brit. Patent* 312,992.)

Lumière is evidently endeavoring to find an alternate way by means of which autochromes can more readily be produced. Silk strands are formed into blocks of the recurring three colors, which are impregnated with wax or paraffin. Thin sheets are cut on a microtome and the silk mosaic is applied to glass or film, the wax or paraffin is removed, and the interstices filled with black carbon dust. (*Photo. Korr.*, No. 1, Vol. 66, 1930).

A motion-picture film has the "film base printed with a foundation or matrix consisting of a half-million minute red, green, and blue-violet squares to every square inch of film," says the *London Daily Mail* of May 20, 1931. This film was shown to the Royal Photographic Society.

NEW COLOR SYSTEM

Regular panchromatic motion picture negative is exposed in a standard type of motion picture camera. The objective is made so that a color line-screen of two, three, or four colors in lines or in recurring units may be inserted in the system. This system brings the images to focus on the screen-plate, and the image and lines are in focus at the film plane. By this means the line-screen is not in contact with the film.

On the edge of the screen-plate is a clear line which photographs at each exposure of the image. This gives a definite registration mark for any particular picture. From this negative, positives may be printed by any means that also includes the registration line or mark.

The projector is equipped with the same type of lens that is used

in the camera. It also has a photo light arrangement to hold the registration line of the line-screen in the projector in registration with the marks on the positive.

The producers are required to make no change in the photographing other than to use the lenses. The makers of sound equipment would be required to equip projectors with the electrical registration means and projecting objectives. No changes will be involved in the cost of making negatives and positives, and sound remains as it is now. (By W. V. D. KELLEY.)

MORENO CAMERA

The outstanding difference between the Moreno camera and the present-day standard camera is that the Moreno camera entails continuous motion. The film passes through the camera at a uniform speed with no intermittent motion of the film or any moving part of the camera. A stationary image on each frame is obtained by distributing the light transmitted by the photographic lens over a given area of constantly moving film by means of a revolving rectifying optical system of thin prisms traveling at a linear velocity equal to that of the film. This is an octagonal glass wheel with each face carrying a plano-convex lens element.

The camera has a practical built-in exposure meter that is automatic in its action. The meter is located at the rear of the camera proper.

INTER-SOCIETY COLOR COUNCIL

President Crabtree appointed Ralph M. Evans and H. W. Moyses as delegates representing the Society of Motion Picture Engineers to the Inter-Society Color Council, which meeting was reported to the S. M. P. E. by Mr. Evans as follows:

On February 26, 1931, about forty men representing fourteen societies met in the Museum of Science and Industry in New York, N. Y., in response to a call for such a meeting by the Optical Society of America. Mr. L. A. Jones acted as chairman and Mr. M. Rea Paul as secretary.

Mr. Irwin Priest of the Bureau of Standards, opening the meeting, spoke at some length on the need for a more definite color nomenclature and methods of specifying colors where a lengthy scientific specification is too troublesome and expensive. To quote from the minutes of the meeting:

“Following Mr. Priest’s remarks a rather lengthy informal discussion was conducted in which practically everyone present took part. In the beginning there seemed to be a rather wide diversity of opinion as to the best mode of procedure to be followed in organizing an inter-society committee or council. As the discussion progressed, however, the ideas began to crystallize and finally almost complete unanimity of opinion was reached and the following resolutions were passed:

“(1) *Resolved*: It is the sense of this meeting that an ‘Inter-Society Color Council’ be formed, composed of delegates from national societies and associations interested in the standardization, description, and specification of color.

“(2) *Resolved*: It is the sense of this meeting that the delegates at this conference report back to their societies and associations the resolution which was adopted at this meeting, and request the several organizations to appoint their delegates and send notification of such appointments to the chairman of this meeting, who will be expected to call the first meeting of the Inter-Society Color Council, at which time the Council will form a permanent organization.

“(3) *Resolved*: It is the sense of this meeting that the secretary be instructed to send minutes of this meeting to all delegates appointed, and also to each society and association invited to send delegates but which were not represented, and extend at the same time to all societies and associations invited but not represented, an invitation to send delegates to the first meeting of the Inter-Society Color Council.

“(4) *Resolved*: It is the sense of this meeting that the several societies and associations be advised that they may appoint as many delegates to the Inter-Society Color Council as desired, but that each organization represented on the Council shall have only one vote.

“(5) *Resolved*: It is the sense of this meeting that the present chairman be, and hereby is, authorized and empowered to call the first meeting of the delegates to be appointed to the Inter-Society Color Council, said first meeting to be called at such time and place as may, in his discretion and that of the secretary, seem most suitable.”

PATENTS RELATING TO ART OF COLOR PHOTOGRAPHY ISSUED IN 1930

1,742,543. **Colored-Picture Transmission.** HERBERT E. IVES, Jan. 7, 1930. (Class 178-5.) Electrical transmission of colored pictures. It is proposed to prepare a set of transparent monochrome color records which are scanned with a source of light and transmitted as a single operation as color records to a distant

point. After the transmission to the distant point, the records are reproduced as line images of the original and utilized to produce the original picture in colors.

1,742,880. **Method of Making Motion Pictures.** PIERRE ARTIGUE, Jan. 7, 1930. (Class 88-16.) Relating to the well-known glass shot art, in which it is proposed to stain a part of one or more of the screens with a photographically less actinic light filter color than the general illumination.

1,742,943. **Automatic Control for Photographic Printing Exposures.** CLIFTON M. TUTTLE AND HERBERT E. WHITE, Jan. 7, 1930. Assigned to Eastman Kodak Company. (Class 95-90.5.)

1,745,107. **Animated Pictures in Relief.** RAFAEL MENDOZA, Jan. 28, 1930. (Class 88-16.4.) A system for exhibiting animated pictures of objects in relief. Two differently colored images are projected onto a screen in laterally displaced relation.

1,745,247. **Manufacturing Foils, Films, Ribbons, and the Like from Viscose and Similar Cellulose Solutions.** EMIL CZAPEK AND RICHARD WEINGAND, Jan. 28, 1930. (Class 18-57.)

1,746,330. **Color Photography.** JAMES G. ZIMMERMAN, Feb. 11, 1930. (Class 95-2.) A photographic printing blank having a plurality of light-sensitive areas presenting three colors, and in such a manner that the combination of any two of which colors will produce a color complementary to the third color.

1,746,584. **Apparatus for Taking Views and for the Reproduction of Cinematographic Films in Colors.** PAUL FOURNIER, Feb. 11, 1930. (Class 95-2.) An objective with a sensitive surface in image-receiving relation thereto is utilized. A multicolor diaphragm provided with dividing lines between color areas is interposed between the objective and sensitive surface.

1,749,278. **Optical System for Use in Photographic Color Processes.** CHAS. W. FREDERICK, Mar. 8, 1930. (Class 95-2.) *Claim 10:* "Complementary optical systems for use in the taking and projecting of color photographs by the use of photographic layers having associated therewith numerous microscopic image-forming elements and comprising two objectives of different focal lengths, each system including one objective and a polychromatic screen associated therewith, and one system including a weak supplemental lens in front of its rear focal plane by a distance less than ten per cent of the focal length of the system, the positions of the screens in the systems being such that the virtual images thereof are of the same size and have the same positions relative to the rear focal planes of the systems."

1,750,358. **Color Photography.** PIERRE ABEL RICHARD, Mar. 11, 1930. (Class 88-16.4.) *Claim 1:* "In the production of motion pictures in color, the steps of photographing the objects on a moving film which is goffered on its front face with a multitude of minute lenticular projections, while subjecting the light rays to the action of a polychrome filter so as to select the colors of the rays which reach the film and thereby form images in polychrome corresponding to the colors of the filter; and thereafter reproducing the polychrome images of the goffered film on a non-goffered film while the former is illuminated, and advancing the non-goffered film, for each image-space of the goffered film, a number of image-spaces equal to the number of color values of the polychrome filter, while masking said filter in such a way as to permit the light to pass through only one of its colored elements for each image on the non-goffered film, to obtain on said non-

goffered film a plurality of separate monochrome images of the polychrome image corresponding in number to the number of color values of said polychrome image."

1,751,220. **Light Filter.** ICHITARO SHOJI, Mar. 18, 1930. (Class 95-81.5.)

1,751,318. **Process for Obtaining Photographic Images.** EUGENE GAY, Mar. 18, 1930. (Class 95-7.) Relating to the obtaining of a positive violet-red image.

1,752,477. **Camera for Color Cinematography.** PERCY D. BREWSTER, April 1, 1930. (Class 88-16.4.) *Claim 1:* "In a color camera, the combination with a lens, a film-gate in the rear of the lens to support a negative film in position for exposure, a plane mirror extending between the lens and said film-gate and occupying a plane at an angle to the axis of the lens, said mirror having at least one light-passing opening, means for revolving the mirror in its own plane, a film-gate arranged to support a negative film in position to receive light reflected by the mirror, means for feeding films through the film-gates simultaneously step-by-step, a shutter for exposing both films at each period of rest thereof, and means for actuating the mirror, the shutter, and the film-feeding means in harmony with each other."

1,752,680. **Optical Means for Producing Color Cinematographic Pictures.** KARL MARTIN AND PAUL TIETZE, April 1, 1930. (Class 88-1.) "In a device of the class described, a ray-dividing device comprising a partly light-pervious mirror, a pair of objectives arranged upon axes perpendicular to one another and positioned so that one objective receives directly the rays reflected from said mirror, while the other objective receives directly the rays transmitted through said mirror, means for passing a film perpendicular at its midline to the plane of said mirror, and optical means for turning the rays from said objectives into parallel contiguous paths registering respectively with the two halves of said film."

1,753,140. **Multicolor Cinematograph and Other Films.** JOHN EDWARD THORNTON, April 1, 1930. (Class 88-16.4.) *Claim 1:* "A multi-color picture-positive having four component images in two half pictures and comprising two thin transparent supports of half thickness, one support bearing a half picture containing two component images, an image in one color upon each side of said support, and the other support bearing a half picture containing two component images, an image in one color upon each side of the other thin support, the two transparent supports being superimposed with the two half pictures assembled and disposed within one picture area and cemented together."

1,753,379. **Color Photography.** WILLIAM V. D. KELLEY, April 8, 1930. (Class 95-2.) *Claim 1:* A photographic process which consists in forming a latent image in a light-sensitized coating on one side of a transparent carrier, developing in acid diaminophenol, toning with an iron salt to a blue color and, after clearing with an aqueous bath of ammonium bromide and potassium bichromate, forming an image in the same coating and an image in a like coating on the other side of the transparent carrier and coloring said last formed images, one a magenta and the other a yellow, while preventing the coloring matter for one image from coming in contact with the other image."

1,754,323. **Color Projection Apparatus for Cinematographs.** REGINALD KILLICK, April 15, 1930. (Class 88-16.4.) Relating strictly to the apparatus.

1,757,852. **Color Screen.** CARL ALSTRUP AND VIGGO JENSEN, May 6, 1930. (Class 88-16.4.) "In an apparatus for producing pictures in natural

colors, a rotatable disk having a plurality of color filters and opposed shutter segments dividing the filters into two groups, one group being composed of red and orange filters and the other group of yellow, green, blue, and violet filters, the tangential lengths of the red and orange filters being greater than the length of the other filters in proportion to the optical effectiveness of the colors whereby the latter produce equal impressions upon the eye."

1,758,137. **Apparatus for Printing Reticulated Films.** RODOLPHE BERTHON, May 13, 1930. (Class 88-24.)

1,758,184. **Manufacture of Multicolor Cinematograph Films.** JOHN EDWARD THORNTON, May 13, 1930. (Class 95-2.) *Claim 2:* "The method of producing a multi-width, multi-layer cinematograph colloid film positive comprising coating a temporary re-inforcing backing with colored colloid arranged in a plurality of parallel strips, sensitizing the colloid, printing component images one at a time in a straight line across the multi-width film, severing the film into a plurality of strips of single-width, removing the paper re-inforcement, cementing the printed colored strips together in accurate register and adding a layer of waterproof varnish."

1,758,185. **Cinematograph Color Film and Method of Manufacture.** JOHN EDWARD THORNTON, May 13, 1930. (Class 95-2.) *Claim 1:* "The method of manufacturing a strip of film material which consists in coating a strip of celluloid with a thin layer of insoluble bichromated gelatin, applying thereto two strips of sensitized colloid, drying and shrinking the same, coating a strip of porous paper with a thin layer of soluble gelatin, drying and shrinking the same, damping the face of the two strips and laying one strip on the other to amalgamate them into a single strip of film material."

1,758,572. **Process of Producing Pictures Consisting of Dyes in Photographic Manner.** FRIEDRICH LIERG, May 13, 1930. (Class 95-6.)

1,758,768. **Multicolor Cinematograph and Other Film.** JOHN EDWARD THORNTON, May 13, 1930. (Class 95-2.) *Claim 1:* "A double-width, multi-color, screen-mosaic picture positive comprising a double width film of transparent material, a color-mosaic screen in two colors covering each half width of the double-width film, an adhesive substratum between each color-screen and each half width of the film, and a half picture of negative character upon each half width of the film superimposed on its own color-screen."

1,758,769. **Multicolor Cinematograph and Other Film.** JOHN EDWARD THORNTON, May 13, 1930. (Class 95-2.)

1,758,977. **Reflecting Prism.** THOMAS W. ROLPH, May 20, 1930. (Class 88-1.) A prism so constructed as to reflect a light ray at least three times in the same plane.

1,759,914. **Method of Producing Film for Color Cinematography.** ALEXANDER PILNY, May 27, 1930. (Class 88-16.4.) *Claim 1:* "A method of producing film strips for cinematography which comprises splitting a series of images rectangularly and projecting them onto longitudinal parallel portions of a film strip by folding the strip longitudinally at right angles to present said portions for receiving the partial images."

1,761,361. **Control-Mechanism for Color Projecting Machines.** ANTON J. OBERG AND ROBERT R. STOEFFEN, June 3, 1930. (Class 88-24.) Relating strictly to the construction of the projecting machine.

1,761,897. **Multicolor-Cinematographic and Other Film and Process of Making Same.** JOHN EDWARD THORNTON, June 3, 1930. (Class 95-2.) *Claim 1:* "A method of producing multi-colored cinematograph film positives upon double width transparent material of half standard thickness consisting in simultaneously coating one half width of the double width material with a sensitized colloid containing dye of one color and the other half width with a sensitized colloid containing dye of a different color, photographically printing on each half width a partial image, washing off the surplus colored colloid, recoating each half width of the support with a differently colored sensitized colloid, which also differs in color from the colors in the first coating, printing on each half width a second partial image in the same picture space as the first partial image, washing off the surplus colloid, dividing the strips longitudinally, superimposing the two divided strips with their partial images in register and cementing them together to produce a complete picture in four colors in a single picture area."

1,762,143. **Filter and Method of Preparing Same.** JOHN G. CAPSTAFF, June 10, 1930. (Class 95-81.5.) Method of manufacture of a filter and of applying a color solution to the surface of a transparent plate.

1,762,144. **Lens System for Color Photography.** HAROLD N. COX, June 10, 1930. (Class 88-1.)

1,762,932. **Projection System for Color Pictures.** JOSEPH MIHALYI, June 10, 1930. (Class 88-16.4.)

1,762,933. **Projection System for Color Pictures.** JOSEPH MIHALYI, June 10, 1930. (Class 88-16.4.)

1,764,083. **Color Guide.** WILLIAM J. MISKELLA, June 17, 1930. (Class 41-6.)

1,768,795. **Dye-Carrying Layer for Photographic Films and the Like.** SAMUEL E. SHEPPARD AND JAMES G. McNALLY, July 1, 1930. (Class 95-9.)

1,768,812. **Method of Producing Light Effects.** WILLIAM J. WHITING, July 1, 1930. (Class 88-1.) *Claim 1:* The method of producing two coördinate differing visual effects which includes the steps of projecting upon an object objectively homogeneous as to color, a plurality of beams of subjectively similar light, said beams having an invisible spectral difference and substantially the same spectral center of gravity, said object having a spectral center of gravity different from that of the beams, whereby, when either beam strikes the object, its subjective color will change.

1,768,813. **Method of Increasing the Chroma of a Color.** WILLIAM J. WHITING, July 1, 1930. (Class 88-1.)

1,768,814. **Method of Reducing Glare and Dazzle of an Opposing Light.** WILLIAM J. WHITING, July 1, 1930 (Class 88-1.)

1,769,041. **Color Filter and Process of Manufacturing the Same** MERRILL W. SEYMOUR, July 1, 1930. (Class 95-81.5.)

1,769,940. **Manufacture of Light-Sensitive Films.** ULRICH DIEM-BERNET, July 8, 1930. (Class 95-9.) *Claim 1:* "A process for producing light-sensitive negative and positive films having no coating, which consists in incorporating sensitizing agents in the film mass of viscose during the manufacture of the film material."

1,771,029. **Motion Picture Film and Method of Producing.** JAKOB BURKHARDT, July 22, 1930. (Class 88-16.) This invention relates to third dimension pictures.

1,772,081. **Process and Apparatus for Treating Derivatives of Aqueous Cellulose Compounds for Use in Photographic and Its Allied Arts and Other Useful Purposes.** FREDERICK W. HOCHSTETTER, Aug. 5, 1930. (Class 91-69.)

1,772,622. **Motion Picture Color Photography.** PIERRE M. ARTIGUE, Aug. 12, 1930. (Class 88-16.4.) *Claim 1:* "The herein described method of coloring motion picture films which consists in mounting a positive film upon supports that are threaded through the apertures at the sides of the film so that certain of the frames of the film are disposed on one side of the supports and the other frames on the other side of said supports, then coloring the frames of said film on one side of said supports and then distinctively coloring the frames of the film on the other side of said supports."

1,775,938. **Color Photography.** ISIDOR KITSEE AND DUFF C. LAW, Sept. 16, 1930. (Class 95-81.5.) *Claim 1:* "The method of coloring the interstitial portion of a celluloid film, one side of which is provided with a developed emulsion in transparent colored figurations in relief and with minute interstices between said figurations extending to the surface of said film, which consists in removing substantially all the air from said interstices and then applying to said side of said film a liquid coloring matter dissolved in a solvent of celluloid in which the material of said emulsion is not soluble, the color of said liquid being complementary to that of said figuration."

1,778,139. **Positive Motion-Picture Film.** ROBERT JOHN, Oct. 14, 1930. (Class 88-19.5.) *Claim 1:* "A motion picture transferring film of the dye transfer type having an image comprising minute color dots in great numbers and more sparsely grouped in the lights and more densely grouped in the shades and being grouped irregularly according to the lights and shades of the original object photographed, and representing a naturally photographic record thereof, said dots and grouping thereof being of such character as to present an apparently unbroken image when projected at above 50 diameters enlargement."

1,778,754. **Optical System** HAROLD N. COX, Oct. 21, 1930. (Class 88-1.) "In apparatus for color photography the combination of a frame, a negative lens element borne by said frame, a plurality of objectives also borne by said frame and to the rear of said negative lens element and symmetrically arranged with respect to the axis thereof, a telescopic lens barrel borne by said frame, and a positive lens element borne by said lens barrel coaxially with the negative lens element aforesaid and arranged in front thereof."

1,780,260. **Method of Producing Pictures in Colors.** GEORGE F. CAPWELL, Nov. 4, 1930. (Class 101-115.) *Claim 1:* "The method of producing pictures in colors, which consists in interposing a protective screen over the surface to receive the picture and beneath a screen stencil, and forcing a color through the stencil and protective screen."

1,781,496. **Apparatus for Color Photography.** HAROLD N. COX, Nov. 11, 1930. (Class 88-1.)

1,782,288. **Projecting Apparatus.** ROHAN CLUFF, Nov. 18, 1930. (Class 88-24.) *Claim 1:* "A projecting apparatus comprising a set of shadow forming elements, a series of light receiving and reflecting elements, one spaced from the other and said elements arranged tandemwise rearwardly of said shadow forming elements, certain of said receiving and reflecting elements having light sources of different colors, means for revolving said elements approximately 1500 revolu-

tions per minute, a telescope arranged adjacent to the inner one of said light receiving and reflecting elements, and a light confining means for said elements and extended upon the telescope at the entrance end of the latter."

1,783,045. **Contact Film Printer.** EDWARD W. KELLOGG, Nov. 25, 1930. (Class 95-75.) A method adapted to allow printing where a plurality of films have different degrees of shrinkage.

1,783,998. **Photographic Reproduction Objective with Two Diaphragms and Its Application as in Printing Positives for Black and White Cinematography, Color Cinematography, or Cinematography in Relief.** HENRI CHRETIEN, Dec. 9, 1930. (Class 88-24.) *Claim 10:* "An apparatus for photographically reproducing cinematographic films including two separate and distinct objectives located side by side and having diaphragms, and optically intermediate convergent optical means adapted to form the image of the diaphragms and a pair of reels on the same identical drive shaft and disposed in front of the objectives, said reels carrying the film to be reproduced and the sensitized film, respectively."

1,784,758. **Cellulose Film.** SAMUEL E. SHEPPARD AND JAMES G. MCNALLY, Dec. 9, 1930. (Class 95-9.) *Claim 1:* "A substantially flat laminated cellulose ester film comprising at least two laminae having the grain of one lamina at an angle to the grain of the adjacent lamina."

1,785,997. **Method of Securing Accurate Color Values in Color Printing and Color Photography.** CARL BLECHER, Dec. 23, 1930. (Class 95-2.) *Claim 1:* "A method for securing accurate color values in color printing and color photography, characterized by the feature that for the colored part images to be placed together intermediate images are made in the respective colors on thin films stretched on frames."

1,787,023. **Camera and Method of Photography.** JOHN F. SEITZ, Dec. 30, 1930. (Class 88-16.) *Claim 1:* "A combination camera and projector comprising a camera structure having a main lens, a film holder to receive light directly through the lens on the film, an auxiliary lens in the side of the camera, means to reflect light passing through the auxiliary lens on the back of the film, and a lamp holder secured in the side of the camera and shiftable to replace the auxiliary lens in relation to the reflector whereby light may be projected from the holder and reflected through the film and through the main lens."

1,787,201. **Combined Black and White and Colored Image Photography.** WILLIAM V. D. KELLEY, Dec. 30, 1930. (Class 95-2.) *Claim 1:* "A transparent carrier coated on one side only with gelatin having a reduced silver image of the minus reds in the original subject and a toned color representation of the red in the original subject."

CLASSIFICATIONS OF PATENTS RELATING TO ART OF COLOR PHOTOGRAPHY

Class 8—Bleaching and Dyeing.

1. Carbon dyes.
5. Dyeing processes.
6. Dyes.

Class 18—Plastics.

Processes.

57. Film spreading.

Class 34—Dryers.

- 48. Web.

Class 41—Ornamentation.

- 6. *Painters'* mixing charts.
- 21. *Surface Type* diaphanous.
- 42. " " etching.
- 43. " " resist preparation.

Class 88—Optics.

- 1. Miscellaneous.
- 16. *Motion Picture Apparatus.*
- 16.4 " " " color.
- 18.4 " " " intermittent grip type.
- 19.5 " " " picture vehicles and elements.
- 24. *Projecting Apparatus.*

Class 91—Coating.*Special Machines*

- 10. Photographic film and plate.

Processes

- 69. Photographic film and plate.

Class 95—Photography.

- 2. Color.
- 6. Sensitizing and developing.
- 7. Sensitizing.
- 8. Sensitized elements.
- 9. Films.
- 75. *Printing* continuous film.
- 81.5 *Screens* color.
- 88. Developing.
- 89. *Fluid Treating Apparatus.*
- 90.5 " " " roll film.
- 94. " " " film guides.

Class 101—Printing.*Stenciling*

- 115. Multicolor.
- 127. Stencil plates.
- 130. *Planographic.*
- 149. " processes.

150. *Intaglio.**Multicolor*

- 182. Interrupter.

Printing Members

- 395. Plates.

Class 154—Laminated Fabric and Analogous Manufactures.

- 40. *Fabric coating and uniting*—processes.

Class 193—Conveyors—Chutes, Skids, Guides, and Ways.

- 2. Chutes.

Class 204—**Electrochemistry.***Electrolysis*

9. Chemicals.

Class 242—**Winding and Reeling.***Reeling and Unreeling*

55. Fabrics.

77. Reels.

Class 271—**Sheet or Web Feeding or Delivering.***Feeding*

23. Bottom Feed.

Respectfully submitted,

J. C. BROWN

J. G. CAPSTAFF

W. T. CRESPINEL

R. M. EVANS

F. E. IVES

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A. WADDINGHAM

W. V. D. KELLEY, *Chairman***REPORT OF THE PROJECTION THEORY COMMITTEE***

This Committee was late in getting organized and has, therefore, been able to hold only one meeting for discussion of its program and division of labor among its members.

Because of the fact that this is the first Projection Theory Committee, the boundary lines separating its proper sphere of activity from the subject matter appropriate to several other committees is not definitely established, so that in the choice of material for consideration there is apt to be a certain amount of overlapping of the work of these committees. In so far as reports of facts are concerned, this overlapping would be objectionable only if the various committees did not agree but in so far as concerns matters of opinion, we see no particular objection to a moderate amount of overlapping, and, on the other hand, feel that even some advantage might be derived from it.

In a general way, the work of this Committee deals with the optical and mechanical principles of the mechanism by which a picture is projected on the screen, with the character of the image on the screen, and with its effect on the observer. It does not concern itself with the lay-out or operation of the projection room, with the characteristics of the screen, or with sound reproduction. The range of interests of the Committee can scarcely exclude consideration of

* Presented at the Spring, 1931, Meeting at Hollywood, Calif.

the brightness of the projected picture in relation to its effect upon the observer, although our consideration of this subject overlaps some of the proposed activities of the Projection Screens Committee.

Since this Committee is new it seems appropriate to begin with a summary of existing literature. Such a summary should serve as a basis for the future activities of this and succeeding committees, and the work involved in formulating it has been undertaken by a subcommittee headed by Mr. H. P. Gage. In addition to a summary of the literature, the Committee intends to call attention to and to comment on proposed types of projection which may differ from current practice.

Several members of the Society are interested in the development of non-intermittent projectors. Papers dealing with these have from time to time been presented and demonstrations of such projectors have been made before the Society. The Committee feels that these efforts deserve recognition. There is no doubt that the future welfare of the motion picture industry will depend upon the quality of projection as much as upon other factors. The designers of non-intermittent projectors are striving for picture quality superior to anything now obtained with the ordinary intermittent projector. The success of non-theatrical motion pictures depends in a large measure on the cost of equipment and operation, and the designers of non-intermittent projectors are convinced that in the field of the 16 mm. projector this type of projection has promise from the standpoint of economy.

It is claimed that pictures projected with continuously moving film and an uninterrupted light-beam will produce less eye-strain and systemic fatigue than the current intermittent system. The Committee does not feel competent to express an opinion as to the soundness of this claim. Reference will be made later to this point.

In addition to the possibility of improving the quality of the projected picture, it is claimed that non-intermittent projectors provide the following mechanical advantages:

- (1) low cost of maintenance;
- (2) longer life of film;
- (3) silent operation;
- (4) advantages in reproducing sound from film;
- (5) special adaptability to the reproduction of color by the additive process.

In elaborating items 4 and 5, it may be said that it seems obvious that certain types, at least, of non-intermittent projectors permit higher film speeds than are practical with the intermittent type. While this leads to a greater cost of film, it would help overcome the difficulty of recording high frequencies on 16 mm. film sound track. In color process work it would permit the super-position (due to persistence of vision) of two or more appropriately colored views of each frame from a single print.

The Committee believes that these claims, in general, are sound. However, in making this statement, it wishes to be understood that it is not referring to any particular non-intermittent projector. The Committee has made no study of individual proposals and does not feel that it lies within its legitimate range of activities to do so. It is merely stating that it believes in general that non-intermittent projection systems possess the possibility of realizing the mechanical advantages enumerated above.

The plan of projecting motion pictures from behind the screen has been revived and has received considerable attention during the past year. From the standpoint of the manufacturer of 16 mm. projectors and from the standpoint of economy in the design and operation of small theaters showing 35 mm. film, it has advantages. In the 16 mm. field it makes possible self-contained cabinet model machines; in the theaters it is economical of space.

In order to realize important economy of space in both these applications it is essential that the projection distance be reduced to the least possible value compatible with an image which is satisfactorily sharp and sufficiently bright. This requirement imposes extraordinary demands on the designer of the optical systems involved and, to some extent, on the maker of incandescent lamps. Since the decrease in projection distance, for an image of constant size, can generally be accomplished only at the expense of definition or brightness, or both, the extent to which this decrease may be carried is always a matter of judgment. Incorrect judgment may involve considerable financial loss. If the Society of Motion Picture Engineers could formulate fundamental principles on the basis of which such judgments could be formed it would be rendering the industry very valuable service.

The Committee is impressed with the desirability of increasing the horizontal angle of view in motion picture practice. Two methods of accomplishing this have been proposed of which the most

discussed is that of using the so-called "wide film." The wide-film problem has been studied by the Committee on Standards and Nomenclature so thoroughly that this Committee will give it no further attention. In this statement the expression "wide film" is to be understood to cover all forms of reduction printing from a wide-film negative as well as the proposal that the picture occupy the space of two frames on the film, rotated 90 degrees by the camera and the projector by means of appropriate optical elements.

Another device has been proposed for accomplishing the same result, in which horizontal dimensions are compressed in photographing and expanded by an equal amount in projection by means of anamorphic systems. Systems of cylinders and of Brewster prisms have been attempted. The optical difficulties of equaling the picture quality obtained by using "wide film" are believed by the Committee to be insurmountable. When analyzed optically, this plan involves lenses whose focal length in the vertical meridian is longer than in the horizontal meridian but whose focal point is the same for both meridians. If satisfactory performance is possible in the horizontal meridian a symmetrical lens is also possible whose focal length is the same as that in the horizontal meridian in the case of both the camera and the projection lens. The use of these comparable short focus symmetrical lenses would, by reason of their greater ease of manufacture and manipulation, result in better definition, but probably in less screen illumination. Assuming that satisfactory designs of the anamorphic systems were possible, it is a question whether the greater difficulty involved in getting satisfactory illumination with the short focus symmetrical lenses would not be compensated by the very much less difficulty of manufacture and operation.

It remains also to be pointed out that should it be possible to design an anamorphic lens system for a given object distance it would be optically impossible to maintain the coincidence of focal points for vertical and horizontal meridians for any other object distance. Such a lens system must always theoretically yield an astigmatic image except for the one object distance for which it is designed.

At the meeting of the Committee, considerable discussion developed on the subject of the fatigue involved in viewing motion pictures. It is a matter of more or less common popular belief that more visual fatigue is experienced in viewing a motion picture program than is

experienced in the ordinary employment of the visual function. This opinion has been accepted generally by the motion picture industry. It has been attributed to a variety of causes. The designers of non-intermittent projectors claim that the alternation of light and darkness on the screen, in spite of the fact that it occurs so rapidly that it is imperceptible, is responsible for visual fatigue. Others attribute fatigue to such factors as flicker, insufficient illumination in the projected picture, excessive illumination in the projected picture, contrast with the surrounding field, and poor focusing of the projected picture. Some of the various methods for projecting motion pictures in natural colors are regarded as more fatiguing to view than others.

In so far as we know, very little quantitative work on the fatigue involved in viewing motion pictures has been done, and yet nothing seems more important to the future welfare of the industry than the study of this problem. Excellent and valuable research work is being carried on by private organizations and individuals within the industry but the inherent difficulty of some of the problems involved is so great as to deter such agencies from attacking them and to prevent them from making sufficiently rapid progress. It is a question whether objective methods exist by means of which visual and systemic fatigue developed on viewing motion pictures can be measured. The development of such methods can probably only be accomplished with the coöperation of ophthalmologists, physiologists, psychologists, and physicists.

It is the suggestion of this Committee, therefore, that the Society of Motion Picture Engineers attempt to interest a suitable educational institution to undertake research work along this line. It is further suggested that the University of Rochester is admirably equipped as to personnel to undertake such research at its Institute of Optics, for it has available on its faculties outstanding men in all the categories listed above. In addition, it also is in a position to secure the coöperation of the Eastman Kodak Company and the Bausch & Lomb Optical Company. It is suggested, therefore, that the Society approach the University of Rochester, urging it to take up research work along this line. There is no doubt that the accumulation of data of this sort would be slow, on account of the difficulty of the problem, but the Committee believes that it is the only sound way to establish a basis for a future projection theory.

It is thought probable that the only way in which this work could

be inaugurated would be by the establishment at the University of a fellowship supported by some individual or organization in the motion picture industry. In discussing this with the director of the Institute of Optics, he expressed the belief that the first year's work could hardly be more than exploratory, that is, a study of the possibilities of various methods of attack, with a view to discovering what methods, if any, can be devised for obtaining the desired information. Such a preliminary exploration might be conducted by a graduate student operating under the director of the Institute, who, in turn, would consult with the departments of medicine, physiology, and psychology of the University and with this Committee.

It is by no means certain that it will be possible to find a quantitative expression for the fatigue experienced in viewing a motion picture, assuming that such a phenomenon exists. There is no doubt, however, that great profit would accrue from such information, substituting it for the mass of personal opinion which now exists and which at present serves as the only basis on which to decide questions of projection theory.

F. BENFORD

J. F. LEVENTHAL

W. F. LITTLE

C. TUTTLE

A. J. HOLMAN

H. P. GAGE

H. GRIFFIN

K. F. MOSS (Advisory)

W. B. RAYTON, *Chairman*

PROJECTION PRACTICE COMMITTEE

At a meeting held May 13th in the Paramount Bldg., New York, N. Y., the following resolution was made and passed:

"Whereas, the Standard Release Print has been in widespread use during the past several months and has resulted in the reduction of film mutilation and the elimination of punch-marking of film for change-over purposes, and

"Whereas, the Standard Release Print has contributed to improved change-overs and smoother performances

"Therefore, be it resolved that the Projection Practice Committee go on record as endorsing the said Standard Release Print as a practical step in the improvement of projection."

H. RUBIN, *Chairman*