

March 30, 1943.

E. H. LAND

2,315,373

PROCESS FOR FORMING LIGHT-POLARIZING IMAGES

Filed May 28, 1941

2 Sheets-Sheet-1

T2660
X2507
X2555

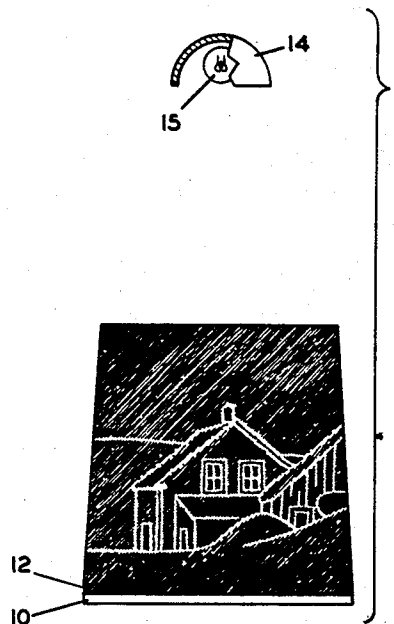


FIG. 1

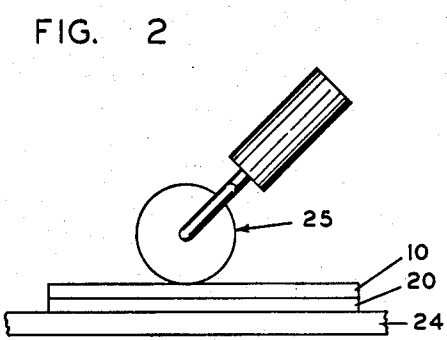


FIG. 2

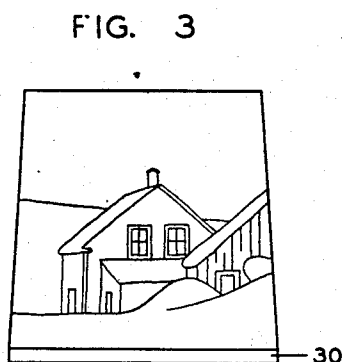


FIG. 3

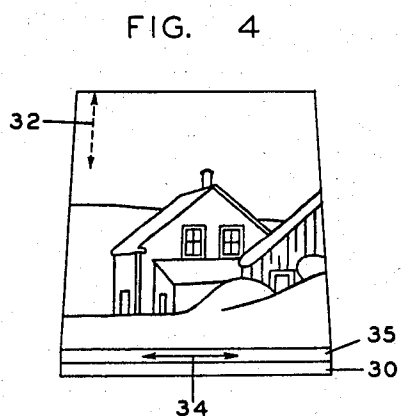


FIG. 4

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FIG. 5



FIG. 6

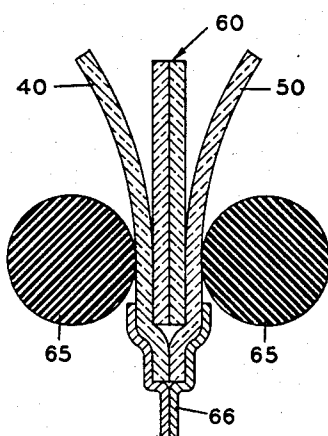
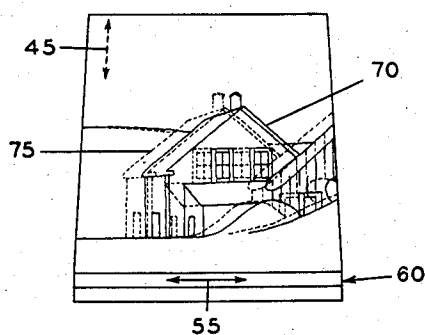


FIG. 7



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PROCESS FOR FORMING LIGHT-POLARIZING IMAGES

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Application May 28, 1941, Serial No. 395,583

12 Claims. (Cl. 88—29)

This invention relates to processes for forming light-polarizing images, particularly reproductions of photographic images.

This application is in part a continuation of my copending application Serial No. 276,233, filed May 27, 1939.

One object of the invention is to provide a new process for reproducing photographic images in light-polarizing areas.

Another object is to provide a new process whereby single or multiple positive, light-polarizing images may be produced by means of a relief of hydrophilic material such, for example, as wash-off gelatin relief made from a conventional photographic negative.

A further object is to provide such a process which is particularly adapted to the production of light-polarizing images which may be combined as superimposed right and left eye stereoscopic images.

A still further object is to provide such a process by which right and left eye stereoscopic images may be simultaneously printed in superimposed relation on a single transparent sheet.

Still further objects are to provide new printing solutions and other materials for use in the practice of the process of the invention.

Other objects and advantages will in part be apparent and in part be pointed out in the course of the following description of one or more embodiments of the invention which are given as non-limiting examples in connection with the accompanying drawings, in which:

Figure 1 is a somewhat diagrammatic view illustrating the step of exposing sensitive wash-off gelatin relief paper to light through a photographic negative of which it is desired to form a positive light-polarizing reproduction;

Figure 2 is a diagrammatic view representing a convenient way of handling the various elements during the transfer of the desired image from a wash-off relief prepared from the negative shown in Fig. 1 to the plastic sheet on which the light-polarizing image is to appear;

Figure 3 is a diagrammatic view in perspective illustrating the light-polarizing image prepared in accordance with the invention, as it appears when viewed without an analyzer;

Fig. 4 is a similar view showing the same print as it appears when viewed with a suitable ana-

lyzer, having its transmission axis at right angles to the transmission axis of said print;

Fig. 5 is a view similar to Fig. 1 showing a pair of stereoscopic, photographic negatives, from which it is desired to make a light-polarizing, stereoscopic print in accordance with the present invention;

Fig. 6 is a diagrammatic view showing a convenient way of handling the various elements during the transfer of the desired images from wash-off reliefs prepared from the negatives shown in Fig. 5 to the plastic sheet on which the stereoscopic images are to appear; and

Fig. 7 is a view showing a stereoscopic print prepared in accordance with the invention from the negatives shown in Fig. 5.

In the preferred embodiment of the present invention, the prints which are the products thereof are produced on a sheet of transparent plastic material, particularly a plastic from the class consisting of the hydrophilic, linear, high polymers such, for example, as polyvinyl alcohol, polyvinyl acetal, and regenerated cellulose. Of the materials falling within this class, the preferred material is polyvinyl alcohol, and prints or images formed in properly prepared sheets of that material possess the highest dichroism and hence are most suitable in the production of superimposed right and left eye stereoscopic images.

In order to obtain the best results with respect to dichroism in the prints of the present invention, at least the surface molecules of the plastic sheet should first be substantially oriented. This may conveniently be accomplished by softening the sheet, as for example by subjecting it to heat, and then stretching or extending the sheet until suitable orientation of the molecules has been obtained. In the case of polyvinyl alcohol, a sheet formed by casting may be placed in satisfactory condition for the formation of polarizing images therein by stretching in a uniform direction until the molecules therein are sufficiently oriented. For the purpose of the present invention it appears that optimum results are obtained with a sheet stretched from two to three times its original length, with a two and a half time stretch being preferred. Alternatively, the surface molecules of one or both sides of a sheet of polyvinyl alcohol may be oriented as by the

application of linear, frictional force thereto without orienting the molecules throughout the remainder of the sheet.

In accordance with the present invention it is proposed to form polarizing reproductions of predetermined images such as photographs by a transfer process from a conventional photographic colloid relief such as a wash-off gelatin relief. Referring to Fig. 1, element 10 represents a sheet of conventional, photographic, wash-off gelatin relief paper having superimposed thereon a photographic negative 12 of which it is desired to form a positive polarizing reproduction. Sheet 10 is indicated as being exposed to light rays emanating from light source 15 provided with a conventional reflector 14. During this exposure step, the sensitive material of sheet 10 is differentially hardened according to the amount of light transmitted thereto by negative 12, in accordance with the conventional photographic practice.

Following the exposure step, sheet 10 may be developed in any ordinary photographic developer, but it appears that better results are obtained by the use of a developer having a particularly rapid action. Many such developers are well known in the art, and the following formula is given merely as an illustrative example and is to be understood as in no way critical or limiting to the scope of the invention.

Warm water	-----cubic centimeters	2000
"Elon"	-----grams	10
Sodium sulphate	-----do	120
Hydroquinone	-----do	10
"Kodalk"	-----do	130
Potassium bromide	-----do	2
Cold water to make a total of	-----cc	4000

The materials "Elon" and "Kodalk" mentioned above are products sold by Eastman Kodak Company. The exposed relief paper should be sufficiently developed after approximately 45 seconds in the above solution, and it should then preferably be washed in water for about one minute. It may then be subjected to bleaching by means of any conventional photographic wash-off relief bleach such, for example, as that sold as "R-10a" by Eastman Kodak Company.

The bleaching action will be sufficiently accomplished in about four minutes, and the relief paper is then washed to remove the soft gelatin from the unexposed areas thereof. This washing should preferably be done in warm water of approximately 125° F. and may conveniently be done either in running water or by means of trays, in which latter case approximately four changes of water should be made.

When the washing is completed the product will be a positive reproduction in relief of the original photographic negative. In other words, areas in the image corresponding to the light areas in negative 12 will constitute the relatively high portions of the relief and areas in the image corresponding to the dark areas in negative 12 will constitute the relatively low areas in the relief. The color of the relief will be a relatively uniform medium brown.

The next step, according to conventional practice, is to fix the relief by removing the silver salts therefrom, but in one modification of the invention the necessity for this operation as a separate step is eliminated, as will be pointed out hereinafter. If, however, a separate fixing operation is desired it should be accomplished by means of a bath which does not harden the gelatin in

the relief, and a satisfactory solution for this purpose may be formed by dissolving 25 grams of hypo (sodium thiosulphate) in 100 cc. of water. After the fixing operation, the hypo should be washed out and the relief then dried. This may be done conveniently by exposure to the atmosphere for about 45 minutes, or the drying may be accomplished in warmed air for about one minute. If the separate fixing operation is not required, the relief should be dried after the step of washing out the soft gelatin.

The relief is now ready for that step of the process wherein the image is transferred to an oriented plastic sheet such as polyvinyl alcohol. This is accomplished by imbibing or saturating the relief in a solution containing one or more dichroic dyes of the desired color and then pressing it into contact with the oriented surface of a sheet of the desired plastic.

The term "dichroism" is used herein and in the claims as meaning the property of differential absorption of the components of an incident beam of light depending upon the vibration directions of said components. By "dichroic" dye or stain is meant a dye or stain whose molecules possess the property of showing dichroism. In the practice of the invention, this property is displayed when said dyes are incorporated in molecularly oriented plastic materials in that the resulting stained areas show dichroism. With some of the dyes and stains which may be used in the process of the invention, said dichroism may extend throughout substantially the entire visible spectrum, whereas others possess considerably shorter absorption bands and hence show dichroism only throughout a band of wavelengths shorter than the visible spectrum.

The dichroic dyes which may be used in the practice of the invention fall into two general groups. The first group comprises solutions which will produce a triiodide ion stain on an oriented plastic such as polyvinyl alcohol. Generally speaking, such solutions may be described as containing triiodide ions and may be formed by dissolving the desired proportions of iodine and at least one soluble iodide salt in water. The proportions and concentrations thereof may vary substantially, and it is to be understood that any such solution which contains triiodide ions and will produce the desired triiodide ion stain is to be construed as within the scope of the invention. For purposes of illustration, however, the following formula is given as an example of a solution with which satisfactory results have been obtained, but it is to be understood that said solution is not to be construed as in any way critical or limiting to the scope of the invention.

Water	-----cubic centimeters	1000
Ammonium iodide	-----grams	83
Gelatin	-----do	10
Iodine	-----do	1

The gelatin may be omitted from the foregoing formula if desired, but in such case the quantity of ammonium iodide should be increased. The solution should be prepared in such manner that none of the ingredients tends to cause any other ingredient to precipitate. This may be accomplished, for example, by dissolving the gelatin in part of the water and the iodine and the ammonium iodide in the rest of the water and then mixing the two solutions. It should be particularly understood that the relative amounts of the above ingredients are interdependent. In general, the range of any one ingredient is limited only to the

amount which is soluble or to the amount which will cause another ingredient to begin to precipitate from the solution. The density of the stain produced by these solutions is controlled by regulating their concentration.

The other group of dyes suitable for this step of the invention comprises water-soluble, dichroic dyes such, for example, as direct cotton dyes of the azo type, or dichroic dyes prepared from fast color salts. Such dyes should be selected for their ability to show high dichroism when applied to a properly oriented sheet of a plastic such as polyvinyl alcohol, and preferred examples thereof will be found, with few exceptions, in the disazo, trisazo, stilbene, thiazole and pyrazolone groups. This type may be used alone for the production of monochromatic prints or in any desired combination to produce any desired color effects, as will be pointed out in more detail hereinafter.

For the production of black and white light-polarizing prints, the tri-iodide solutions mentioned above are to be preferred, primarily for the reason that their use eliminates the necessity for a separate fixing operation. When the dried but unfixed relief is immersed in a tri-iodide solution such as that given above, it changes color virtually immediately from brown to cream, this result apparently being caused by the formation of silver iodide in the relief. When it is allowed to soak for a short while, the cream color gradually changes until the relief becomes transparent, this result apparently being caused by the gradual change of the silver iodide to a complex, soluble silver salt which dissolves in the solution. The imbibition of the relief should be continued until the color change is completed, which may take approximately two minutes. At the end of that time, the relief will be unchanged in contour, but the gelatin therein will have absorbed the solution differentially according to its thickness in each particular area of the relief.

After the above color change is completed, the relief should be removed from the solution and placed with its face or relief side in contact with the oriented surface of a suitable plastic such as polyvinyl alcohol. The two elements are pressed into even contact with each other, and a convenient method for carrying out this step of the process is shown in Fig. 2 wherein element 10 represents the saturated relief superimposed face down upon the oriented surface of a sheet of polyvinyl alcohol 20. The two elements are shown as mounted for convenience on a flat surface such as 24, and element 25 represents any device such as a rubber roller or squeegee for pressing the two sheets evenly together.

The relief and the plastic sheet should be allowed to remain in contact for about two minutes, during which time the tri-iodide ion solution will be transferred from the relief to the oriented surface of the plastic sheet. Since the amount of iodine held by the relief varies depending upon the thickness of the gelatin layer at each particular point, the plastic sheet will be differentially stained proportionally to the thickness of the relief. Since the variation in the thickness of the relief corresponds to the variation in density of the original image, this will result in a positive reproduction in light-polarizing areas of the negative shown in Fig. 1.

When the foregoing steps are completed, the two elements should be separated and the print will then be finished. The relief may then be

resaturated with the dye solution and the transfer process repeated as many times as desired. It may be repeated virtually indefinitely or until the relief becomes worn out from handling. This feature of multiple printing of light-polarizing images from a single wash-off relief is one of the important advantages of the present invention.

The finished print prepared as described above will have approximately the appearance illustrated in Fig. 3, wherein print 30 bears a positive reproduction in dichroic areas of the image in negative 12, but the image will be relatively faint when viewed as in Fig. 3 without an analyzer. This is due to the fact that print 20, speaking in terms of optics, is merely an imperfect polarizer, which absorbs some of the light vibrating in one direction proportionally to the variations in density of its stained areas, but transmits the remainder of that component and all of the component vibrating in the opposite direction. In order, therefore, to see the image thereon properly, it should be viewed through a suitable crossed analyzer.

Such an arrangement is shown in Fig. 4, wherein a polarizing element 35 of uniform polarization characteristics is shown superimposed on print 30, with its transmission axis at right angles to that of the print, as indicated by arrows 32 and 34. The result is that analyzer 35 absorbs all of that component of the light which is freely transmitted by print 30. On the other hand, the analyzer transmits the other component of the light, which is the component differentially absorbed by the print, and will thus cause the image on print 30 to appear in as complete detail and with as high a degree of clarity as a photographic print of negative 12 produced by conventional photographic methods.

It should be understood that the elimination of the separate fixing operation as described above is optional, and the fixing may be carried out separately as by means of a hypo solution. If this latter procedure is desired, it will merely add an extra step to the process, but otherwise the transfer operation will be substantially the same. If it is desired to print with a solution of one or more of the dichroic, direct cotton dyes mentioned above, the mechanics of the transfer operation will similarly be substantially the same, but it is to be understood that in that case the separate fixing operation is necessary.

As was pointed out above, direct cotton dyes may be used in the production of light-polarizing black and white prints, monochromatic color prints, or full color prints, depending upon the proper choice of the particular dyes used. Among those found especially suitable for the practice of this invention may be mentioned Niagara Sky Blue 6B, Solantine Red 8BL, and Solantine Yellow FF. Black and white prints of excellent quality may be obtained by following the above procedure and using, for example, a dye solution comprising 500 cc. of water to which are added 3 grams of Niagara Sky Blue 6B and 1 gram each of Solantine Red 8BL and Solantine Yellow FF. It is to be understood that any other such combination of dyes is to be construed as within the scope of the invention and of the claims herein.

Substantially the same process as that outlined above may be followed for the production of three-color prints. The difference in this case is that separate wash-off reliefs must be

prepared for each of the three color components—cyan, yellow and magenta. Such reliefs may be obtained in conventional photographic manner by first preparing three black and white separation negatives from a color transparency such, for example, as a "Kodachrome" transparency, by using for each negative a filter which will transmit only the desired component, red, green or blue-violet. From the negative so formed, separate wash-off reliefs may be prepared as outlined above and each may then be used in combination with dichroic dye of appropriate color such, for example, as those mentioned above, to produce a corresponding dichroic print. The resulting three light-polarizing images may then be assembled in superimposed relation to form a positive, light-polarizing image in full color.

The process of the invention which has thus far been described is applied to two-dimensional images. It should be pointed out, however, that it may easily be practiced to produce three-dimensional prints comprising superimposed right and left eye images prepared from stereoscopic negatives. For example, a pair of wash-off reliefs may be prepared as outlined above from a pair of stereoscopic negatives such as those shown in Fig. 5, and the transfer step may be carried out separately with each of said reliefs to produce separate right and left eye light-polarizing images. In this case it would merely be necessary to arrange the oriented sheets at the beginning of the transfer step so that one sheet will have its direction of orientation relatively perpendicular to the direction of orientation of the other said sheet in the corresponding position. In this way, when the two images so produced are assembled in superimposed relation, their transmission axes will be relatively perpendicular, as will be explained in more detail hereinafter in connection with Fig. 7.

An alternative and more convenient method of practicing the invention in connection with stereoscopic negatives is illustrated in Figs. 6 and 7. As in the above outlined modifications, the first step is to prepare wash-off gelatin reliefs from a pair of stereoscopic negatives such as those shown in Fig. 5. However, in the preferred practice one of these reliefs is reversed from right to left with respect to the other. This may be conveniently accomplished during the exposure step described above in connection with Fig. 1, by positioning one negative during the exposure step with its emulsion side adjacent the relief paper and the other negative during the corresponding exposure step with its emulsion side adjacent the light source. The result will be that one relief will be substantially a mirror reproduction of the other, with the exception that the images thereon are relatively offset by reason of their stereoscopic relation.

The purpose of this procedure will be apparent in Fig. 6, which represents diagrammatically a convenient arrangement for carrying out the transfer step of the process. In Fig. 6 elements 40 and 50 represent gelatin reliefs prepared as described above from the negatives shown in Fig. 5, and it is assumed that each has been saturated with a suitable dye solution such as the iodine-iodide solution described above. Element 60 represents a suitably prepared sheet of plastic such as polyvinyl alcohol, and by "suitably prepared" it is meant that the molecules of one surface of said sheet have been oriented in a direction substantially at right angles to the direction

of orientation of the other said surface. This result may be accomplished in one of two ways. The sheet may comprise a lamination of two separate sheets of polyvinyl alcohol which have been separately stretched as described above and then laminated with the stretch axes thereof substantially crossed. Alternatively, element 60 may comprise a single sheet of polyvinyl alcohol which has had the molecules of each surface thereof oriented in directions substantially at right angles to each other as described above.

In carrying out the transfer step of the process, the saturated reliefs are placed face to face on opposite sides of a suitably oriented sheet to form a sandwich, care being taken to secure accurate relative registering between the images on the two reliefs. The three elements should then be pressed relatively firmly and evenly together by any means such, for example, as a pair of rubber rollers 65 illustrated in Fig. 6, wherein reliefs 40 and 50 are represented as forming the outside layers of the sandwich and with their faces in contact with the surfaces of plastic sheet 60.

It is very desirable, particularly if the reliefs are to be used in the production of multiple, stereoscopic prints, to secure them together along one edge by some suitable hinge-like means such as adhesive tape or a suitable clip means, as is indicated at 66 in Fig. 6. Then, after the transfer step has been completed, the reliefs can be removed from the plastic sheet, resaturated with the solution, and the transfer step carried out as many times as desired, as is pointed out in connection with single prints. The advantage of this arrangement is that it eliminates the necessity of registering the images on the reliefs for each print, for the reliefs may easily be so hinged together that accurate, relative registry is maintained throughout multiple printing operations.

Fig. 7 represents a stereoscopic print produced in accordance with the above outlined steps. When viewed without a suitable stereoscopic viewing device, it will be noted that on one surface of plastic sheet 60 appears the image 70 transferred from relief 40, and the transmission axis of the dichroic areas therein is represented as parallel to the arrow 45. On the other surface of sheet 60 there is indicated, in dotted lines, a light-polarizing reproduction 75 of the image transferred from relief 50, with the transmission axis thereof indicated by arrow 55 as at right angles to the transmission axis of image 70. When the print shown in Fig. 7 is viewed through a suitable viewing device such as a pair of glasses provided with polarizing lenses having their transmission axes relatively perpendicular and parallel respectively to one and the other of the transmission axes of images 70 and 75, each eye will see only one of said images, which will thus produce the desired three-dimensional effect.

It should be pointed out that the stereoscopic print shown in Fig. 7 will be substantially the same in appearance and operation whether element 60 is a laminated sheet of separately stretched components or a single sheet having its opposite surfaces differently oriented. It should also be pointed out that if the right and left eye images are prepared separately and then assembled in superimposed relation, in accordance with the first method outlined above, the resulting print will be substantially the same as that shown in Fig. 7, with the exception that the image therein corresponding to the image 75 will preferably lie on that surface of the separate

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sheet whereon it is reproduced which is adjacent to or laminated to the sheet bearing image 70, instead of lying on the outer or bottom surface of element 60 in the manner indicated in Fig. 7.

It will be noted that in every example given above, some reference is made to orientation of the molecules of the plastic sheet on which the prints are made. It should be pointed out, however, that it is essential only that at least the portions of the sheet penetrated by the dyes should have the molecules therein oriented, for if the dyes are applied in unoriented portions those portions will not be transparent. In other words, it makes no difference if oriented portions of the sheet are left unstained, as will frequently be the case in the light areas of the images, but, on the other hand, if unoriented portions are penetrated by the dyes, the prints will be seriously impaired, particularly with respect to their usefulness in stereoscopic prints. It is to be understood, therefore, that whenever in the following claims a sheet is specified as being substantially oriented, or the step of substantially orienting is called for, these terms are to be interpreted as meaning that the orientation is at least sufficient to include all portions penetrated by the dye solution, and it is immaterial whether or not the unpenetrated areas of the sheet are so oriented.

As has been previously stated, the foregoing description is illustrative only of operative embodiments of the present invention. It must be emphasized that each step therein is a variable, and that none of the ingredients, times or proportions for any step or solution are critical except in so far as they may be made so by the other variables. The specific examples given comprise operative embodiments of the invention with which excellent results have been obtained. However, considerable variation is possible in virtually any degree thereof, and one or more solutions or steps can be compensated for in the other steps. It is accordingly obvious that no set rules can be given and it would be difficult, if not impossible, even to set outside limits on the ranges of variation.

It should be pointed out that, although the foregoing description emphasizes printing with reliefs prepared from photographic negatives, the invention is in no way limited to the use of such materials. Reliefs may be prepared by exposure through any desired differentially light-absorbing medium, such for example as a blueprint, or in any other convenient way. It should further be pointed out that the invention is not limited to the preparation of superimposed stereoscopic images, but that it may be practiced equally well in connection with images having a different relation to each other, such for example as "before and after" pictures, or with images having no relation to each other at all.

It is also to be understood that the invention is not limited to the use of colloid reliefs or to the photosensitive gelatin reliefs described above. Inasmuch as the preferred dyes for use in the practice of the invention may be used in water solution, the reliefs will preferably be made from hydrophilic material. In general, however, suitable reliefs may be prepared from any material which will absorb or adsorb the desired dye solution and then transfer it to the oriented plastic sheet on which the light-polarizing image is to appear.

Since certain changes in carrying out the above process may be made without departing from its scope, it is intended that all matter contained

in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

What is claimed is:

1. The method of making a light-polarizing image which comprises wetting a relief of a predetermined image with a solution containing a dichroic dye, and pressing said relief into contact with a sheet of molecularly oriented, transparent plastic material, whereby said dye is caused to transfer from said relief to said sheet.

2. The method of making a light-polarizing image which comprises wetting a relief of a predetermined image with a solution containing a dichroic dye, and pressing said relief into contact with a sheet of a molecularly oriented, transparent, hydrophilic, linear, high polymeric plastic, whereby said dye is caused to transfer from said relief to said sheet.

3. The method of making a light-polarizing image which comprises wetting a relief of a predetermined image with a solution containing triiodide ions, and pressing said relief into contact with a sheet of a molecularly oriented, transparent, hydrophilic, linear, high polymeric plastic, whereby said dye is caused to transfer from said relief to said sheet.

4. The method of making a light-polarizing image which comprises wetting a relief of a predetermined image with a solution containing at least one dichroic, direct cotton dye, and pressing said relief into contact with a sheet of a molecularly oriented, transparent, hydrophilic, linear, high polymeric plastic, whereby said dye is caused to transfer from said relief to said sheet.

5. The method of making a light-polarizing image which comprises wetting a relief of a predetermined image with a solution containing a dichroic dye, and pressing said relief into contact with a sheet of molecularly oriented polyvinyl alcohol, whereby said dye is caused to transfer from said relief to said sheet.

6. The method of making a light-polarizing image which comprises wetting a relief of a predetermined image with a solution containing iodine and a soluble iodide, and pressing said relief into contact with a sheet of molecularly oriented polyvinyl alcohol, whereby said dye is caused to transfer from said relief to said sheet.

7. The method of making a light-polarizing image which comprises forming in hydrophilic material a relief of a predetermined image, predeterminedly orienting the molecules of a sheet of polyvinyl alcohol, wetting said relief with a solution containing a dichroic dye, and pressing said wetting relief into contact with said sheet and thereby causing said dye to transfer to said sheet from said relief.

8. The method of making a light-polarizing image which comprises forming in hydrophilic material a relief of a predetermined image, orienting the molecules of at least one surface of a sheet of polyvinyl alcohol, wetting said relief with a solution containing a dichroic dye, and pressing said wetted relief into contact with said oriented surface and thereby causing said dye to transfer to said sheet from said relief.

9. The method of making a light-polarizing

image which comprises forming in hydrophilic material a relief of a predetermined image, stretching a sheet of polyvinyl alcohol to at least twice its original length, wetting said relief with a solution containing a dichroic dye, and pressing said wetted relief into contact with said sheet and thereby causing said dye to transfer to said sheet from said relief.

10. The method of making superimposed, light-polarizing images which comprises forming in hydrophilic material a relief of a predetermined image, forming in similar material a second relief of another predetermined image, wetting each relief with a solution containing a dichroic dye, pressing one of said wetted reliefs into contact with one surface of a sheet of a transparent, hydrophilic, linear, high polymeric plastic having the molecules on one surface thereof oriented in a direction at right angles to the molecules on the other surface thereof, and pressing the other of said wetted reliefs into contact with the other surface of said sheet, whereby said dye is caused to transfer from each of said reliefs to the surface of said sheet where-with it is in contact.

11. The method of making superimposed, stereoscopic, light-polarizing images which comprises forming in hydrophilic material a pair of reliefs defining predetermined stereoscopic images, the image defined by one of said reliefs being reversed from right to left with respect

to the other said image, wetting each relief with a solution containing a dichroic dye, pressing one of said wetted reliefs into contact with one surface of a sheet of a transparent, linear, high polymeric plastic having the molecules on one surface thereof oriented in a direction at right angles to the molecules on the other surface thereof, and pressing the other of said wetted reliefs into contact with the other surface of said sheet, whereby said dye is caused to transfer from each of said reliefs to the surface of said sheet wherewith it is in contact.

12. The method of making superimposed, stereoscopic, light-polarizing images which comprises forming in hydrophilic material a pair of reliefs defining predetermined stereoscopic images, the image defined by one of said reliefs being reversed from right to left with respect to the other said image, wetting each relief with a solution containing a dichroic dye, positioning said wetted reliefs in face-to-face relation on opposite sides of a sheet of a transparent, linear, high polymeric plastic having one surface molecularly oriented in a direction at right angles to its other surface, said reliefs being positioned with the images defined thereby in relative registry, and pressing said three elements together, whereby said dye is caused to transfer from each of said reliefs to the surface of said sheet where-with it is in contact.

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