

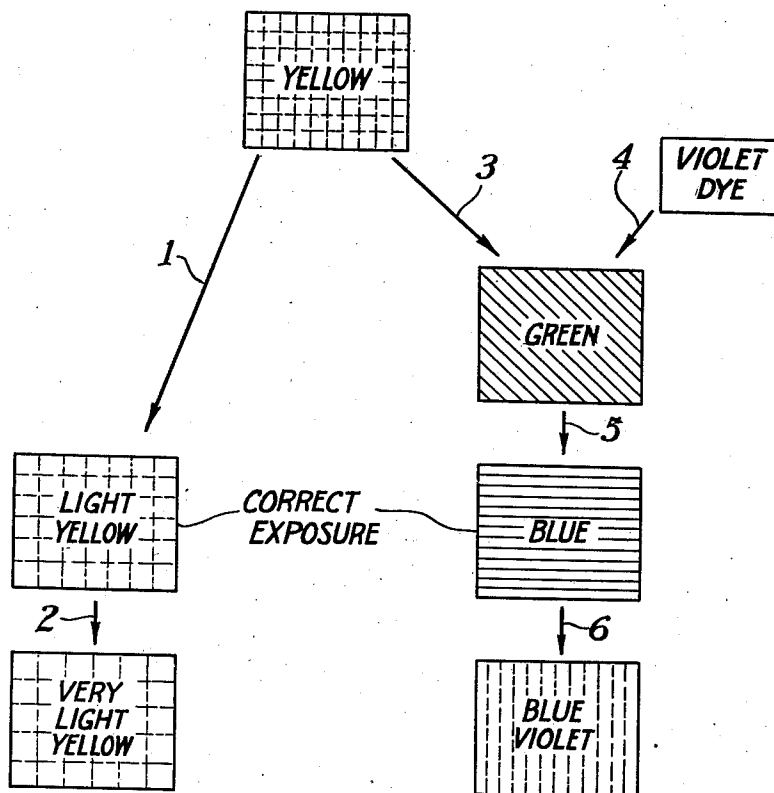
Aug. 8, 1939.

A. MURRAY

2,169,003

PHOTOSENSITIVE MATERIAL

Filed March 20, 1937



Alexander Murray
INVENTOR.

BY

Newton M. Perrins
R. Frank Smith

ATTORNEYS

UNITED STATES PATENT OFFICE

2,169,003

PHOTOSENSITIVE MATERIAL

Alexander Murray, Rochester, N. Y., assignor to
Eastman Kodak Company, Rochester, N. Y., a
corporation of New Jersey

Application March 20, 1937, Serial No. 132,081

4 Claims. (Cl. 95—7)

This invention relates to photo-sensitive materials and particularly to photo-sensitive photographic materials of the developing out type. One particular embodiment of the invention relates to photo-sensitive resists of the type employed by the graphic arts in the manufacture of printing plates.

The general object of the invention is to produce a photo-sensitive material which, under exposure to light, visibly changes by an amount definitely indicative of the exposure to which it has been subjected whereby the correct exposure for getting a useful image when the material has been developed in a suitable way, is obtained when the exposure is sufficient to give a predetermined amount of said visible change. In the preferable embodiment of the invention, this visible change is a change in color hue rather than merely a change in color saturation.

It is a particular object of the invention to provide a photo-mechanical resist having the above-described properties.

It is a special object of the invention, when using photo-mechanical resists such as dicinnamyl acetone, whose color changes slightly under exposure to light, to enhance the apparent color change sufficiently to be useful as a measure of exposure.

Thus the object of the invention is to provide a photographic developing-out material which is capable of acting as its own actinometer.

As is well known to those skilled in the art, the image obtained when a developing-out photographic material is processed, is satisfactory only when the exposure to which the material was subjected is within a certain range (i. e. not underexposed or overexposed). A photographic material made according to the invention, is subjected to sufficient exposure to give a predetermined amount of change in its appearance and is then developed in a suitable manner giving a satisfactory image. The invention is particularly useful with materials requiring relatively long exposure to light of a certain intensity. In this case, the exposure is started and allowed to continue until the predetermined amount of change in appearance is obtained. The material is then ready to be developed, and when developed will give a satisfactory image.

Other objects and advantages of the invention will become apparent from the following description when read in connection with the accompanying drawing which shows, by means of a

flow chart, the results obtained when using one specific embodiment of the invention.

The following description relates only to this specific but very useful embodiment of the invention.

As is well known in the graphic arts, one method of making printing plates comprises coating a resist on an etchable base (preferably metal) exposing the plate through a half-tone negative, processing the plate in a suitable manner to differentially remove the resist according to the exposure received and then etching the exposed portions of the base.

Many photo-mechanical sensitizers exhibit a color change with exposure, but to a degree which is so slight as to be valueless in judging the course of exposure. For example, the bichromated colloids develop a pale brownish-yellow image, well known to those skilled in the art, which is not visible through the negative during exposure and is of very little assistance to the judgment of the operator after exposure. As is well known in trade practice, prints are frequently remade because the printer has misjudged the density of the negative or has been unable to estimate correctly the retarding effect of stain or fog.

For many purposes it is desirable to use a water insoluble photomechanical resist free from metals such as those based on certain types of light sensitive organic compounds (e. g. dicinnamyl acetone). The accompanying chart refers particularly to the use of dicinnamyl acetone. This substance is yellow, and when given sufficient exposure to make a developable print, the yellow color is partly or wholly bleached. This color change in itself is insufficient to be useful in estimating the exposure since it is difficult, if not impossible, to accurately judge the relative densities of light yellows.

On the chart, the effect of exposing a resist comprising dicinnamyl acetone is indicated by the arrows 1 and 2. The correct exposure as shown on the chart is that obtained when the exposure is sufficient to bleach the yellow to a certain density of light yellow.

In accordance with the invention a violet dye is incorporated in the resist which together with the yellow color of the dicinnamyl acetone gives a greenish coating. This step is indicated by the arrows 3 and 4 on the chart.

When this green coating is exposed to light, the yellow component fades in proportion to the exposure and the exposed region becomes blue and then a bright blue-violet as indicated by

the arrows 4 and 5. This change produces a high visible contrast with the background color in which the color saturation is much lower and the hue entirely different. Actually, this color change can be easily seen through the clear parts of the negative with which it is in contact during exposure and is an accurate indication of the correct exposure. This advantage is, of course, due to the fact that the human eye is more sensitive to changes from green to blue than in changes from yellow to light yellow.

I have found that various dyes are suitable, for example, the bases of the triphenylmethane violets, such as methyl violet base, crystal violet base, and ethyl violet base. Certain solutions, useful as resists and containing dicinnamyl acetone, keep almost indefinitely. I have found that it is desirable to add a small amount of crystal violet base to such a solution just before coating the plates, at least within 24 hours prior to such coating. A suitable resist is as follows: dicinnamyl acetone, 4 grams; pale Kauri resin, 6 grams; ethyl methyl ketone, 60 grams; toluene, 30 grams; benzyl alcohol, 1 gram. To this is added 0.2 gram crystal violet base. When the liquid is first applied to the metal, it is almost colorless, but as it dries, it develops the blue-green color which was discussed in detail above. The coated metal plate after drying, will keep for a considerable time.

The violet dye chosen for this purpose should, of course, be compatible with the processes to which the resist is to be subjected and preferably should be stable under the action of light. However, the violet dye may also vary under the action of light, provided the variation of the yellow and violet components combine to form a definitely recognizable change when the material is subjected to the correct exposure.

Thus the coloring material of the resist comprises two components, namely, the yellow of the resist itself and the violet of the added dye. Hence, in accordance with the invention, there is provided for the first time a photo-sensitive resist whose coloring material changes under the

action of light by an amount sufficient to be useful as an actinometer.

The invention may be applied equally well to other types of photographic materials, but as pointed out above, it is particularly suitable for use with photo-sensitive resists.

Having thus described one embodiment of my invention, I wish to point out that it is not limited to the specific materials employed but is of the scope of the appended claims.

What I claim and wish to protect by Letters Patent of the United States is:

1. A photomechanical resist comprising dicinnamyl acetone and a violet dye substantially stable under exposure to any light and compatible with the processes for which the resist is intended, the proportion of violet dye to dicinnamyl acetone being such that the unexposed resist has a hue in the spectrum region of green and blue.

2. A photomechanical resist comprising dicinnamyl acetone and a dye of the triphenylmethane violet bases, in such proportion that the resist shifts in hue from green to shorter wavelengths with exposure to light.

3. A photo sensitive layer comprising a colored light sensitive material whose color saturation changes with exposure to substantially any light to which said material is sensitive and a dye substantially stable to any light and of a contrasting color such that the change in color saturation appears as a change in hue, the relative proportion of the dye to the substance whose color saturation changes being such that the unexposed material has a hue in a spectrum region very different from that of the dye alone.

4. A photosensitive layer comprising a light sensitive material having a color which changes with exposure to light and a dye substantially stable under exposure to any light and of a different color whereby the apparent change in color is enhanced, the relative proportion of the dye in the layer being such that the unexposed material has a hue different from that of the dye alone.

ALEXANDER MURRAY. 45