

No. 776,470.

PATENTED NOV. 29, 1904.

F. E. IVES.
SAFETY COMPOSITE COLOR PRINT.

APPLICATION FILED SEPT. 15, 1903.

NO MODEL.

Fig. 1.

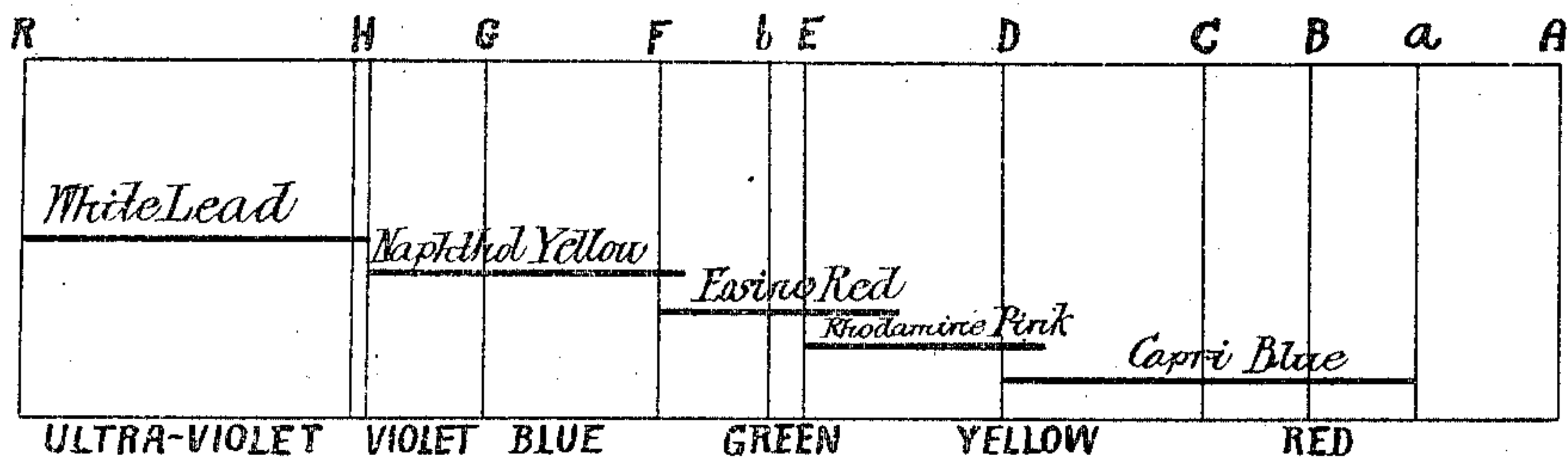


Fig. 2.

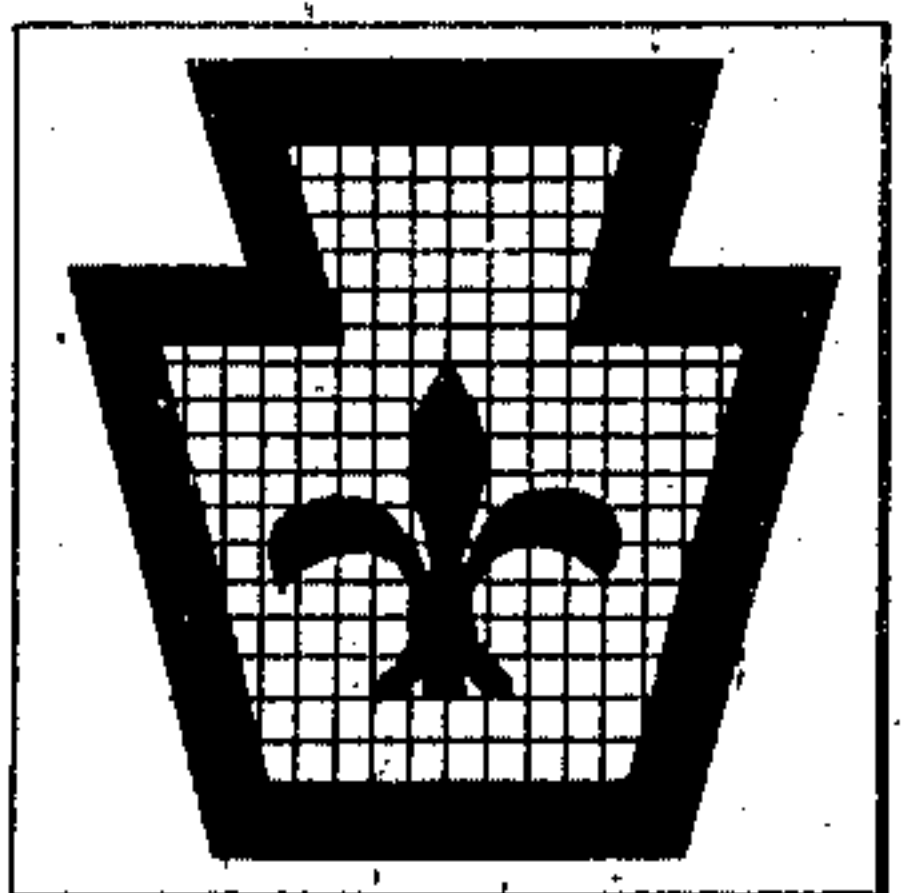
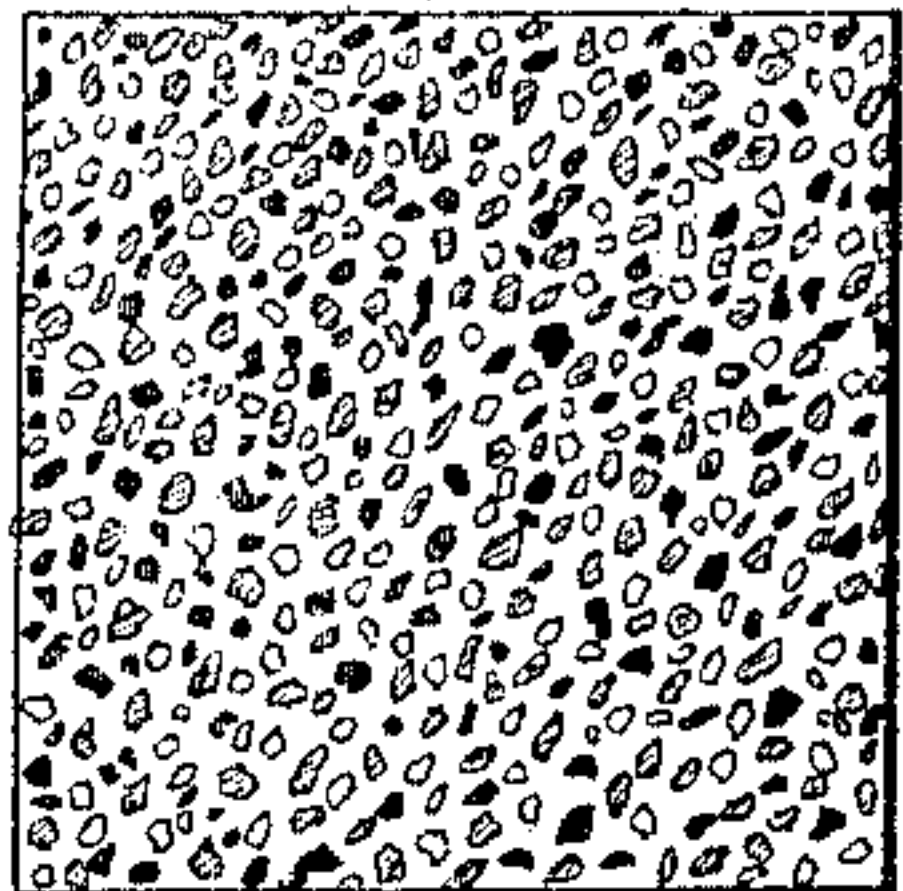
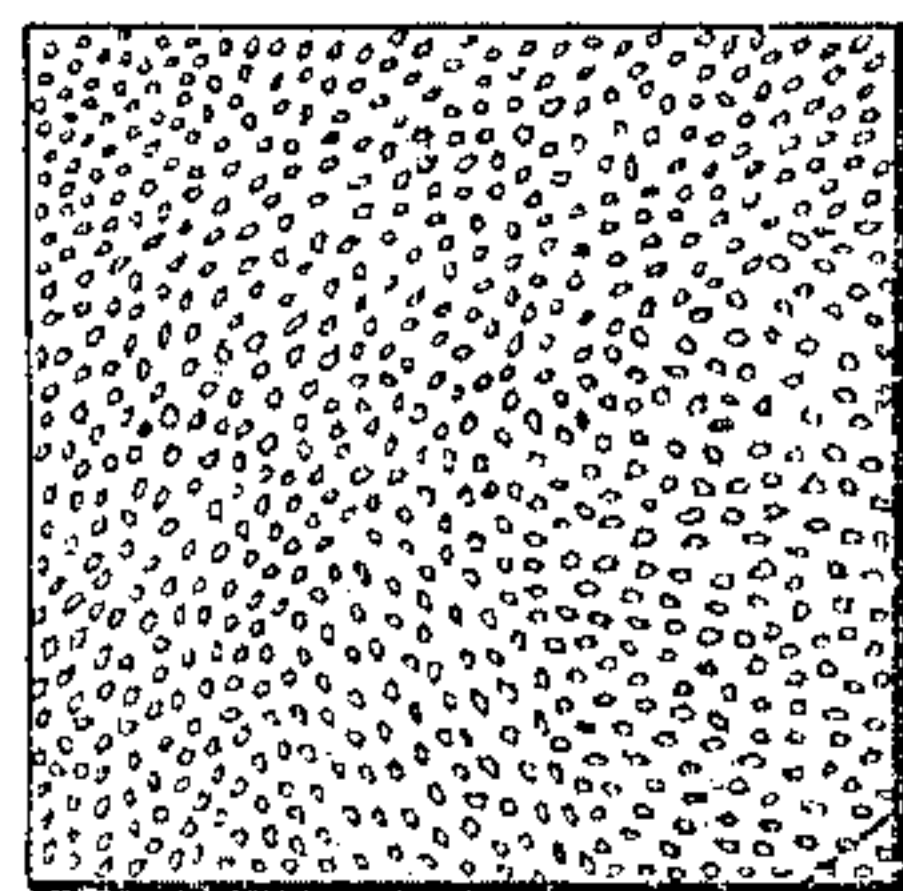


Fig. 3.

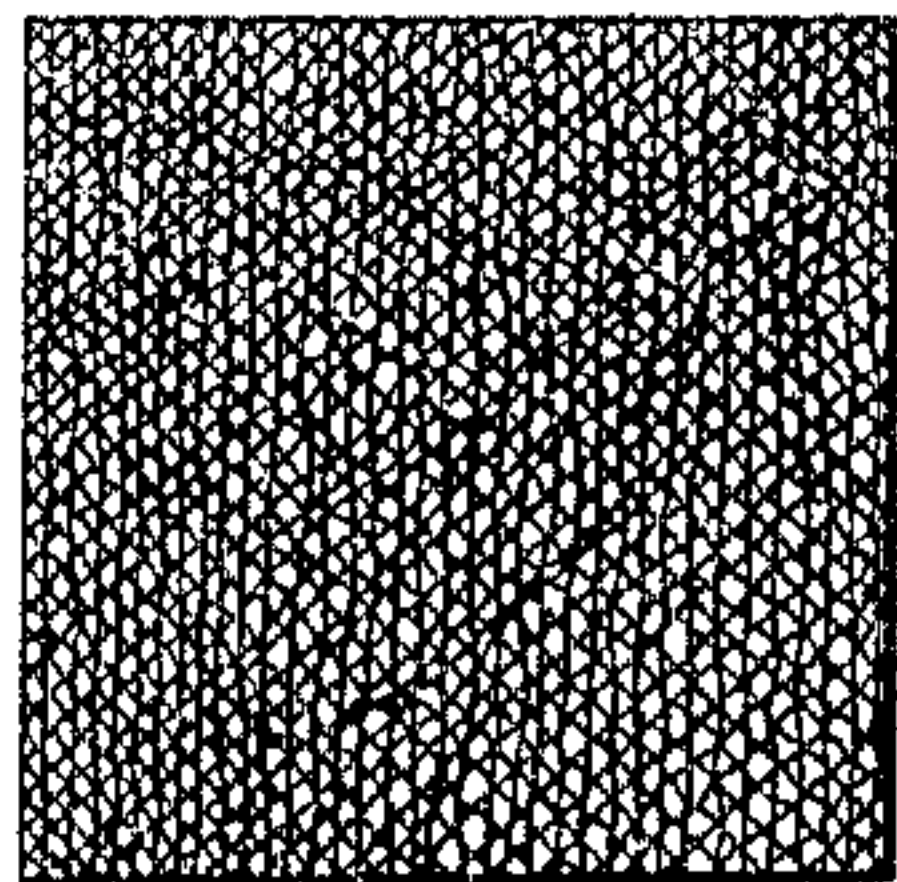


Fig. 5.

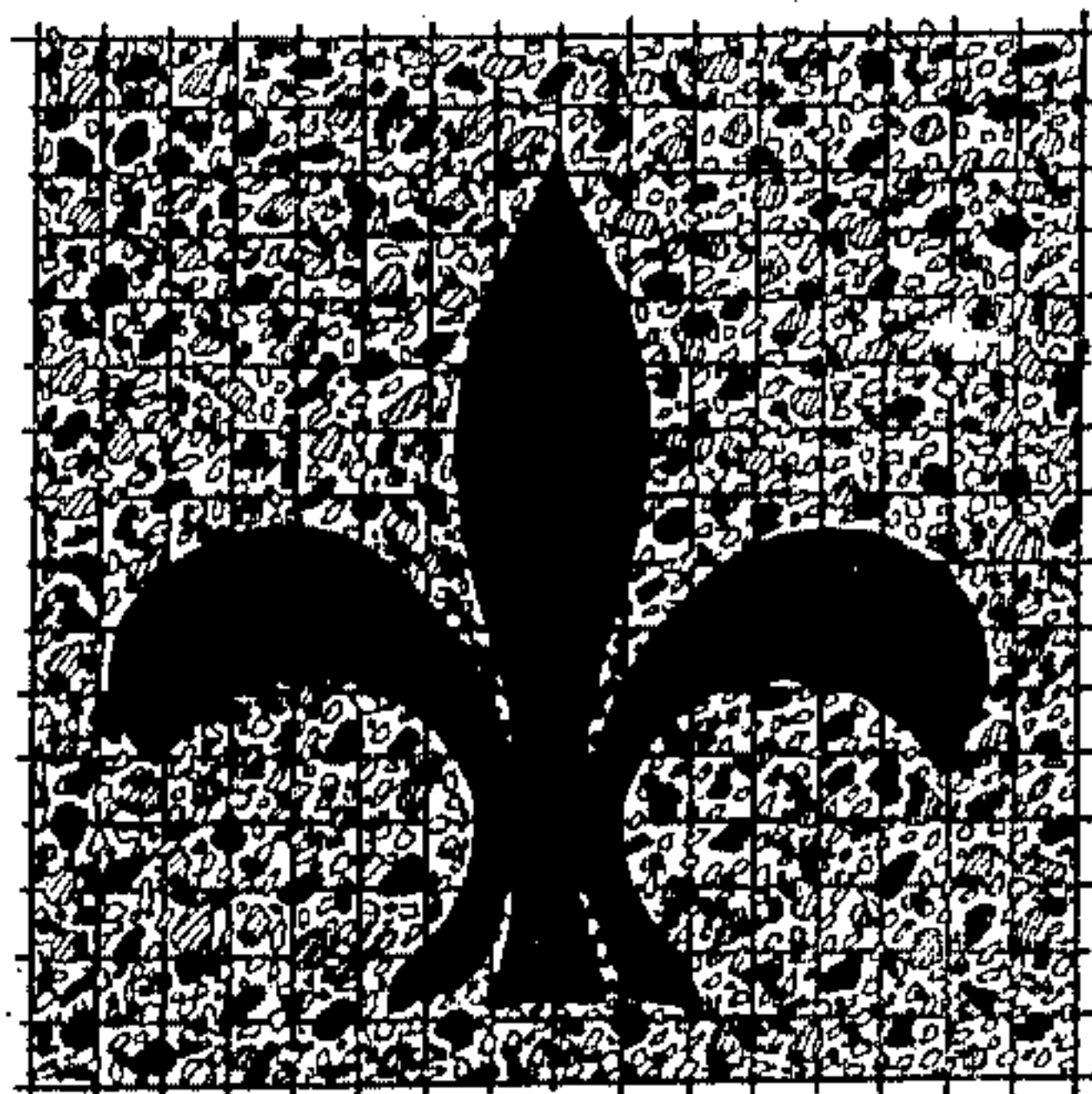


Fig. 4.



Witnesses:
Louis H. Bick
Jesse H. Jones.

Inventor:
Frederic E. Ives.
by his Attorneys,
Howan Howan

UNITED STATES PATENT OFFICE.

FREDERIC E. IVES, OF WEEHAWKEN, NEW JERSEY.

SAFETY COMPOSITE-COLOR PRINT.

SPECIFICATION forming part of Letters Patent No. 776,470, dated November 29, 1904.

Application filed September 15, 1903. Serial No. 173,359. (No model.)

To all whom it may concern:

Be it known that I, FREDERIC E. IVES, a citizen of the United States, residing in Weehawken, New Jersey, have invented certain
 5 Improvements in Safety Composite-Color Prints, of which the following is a specification.

The object of my invention is to provide such a combination of a distinctive design or
 10 picture with a multicolor ground as will make the reproduction of the former by photomechanical process difficult or impossible.

In the accompanying drawings, Figure 1 is a diagrammatic representation of the solar
 15 spectrum, showing the relation thereto of colors which may be employed in carrying out my invention. Fig. 2 is a view of various elements of a safety composite-color print made in accordance with my invention. Fig.
 20 3 is a view showing one of the elements of the print differing from the corresponding element shown in Fig. 2. Fig. 4 is an exaggerated section of the complete print, and Fig.
 25 5 a view showing superposed the various elements of the composite print.

In carrying out my invention I prepare a ground comprising designs of various bright colors juxtaposed to form a pattern which
 30 when viewed from such a distance that the individual color designs are not separately perceived shows a single gray patch of medium luminosity.

An essential feature of my invention is the selection for the printing of such a multicolor
 35 ground of a series of colors which have separately considerable luminosity, but which collectively absorb all kinds of visible spectrum-rays which are absorbed by the superposed distinctive design or picture, so that although
 40 the latter is well relieved and clearly defined upon the multicolor ground there is no group of spectrum-rays by which it can be separately photographed. The spectrum absorption of such a series of colors is shown diagrammatically in Fig. 1, in which the space
 45 A to R represents the solar spectrum with its Fraunhofer lines, and the heavy horizontal lines represent the various printing colors—namely, white lead, naphthol-yellow, yellow-
 50 ish eosin, rhodamine-pink, and capri-blue.

For the most perfect protection it is desirable that the multicolor ground overlie a coarse design or subground printed with the white lead or other colorless material, which while
 invisible to the sight will be opaque to the
 55 ultra-violet rays of the solar spectrum, and hence will affect the photographic sensitive plate, and, further, that the distinctive design or picture be in a transparent color or transparent black.

In case all of the ground colors are transparent a mixture of them will make a good
 printing color for the distinctive design or picture. A good combination is a spatter-
 60 work design in white-lead ink for the subground, a mosaic in transparent naphthol-yellow, eosin-red, rhodamine-pink, and capri-blue for the ground, and a superposed distinctive design printed in a mixture of two or
 65 more of the ground colors or their optical equivalent—that is to say, a color having the same absorption-spectrum. Representations of these three elements of the print are shown, respectively, at 1, 2, and 3 in Fig. 2, 1 representing the subground, 2 the ground, and 3
 70 the distinctive design or picture, while at 2^a in Fig. 3 is shown a ground design composed of crossing lines instead of a patchwork or mosaic.

A color which is a mixture of two or more
 80 of the ground colors is preferred for printing the distinctive picture or design to one which is simply the optical equivalent of such mixture, for the reason that chemical treatment which would affect any one or more of the
 85 ground colors would correspondingly affect such element of the mixture with which the distinctive design was printed.

The surface design may be engraved or it may be a photograph or other picture having
 90 body-shades and printed in collotype or photogravure. It is evident that this principle of protection may not only be carried out with a set of ground colors which collectively absorb all of the visible spectrum, so that a black
 95 or nearly black distinctive design or picture may be protected, but that it can be carried out with a series of ground colors which do not collectively absorb all kinds of visible
 100 spectrum-rays, provided that the rays not ab-

sorbed by any of the ground colors are also not absorbed by the distinctive design or picture superposed thereon. For example, the ground colors may be yellowish eosin, rhodamine-pink, and capri-blue and the distinctive design or picture a dark blue which is either obtained by or is optically similar to a mixture of the ground colors. In this case the effect at a sufficient distance will be that of a dark-blue design or picture on a blue-gray ground.

The juxtaposed patches of bright colors which form the ground may either completely cover it without overlapping each other or may to some extent overlap one another or may be separated by white spaces, or the distribution of the colors may be such as to constitute a color design which supplements the darker superposed design, provided that a sufficient number of suitable ground colors be juxtaposed under some important details of the distinctive engraving or picture. It should also be understood that the order in which the colors are laid down may be unimportant, provided that transparent colors are employed, since the effect may then be the same whether the distinctive engraving or picture be printed first or last. Hence the terms "ground" and "subground" as used in the claims are not to be understood as indicating the necessary order of application of these elements of the print.

In further explanation of the protection afforded by the combination of a distinctive design or picture with a ground of juxtaposed color-patches in accordance with my invention it may be assumed that the particolored ground is of two colors, one of which absorbs those spectrum-rays between Fraunhofer lines A and D and the other those between D and E and that the superposed distinctive design is printed in a color which absorbs the spectrum-rays from A to E. The ground colors will in this case appear to the eye as light greenish or peacock blue and bright pink, respectively, and the superposed design a bright true blue. If now an ordinary photograph of this combination is made, the entire surface will reproduce as white, since the photographic action is almost entirely confined to the blue, violet, and ultra-violet rays of the spectrum, which none of the colors named absorb. If instead of an ordinary print a photograph is made by the action of the yellow-green rays of the spectrum, which are absorbed both by the pink brown color and by the true-blue superposed design, both will photograph as black and the integrity of the superposed design will be destroyed. If to avoid the interference caused by the pink elements in the ground the orange or red rays are employed to make the photograph, then the patches of peacock-blue in the ground will photograph as black, as well as the true-blue superposed design, and the integrity of the latter will

again be destroyed. In either case the ground color-patches may photograph darker than the superposed design if the absorption of the latter is weaker, as it may very well be without material alternation of appearance. If the photograph is made by a mixture of all of the spectrum-rays between A and E, both of the ground colors may photograph as dark as the superposed design color if the absorption of the latter is weaker; but if not, and especially if there be white interspaces between the ground colors, the darkened and irregular ground of the photograph of the distinctive design can only be sufficiently eliminated for the purpose of photomechanical reproduction by an intensifying process which would choke up the finer lines or destroy the finer gradations of the design.

It follows that the superposed design, although in color visually quite different from either of the ground colors, cannot be reproduced as a separate print, and in order to reproduce the composite-color print it will be necessary to make one plate of the distinctive design in combination with the peacock-blue color-patches and another plate of the distinctive design in combination with the pink color-patches and then print the two in the respective ground colors with such perfection of registry that the double printing of the lines or shadings of the distinctive design would not be detected.

Given a distinctive design of suitable character and delicacy of definition, its reproduction by double printing would be impracticable, not only because of the difficulty of sufficiently-precise registration, but because even with absolutely-perfect register the two printings would not yield the same character of distinction obtained by three printings in the first instance, and examination with a simple magnifying-glass would show a very marked difference in the character of the original and of such a photomechanical reproduction even at its best. It should also be understood that by printing the superposed distinctive design in a color which instead of absorbing the spectrum-rays from A to E absorbs only those between said C and D $\frac{1}{2}$ E, which would be a bright violet or purple instead of a blue, the distinctive design will have exactly the same kind of protection afforded by the pink and peacock-blue ground colors, with additional protection due to the fact that double printing with the ground colors will not reproduce the bright violet or purple color of the distinctive design. Such a combination comes within the requirement that the rays not absorbed by any of the ground colors are also not absorbed by the distinctive design or picture superposed thereon and also within the requirement that the multicolored ground is composed of a series of colors which have separately considerable luminosity, but which, collectively absorb all

kinds of color-rays which are absorbed by the superposed design or picture.

The essence of my invention is the use of a distinctive design printed with a different color and having a different and preferably greater extension of absorption in the spectrum than any of the ground colors, and therefore of a different hue from any of said ground colors, but which absorbs no part of the spectrum not absorbed by the ground colors taken collectively.

The most successful application of this principle of protection involves the use of no less than two ground colors to protect a distinctive design in any bright color and not less than three to protect a distinctive design in black or a close approximation thereto.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. In a safety composite-color print, a ground of juxtaposed colors in combination with a superposed distinctive design or picture printed with a color having a different hue from any of the ground colors, but absorbing no part of the spectrum which the ground colors, taken collectively, do not also absorb.
2. In a safety composite-color print, a ground of juxtaposed colors, in combination with a superposed distinctive design or picture, printed with a transparent color having a different hue from any of the ground colors, but absorbing no part of the spectrum which the ground colors, taken collectively, do not also absorb.
3. In a safety composite-color print, a ground of juxtaposed colors in combination with a distinctive design or picture in color which is optically similar to a mixture of two or more of the ground colors.
4. In a safety composite-color print, a ground of juxtaposed colors in combination with a distinctive design or picture in transparent color which is optically similar to a mixture of two or more of the ground colors.
5. In a safety composite-color print, a ground of juxtaposed colors in combination with a distinctive design or picture in color which is a mixture of two or more of the ground colors.
6. In a safety composite-color print, a ground of juxtaposed colors in combination with a distinctive design or picture in transparent color which is a mixture of two or more of the ground colors.
7. In a safety composite-color print, a ground of juxtaposed colors in combination with a distinctive design or picture in color which is optically similar to a mixture of all of the ground colors.
8. In a safety composite-color print, a ground of juxtaposed colors in combination with a distinctive design or picture in transparent color which is optically similar to a mixture of all of the ground colors.
9. In a safety composite-color print, a

ground of juxtaposed colors, in combination with a distinctive design or picture in color which is a mixture of all of the ground colors.

10. In a safety composite-color print, a ground of juxtaposed colors, in combination with a distinctive design or picture in transparent color which is a mixture of all of the ground colors.

11. In a safety composite-color print, a distinctive design or picture in a dark color or black on a ground of juxtaposed colors which collectively absorb all kinds of visible spectrum-rays.

12. In a safety composite-color print, a distinctive design or picture in a transparent dark color or black on a ground of juxtaposed colors which collectively absorb all kinds of visible spectrum-rays.

13. In a safety composite-color print, a ground of juxtaposed colors which collectively absorb all of the visible spectrum-rays, in combination with a distinctive design or picture in color of a different hue from the ground colors, but having a spectrum which comprises that of one or more of the ground colors.

14. In a safety composite-color print, a ground of juxtaposed colors which collectively absorb all of the visible spectrum-rays, in combination with a distinctive design or picture in transparent color of a different hue from the ground colors, but having a spectrum which comprises that of one or more of the ground colors.

15. In a safety composite-color print, a ground of juxtaposed colors which collectively absorb all of the visible spectrum-rays, in combination with a distinctive design or picture in color which is optically similar to a mixture of two or more of the ground colors.

16. In a safety composite-color print, a ground of juxtaposed colors which collectively absorb all of the visible spectrum-rays, in combination with a distinctive design or picture in transparent color which is optically similar to a mixture of two or more of the ground colors.

17. In a safety composite-color print, a ground of juxtaposed colors which collectively absorb all of the visible spectrum-rays, in combination with a distinctive design or picture in color which is a mixture of two or more of the ground colors.

18. In a safety composite-color print, a ground of juxtaposed colors which collectively absorb all of the visible spectrum-rays, in combination with a distinctive design or picture in transparent color which is a mixture of two or more of the ground colors.

19. In a safety composite-color print, a ground of juxtaposed colors which collectively absorb all of the visible spectrum-rays, in combination with a distinctive design or picture in color which is optically similar to a mixture of all of the ground colors.

20. In a safety composite-color print, a

5 to a mixture of all of the ground colors.

colors.
cc. In a safety composite-color print, a

of the ground colors.

25 one or more of the ground colors.
84. In a safety composite-color print, a sub-

colors.

or more of the ground colors.

27. In a safety composite-color print, a sub-

55 ground colors.
98. In a safety composite-color print, a sub-

more of the ground colors.

ground design in white or colorless material

of the ground colors. 20 In a safety composite-color print, a sub- 70

31. In a safety composite-color print, a sub-
 lation in white or colorless material

which is a mixture of all of the ground colors.

ground colors. 22. In a safety composite-color print, a sub- 90

rays. In a safety composite-color print, a sub-

35. In a safety composite-color print, a sub-
strate of white or colorless material opaque 105

ors, but having a spectrum which comprises that of one or more of the ground colors.

ground colors, but having a spectrum which comprises that of one or more of the ground

combination with a distinctive design or pre-

ture in color which is optically similar to a mixture of two or more of the ground colors.

38. In a safety composite-color print, a sub-ground design in white or colorless material 5 opaque to ultra-violet spectrum-rays, and a ground of juxtaposed colors which collectively absorb all of the visible spectrum-rays, in combination with a distinctive design or picture in transparent color which is optically 10 similar to a mixture of two or more of the ground colors.

39. In a safety composite-color print, a sub-ground design in white or colorless material 15 opaque to ultra-violet spectrum-rays, and a ground of juxtaposed colors which collectively absorb all of the visible spectrum-rays, in combination with a distinctive design or picture in color which is a mixture of two or 20 more of the ground colors.

40. In a safety composite-color print, a sub-ground design in white or colorless material 25 opaque to ultra-violet spectrum-rays, and a ground of juxtaposed colors which collectively absorb all of the visible spectrum-rays, in combination with a distinctive design or picture in transparent color which is a mixture 30 of two or more of the ground colors.

41. In a safety composite-color print, a sub-ground design in white or colorless material 35 opaque to ultra-violet spectrum-rays, and a ground of juxtaposed colors which collectively absorb all of the visible spectrum-rays, in combination with a distinctive design or pic-

ture in color which is optically similar to a mixture of all of the ground colors. 35

42. In a safety composite-color print, a sub-ground design in white or colorless material 40 opaque to ultra-violet spectrum-rays, and a ground of juxtaposed colors which collectively absorb all of the visible spectrum-rays, in combination with a distinctive design or picture in transparent color which is optically 45 similar to a mixture of all of the ground colors.

43. In a safety composite-color print, a sub-ground design in white or colorless material 50 opaque to ultra-violet spectrum-rays, and a ground of juxtaposed colors which collectively absorb all of the visible spectrum-rays, in combination with a distinctive design or picture in color which is a mixture of all of the 55 ground colors.

44. In a safety composite-color print, a sub-ground design in white or colorless material 60 opaque to ultra-violet spectrum-rays, and a ground of juxtaposed colors which collectively absorb all of the visible spectrum-rays, in combination with a distinctive design or picture in transparent color which is a mixture 65 of all of the ground colors.

In testimony whereof I have signed my name 60 to this specification in the presence of two subscribing witnesses.

FREDERIC E. IVES.

Witnesses:

WILL. A. BARR,
JOS. H. KLEIN.