A. S. SPIEGEL.

DISPLAY DEVICE.

APPLICATION FILED APR. 13, 1908.

957,119.

Patented May 3, 1910.

4 SHEETS—SHEET 1.

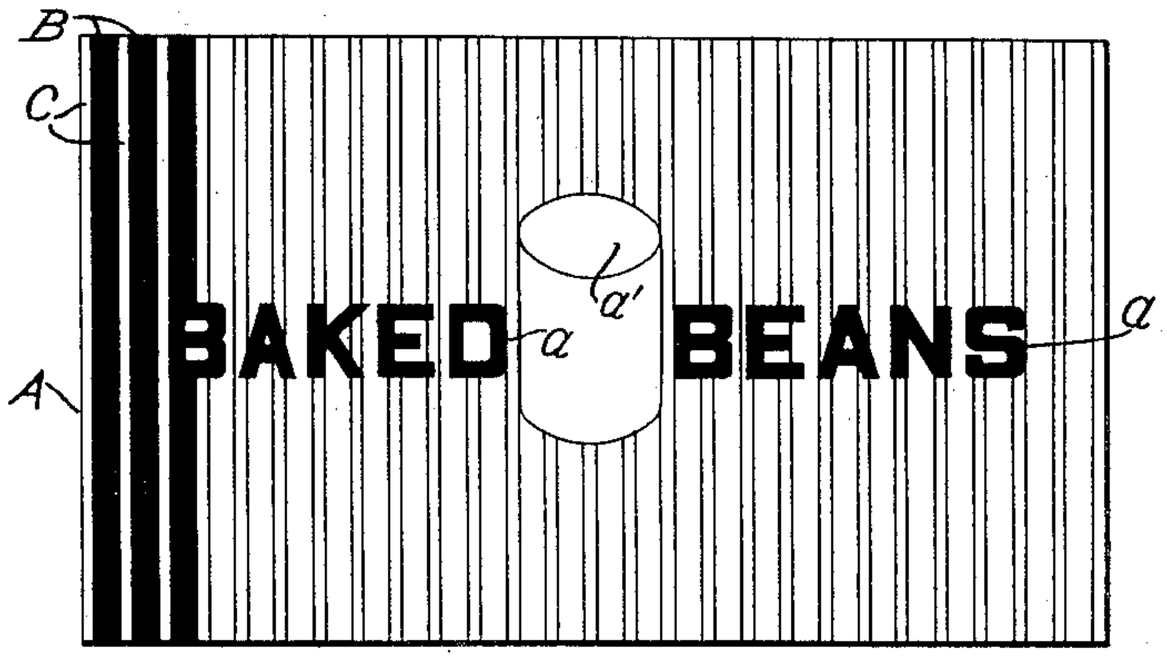

FIG. 1.

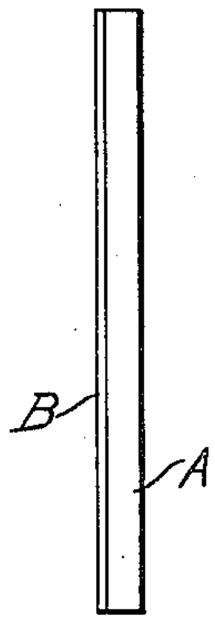

FIG. 2.

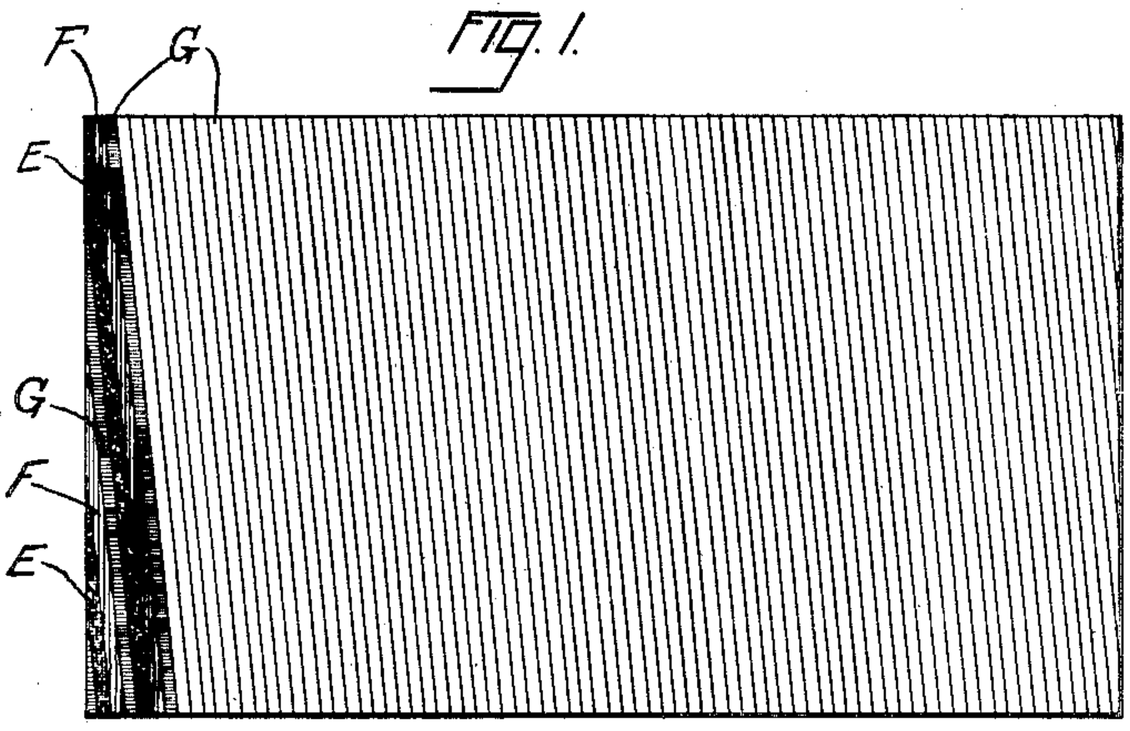

FIG. 3.

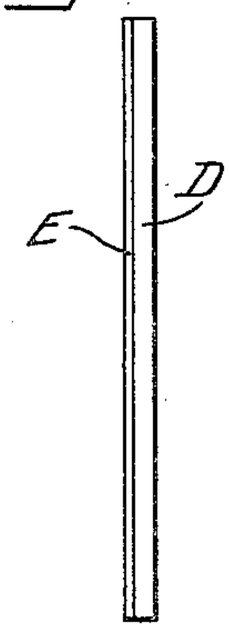

FIG. 4.

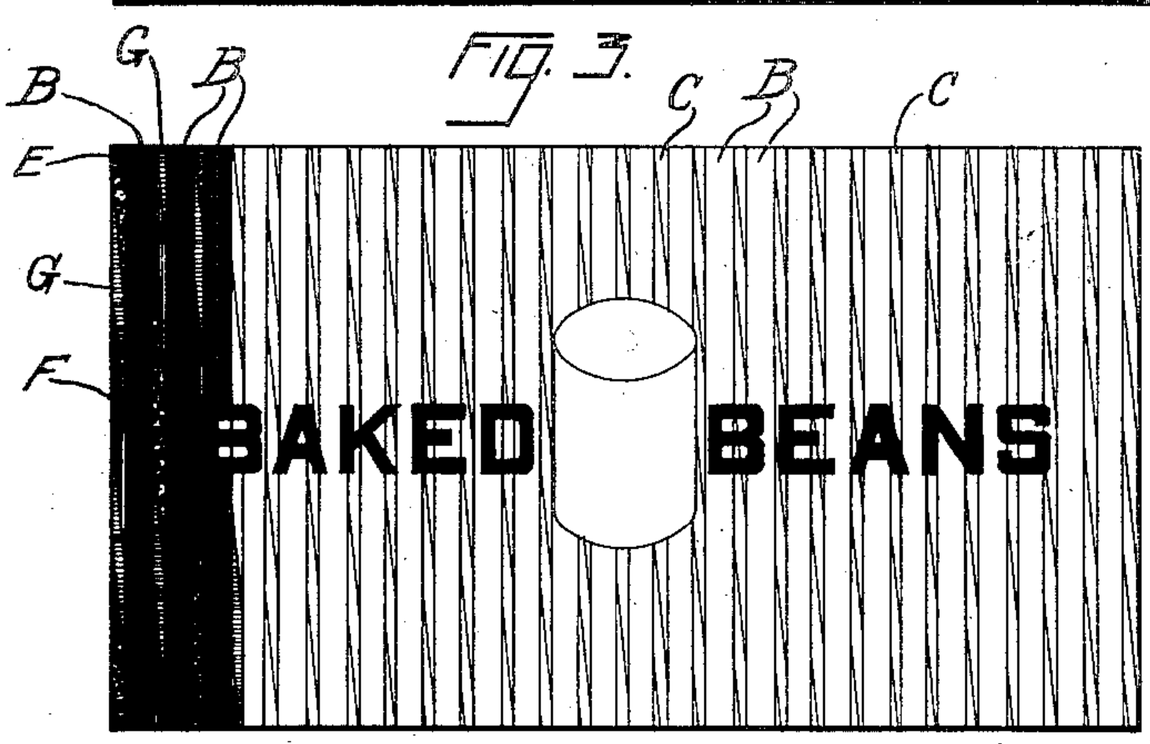

FIG. 5.

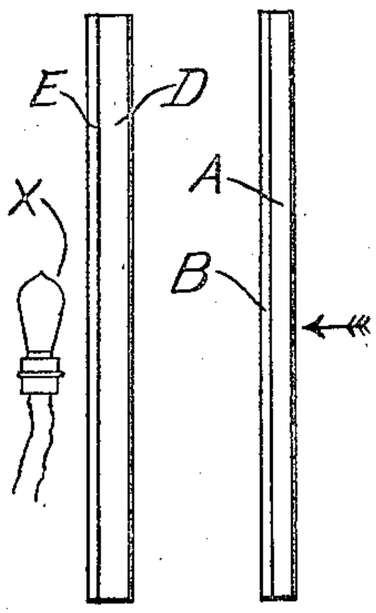

FIG. 6.

WITNESSES:

O. E. Brown

C. A. Adams.

INVENTOR

Alexander S. Spiegel;

BY Charles Turner Brown,

ATTORNEY

A. S. SPIEGEL.

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4 SHEETS—SHEET 2.

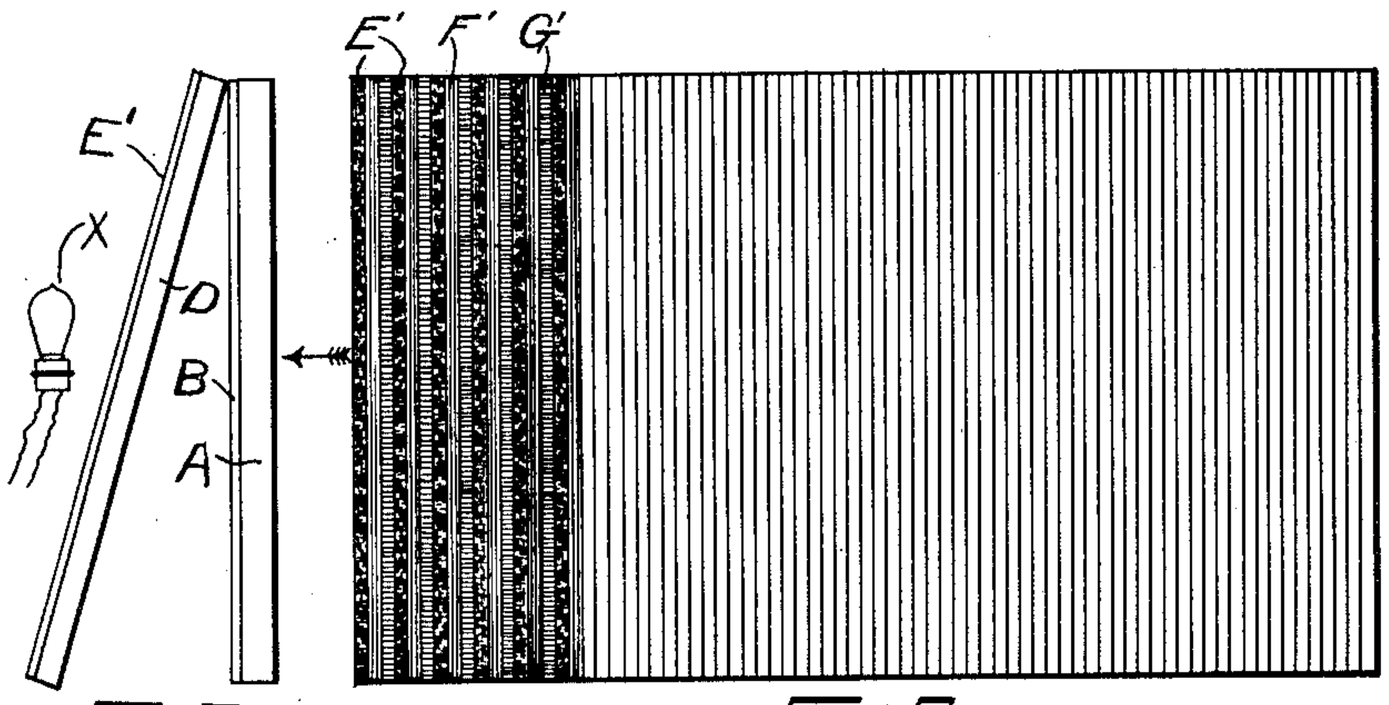

Fig. 7.

Fig. 9.

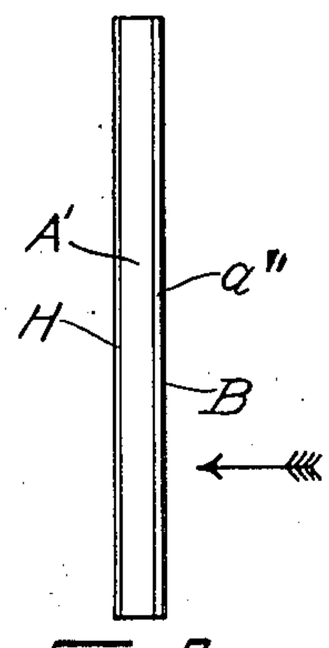

Fig. 8.

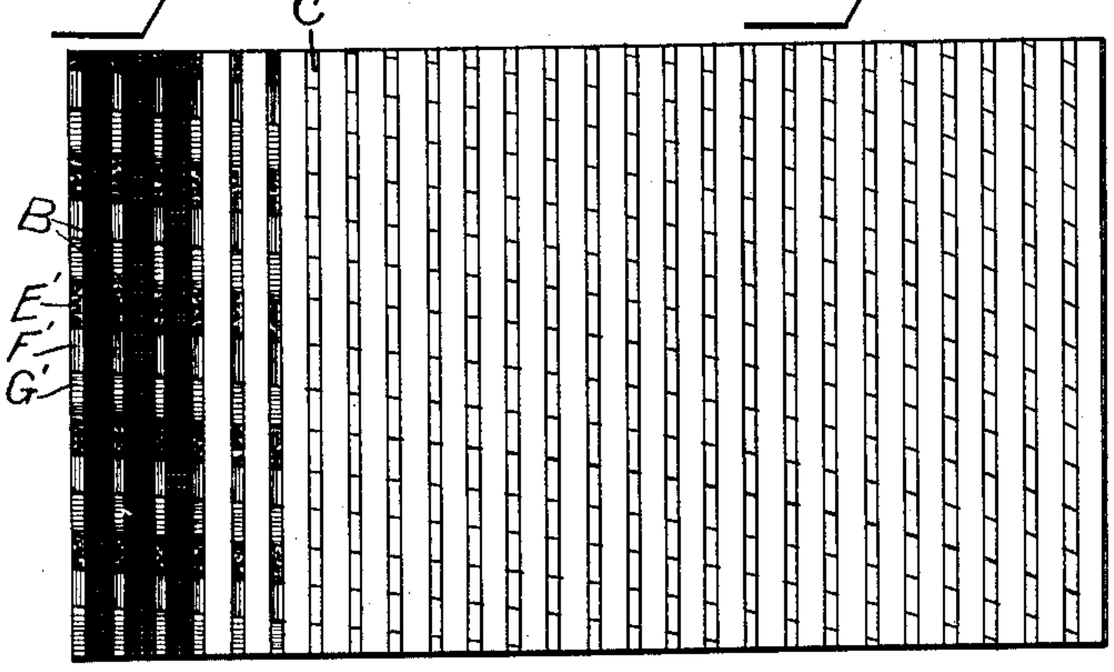

Fig. 10.

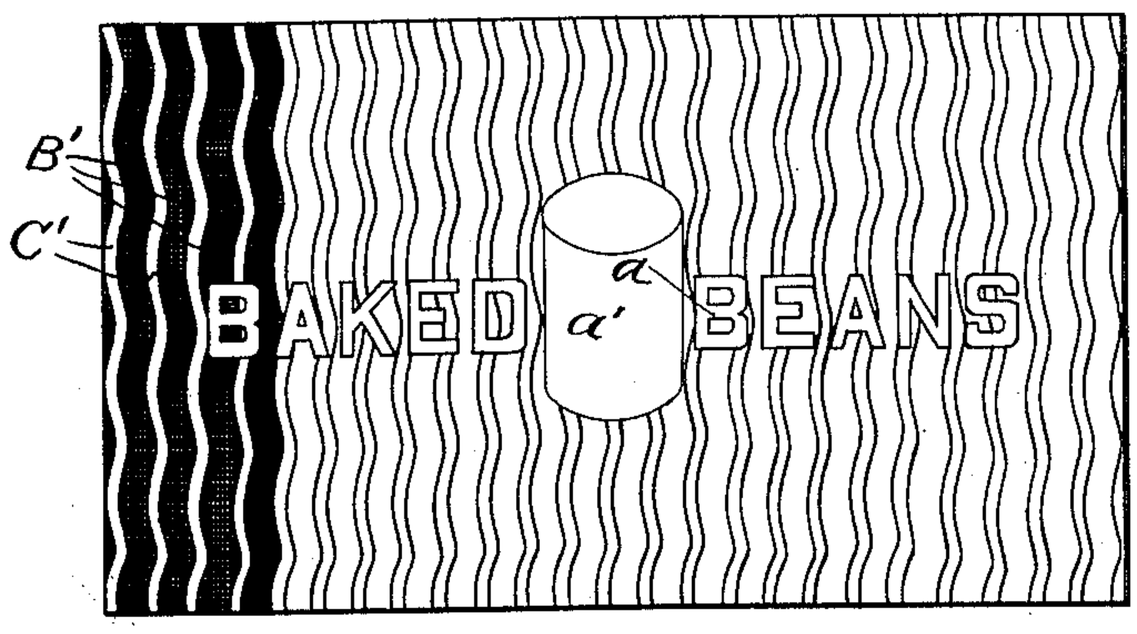

Fig. 11.

WITNESSES:

O. C. Brown

C. A. Adams.

INVENTOR

Alexander S. Spiegel;

BY Charles Turner Brown,

ATTORNEY

A. S. SPIEGEL.

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4 SHEETS—SHEET 3.

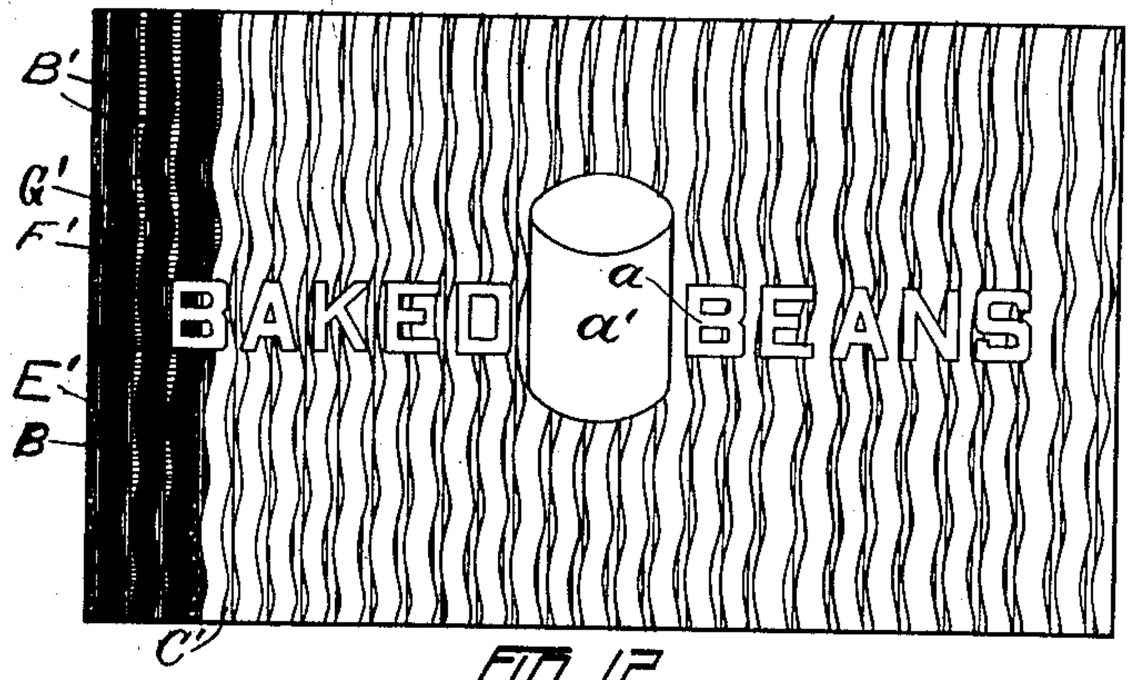

FIG. 12.

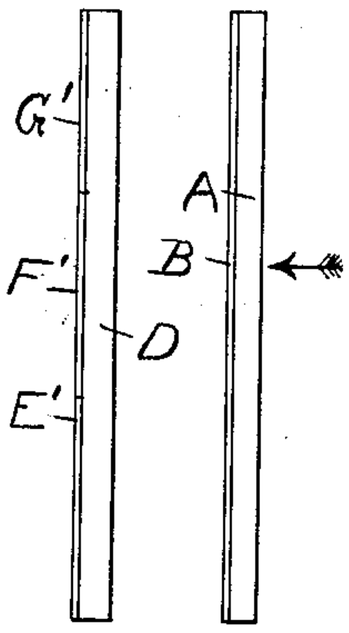

FIG. 13.

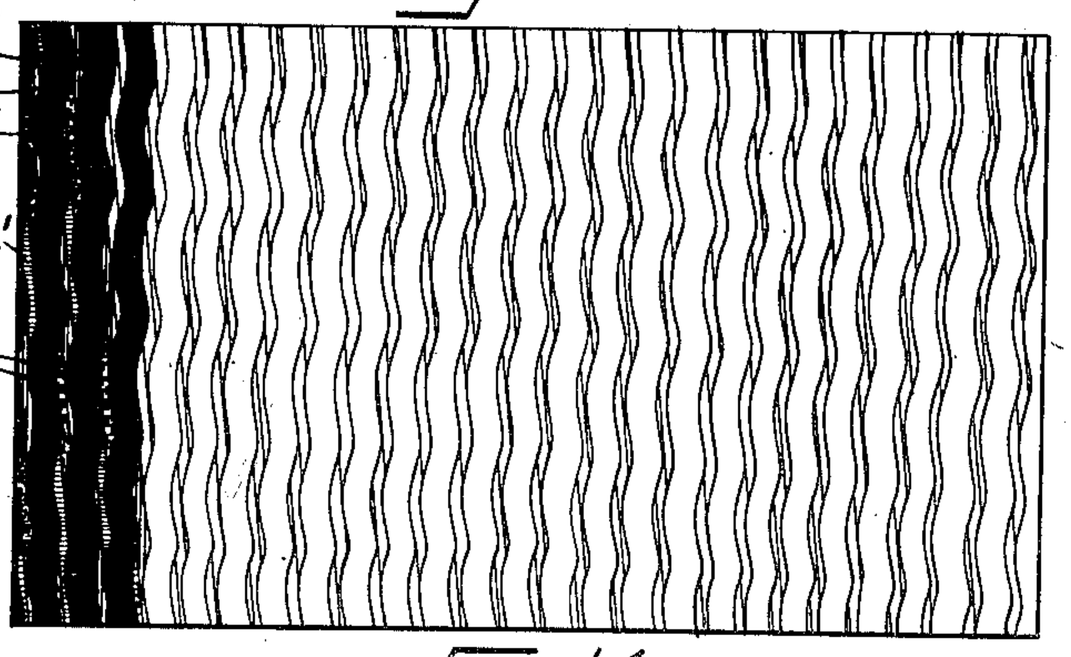

FIG. 14.

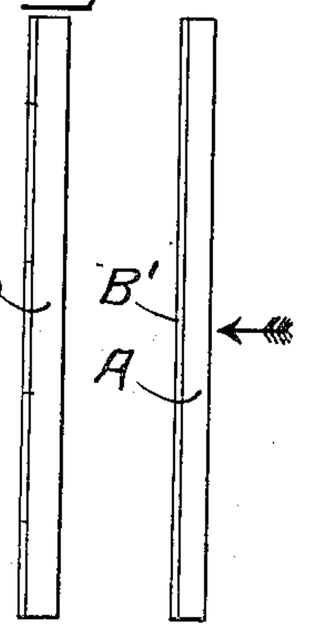

FIG. 15.

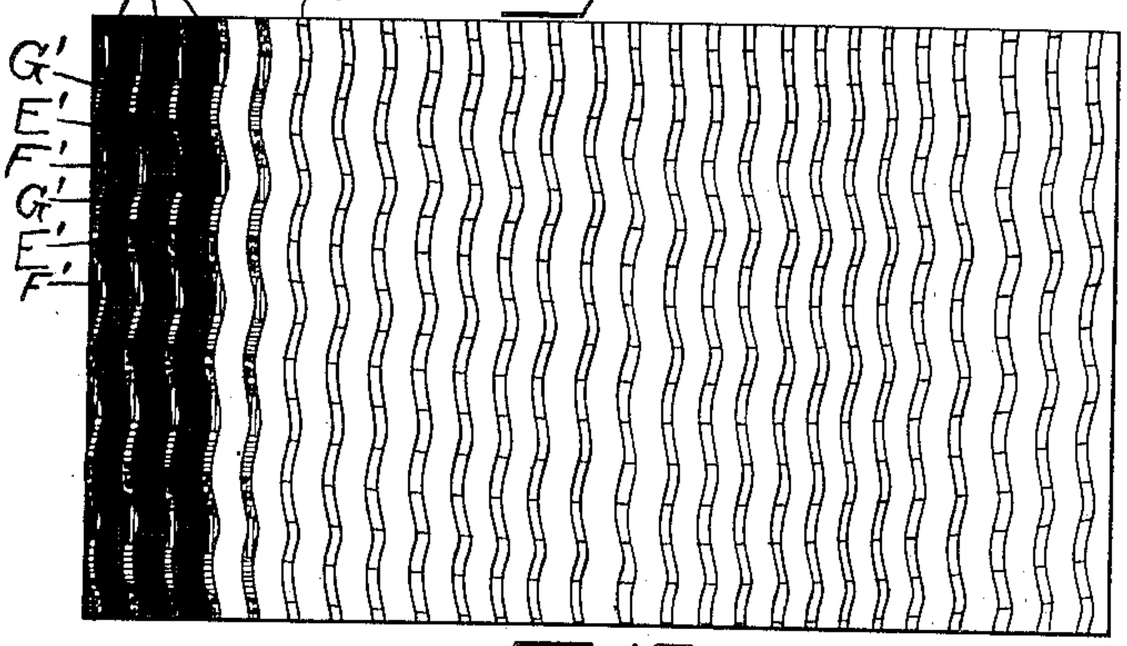

FIG. 16.

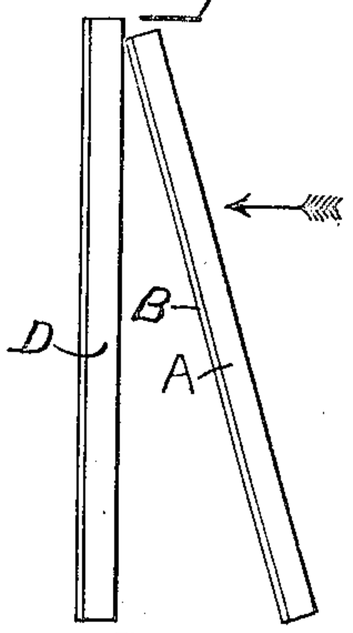

FIG. 17.

WITNESSES:

C. C. Green

C. A. Adams.

INVENTOR

Alexander S. Spiegel;

By Charles Turner Brown.

ATTORNEY

A. S. SPIEGEL.

DISPLAY DEVICE.

APPLICATION FILED APR. 13, 1908.

957,119.

Patented May 3, 1910.

4 SHEETS—SHEET 4.

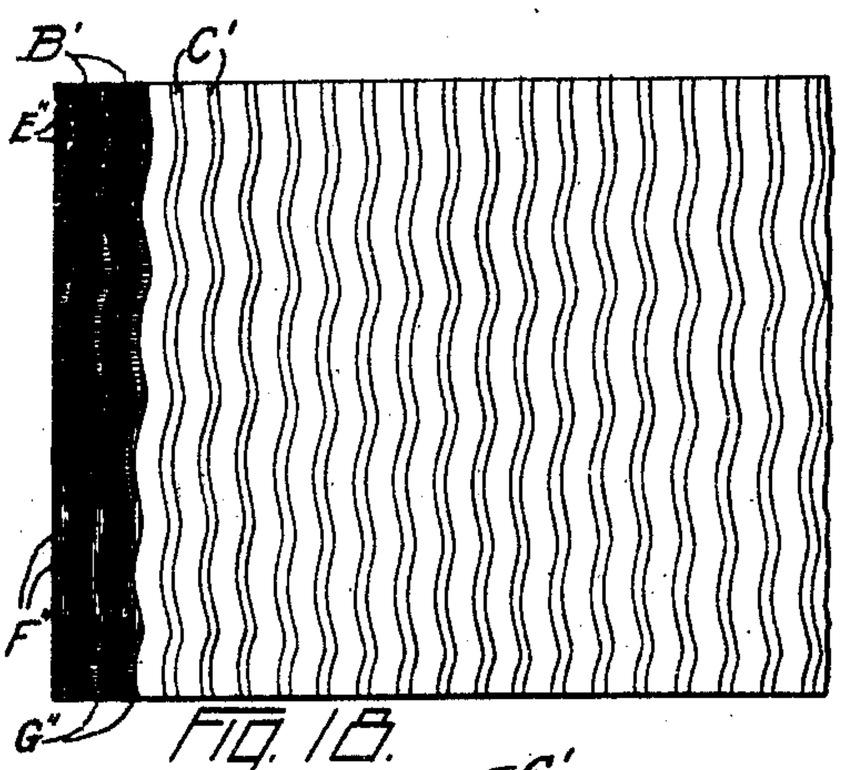

FIG. 18.

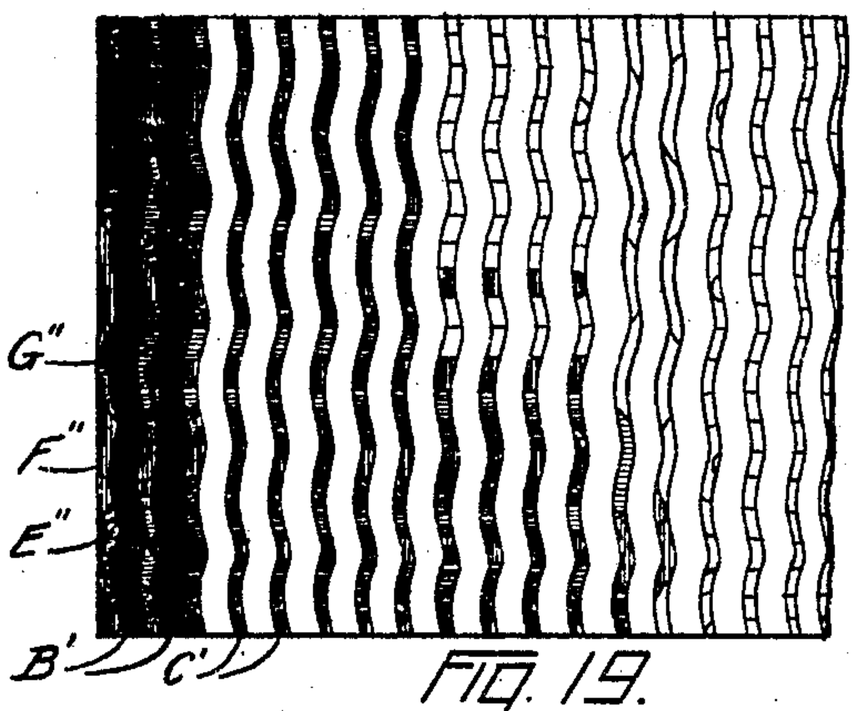

FIG. 19.

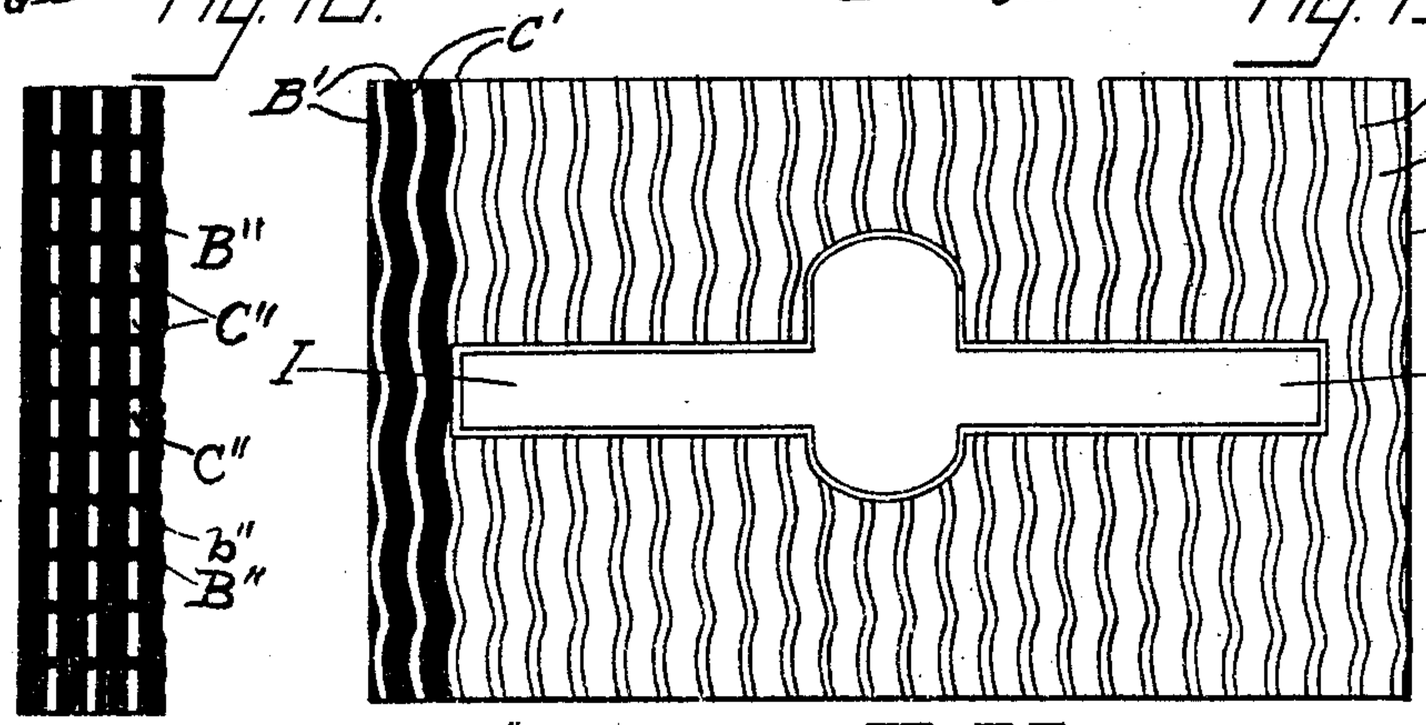

FIG. 24.

FIG. 20.

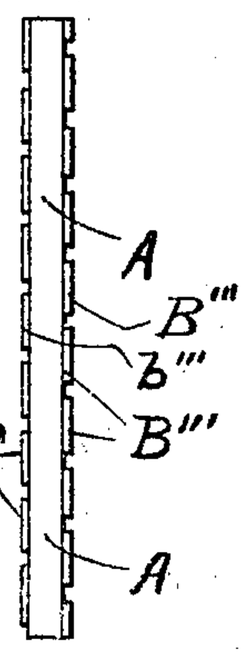

FIG. 25.

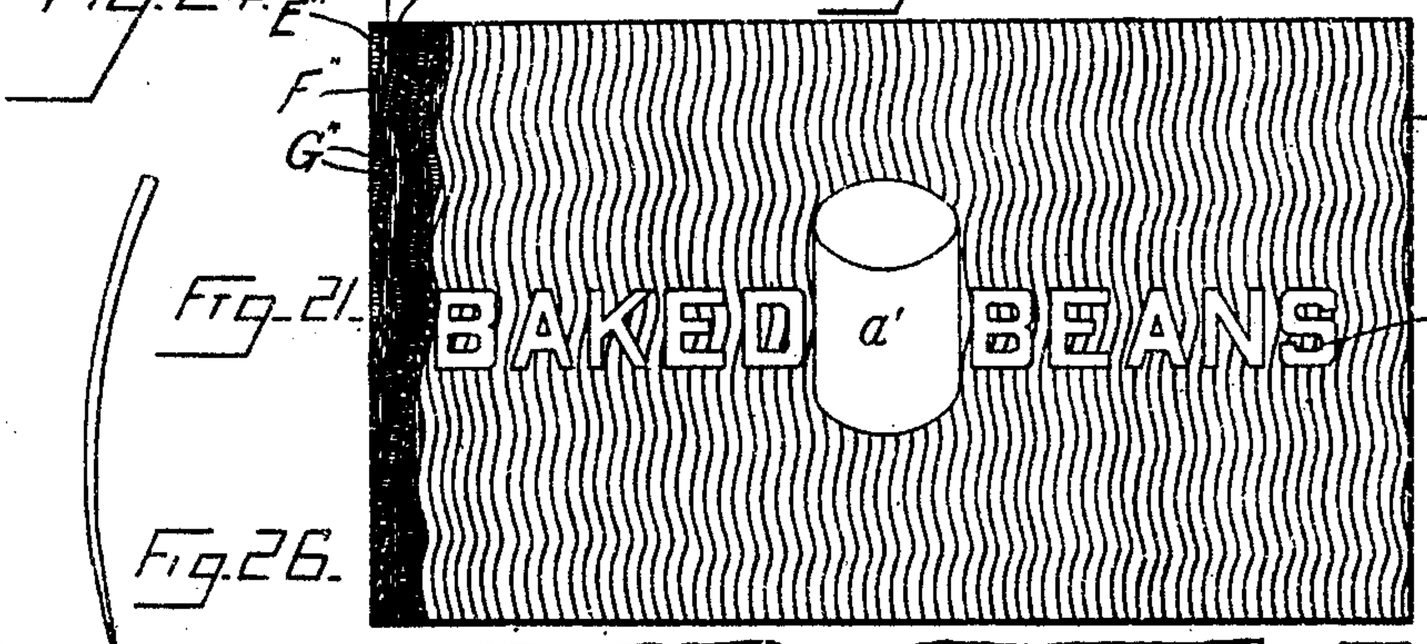

FIG. 21.

FIG. 26.

FIG. 27.

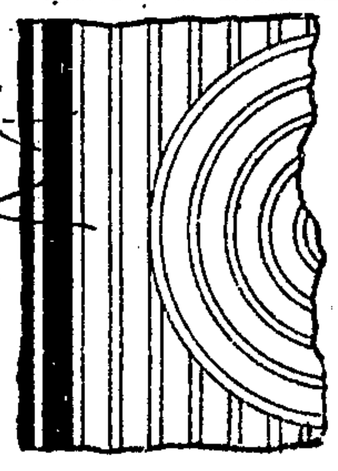

FIG. 22.

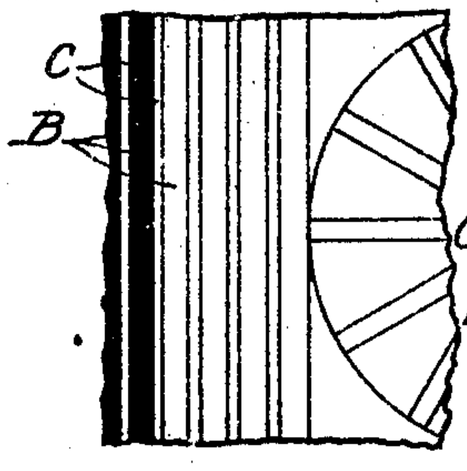

FIG. 23.

WITNESSES:

C. A. Adams.

INVENTOR

Alexander S. Spiegel,

By Charles Turner Brown,

ATTORNEY

UNITED STATES PATENT OFFICE.

ALEXANDER S. SPIEGEL, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE ATTRACTOGRAPH COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION.

DISPLAY DEVICE.

957,119. Specification of Letters Patent. Patented May 3, 1910.

Application filed April 13, 1908. Serial No. 426,781.

To all whom it may concern:

Be it known that I, ALEXANDER S. SPIEGEL, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Display Devices, of which the following, when taken in connection with the drawings accompanying and forming a part hereof, is a full and complete description, sufficient to enable those skilled in the art to which it pertains to understand, make, and use the same.

This invention relates to display devices illuminated from behind and is particularly adapted for use in advertising signs having artificial light directed through stationary transparent or translucent plates. And the object of the invention is to obtain means whereby an advertisement consisting of one or a plurality of designs, as desired, will be provided with a back ground comprising a plurality of colors, which colors appear to a moving observer to constantly change, producing what I term a rainbow effect.

In the drawings referred to Figure 1 is a front view of a screen with a sign or advertisement thereon forming an element in a device embodying this invention. Fig. 2 is an end view of the screen and advertisement illustrated in Fig. 1. Fig. 3 is a front view of a color scheme forming an element in a device embodying this invention. Fig. 4 is an end view of the color scheme illustrated in Fig. 3. Fig. 5 is a front view of the screen and advertisement illustrated in Figs. 1 and 2, with the color scheme illustrated in Figs. 3 and 4, placed back thereof. Fig. 6 is an end view of the screen and advertisement illustrated in Figs. 1 and 2 and of the color scheme illustrated in Figs. 3 and 4 back thereof showing the relative position of such screen and advertisement thereon and of the color scheme. Fig. 7 is an end view of the screen and advertisement and of the color scheme, showing a modification of the relative positions thereof. Fig. 8 is an end view of a modification showing the screen and advertisement and a color scheme all applied to a single sheet of transparent material. Fig. 9 is a front view of a modification of the color scheme illustrated in Figs. 3 and 4. Fig. 10 is a front view of the screen illustrated in Figs. 1 and 2, and of the color scheme illustrated in Fig. 9, placed at an angle to each other, that is, in the relative position illustrated in Fig. 7. Fig. 11 is a front view of a screen made with curved opaque lines, and with a sign or advertisement thereon forming a modification of the screen illustrated in Figs. 1 and 2. Fig. 12 is a front view of a screen made with curved lines, with a sign or advertisement thereon, and with a color scheme consisting of perpendicular lines, (the modification shown in Fig. 9), placed back thereof, in the relative position shown in Fig. 13. Fig. 13 is an end view of the modifications of the screen and color scheme which are illustrated in Fig. 12, showing their relative position. Fig. 14 is a front view of a modification of the screen, such modification having no sign or advertisement thereon, with the modification of the color scheme which is illustrated in Fig. 3 placed back thereof. Fig. 15 is an end elevation of the modifications of the screen and color scheme which are illustrated in Fig. 14. Fig. 16 is a front view of the modification of the screen which is illustrated in Fig. 11, with the modification of the color scheme which is illustrated in Fig. 3 placed back thereof in the relative position illustrated in Fig. 17. Fig. 17 is an end elevation showing the relative position of the modification of the screen and advertisement thereon and of the color scheme which are illustrated in Fig. 16. Fig. 18 is a front view of a modification, (with curved lines), of a screen embodying my invention, and having back thereof, in the relative position illustrated in Fig. 6, a modification of the color scheme; such modification comprising curved and crossed color lines, as in Fig. 21. Fig. 19 is a front view of a modification of a screen, with a modification of the color scheme back thereof, in the relative position illustrated in Fig. 7; such modification of the color scheme consisting of curved and crossed color lines, as in Fig. 21. Fig. 20 is a front view of an additional modification of the screen. Fig. 21 is a front view of a modification of the color scheme forming an element in a device embodying the invention, such modification comprising curved and crossed color lines, and a sign or advertisement. Fig. 22 is a front view of a portion of a sheet of transparent or translucent material, having thereon an additional modi-

fication of the screen forming an element in a device embodying the invention. Fig. 23 is a front view of a portion of a sheet of transparent or translucent material having thereon an additional modification of the screen. Fig. 24 is a front view of an additional modification of the screen forming an element in the device. Fig. 25 is an end view of a modification of the screen, in which the lines of the screen consist of broken lines placed on both sides of a sheet or plate of transparent or translucent material. Figs. 26 and 27 represent modifications.

A reference letter applied to designate a given part is used to indicate such part, throughout the several figures of the drawing, wherever the same appears.

In the drawings illustrating constructions embodying my invention a sign is displayed; and in Figs. 1 and 2 I have shown a screen consisting of opaque lines B, B, on a transparent plate (A) with intervening clear spaces (C, C,), and with the advertisement or sign (a, a') thereon.

In Figs. 3 and 4, I illustrate a color scheme consisting of plate D and the color lines E, F, and G. When plates A and D are assembled, with the plate A in front of the plate D, and some distance therefrom, as illustrated in Fig. 6 of the drawings, and lamps X are placed back of plate D, or between and to one side of such plates to illumine the same, the marks or letters a, a', and the lines B, will both appear immovable to an observer, in whatever color or colors such marks, letters and lines may be made. The color E, F, and G, on plate D, will also appear clearly, the same being viewed through the clear spaces C, C, on plate D. The lines of color not being in the same plane as the lines and intervening clear spaces of the screen, at any given time and with the observer in any given position to view the device, a given line of color will be exposed to view through a plurality of the clear spaces, and the plate D, being back of plate A any movement of the observer will cause a change of the color line which may be viewed at a given point through the clear spaces of plate A. Apparent movement of the colors with resulting change of color at a given point is thus effected by the movement of the observer; while plates A and D remain stationary. This apparent change or play of color produces what I term a rainbow effect, which serves to attract attention to the device.

Where, as in Figs. 1 and 2, but one sign or advertisement is used and it is placed as shown on plate A the permanent character thereof permits its easy and accurate observation while the playing colors of the background attract attention thereto.

I have sought to indicate in Fig. 5 the appearance obtained where plate A, having thereon the several lines B, clear spaces C, and signs or marks a, a', and plate D, having thereon the lines of color E, F, and G as above described, are assembled as illustrated in Fig. 7; with the lower (or side) edges thereof at a greater distance apart than are the upper (or other side) edges and illumined as described from the back. The play of colors which is obtained in assembling such plates in parallel planes as illustrated in Fig. 6 is obtained by this way of assembling the plates and in addition thereto there is added a perspective illusion in which the continuous play of colors apparently occurs in a plane viewed from the under side and which extends back an indefinite distance.

A like effect as that obtained when the plate A and the plate D, are assembled as illustrated in Fig. 6 of the drawings is obtained when the lines of the screen are placed on the front of a transparent plate, as say a'' on plate A', Fig. 8, and the lines of color are placed on the back of the same plate, as say, H, in said Fig. 8.

When the sign is used as an out-door sign and the lines B, and sign or advertisement a', a, are placed on the front or exposed side of a plate or sheet of transparent material, as glass, such advertisement and lines B, are, of course, subject to wear, and to the elements. In addition thereto, greater movement on the part of an observer, in an ordinarily sized device, is required to obtain an equally great or as rapid a change of color in the background; and for such reasons I prefer a construction (when a transparent screen is made), wherein the screen and the sign or advertisement are placed on the back of such transparent sheet, and wherein the color scheme presented is placed on an additional plate, (D) and some distance back of the screen sheet or plate, (A).

I have found that where a plurality of plates are used for the screen and for the color plate, (as plates A and D), and such plates are placed in the relative position illustrated in Fig. 7 of the drawings, say, with the bottom or one side of plate D at a greater distance from plate A than is the top or opposite side, the effect obtained is not essentially different whether the lines of color be perpendicular or whether such lines of color be at an angle to the perpendicular and thence when plates A and D are assembled substantially as is illustrated in Fig. 7 the plate A may have thereon inclined color lines E, F and G as is illustrated in Fig. 3 of the drawings or the perpendicular color lines E', F', and G', as illustrated in Fig. 9 of the drawings.

I have constructed signs embodying this invention with two screens, one on each side of a sheet of glass, with the color scheme on

a third sheet of glass, and with an electric lamp back of the color scheme to illumine the device.

In Fig. 10 I have endeavored to illustrate the appearance of assembling the plates A, D, in the manner shown in Fig. 7 with the color lines E′, F′, G′ on plate D, at a given moment.

Very similar effects to those above described may be obtained by having the lines B′, B′, Fig. 11, curved, with intervening clear spaces C′, C′, between them and using the color lines E, F, and G (Fig. 3) or E′, F′, G′, (Fig. 9) assembled as illustrated in Figs. 6 and 7.

In the modification of the screen illustrated in Figs. 14, 15, 16, and 17 the lettering *a* and designs *a′* have been removed making a device which may be used as a panel in the ornamentation of a wall or ceiling.

In Fig. 18 I have endeavored to show the complicated color effect produced when a screen having curved lines is placed in front of a transparent or translucent plate having curved color lines which cross each other (as in Fig. 21), and in Fig. 19 I endeavor to represent the comparative effect produced when such plates are assembled as illustrated in Fig. 7.

E″, F″, G″, Fig. 21, are, respectively, color lines on plate D, which are not only curved but in addition thereto cross each other.

The sign or advertisement may at any time be placed upon the front of plate D, in which case color clear space I (Fig. 20) is left on plate A through which clear space the sign or advertisement on plate D (Fig. 21), may be viewed.

When the sign or advertisement is placed on the plate D, in addition to the lines of color, such sign may be placed on the front side or face of plate D, and the lines of color may be placed on the back or face thereof and lines of color may be placed in the body of the letters or designs of the sign or advertisement.

To get the effect desired in all and every of the constructions embodying my invention it is simply necessary to so construct and locate the screen (lines B and clear spaces C), and the color scheme (lines E, F, G, E′, F′, G′, and E″, F″, G″) so that from a given point of observation a plurality of colors will appear through a given clear space and to so place the screen and color scheme relative to each other that a change of position of the observer will produce a change of color line visible at a given point on the screen; and I have found more satisfactory results are obtained, that is, the results appear to be more restful and pleasing to the eye, when the opaque lines and clear spaces on the screen plate are straight, either perpendicular or horizontal and the variation required for different designs is obtained by varying the directions, colors and numbers of the lines of color.

In Figs. 22 and 23, a portion of the screens are shown as having center pieces. In Fig. 22 the center piece consists of concentric lines and clear spaces, and in Fig. 23 of radial lines and clear spaces.

In Fig. 24 I show a front elevation of a portion of a screen which is made of sheet metal. Rectangular pieces between the parts B″ and *b″* are punched out of the sheet, thereby obtaining the clear spaces C″, through which the color scheme placed back thereof is viewed. In this construction the lamps which illumine the color lines are placed either back of the color plate or between the color plate and the screen.

In the modification of the screen illustrated in Fig. 25 the broken lines B‴ on one side of the transparent plate A are in front of the broken lines *b‴* on the other side of such plate; so that when a person stands in front of the plate the result is to give an apparent straight, unbroken line, similar to the screens illustrated in Figs. 1 or 11. By making a slight break in the lines *b‴* and omitting the broken lines B‴, substantially the same result can be obtained as if the lines were unbroken, as in Figs. 1 and 11.

I have shown in the drawings and have described a color scheme consisting of three lines of color of various forms and directions, but I do not wish to be understood as confining the color scheme to or requiring as many as three lines of color as a very efficient result is obtained with one or two colors, in the color scheme while a still more complicated appearance is presented to the back ground with three or more lines of color employed in the color scheme.

The back of sheet D is provided with a covering as of white paint, to diffuse the light from the lamps used to illumine the device.

X, Figs. 6 and 7, are electric lamps arranged to illumine the lines of color.

The lines B, B, and the sign or advertisement *a*, *a′*, are made with black paint when desired to be opaque, or they may be made of different colors and one or the other made opaque. As for instance, the line B may be made blue and the advertisement, *a*, *a*, *a′*, black. When so made the blue need not be opaque and in such case the lines of yellow color on plate D will appear yellow through the clear spaces of the screen and green when back of the lines B, B. The lines B, B, may be made any desired color.

I have also constructed devices embodying the invention with the sheets A and D, curved, that is, concave on one side and con-

vex on the other, as shown in Fig. 26, and still others with such sheets made wavy, as shown in Fig. 27. One or both sheets may be thus curved.

For the sheet D I have used oiled and varnished paper.

When the lamps are placed in front (but to one side) of sheet D and back (and to one side) of sheet A such sheet D may be of metal, wood, cloth, card board, or other material, suitably painted, colored or printed on.

In the companion case, filed March 20, 1909, 484832, I show a device wherein advertisements comprising a plurality of designs continuously appear and disappear, there being a background of many colors, one of the parts being movably mounted in relation to the other parts.

Having thus described my invention, the construction of a device embodying the same, and the operation thereof, what I claim as new and desire to secure by Letters Patent is;—

1. The combination with a sheet of transparent material, of a plurality of opaque lines arranged on such sheet to obtain intervening clear spaces, and a surface on which are a plurality of color lines, the color lines and opaque lines being at an angle to each other, and such opaque lines and the lines of color separated by a space not less than the thickness of the transparent sheet; substantially as described.

2. The combination with a sheet of transparent material, of a plurality of opaque lines arranged thereon to obtain intervening clear spaces, and a surface on which are a plurality of color lines all of such color lines arranged so that each thereof is exposed to the view of an observer at a given point through a plurality of the clear spaces, and the plane of such opaque lines at an angle to the plane of the colored lines and such planes separated at their nearest point by not less than the thickness of the transparent sheet; substantially as described.

3. The combination with a sheet of transparent material having plurality of opaque lines arranged thereon to obtain intervening clear spaces, and a surface on which are a plurality of color lines, such color lines being arranged at an angle to the clear spaces so as to be exposed to the view of an observer stationed at a given point through a plurality of the clear spaces, substantially as described.

4. The combination with a sheet of transparent material having plurality of opaque lines arranged thereon to obtain intervening clear spaces, and an additional sheet of material such additional sheet pervious to light and provided with a plurality of color lines, all of such color lines arranged so as to cross the lines of clear spaces and thus be exposed to the view of an observer stationed at a given point through a plurality of the clear spaces, substantially as described.

5. The combination with a sheet of transparent material, of a plurality of opaque lines arranged on such sheet to obtain intervening clear spaces, and an additional sheet of material, such additional sheet pervious to light and provided with a plurality of color lines; all of such color lines arranged so that each thereof is exposed to the view of an observer stationed at a given point through a plurality of the clear spaces, and such sheets fixed in different and other than parallel planes, with means to obtain illumination of the color lines, substantially as described.

6. The combination of a screen provided with lines of clear spaces, and of a sheet provided with a plurality of lines of colors, arranged so that the color lines cross the lines of clear spaces and thus a given line of color is exposed to view through a plurality of the clear spaces of the screen and a plurality of lines of color are exposed to view through a given clear space, and means to illumine the lines of color; substantially as described.

7. The combination of a screen provided with clear spaces, and of a sheet provided with a plurality of colors respectively arranged to form lines, such colors and the screen arranged so that from a given point of observation a given line of color is exposed to view through a plurality of the clear spaces of the screen and a plurality of lines of color are exposed to view through a given clear space, and such screen and sheet fixed in different and other than parallel planes, and means to illumine the lines of color; substantially as described.

8. The combination of a plurality of screens, a sheet provided with lines in a plurality of color lines, such sheet placed back of the screens and the sheet and screens arranged so that a line of given color may be viewed from a given point of observation through a plurality of the clear spaces of the screens, and means to illumine the lines of colors, substantially as described.

9. In a display device, a background bearing a plurality of color lines in regular repeated sequence, a screen having opaque portions and intermediate spaces, the color lines and screen lines being so arranged relatively to each other that, at a given moment to an observer at a given point, each of the color lines is exposed through a plurality of spaces of the screen, and a plurality of the color lines through a given space, substantially as described.

ALEXANDER S. SPIEGEL.

In the presence of—

CHARLES TURNER BROWN,

CORA A. ADAMS.