Jan. 24, 1928. 1,657,415

C. F. SMITH

PRODUCTION OF DESIGNS ESPECIALLY SCENIC EFFECTS AND IN APPARATUS THEREFOR

Filed June 4. 1924 3 Sheets-Sheet 1

Fig. 1.

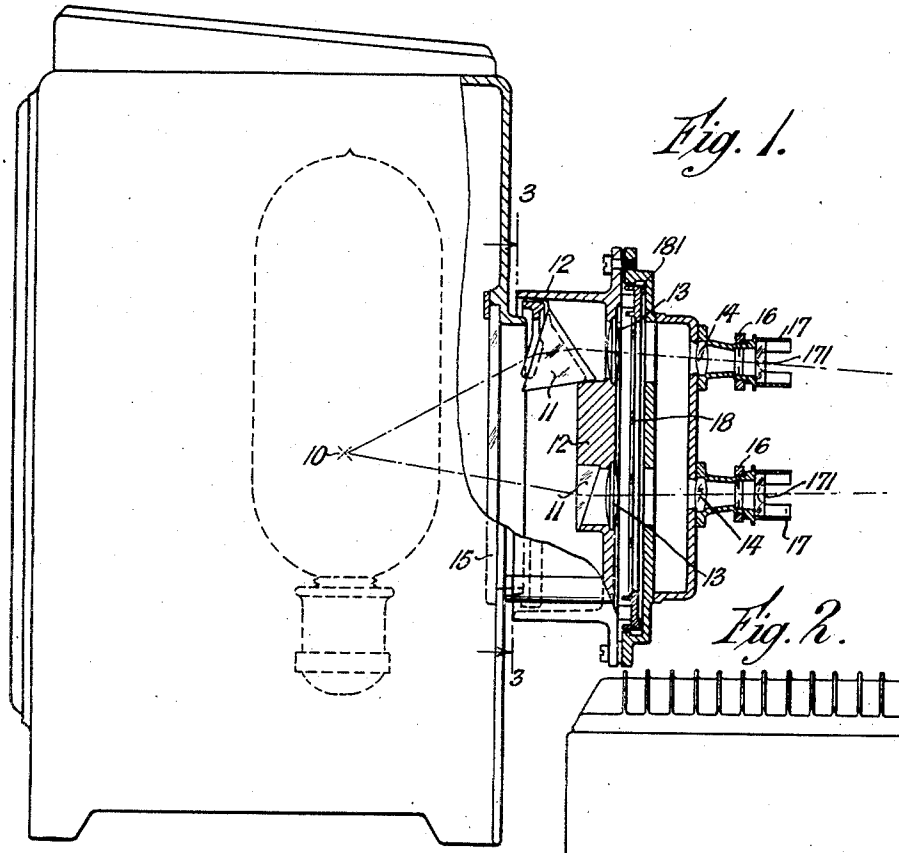


Fig. 2.

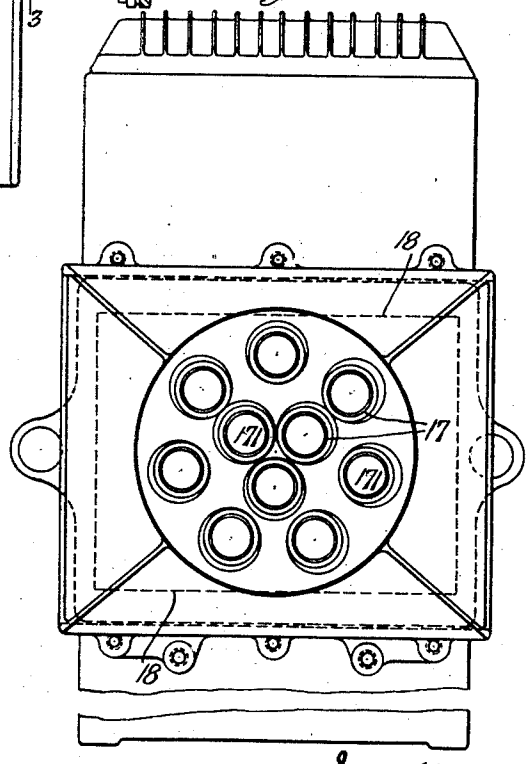
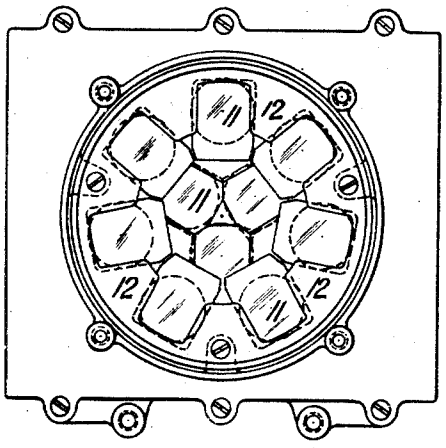


Fig. 3.



Inventor:
Charles Frederick Smith.
By his attorneys,
Baldwin & Wright

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Filed June 4, 1924 3 Sheets-Sheet 2

Fig. 4.

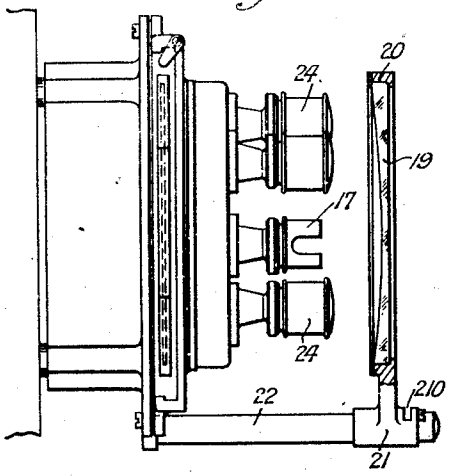
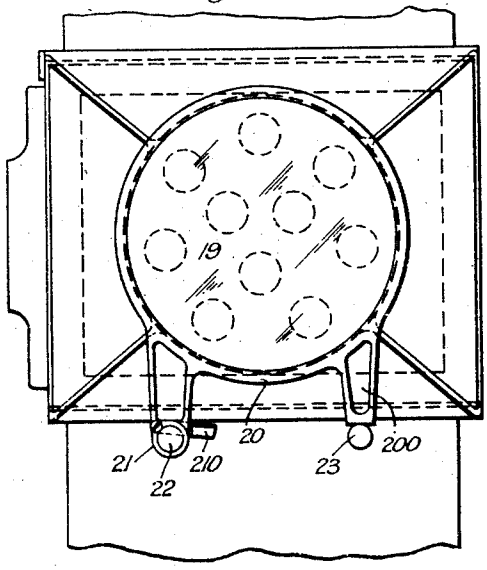


Fig. 5.



Inventor:
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Fig. 6.

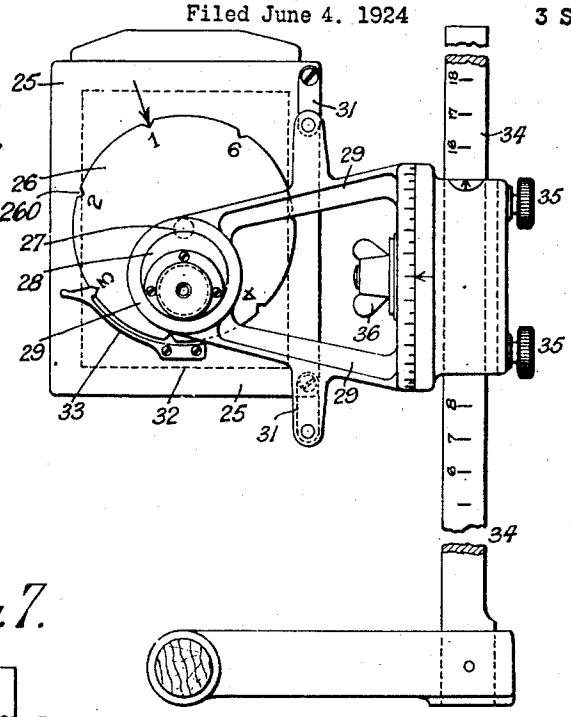


Fig. 7.

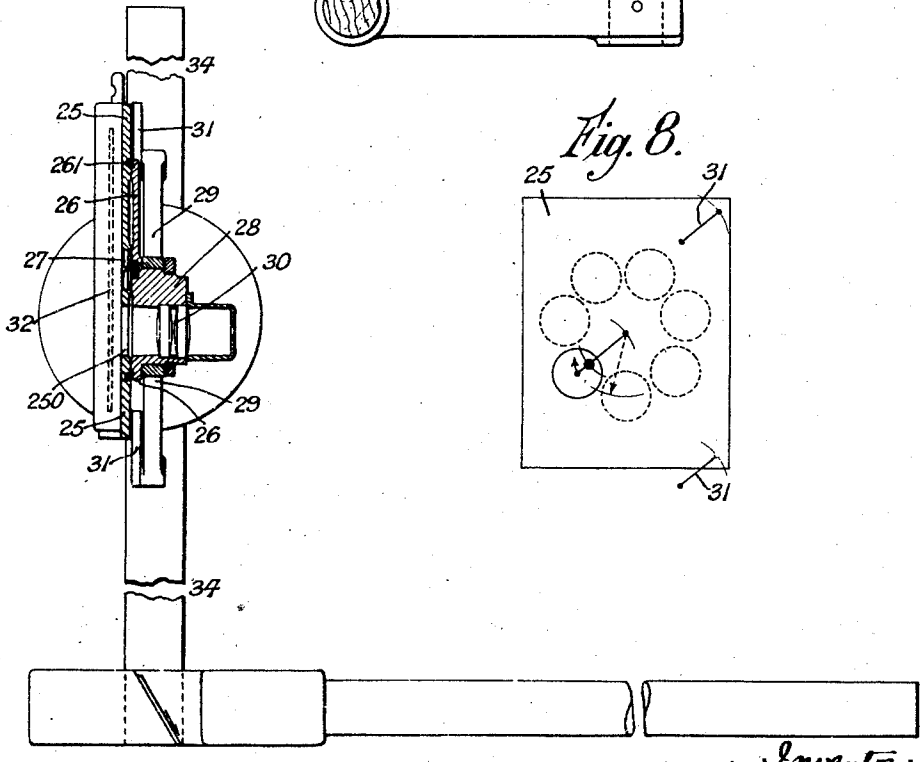


Fig. 8.

Inventor:
Charles Frederick Smith
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Patented Jan. 24, 1928. 1,657,415

UNITED STATES PATENT OFFICE.

CHARLES FREDERICK SMITH, OF LONDON, ENGLAND, ASSIGNOR TO ADAM HILGER, LIMITED, OF LONDON, ENGLAND.

PRODUCTION OF DESIGNS, ESPECIALLY SCENIC EFFECTS AND IN APPARATUS THEREFOR.

Application filed June 4, 1924, Serial No. 717,706, and in Great Britain September 21, 1923.

This invention relates to the determination of the colours or shades to be employed in the production of coloured pictures or designs of posters, cretonnes and the like and also to the production of designs particularly scenic effects and in the determination of the colours or shades to be employed in the scenic effects.

According to this invention a number of photographic negatives is taken of the picture or design preferably on one plate, each negative representing such parts of the picture or design as are to be coloured or shaded the same, the rest of the picture or design being stopped out in each case. Positive transparencies are made preferably on one plate from the negatives and are placed in projecting apparatus by which they are projected on to a screen to produce thereon the picture or design.

Different colour screens and different luminosities are employed with each positive so that by altering the colour screens or varying the luminosity or both different colour or shade effects are produced on the screen. When the most satisfactory colour or shade effect has been found the colour of the screen or the amount of luminosity employed with each positive is noted and this colour and luminosity is employed in the production of the picture or design.

When the invention is applied to the production of scenic effects a scene to a small scale is constructed and a number of photographic negatives are taken on one plate or sheet in a camera of the scene, each negative representing part of the scene, the rest of the scene being stopped out in each case. Positive transparencies of a larger size are made from the negatives, the positives being printed on one plate or sheet. The positives are placed in projecting apparatus of a larger size than the camera employed, and are projected in the theatre itself. The ratio of the size of the negatives to the positives should be equal to the ratio of the focal lengths of the lenses of the camera and the projector.

In projecting the parts of the picture the colour screens used for each part may be varied as desired and the intensity of the light used with each part may be varied so varying the shades whether colour screens, neutral screens or no screens are employed. The photographs projected produce a number of pictures which intermesh and form a complete design, the colours and shades of different parts of which can be varied.

An apparatus suitable for projecting positives consists of say 10 projecting lenses, 7 of which may be arranged in a circle with three arranged round its centre and in rear of each projecting lens is a double convex condensing lens and a prism or mirror or its equivalent for refracting or reflecting the light so that the axis of the cone of light is in the line passing through the centres of each condensing lens and its corresponding projecting lens. In front of each projecting lens is a means for varying the luminosity preferably an iris diaphragm and also supports for colour screens. The positives to be projected are placed near the double convex lenses and preferably between the latter and the projecting lenses. In place of providing a mirror for each lens, one mirror common to all the lenses may be employed.

A double concave or plano concave lens may be arranged in front of the projecting lenses for refracting the light in order to increase the size of the design simultaneously with the distance to which the picture is to be projected.

The same apparatus may be used for taking the negatives in which case the photographic plate is placed in rear of the projecting lenses.

A camera suitable for use in this process consists of a photographic plate holder having a circular opening which is covered by a light-tight disk, the plate holder being rotatably mounted on a pivot on the disk. On the disk is an eccentric boss rotatably mounted in a bracket and containing a positive lens. The plate holder is attached to the bracket by two pivoted links to allow it to move when the disk is turned. The distance between the centre of the disk and the axis of the lens depends on the size of the photographic plates used in the camera and in the projector, that is the magnification. The distance between the centre of the boss and the axis of the lens depends on the relative size of the model scene and the theatre. When the disk is turned the lens will successively take up on the plate a number of positions in a circle so that a number of positive photographs of part of the scene

can be taken upon the plate, and on the disk are a number of notches corresponding to the positions of the lens and a catch is provided which enters the notches and holds the disk stationary while the photograph is being taken.

The bracket may be slidably mounted upon a graduated upright and may also be mounted so that it can be turned to tilt the plate, a scale being provided to indicate the angle through which the bracket has been turned.

The accompanying drawings illustrate a projector which may be employed as a camera and also a camera both of which are suitable for use in carrying out the invention.

Figure 1 is a longitudinal section partly in elevation, Figure 2 is a front elevation and Figure 3 is a view on the line 3, 3, Figure 1, looking in the direction of the arrows, of a projector which may be employed as a camera. Figures 4 and 5 are a side and a front elevation of a modification. Figure 6 is a front elevation of a camera and Figure 7 is a vertical section while Figure 8 is a diagrammatic view of a plate.

Referring to Figures 1, 2 and 3, 10 is a source of light and 11 are prisms, supported in a frame 12, which refract the light so that it passes through condensing lenses 13 and projecting lenses 14, the path of the light being such that the axis of each cone of light passes through the centres of each condensing lens 13 and its corresponding projecting lens 14. Between the source of light and the prisms 11 is a sheet 15 of glass or other heat insulating material. Arranged in front of each projecting lens 14 is an iris diaphragm 16 of usual construction and a holder 17 for retaining a colour screen 171, the amount of luminosity being varied by the iris diaphragms and the colours by the colour screens. A plate 18 on which the positives are taken is retained in rear of the projecting lenses 14 in a holder 181.

In the modification shown in Figures 4 and 5 a plano concave lens 19 is mounted in a frame 20 supported by a socket 21 on a rod 22 secured to the end of the instrument. On the socket 21 is a pivoted catch 210 which when in the position shown in the drawings enters a slot in the rod 22 and so holds the lens 19 in position. A second rod 23 is provided upon which a projection 200 on the frame 20 rests. The light issuing from the projecting lenses is refracted by the lens 19 in order to increase the size of the design simultaneously with the distance to which the picture is to be projected.

In Figure 4 the holders 17 with the exception of one are shown provided with caps 24 which caps are used when the instrument is employed as a camera.

Referring to Figures 6, 7 and 8 which show a camera, 25 is a plate holder having 7 circular openings 250 which is covered by a light-tight disk 26, the plate holder being rotatably mounted on a pivot 27 on the disk 26 and a ring 261 on the disk 26 extends into a groove in the plate holder 25. On the disk 26 is an eccentric boss 28 rotatably mounted in a bracket 29 and in the boss is a positive lens 30. The plate holder 25 is attached to the bracket 29 by two links 31 which allow it to move. When the disk is turned the lens 30 will successively take up a number of positions in a circle on a photographic plate 32 mounted in the plate holder 25. The photographic plate and the positions of the photographs taken by the lens are diagrammatically shown in Figure 8. In the disk 26 is a number of notches 260 corresponding to the positions of the lens 30 and a catch 33 is provided on the plate holder 25 which successively enters the notches and locks the disk and plate holder while a photograph is being taken.

The bracket 29 is slidably mounted upon an upright 34 on which it is retained in any position by screws 35 and the upright is graduated as shown. The bracket is constructed in two parts held together by a thumb screw 36 so that the plate holder may be tilted and a scale is provided to indicate the angle through which the part of the bracket carrying the plate holder is turned.

What I claim is:—

1. The process of producing designs which comprises taking a separate negative of each of all the parts of a basic design, producing positive transparencies from the negatives, projecting beams of light through the several positives so as to reproduce the configuration of the basic design, coloring said beams and varying their individual colors at will until the reproduced design has a desired appearance.

2. The process of producing designs which comprises taking a separate negative of each of all the parts of a basic design, producing positive transparencies from the negatives, projecting beams of light through the several positives so as to reproduce the configuration of the basic design, coloring said beams and varying their indivdual luminosities at will until the reproduced design has a desired appearance.

3. The process of producing designs which comprises taking a separate negative of each of all the parts of a basic design, producing positive transparencies from the negative, projecting beams of light through the several positives so as to reproduce the configuration of the basic design, coloring said beams and varying their individual colors and luminosities at will until the reproduced design has a desired appearance.

4. The process of producing designs which comprises taking a separate negative of each

of all the parts of a basic design, producing positive transparencies of a larger size on one plate from the negatives, projecting beams of light through the several positives so as to reproduce the configuration of the basic design, coloring said beams and varying their individual colors at will until the reproduced design has a desired appearance.

5. The process of producing designs which comprises taking a separate negative of each of all the parts of a basic design, producing positive transparencies of a larger size on one plate from the negatives, projecting beams of light through the several positives so as to reproduce the configuration of the basic design, coloring said beams and varying their individual luminosities at will until the reproduced design has a desired appearance.

6. The process of producing designs which comprises taking a separate negative of each of all the parts of a basic design, producing positive transparencies of a larger size on one plate from the negatives, projecting beams of light through the several positives so as to reproduce the configuration of the basic design, coloring said beams and varying their individual colors and luminosities at will until the reproduced design has a desired appearance.

7. The process of producing designs which comprises taking a separate negative of each of all the parts of a basic design producing from the negatives positive transparencies of such larger size that the ratio of the size of the negatives to the positives is equal to the ratio of the focal length of the lenses used in taking and projecting beams of light through the several positives so as to reproduce the configuration of the basic design, coloring said beams and varying their individual colors at will until the reproduced design has a desired appearance.

8. The process of producing designs which comprises taking a separate negative of each of all the parts of a basic design producing from the negatives positive transparencies of such larger size that the ratio of the size of the negatives to the positives is equal to the ratio of the focal length of the lenses used in taking and projecting beams of light through the several positives so as to reproduce the configuration of the basic design, coloring said beams and varying their individual luminosities at will until the reproduced design has a desired appearance.

9. The process of producing designs which comprises taking a separate negative of each of all the parts of a basic design producing from the negatives positive transparencies of such larger size that the ratio of the size of the negatives to the positives is equal to the ratio of the focal length of the lenses used in taking and projecting beams of light through the several positives so as to reproduce the configuration of the basic design, coloring said beams and varying their individual colors and luminosities at will until the reproduced design has a desired appearance.

10. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition, the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, means between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, and stationary means for supporting the transparencies.

11. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, a prism between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, and stationary means for supporting the transparencies.

12. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, means between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, and color screens arranged to coact with each projecting lens.

13. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing

lenses, the projecting lenses and condensing lenses, being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, a prism between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, a stationary means for supporting the transparencies, and color screens arranged to coact with each projecting lens.

14. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, means between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, and means for regulating the amount of light passing from each projecting lens.

15. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, a prism between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, and means for regulating the amount of light passing from each projecting lens.

16. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, means between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, color screens arranged to coact with each projecting lens, and means for regulating the amount of light passing from each projecting lens.

17. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, a prism between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, color screens arranged to coact with each projecting lens, and means for regulating the amount of light passing from each projecting lens.

18. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, means between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, and an iris diaphragm for regulating the amount of light passing from each projecting lens.

19. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, a prism between the light source and each condensing lens which causes each cone of light to

travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, and an iris diaphragm for regulating the amount of light passing from each projecting lens.

20. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, means between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, and means arranged in front of the projecting lenses for refracting the light.

21. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, a prism between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, and means arranged in front of the projecting lenses for refracting the light.

22. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, means between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, color screens arranged to coact with each projecting lens, and means arranged in front of the projecting lenses for refracting the light.

23. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, a prism between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, color screens arranged to coact with each projecting lens, and means arranged in front of the projecting lenses for refracting the light.

24. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, means between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, means for regulating the amount of light passing from each projecting lens, and means arranged in front of the projecting lenses for refracting the light.

25. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arraged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, a prism between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, means for regulating the amount of light passing from each project-

ing lens, and means arranged in front of the projecting lenses for refracting the light.

26. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, means between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, color screens arranged to coact with each projecting lens, means for regulating the amount of light passing from each projecting lens, and means arranged in front of the projecting lenses for refracting the light.

27. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, a prism between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, color screens arranged to coact with each projecting lens, means for regulating the amount of light passing from each projecting lens, and means arranged in front of the projecting lenses for refracting the light.

28. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, means between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, an iris diaphragm for regulating the amount of light passing from each projecting lens, and means arranged in front of the projecting lenses for refracting the light.

29. Apparatus for projecting transparencies, each carrying a constituent part of a design, to form by juxtaposition the complete design, comprising a plurality of projecting lenses, a plurality of condensing lenses, the projecting lenses and condensing lenses being arranged in pairs so that the lines, one of which passes through the center of each condensing lens and its corresponding projecting lens, meet the screen at the desired points, a light source, a prism between the light source and each condensing lens which causes each cone of light to travel along a path so that the axis of the cone is in the line passing through the centers of the condensing lens and its corresponding projecting lens, stationary means for supporting the transparencies, an iris diaphragm for regulating the amount of light passing from each projecting lens, and means arranged in front of the projecting lenses for refracting the light.

In testimony that I claim the foregoing as my invention I have signed my name this 26th day of May, 1924.

CHARLES FREDERICK SMITH.