June 24, 1930. K. BRENKERT ET AL 1,766,102

PROJECTION APPARATUS

Filed April 25, 1927

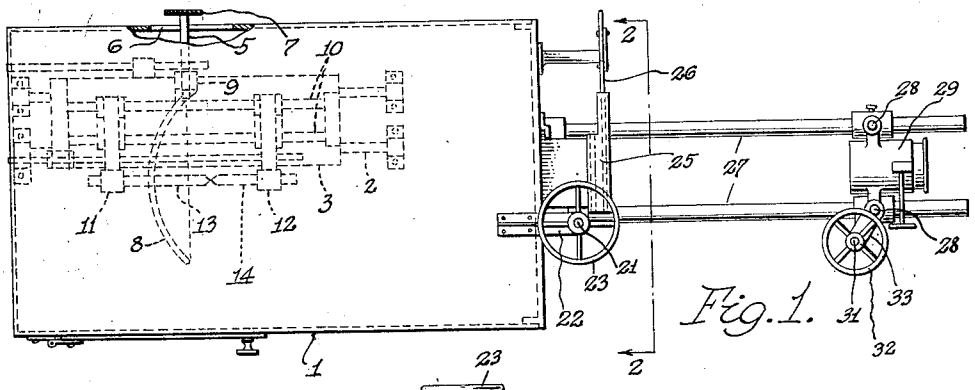


Fig. 1.

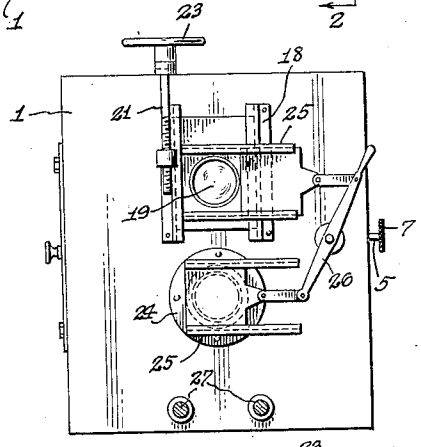


Fig. 2.

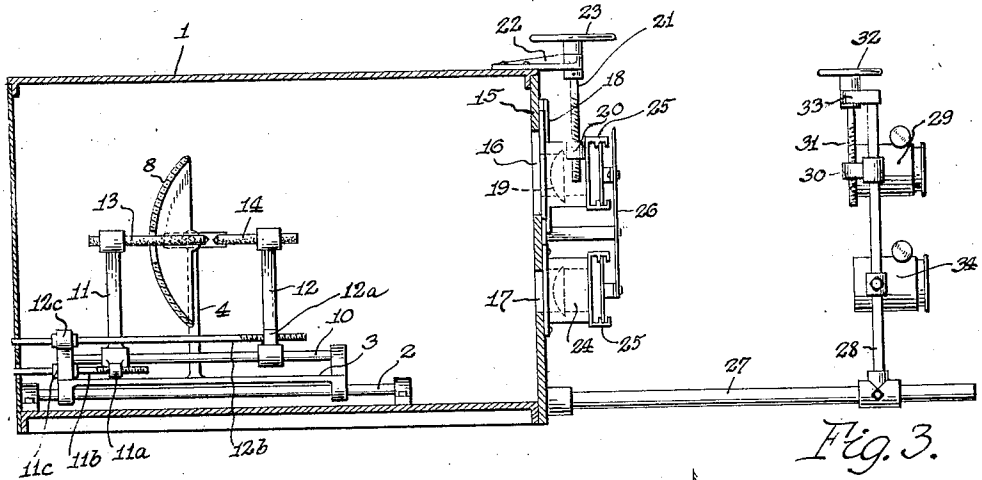


Fig. 3.

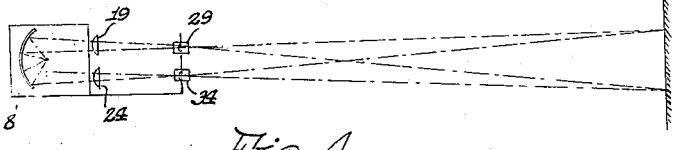


Fig. 4.

Inventor

Karl Brenkert,

Joseph W. Brenkert,

By Darby & Darby

Attorneys

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UNITED STATES PATENT OFFICE

KARL BRENKERT AND JOSEPH W. BRENKERT, OF DETROIT, MICHIGAN

PROJECTION APPARATUS

Application filed April 25, 1927. Serial No. 186,206.

The present invention pertains to a novel projection apparatus designed particularly for stereopticon purposes.

The principal object of the invention is to provide a two-unit device of this character using only one light source as compared with two light sources employed in such devices of present construction. It has been found that a single light source installed according to this invention effects a saving of approximately fifty per cent in electrical energy.

The provision of a single light source for a two-unit projector operating alternately through its two lens assemblies raises the problem of arranging these sets of lenses in such a manner that both will project upon a single given area of the screen. At the same time the device of the invention is adapted to project on two different areas, one above the other.

The latter case is the simpler, and merely requires a beam of parallel rays issuing from the light source and divided by the two lens assemblies. To project both lens assemblies upon a given area of the screen, various modifications and adjustments are necessary. The problem involved is met by mounting the light source movably along the axis of a parabolic reflector so that converging as well as parallel rays may be obtained. The converging beam may be divided equally between the two lens assemblies, and the divisions projected upon a given area of the screen, by peculiar adjustments of the reflector and at least one set of lenses.

The invention is fully disclosed by way of example in the following description and in the accompanying drawing, in which

Figure 1 is a plan view of the apparatus;

Fig. 2 is a vertical section thereof on the line 2—2 of Figure 1;

Fig. 3 is a longitudinal vertical section; and

Fig. 4 is a diagrammatic elevation showing the projection upon the screen.

Reference to these views will now be made by use of like characters which are employed to designate corresponding parts throughout.

The apparatus is built on a housing 1 having a track 2 on its base. A carriage 3 slides on the base and is provided with a vertical arm 4 in which is rotatably mounted a horizontal stem 5. This stem passes through a horizontal slot 6 cut in one of the walls of the housing 1, as shown in Figure 1, and is provided with a turning head 7. A reflector 8 is supported on the stem 5 by a boss 9 formed on the reflector and having the stem anchored therein. The carriage 3 further includes a rail 10 having slidably mounted thereon arms 11 and 12 disposed at opposite sides of the reflector. These arms support carbon rods 13 and 14 positioned to form a light crater on the concave side of the reflector. The arms are formed with internally threaded ears 11^a and 12^a receiving screws 11^b and 12^b which are journaled in suitable bearings 11^c and 12^c provided on the carriage.

The reflector 8 is of a type adapted to produce parallel or converging rays, depending on the position of the light crater with reference to the focal point. A parabolic reflector is suitable for this purpose, for such a member provides parallel beams when the light crater is at the focal point and converging beams when the crater is disposed forwardly of the focal point. The relation between the light crater and the focal point of the reflector may be varied by adjusting the screws 11^b and 12^b. The reflector is also tiltable on the bearing supporting the stem 5, and the object of this adjustment will presently be described. It is also to be noted that when the stem 5 is slid in the slot 6, the relation between the carbon rods 13 and 14 is not changed because their supports move with the carriage 3. The relation of the rods is changed by operation of the screws 11^b and 12^b.

The front wall 15 of the housing 1 has apertures 16 and 17 one over the other. At the aperture 16 is mounted a guide 18 having a vertical path, and a condensing lens 19 is mounted in the guide. The lens structure has a lateral ear 20 in which is

threaded a vertical screw 21 journaled in a bracket 22 fixed to the housing 1. The screw is operated by a hand wheel 23. It will be seen in Figure 3 that the aperture 16 is of sufficient height to permit adjustment of the lens structure 19.

At the lower aperture 17 is mounted a condensing lens structure 24 which need not be adjustable. The lens structures are equipped with double holders 25 accommodating in one element thereof dissolving shutters indicated generally by the numeral 26 and adapted to receive slides in the remaining sections.

A horizontal guide rod 27 extends forwardly from the casing 1 and supports a standard 28. On the standard is slidably mounted a focusing lens structure 29 adapted for alignment with the structure 19. The member 29 has a lateral ear 30 into which is threaded a screw 31 having a hand wheel 32 and journaled in a bearing 33 at the upper end of the member 28. This member also carries a lower focusing lens structure 34 in line with the member 24. The member 34 need not be adjustable if the member 24 is fixed. The supporting standard 28 may be adjustable on the rod 27 if desired, and the latter member may be substituted by any other suitable supporting device that may be especially adapted for special conditions.

Figure 3 illustrates the light source and reflector arranged for projecting parallel rays, in which case the light crater is at the focal point of the reflector. The beam is divided by the condensing lenses 19 and 24 and projected through the lenses 29 and 34 towards two areas, one over the other, on the screen.

In most cases however it is desired that the projections be made alternately from the two units upon one area of the screen. The alternation is effected by the dissolving shutters in a manner already well known in the art. For this mode of operation the rays must be converged, and this is accomplished by moving the light crater forwardly of the focal point of the reflector in the manner already described. The rays will then converge on a line passed horizontally between the lenses and will for the most part evade the lenses. A sufficient section of the beam is directed through the lower set of lenses by merely tilting the reflector forwardly, as in Figure 4, by turning the stem 5, and the upper set of lenses receives less light than formerly. These lenses are however adjustable vertically so that they may be brought into the path of the upper half of the beam.

It is also to be noted that this device differs from the movable head type by having only one light source supplying both units. It has been found that a single light source arranged in this manner enables a saving of approximately fifty percent of the electrical energy consumed in a two-unit machine.

The disclosed means of deflecting one of the beam divisions so that its projection registers with that of the other division is merely illustrative. Any suitable device for accomplishing this function may be employed, such as a wedge prism for example or an initial reflector having a section hinged to permit changing the direction of a section of the beam as desired. Actually, no auxiliary deflecting device may be necessary, for the theoretical angle of tilt is so slight that a proper adjustment for superposition of the projections might be obtainable by regulation of the condensing and focusing lenses alone. Also, it is to be pointed out that the lower beam division instead of the upper one might require a change in direction.

Although a specific embodiment of the invention has been illustrated and described, it will be understood that various alterations in the details of construction may be made without departing from the scope of the invention as indicated by the appended claims.

What we claim is:—

1. A projector comprising a light source, a tiltably mounted concave reflector adapted to produce a converging beam, means for tilting said reflector, a pair of lenses positioned to divide the beam, one of said lenses being adjustably mounted, and means for adjusting said lens to follow its division of the beam on tilting of said reflector.

2. A projector comprising a light source, a tiltably mounted concave reflector adapted to produce a converging beam, means for tilting said reflector, a pair of condensing lenses positioned to divide the beam, focusing lenses in advance of said condensing lenses, one of said condensing and focusing lenses being adjustably mounted, and means for adjusting said lens to follow the corresponding division of the beam on tilting of said reflector.

3. A projector comprising a light source, a tiltably mounted concave reflector adapted to produce a converging beam, means for tilting said reflector, a pair of lenses one above the other and positioned to divide the beam, the upper lens being adjustably mounted, and means for adjusting said lens to follow its division of the beam on tliting of said reflector.

4. A projector comprising a light source, a tiltably mounted concave reflector adapted to produce a converging beam, means for tilting said reflector, a pair of lenses positioned to divide the beam, one of said lenses being adjustably mounted, means for adjusting said lens to follow its division of

the beam on tilting of said reflector, and dissolving shutters at said lenses.

5. A projector comprising a light source, a tiltably mounted concave reflector adapted to produce a converging beam, means for tilting said reflector, a pair of condensing lenses positioned to divide the beam, focusing lenses in advance of said condensing lenses, one of said condensing and focusing lenses being adjustably mounted, means for adjusting said lens to follow the corresponding division of the beam on tilting of said reflector, and dissolving shutters at said condensing lenses.

In testimony whereof we affix our signatures.

KARL BRENKERT.
JOSEPH W. BRENKERT.