Jan. 4, 1966 M. C. KUCZEWSKI DE PORAY 3,226,866

APPARATUS FOR OBSERVING IMAGES

Filed Jan. 23, 1962 2 Sheets-Sheet 1

Fig. 1

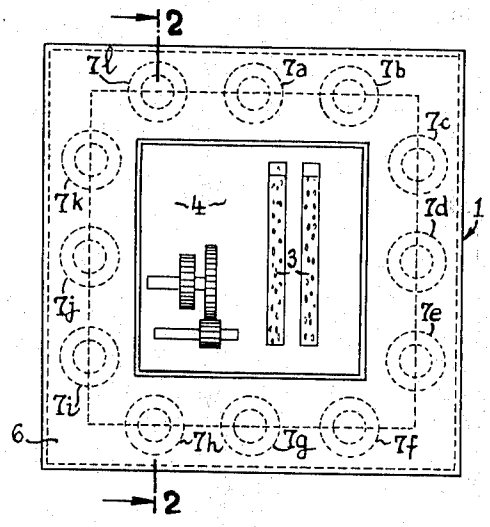
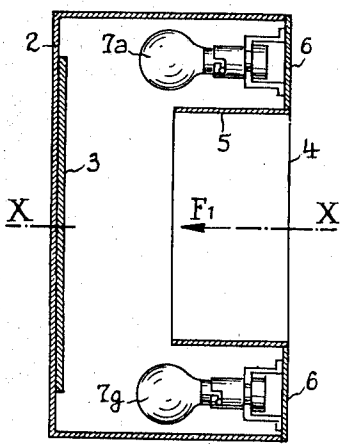


Fig. 2



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APPARATUS FOR OBSERVING IMAGES
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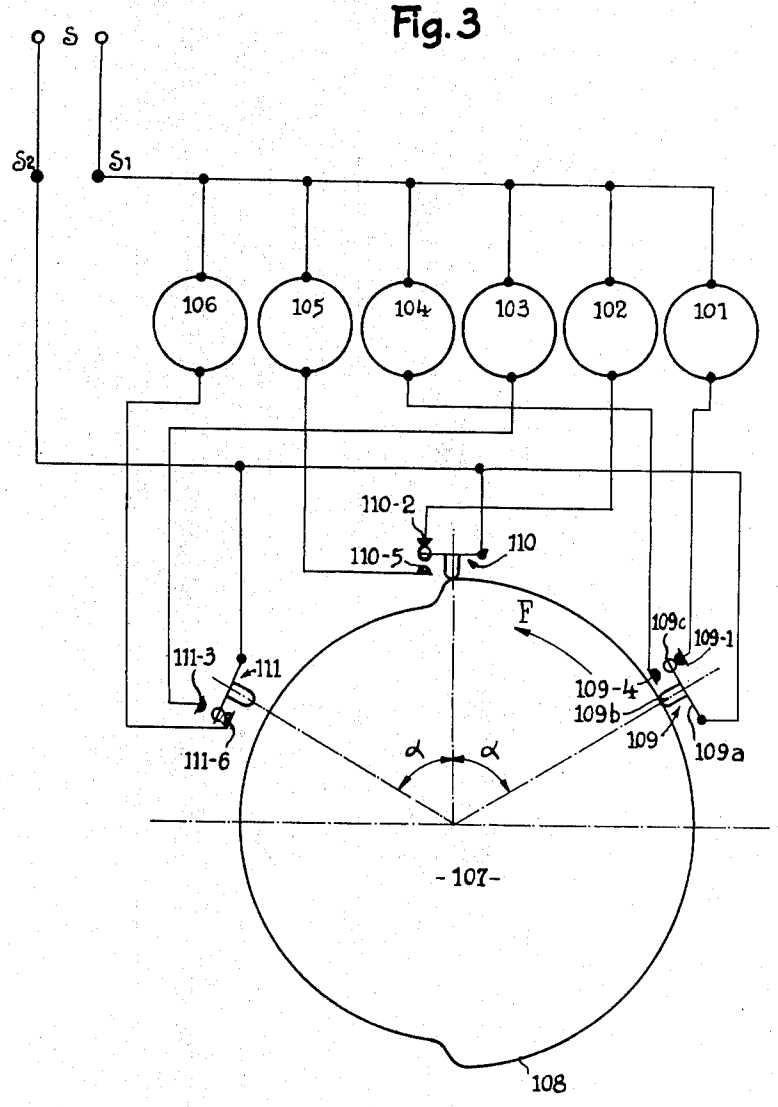
Fig. 3



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1

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APPARATUS FOR OBSERVING IMAGES

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7 Claims. (Cl. 40—152.2)

The present invention relates to constant intensity illumination apparatus which simulates a moving light source and which may be used for observing images or pictures of the type having series of projections and recesses orientated in different directions and disclosed, for example, in the U.S. Patent No. 2,560,392 of July 10, 1951.

More particularly, the invention relates to apparatus for observing these pictures which permit obtaining special effects and in particular the illusion of various movements by means of a fixed picture lit up by light rays projected on this picture from successively different points in space.

In such apparatus the variation in the angle of incidence of the light rays can also be obtained by disposing lamps in fixed positions around the picture and in lighting them in succession by means of a rotary switching device or commutator.

This apparatus, however, has serious disadvantages.

Indeed, in order to reproduce a movement of continuous rotation it is necessary to use a rather larger number of lamps, for example twenty-four lamps. Further, it is generally necessary to obtain an apparent rotational speed of the light zones which involves a rapid switching of the lamps. Now, the thermal inertia of incandescent lamps is such that it is practically impossible when one lamp is energized at the same time as the preceding lamp is deenergized, to obtain incandescence quick enough to achieve, in practice, a constant level of illumination of the picture. In practice, there is obtained a succession of extinctions and illuminations, that is, an undesirable flickering which is highly undesirable.

The object of the present invention is to provide an apparatus which avoids this disadvantage.

In accordance with the invention, the lamps are arranged in at least one series which comprises a suitable number of lamps. Within a particular series, the illumination progresses in a predetermined direction of travel from one end lamp of the series to the other end lamp. Three adjacent lamps, the end lamps being considered adjacent to each other, are always energized simultaneously and each successive lamp remains energized for a predetermined time interval which determines the speed of travel of the illumination along the series. An overlap is provided so that at one third and at two thirds of the way through the full time interval of energization of a particular lamp, the trailing one of the three adjacent lamps is deenergized and the leading adjacent lamp is energized by substantially instantaneous switching. As the light from the trailing lamp dies out, the light from the leading lamp builds up so that a constant level of illumination is continuously maintained. In this manner, undesirable flickering effects are avoided.

Further features and advantages of the invention will be apparent from the ensuing description, with reference to the accompanying drawing to which the invention is in no way limited.

2

In the drawing:

FIG. 1 is a front elevational view of the apparatus according to the invention;

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1, and

FIG. 3 is a diagrammatic view of an example of the switching system of the apparatus.

The apparatus according to the invention comprises (FIGS. 1 and 2) a rectangular case **1** whose rear face is closed by a vertical wall **2** which supports a picture **3** held on this wall by any suitable means. The forward face of the case has a window **4** which is extended inwardly of the case by a passageway or light shield **5** through which the picture **3** can be observed in the direction of arrow F1. The forward wall **6** surrounding the window **4** acts as a support for electric lamps secured to the rear face of this wall within the case; FIG. 1 shows twelve lamps carrying the reference numerals *7a–7l*. These lamps can be of the incandescent type or of the fluorescent type; they are shielded or masked off from the view of the observer by the shield **5** but illuminate the picture at angles of incidence determined by the position of each lamp with respect to the picture **3**.

The rear wall **2** or the forward wall **6** can be detachable or otherwise arranged so as to permit access to the inner face of the wall **2** for conveniently placing the picture in position or replacing it by another picture.

Current is supplied to the lamps by an electric source—the alternating current mains supply for example—through the medium of a commutator or rotary switching device which is arranged in such a manner that the illumination or lighting of the picture obtained is similar to that which would be obtained from rotation of the group of four diametricaally opposed lamps *7a*, *7d*, *7g*, *7j*, if these four lamps were fixed to a common support mounted for rotation about the horizontal central axis of the apparatus.

This switching device can be located in any position in the apparatus or even outside the apparatus, and is connected to the lamps merely by electric connections. For this reason it has not been shown in FIGS. 1 and 2.

The switching circuit shown in FIG. 3 is arranged to control a total of twenty-four lamps instead of the twelve lamps *7a* through *7l* shown in FIG. 1. By placing six lamps in each of the vertical and horizontal rows of FIG. 1 instead of the three lamps shown, the switching circuit of FIG. 3 may be utilized without modification. Each of the series of circles **101** through **106** represents a group of four lamps connected in parallel, the four lamps being thus shown for simplicity of illustration. When placed in the arrangement of FIG. 1, each of the end lamps of the parallel connected group **101** will be adjacent to an end lamp of group **106** of an adjacent horizontal or vertical series, as the case may be. In this manner, the illumination will travel from one vertical or horizontal series to the next series in an uninterrupted manner.

Each of the groups of lamps **101–106** is connected by the upper one of its terminals to one of the terminals S1 of the supply source S (for example the electric mains supply); the other terminal is connected to the apparatus in the manner described hereinafter.

The apparatus comprises a rotary cam **107** comprising a projection or cam rise **108** having an angular extent of 180° round the periphery of the cam. Arranged around this cam are single-pole double-throw snap-action or

microswitches having a quick circuit transfer action, namely microswitches **109**, **110** and **111**. The switch **109** comprises a resiliently biased movable switch arm **109***a* carrying a cam follower push-button **109***b*, and a moving contact **109***c* being capable of bearing selectively against an outer fixed contact **109–1** or against an inner fixed contact **109–4**, depending on whether the cam follower button **109***b* is actuated or not.

The microswitches **110** and **111** comprise similar elements carrying similar reference characters and in particular outer fixed contacts **110–2**, **111–3** and inner fixed contacts **110–5**, **111–6**.

The free terminals (which are not connected to the terminals S_1 of the source of the supply) of the groups of lamps **101** and **104** are respectively connected to the fixed contacts **109–1** and **109–4**; similarly, the free terminals of the groups of lamps **102** and **105** are respectively connected to the fixed contacts **110–2** and **110–5** and the free terminals of the groups of lamps **103** and **106** are respectively connected to the fixed contacts **111–3** and **111–6**.

The terminal S_2 of the source of supply is connected to a conductor **112** which is connected to the three moving switch arms **109***a*, **110***a*, and **111***a*.

The three reversing microswitches are spaced angularly apart about the axis of the cam at angles *a* equal to 60°.

The apparatus operates in the following manner:

Let it be assumed that the cam rotates in the direction of arrow F.

In the position shown in the drawing, the microswitches **109** and **110** are actuated, that is, the outer contacts of these microswitches are closed and the groups **101** and **102** are supplied with current. The microswitch **111** is unactuated and its inner contact is closed and the group **106** is energized.

If, in starting from this position, the cam effects successively five partial rotations of 60°, it is clear that owing to the action of the projection or cam rise on the cam follower push-buttons of the switches the groups of lamps will be lit up in succession in the following sequence of combinations:

Successive angular displacements of 60°:	Lamp groups energized
0	106–101–102
1	101–102–103
2	102–103–104
3	103–104–105
4	104–105–106
5	105–106–101

After a further angular displacement of 60° the lamps lit up will be in groups **106**, **101** and **102**, or in other words, the initial position shown in FIG. 3 is resumed.

It can be seen that in any case each sector always comprises three energized lamps; at the moment of extinguishing the trailing one of these lamps a leading adjacent lamp is energized, these two operations occurring almost simultaneously. The switching operation involves only one third of the total current drawn by the lamps and is effected rapidly. The fluctuation of the illumination level is therefore very slight and practically imperceptible.

The sequential switching of the lamps produces an effect similar to that produced by mechanical rotation of a group of three adjacent continuously energized lamps.

Although specific embodiments of the invention have been described, many modifications and changes may be made therein without departing from the scope of the invention as defined in the appended claims.

In respect of certain images or pictures in which the representation of the movements permits a certain discontinuity, the rotary switch device can be replaced by a switch device which is displaced along a straight line in one direction or in both directions, depending on the nature of the movements to be represented.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. A device for producing illumination of an object, the direction of incidence of said illumination upon said object being constantly changing to simulate illumination by a light source traveling in a generally circular path, said device comprising: a plurality of series of regularly arranged light sources generally peripherally surrounding said object, energization of an end source of a particular series simultaneously with an adjacent end source of an adjacent series being quantitatively equivalent to the energization of two adjacent sources within one of said series; a common energizing circuit for all of said sources; and cyclically operative switching means, said switching means comprising circuit control means simultaneously and sequentially energizing successive corresponding single lamps in each series simultaneously with an adjacent lamp, said switching means susbtantially instantaneously transferring energization from an adjacent lamp behind said single lamp to a lamp ahead of said single lamp while maintaining said single lamp energized, one of said adjacent lamps when said single lamp is an end lamp, being a lamp in an adjacent series.

2. A device according to claim 1, wherein said switching means simultaneously energizes three adjacent lamps.

3. A system for producing illumination of an object which illumination simulates illumination by a light source traveling in a closed path extending generally around said object, said system comprising: at least one series of uniformly spaced lamps arranged around said object; an energizing circuit for said lamps; cyclically operative switching means comprising separate contact means controlling each lamp, and actuating means included in said switching means causing said contact means to energize each lamp of said series to be energized for a predetermined constant time interval by connection thereof to said energizing circuit, said actuating means producing the simultaneous energization of a plurality of adjacent lamps within said series, the two end lamps being controlled as adjacent lamps, said contact means including transfer contact means operative to deenergize the trailing lamp of said simultaneously energized lamps effectively simultaneously with the energization of an adjacent leading lamp while maintaining a particular lamp adjacent to one of said last named lamps energized, said transfer contact means being operative at a predetermined fractional portion of said time interval of energization of said particular lamp.

4. A system according to claim 3, wherein the number of simultaneously energized lamps is three and in which said particular lamp is adjacent to said trailing lamp, said fractional portion being two thirds.

5. A system according to claim 3, wherein said transfer contact means is formed by a plurality of snap-action switches, said switching means comprising continuously operative cam means sequentially actuating said transfer contact means.

6. A system for producing illumination of an object the direction of incidence of said illumination upon said object being constantly changing to simulate illumination by a light source traveling in a generally circular path, said system comprising: continuously operative cam means; a plurality of regularly angularly spaced snap-action transfer contact means sequentially actuated by said cam means, each contact means comprising two spaced stationary contacts and a movable contact selectively engageable separately with either one of said stationary contacts; a plurality of lamps, one terminal of each lamp being connected to one of said stationary contacts; and an energizing circuit comprising a conductor connected to the other terminal of each lamp and a further conductor connected to all of said movable contacts,

said lamps being arranged around said object in at least one regularly spaced series, said contact means being operative to energize each lamp within a particular series consecutively for a predetermined uniform time interval and to produce the simultaneous illumination of a plurality of adjacent lamps within said series, each transfer contact means, when actuated, causing the deenergization of a lamp in trailing position with respect to said particular lamp substantially simultaneously with the energization of another lamp in leading position with respect thereto.

7. A system according to claim 6, further comprising an enclosure having spaced front and rear walls, said front wall having a window formed therein, said object being mounted on said rear wall; and light shield means extending around said window interiorly of said enclosure, said lamps being mounted on said front wall and surrounding said light shield means interiorly of said enclosure.

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