Oct. 18, 1960 K. F. SMITH ET AL 2,956,359

ANIMATED DISPLAY

Filed April 16, 1958 3 Sheets-Sheet 1

FIG. 3.

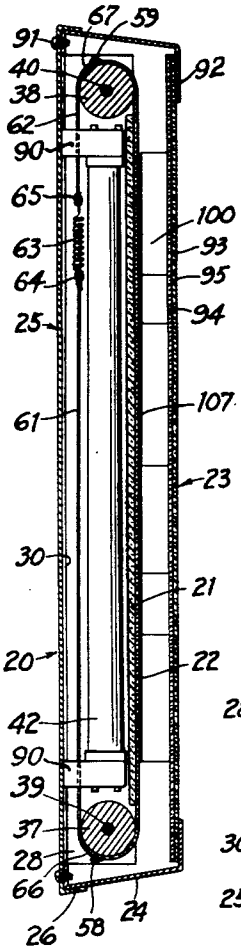


FIG. 1.

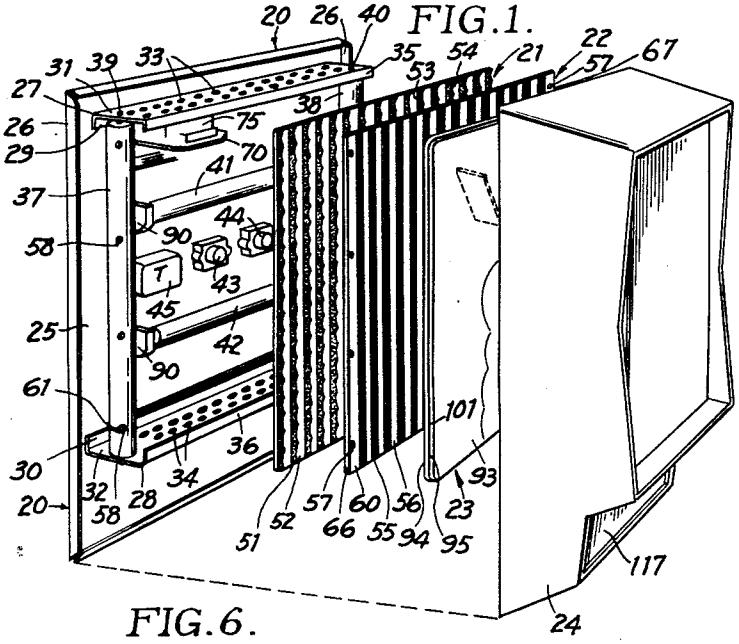


FIG. 6.

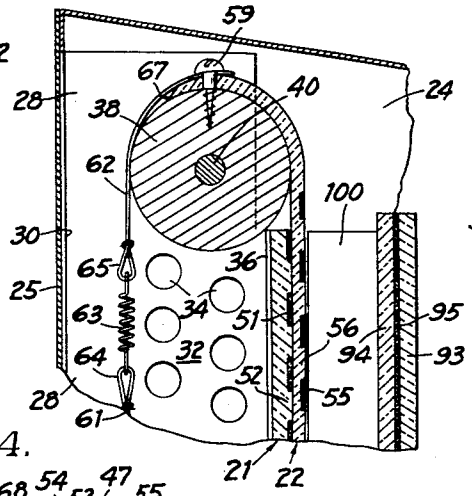


FIG. 5.

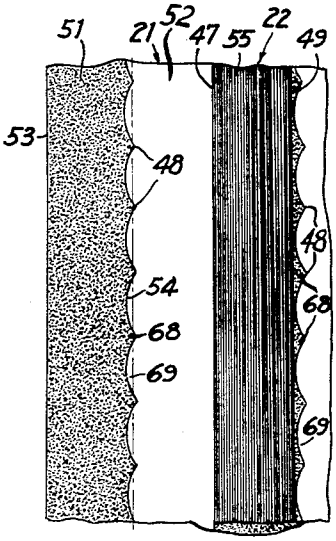
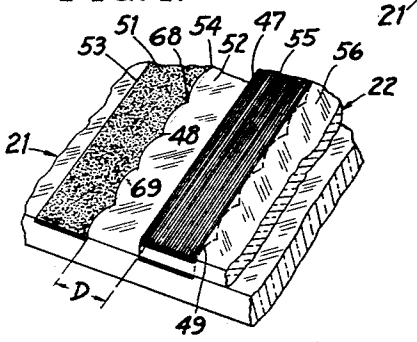


FIG. 4.



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ANIMATED DISPLAY

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FIG. 2.

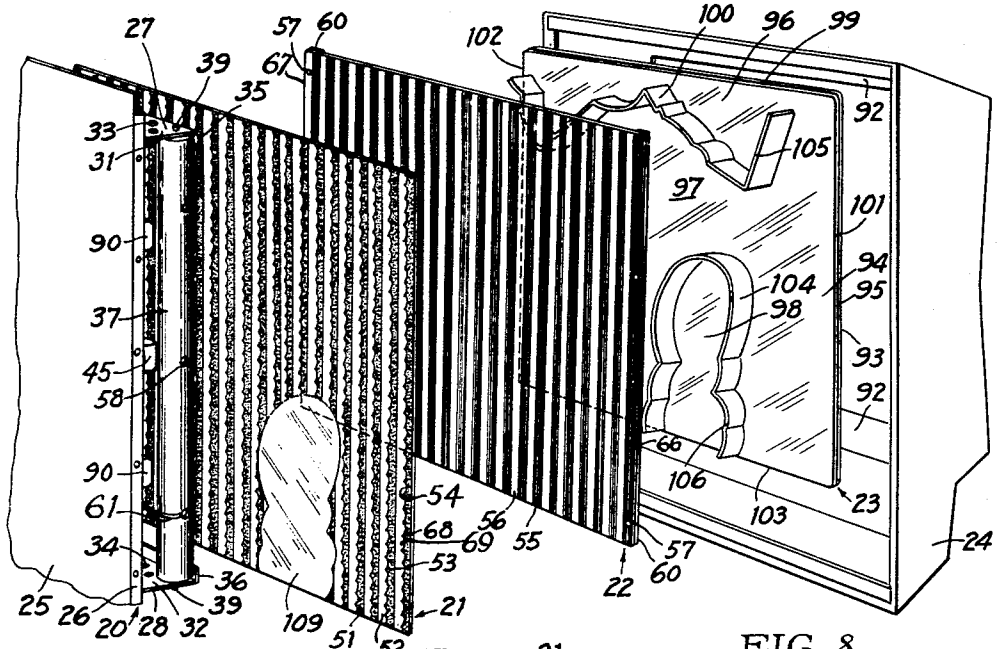


FIG. 7.

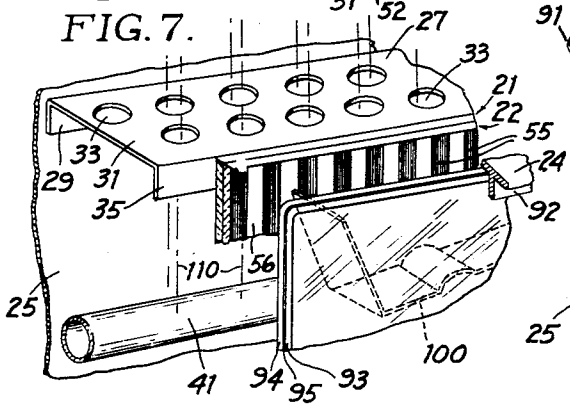
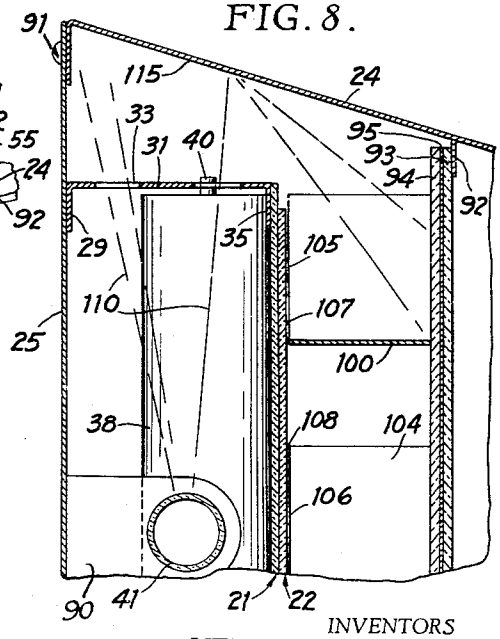


FIG. 8.



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ANIMATED DISPLAY

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FIG. 9.

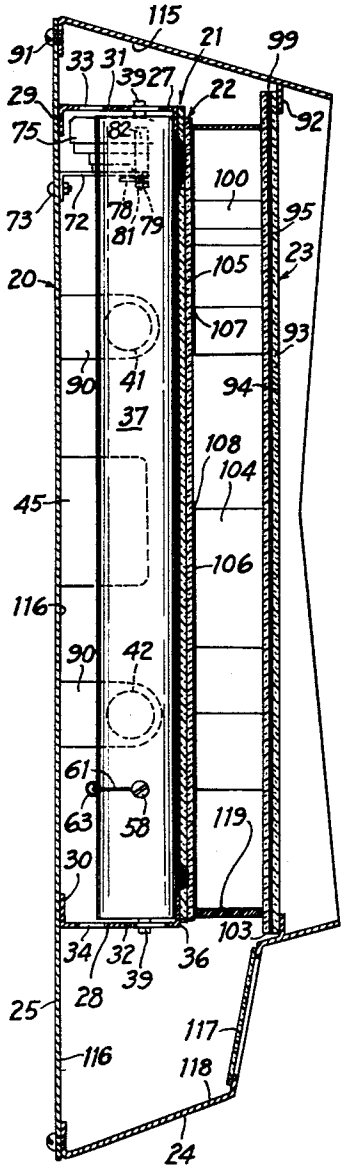


FIG.10.

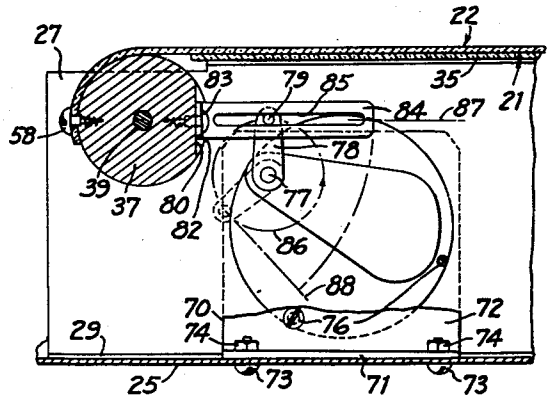


FIG.11.

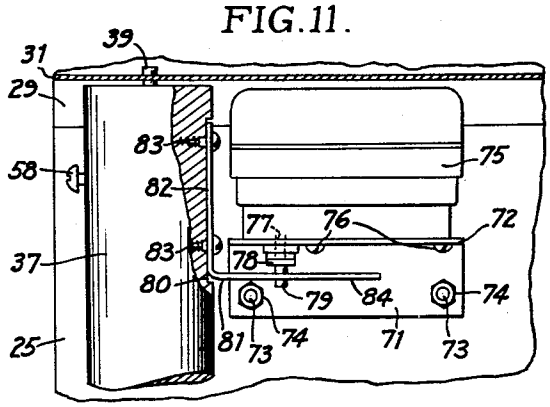
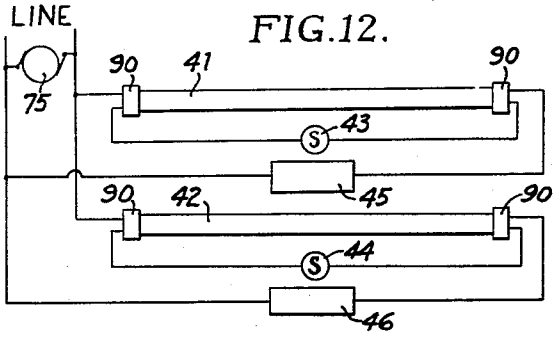


FIG.12.



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United States Patent Office

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ANIMATED DISPLAY

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Filed Apr. 16, 1958, Ser. No. 728,928

17 Claims. (Cl. 40—132)

This invention relates to animated illuminated display means, and to illuminated display means for variably illuminating a transparent or translucent display such as a sign.

An object of this invention is to provide a device having means for variably illuminating a transparent or translucent display, such as a photographic color transparency, indicia bearing sign, or the like.

A further object of this invention is to provide a device of the above character in which a portion of the display is illuminated by light of controlled varying intensity, while another portion thereof is illuminated at constant intensity.

A further object of this invention is to provide a device of the above character in which light for illuminating the display is produced by a source of constant intensity.

A further object of this invention is to provide a device of the above character in which the light source is a discharge tube, such as a neon tube, a hot or a cold cathode fluorescent lamp, or the like, which is not adapted for producing light of controlled variation in intensity.

Another object of this invention is to provide a device of the above character in which variation of the intensity of illumination of a portion of the display is effected without altering the color balance of the light striking the display.

A further object of this invention is to provide a device of the above character in which the display is illuminated by a discharge tube type light source housed in the display device and which, because it produces less heat per unit of light output, involves a reduced fire risk while requiring less ventilation for cooling.

Another object of this invention is to provide a device of the above character comprising a source of light, a display spaced therefrom, a stationary member and a co-operating reciprocable member disposed between the source of light and the display, the stationary and reciprocable members each having similar, non-opaque and opaque areas of such shape and arrangement that like areas of the reciprocable member and stationary member are in superposed registry in one limit position of movement of the reciprocable member and unlike areas are in superposed registry in the other limit position of the reciprocable member, the size and arrangement of the opaque and non-opaque areas being related to the magnitude of reciprocative movement of the reciprocable member and respective portions of the display, and means supporting and encasingly concealing said structure except the display portion thereof.

A further object of this invention is to provide a device of the above character comprising a source of light, a display spaced therefore, a stationary banded member, and a co-operating, reciprocable banded member disposed between the source of light and the display, the stationary and reciprocable banded members each having alternate, transparent and opaque bands extending transversely of the direction of movement of the reciprocable

member and of a width related to the magnitude of its reciprocative movement, and means supporting and encasingly concealing said structure, except the display portion thereof.

Another object of this invention is to provide a device of the above character in which the display has a partition or shadow box flange member extending along and from the boundary between areas respectively illuminated at constant intensity and at varying intensity, to adjacent the banded members, and the stationary banded member of which has an unbanded area registering with the area to be constantly illuminated.

A further object of this invention is to provide a device of the above character in which the display has a partition member extending along and from the boundary between areas respectively illuminated at varying intensity by light passing through said banded members, one of said areas being contiguous to a marginal edge of said display, and means for indirectly supplying supplementary illumination of constant intensity which does not pass through said banded members between said source and the display area to be illuminated thereby contiguous to the edge of the display, whereby the minimum level of illumination of that area receiving constant supplementary illumination may be higher than that of the contiguous area illuminated only by light passing through said banded members.

A further object of this invention is to provide a device of the above character having means for supplying light indirectly and of constant intensity from said source to a portion of the display.

A further object of this invention is to provide a device of the above character in which said reciprocable banded member is flexible and its ends are secured to means for reciprocating it in a direction transversely of the bands, said means for reciprocating same comprising a pair of oscillatable rolls extending parallel to the bands and about which the end portions of the flexible banded member are coilable, means biasing the rolls to load the flexible band member in tension in smooth, overlying contacting relation to the stationary banded member, and means for oscillating at least one of the rolls through an angle corresponding to movement of the flexible banded member a distance substantially equal to the width of a transparent band of the stationary banded member.

Another object of this invention is to provide a device of the above character in which one of the rolls has a radially extending arm and a power driven crank co-operatively engaging said arm to oscillatingly swing same with a predetermined frequency through an angle of rotation of limited magnitude related to the magnitude of the desired reciprocative movement of the flexible banded member.

A further object of this invention is to provide a device of the foregoing character in which each of the opaque bands on one of said banded members has one regularly indented, longitudinal edge, and the movement of the flexible banded member is substantially equal to the minimum width of the transparent band adjacent said regularly indented edge.

A further object of this invention is to provide a device of the foregoing character in which each of the opaque bands on one of said banded members has one scalloped, longitudinal edge, and the movement of the flexible banded member is substantially equal to the minimum width of the transparent band adjacent said scalloped edge.

Another object of this invention is to provided low cost, effective, reliable means for controlled varying of the intensity of illumination of a display using a constant

intensity light source of the discharge tube type located behind the display.

The above and other features and objects of this invention will in part be obvious, and will in part be apparent to those having ordinary skill in the art to which this invention pertains, from the following description and the drawings, in which:

Fig. 1 is an exploded view in perspective of what presently appears to be a preferred embodiment of this invention, portions thereof being omitted for clarity of illustration;

Fig. 2 is an exploded view in perspective of the device shown in Fig. 1, the view being from a different vantage point and more clearly showing some of the details of the device;

Fig. 3 is a view in horizontal section of a device similar to that shown in Figs. 1 and 2, some details of which have been omitted for clarity in illustration of other details;

Fig. 4 is a fragmental view in perspective showing details of the banded members, the thinner member being broken away along one edge of an opaque band;

Fig. 5 is a fragmentary plan view illustrating the relative positioning and co-operation of the banded members in one embodiment of this invention;

Fig. 6 is a fragmentary view in section showing some details of a portion of the display embodying our invention;

Fig. 7 is a fragmentary view in perspective of a device embodying this invention, illustrating the manner in which portions of the display may be supplementarily illuminated in an indirect manner by light of constant intensity supplied by the source of light from which light is supplied to other portions of the display in varying intensity;

Fig. 8 is a fragmental view in section schematically illustrating supplementary constant illumination of an area of a display which area is also variably illuminated;

Fig. 9 is a view in side elevation partly broken away, of a device embodying this invention and similar to the device illustrated in Fig. 2;

Fig. 10 is a fragmental view partly in section, of details of means, shown generally in Fig. 1, for controlled oscillation of the flexible banded member as viewed from below, some adjacent parts being shown schematically;

Fig. 11 is a view in front elevation of the structure illustrated in Fig. 10; and

Fig. 12 is a schematic wiring diagram of the device illustrated in Fig. 1.

The device illustrated in Figs. 1 and 2 comprises a back plate assembly **20**, a stationary banded member **21**, a flexible banded member **22**, a display assembly **23**, and a case **24**.

The back plate assembly **20** comprises a back plate **25** of a suitable material such as sheet metal, which may be stiffened and rigidified by means of edge flanges **26**, provided along two opposite edges of member **25** as shown, or along all four edges thereof. A pair of channel members **27, 28** are secured to back plate **25** as shown in Figs. 1, 7, 8 and 9. One flange **29, 30** of each respective channel member is secured in face-to-face flatwise engagement with a face of back plate **25** by any suitable means such as screws, spot welds, rivets, or the like (not shown). The channel members **27** and **28**, as shown in Fig. 1, extend horizontally and are parallel to each other. The web portions **31, 32** of channels **27, 28**, each has a plurality of respective apertures **33, 34**. The web portions **31, 32** of channel members **27, 28** are in spaced parallel relation while the flange portions **35, 36** of those members, respectively, are in spaced, coplanar relationship and parallel to back plate **25**. A pair of cylindrical rolls **37, 38** are respectively supported on shafts **39, 40** journalled in web portions **31, 32**, for rotation about parallel axes. Thus, roll **37** is a cylindrical member of suitable material, such as wood, axially from which stub end portions of its shaft **39** extend into bearing apertures provided in webs **31, 32**. Roll **37** is thereby supported in substantially perpendicular relation to the webs **31, 32** of the channel members, and in spaced, parallel relation to back plate **25**. The shaft **39** may be of one-piece construction or comprise two stub shafts secured in fixed relation to roll **37**. Roll **38** may be constructed in like manner and preferably is of substantially the same size and dimensions as roll **37**. Roll **38** is supported in spaced, parallel relation to back plate **25** and roll **37** so that flexible member **22** tracks thereon.

The member **21** may be made from a relatively rigid plate of transparent or translucent light transmitting material, such as methyl methacrylate resin, or other suitable material. The rigid plate **21** has opposite marginal portions adapted to be secured in face-to-face flatwise engagement with the supporting coplanar faces of flanges **35, 36**, by any suitable means while the intervening edges respectively lie in close, spaced relation to rolls **37, 38** as shown in Figs. 3, 6, 7, 8, 9, and 10. Stripes or bandlike areas **51** are rendered opaque by any suitable material such as paint, which may be applied by silk screen or other suitable method. The opaquing material used may be one which penetrates into the plate or does not protrude any substantial distance above the plate surface to which that material is applied. Light transmitting stripes or bandlike areas **52** intervene between opaque stripes **51**. All opaque areas **51** are duplicates, being regularly spaced by intervening light transmitting areas **52** which are also all alike and each of a width substantially equal to the width of each stripe **51**. Stripes **51** and **52** extend parallel to rolls **37** and **38** as shown most clearly in Fig. 2. Stripes **51** preferably have one straight edge **53** and an opposite edge **54** which is regularly indented in a fashion such as is exemplified by the edges having opaque somewhat triangular areas **68** between which light transmitting lobular areas **69** intrude as shown most clearly in Figs. 4 and 5.

Stationary banded member **21**, when in co-operating relation to supporting flanges **35, 36**, has one of its faces lying in a plane substantially tangent to rolls **37, 38**, as is shown quite clearly in Figs. 6 and 10.

A second banded or grid member **22** overlies plate member **21** in face-to-face relation, as shown in Figs. 3 through 10. Member **22** is a flexible sheet of material similar to that of plate member **21** and has alternate opaque **55** and light transmitting **56** stripes or bands. The opaque stripes **55** may be applied in a manner similar to that used in applying bands **51** to the member **21**. The bands on member **22**, as shown, have straight-edges and extend parallel to the bands on member **21**. Member **22** is adapted to be secured to respective rolls **37** and **38** with the bands **55, 56** thereon parallel to the bands **51, 52** on member **21**. Adjacent edges **66, 67**, as shown in Fig. 1, eyelets **57** may be provided in member **22** through which screws **58** and **59** may extend into securing engagement with the respective rolls **37** and **38**. The member **22** may be skived or tapered to edges **66, 67** as shown in Fig. 6, or it may be cut off in non-tapered fashion as shown in Fig. 10. Any suitable reinforcing means such as tape **60** shown in Fig. 1 may be provided. Tape **60** preferably co-operates with a portion of the member **22** which remains continuously in engagement with the respective roll **37** or **38**, as the case may be. As shown most clearly in Figs. 3, 6, and 10, member **22** is supported in face-to-face overlying relationship to plate member **21**, by the rolls **37** and **38**.

To maintain the flexible member **22** in smooth, taut, co-operating relation to plate member **21**, we provide means biasing the rolls **37** and **38** toward rotation in opposite directions. The biasing means shown particularly in Figs. 1, 3 and 6 comprises a pair of cord members **61, 62**, and a helical spring **63**. One end of cord member **62** is anchored by a screw **59** to roll **38** and a permanent loop **65** is provided adjacent its unanchored

end. Cord member 61 is anchored in a similar fashion to roll 37 by a screw 58 and has a permanent loop 64 formed in its unanchored end. The opposite hook-shaped ends of helical tension spring 63 respectively engage loops 64 and 65 to load the cords 61 and 62 in tension. As shown most clearly in Figs. 3 and 6, portions of cords 61 and 62 are wrapped part way around a respective one of the rolls 37, 38, a distance such that during normal oscillation of the rolls a portion of each cord will remain in wrapped relation upon the surface of a respective one of the rolls.

To oscillate the rolls, and reciprocate the flexible banded member 22 in a direction transversely of the bands thereon, means are provided as shown in Figs. 1, 10, and 11. An angle plate form motor mounting bracket 70, having a foot flange portion 71 and a motor supporting flange 72, is secured to back plate 25 by any suitable means such as screw bolts 73, the shanks of which extend through back plate 25 and foot flange 71 into threaded engagement with securing nuts 74. The nuts and bolts 74, 73 secure foot flange 71 in flatwise, face-to-face engagement with back plate 25 whereby flange portion 72 is secured in spaced, parallel relation to web 31. A motor 75 is supported by motor bracket 70 to which it is secured by any suitable means such as screws 76. Motor 75 has a shaft 77 which preferably revolves at low speed; for example, in some embodiments of this invention, motors having shaft speeds of one revolution in two minutes (½ r.p.m.) have been found quite satisfactory. Such motors are usually of the synchronous type and include appropriate gearing enclosed within the motor case from which the shaft projects. As shown most clearly in Figs. 10 and 11, motor 75 has a shaft 77 which projects through an aperture provided in flange portion 72 of the motor bracket. A crank 78 is mounted upon motor shaft 77 for rotation in unison therewith, crank 78 has connecting pin portion 79 which projects in radially spaced parallel relation to shaft 77. As shown most clearly in Fig. 11, pin 79 extends away from the case of motor 75 and beyond the free end of shaft 77.

A flat face 80 is provided on roll 37 in perpendicular relation to a radius of that roll. Arm 82 of angle lever 81 is secured in flatwise face-to-face engagement with flat face 80 by suitable means, such as screws 83. The slotted arm 84 of angle lever 81 extends perpendicularly to arm 82 thereof and in radial relation to roll 37. Arm portion 84 has a longitudinal slot 85 of a width substantially equal to the diameter of pin portion 79 and the center line of which slot extends in radial relation from roll 37. Pin portion 79 of crank 78 projects into slot 85, and, as shown in Fig. 11, may project therethrough in order that the cylindrical surface of the pin portion 79 may engage the slot-bounding edge of arm 84.

The axis of pin 79 has a locus of movement indicated in Fig. 10 by circle 86. In Fig. 10 the arm 84 is shown in full lines in the limit position in which the center line of its slot 85 coincides with line 87 extending substantially parallel to the plane of the banded members 21, 22. When the crank 78 is in the position shown in dashed lines in Fig. 10, the center line of slot 85 will coincide with the line 88. Lines 87 and 88 represent the limits of swing of arm 84 corresponding to the particular spacing relationship existent between the axis of rotation of roll 37 and the axis of rotation of shaft 77. In mounting motor bracket 70 slots may be provided in back plate 25 or foot flange 71, or in both, to permit shifting of the bracket 70 relative to roll 37 when screws 73 are loosened. Thus, if bracket 70 is shifted to the right of the position in which it is shown in Fig. 10, motor 75, its shaft 77, associated crank and crank pin 78, 79 would also be shifted a corresponding distance in the same direction. Such shifting of the bracket and members supported in relation thereto will effect a reduction in the magnitude of the angle through which arm 84 swings or oscillates and included between lines 87 and 88. The limit represented by line 87 remains unchanged as the shifting is parallel thereto; however, the limit represented by line 88 will be shifted a corresponding amount toward limit 87. The magnitude of oscillation of roll 37 and reciprocation of flexible banded member 22 will be correspondingly reduced.

As is indicated schematically in Fig. 12, motor 75 is connected across the line so that it operates whenever electric current is supplied to the line in any usual manner.

A light source is provided located between back plate 25, stationary banded member 21, channel members 27, 28 and rolls 37, 38, as indicated in Figs. 2, 3, 7, 8 and 9, and most clearly in Fig. 1. The light source shown in the illustrative embodiment comprises a pair of hot cathode pre-heat starting fluorescent tubes 41, 42 each in co-operative relation to and supported by pairs of sockets 90 which, in turn, are secured in fixed relation to back plate 25 by any suitable means, such as screws, or the like, not shown. Where a plurality of such fluorescent tubes are used, as in the structure disclosed in Fig. 1, appropriate starters 43, 44 and transformers or ballasts 45, 46 may be mounted between them in a fashion which results in no substantial interference with light passing from either of the respective tubes 41, 42 to the banded member 21. Fig. 12 indicates schematically one conventional manner of connecting the components of the electric illumination circuit.

Case 24 comprises a shell-like member fabricated from any suitable material, such as sheet metal, synthetic resin, or the like, having suitable physical properties. Case 24 is adapted to be secured in co-operating relation with back plate 25 forming a substantially light-tight connection therewith. Case 24 may be secured to back plate 25 by any suitable means, such as screws 91 shown in Figs. 8 and 9. Case 24 has a flange 92 in spaced, parallel relation to back plate 25 against which a display assembly 23 may be supported. In the illustrative embodiment shown in the drawings, the display assembly 23 is in the form of supporting members 93, 94 between which a photographic transparency 95, or the like, is sandwiched. The support members 93, 94 and transparency 95 disposed therebetween, may be secured in co-operating engagement with supporting flange 92 by any suitable means such as clips, screws, or the like, not shown.

Support member 94, as shown in perspective in Fig. 2, is preferably adapted for use with a particular display, such as the transparency 95, with which it is in registry. Transparency 95 has third, second and first areas corresponding to and in registry with areas 96, 97 and 98 of member 94. Area 96 is substantially bounded by upper edge 99 of member 94 and shadow box flange 100. Area 97 is bounded by shadow box flanges 100 and 104, the edges 101, 102, and portions of edge 103 of plate 94. Area 98 is bounded by shadow box flange 104 and plate edge 103. Shadow box flanges 100 and 104 are secured to and extend perpendicularly from support member 94 toward flexible banded member 22. Flanges 100 and 104 terminate in edges 105, 106 spaced from flexible banded member 22 by narrow gaps 107, 108 (Fig. 8). The gaps 107, 108 are of sufficient width to allow free movement of member 22 in substantially non-contacting relationship to the edges 105, 106, while keeping cross leakage of light to a minimum. That is, light passing through a portion of banded members 21, 22 in registry with area 97 is confined so as not to strike portions 96 or 98 of member 94, and vice versa.

The display such as transparency 95 may constitute a landscape scene having a skyline which coincides with the line of intersection of shadow box flange 100 and the rear face of support member 94. The sky area of the scene thus corresponds to area 96 while the terrestrial area corresponds to area 97. The scene or landscape has an area corresponding to area 98 which may be a particular portion of the scene or an area upon which

indica relating to the scene, or otherwise forming part of the display, may appear. As is shown clearly in Fig. 2, an area 109 of banded member 21 is of the same size and configuration as area 98 and so disposed as to be in registry with area 98 when the device illustrated in Fig. 2 is assembled. Thus, shadow box flange 104 will be substantially in registry with the boundary between unbanded area 109 and the contiguous banded portions of stationary banded member 21. It may be noted that the flexible banded member 22 has no clear or unbanded areas corresponding to area 109 as the absence of opaque bands in area 109 of member 21 results in constant intensity lighting of area 98 whether member 22 oscillates to and fro or remains stationary.

Back plate 25 and case 24 serve to provide a light-tight enclosure which precludes back lighting of the display, that is, transparency 95, by stray light. As a result all back illumination of the display transparency 95 is by light emitted from fluorescent tubes 41 and 42, previously described. The light source comprising fluorescent tubes 41, 42 produces light which, in so far as visual perception is concerned, is of constant color and intensity. Area 98 will receive illumination of constant intensity, since registering area 109 is unbanded and any relative reciprocation of flexible banded member 22 will have no material effect upon the intensity of light passing through area 109 to area 98.

Areas 96 and 97 receive illumination of similar intensity through and controlled by banded members 21 and 22. The intensity of the illumination reaching areas 96 and 97 is determined by the relative positioning of banded members 21 and 22. As previously explained, banded member 21 is secured in fixed relation to back plate assembly 20 with the bands thereon extending parallel to rolls 37, 38, and as shown in Fig. 1, transversely of fluorescent tubes 41, 42. Flexible banded member 22 is in face-to-face relation with member 21 with the bands thereon extending parallel to the bands on member 21. The member 22 is reciprocable in a direction transversely of the bands in response to operation of motor 75 which, through crank 78 and lever 81 oscillates roll 37. The opaque 51, 55 and transparent 52, 56 banded portions of members 21 and 22 are in the relative positions illustrated in the fragmentary perspective view, Fig. 4, when the center line of lever arm 84 coincides with line 88 in Fig. 10. As crank 78 moves in a counter-clockwise direction, as indicated by the arrows on circle 86, additional portions of flexible banded member 22 are wrapped or wound on roll 37 while corresponding portions are unwound from roll 38, effecting translatory movement of member 22, to advance the opaque bands 55 thereon into overlying relationship with an increasingly greater portion of light-transmitting band areas 52 of member 21. Simultaneously, the light-transmitting areas 56 of member 22 move into overlying relationship with opaque banded areas 51 of member 21. This movement of member 22 relative to member 21 effects a gradual reduction in the effective light-transmitting areas 52, decreasing the intensity of illumination reaching areas 96, 97 by an amount corresponding to the reduction in the effective amount of light-transmitting area. As shown in Figs. 4 and 5, the opaque bands 51 of stationary member 21 may have one edge 54 indented, while the leading edge 47 of band 55 which advances toward it across the adjacent light-transmitting area 52 is straight. The movement of member 22 which corresponds to swinging of lever arm 84 from the position in which its center line coincides with line 88 to the position in which its center line coincides with line 87 in Fig. 10, may be equal to the minimum width of light transmitting area 52 indicated in Fig. 4 as the distance D. Thus, when lever 84 has moved to the limit position in which its center line coincides with line 87, edge 47 has advanced to a position in which its projection upon member 21 would just intersect or slightly overlap points 48 on indented edge 54. In this limit position of advance of edge 47 lobular or semi-circular areas 69 of light-transmitting area 52 will remain unobstructed or uncovered and a predetermined minimum amount of illumination may pass therethrough to display areas 96, 97. Further, in this limit position, edges 49 and 53 of opaque bands 55 and 51 overlap a sufficient distance so as to preclude passage of any substantial amount of light therebetween.

As crank 78 advances from the position in which it is shown in full lines in Fig. 10, counterclockwise to the position in which it is shown in dashed lines in that figure, member 22 will move to the limit position in which the edges 47 of opaque bands 55 if projected onto member 21 would lie on a respective opaque band 51. It may be noted that the width, the distance from edge 47 to edge 49, of opaque band 55 shown is slightly greater than the minimum width of light-transmitting band 52 (distance D) and is substantially equal to the minimum width of the opaque band 51, as shown in Figs. 4 and 5.

Thus, when crank 78 rotates in the counterclockwise direction as indicated in Fig. 10, intensity of illumination reaching areas 96 and 97 diminishes more slowly than it increases, but the period of diminution is greater than the period of increase. When the crank 78 moves in a counterclockwise direction, as indicated in Fig. 10, illumination of the display areas 96, 97 undergoes a two-phase cycle, one phase being a slow dimming phase, while the other phase is one of more rapid increase in illumination. It should be noted that in the event more rapid dimming and slower brightening of the illumination of the display is desired, reversal of the direction of rotation of crank 78 to clockwise rotation when viewed as in Fig. 10, will effect such modification. It may also be noted that adjustment of motor bracket 70 toward the right from the position in which it is shown in Fig. 10, will effect a reduction in the magnitude of the movement of member 22 and this, in turn, will tend to lower the maximum intensity of illumination reaching third and second areas 96, 97, without altering the minimum level of intensity of illumination. Adjustment of the maximum or minimum intensity can also be effected by slight shifting of member 21 longitudinally of flanges 35, 36 toward or away from roll 37.

The illumination which reaches third area 96 after passing through members 21 and 22, may be supplemented by indirect illumination of that area. In connection with the description of the supplementary illumination of area 96, reference may be had to Figs. 7, 8, 2, and 9. As shown in Figs. 7 and 8, light rays such as 110 emitted from lamp 41 may pass directly through apertures 33 in channel member 27 to strike the inner surface 115 of case 24, as well as surface 116 of back plate 25. We prefer that surfaces 115, 116, the surfaces of rolls 37, 38, bracket 70, the case of motor 75, transformers 45, 46, channel members 27, 28 and all other surfaces generally surrounding the light-producing means be adapted to reflect light. When the surfaces mentioned are adapted to reflect light, a substantial amount of light passes through apertures 33 in widely varying directions and strikes surfaces such as 115, 116. A substantial quantity of this light reaches area 96 by reflection. The light reflected to area 96 after passing through apertures 33 does not pass through members 21 and 22, and therefore, is of substantially constant intensity, irrespective of the relative positioning of these members. As previously explained, we prefer to so regulate the movement of member 22 with reference to member 21 so as to provide illumination of predetermined minimum intensity through those members to areas 96, 97, at all times. However, the supplementary constant intensity indirect illumination of area 96 is in addition to that passing through members 21, 22 so that the mini-

mum intensity of illumination of area 96 is greater than the minimum intensity of illumination of area 97 by the amount of the indirect kind.

It may be noted that the shadow box or partition flanges 104 and particularly 100, preferably are light-reflective and opaque or light-reflective and slightly translucent. Where an area is indirectly lit, or is supplementarily illuminated, in the indirect manner, the spacing of members 22 and 94 must be great enough and shadow box flanges such as 100 must project a sufficient distance from the surface of support member 94 in order that the indirect light may be diffused or distributed in a sufficiently even fashion over area 96, as desired. Surfaces such as 115, 116 if possessing a light diffusing as well as reflecting quality, will also contribute to the evenness of indirect illumination.

As shown in Fig. 9, a second or secondary display 117 may be supported in registry with an aperture provided in case 24 adjacent the aperture in which primary display assembly 23 is provided. Display or fourth display area 117 may bear indicia as desired, such as a title, legend, or the like, display of which in association with display 23, may be desired. Display 117 may be constantly indirectly illuminated by light reaching it from the sources 41, 42. Light from sources 41, 42 may pass through apertures 34 in the web of channel member 28, either directly or by reflection reach display 117. Faces such as face 116 of back plate 25 and face 118 of case 24 may serve as reflectors of light passing through apertures 34 to display 117. Such indirect illumination of display 117 is of a constant intensity as it is not subject to control through relative movement of members 21, 22. Further, the shadow box flange 119 precludes illumination of display 117 by light which has passed through members 21 and 22. Surface 118 may like 116 also be light diffusing.

It may be understood that while shadow box flanges 100, 104 are shown in Fig. 2, additional flanges of that character may be provided, as desired, including flanges extending along the marginal edges of member 94, or portions thereof, so as to preclude indirect lighting of any portion thereof as desired.

Having thus described the disclosed embodiment of this invention, it will in part be apparent and in part be obvious to those having ordinary skill in the art to which this invention pertains, that various modifications and changes may be made in the illustrative embodiment, without departing from the spirit or the scope of the appended claims.

Therefore, what is claimed as new and desired to be secured by Letters Patent is:

1. In an animatedly illuminated display device the combination which comprises, a display at least a portion of which is translucent, a light source, a pair of co-operating members each having opaque and non-opaque portions and disposed between and spaced from said light source and said display for controlling illumination of the display by light from said light source, and means for moving one of said pair of members between one limit position in which opaque portions of one member of said pair are in superposed relation with opaque portions of the other of said pair, and another limit position in which opaque portions of one member of said pair overlap non-opaque portions of the other member of said pair, whereby illumination of the display may be varied between predetermined maximum and minimum intensities.

2. In an animatedly illuminated display device the combination comprising, a display at least a portion of which is translucent, a light source, a pair of co-operating members between said light source and display, the second member of said pair being movable relative to the first members of said pair, said first member having a non-opaque first area registering with an area of the display to be illuminated at constant intensity and a second area registering with an area of the display to be illuminated at varying intensity, said second area of said first member and said second member having opaque and non-opaque portions, means for moving said second member between one limit position in which opaque portions thereof register with opaque portions of said first member and a second limit position in which opaque portions of the second member overlap non-opaque portions of said first member, whereby the area of the display registering with the first area of said first member may be illuminated at constant intensity while the area of the display registering with the second area of said first member may be illuminated at intensities varying between predetermined maximum and minimum intensities.

3. In an animatedly illuminated display device the combination comprising a primary display at least a portion of which is translucent, a secondary display at at least a portion of which is non-opaque, a light source behind said display, a pair of co-operating members each having opaque and non-opaque portions and disposed between and spaced from said light source and said primary display for controlling direct illumination thereof by light from said light source, means for moving one of said pair of co-operating members between one limit position in which opaque portions of said pair of members are in superposed relation, and another limit position in which opaque portions of one member of said pair are in overlapping relation to non-opaque portions of the other member of said pair, means for conducting light from said light source around said pair of co-operating members to said secondary display for indirectly illuminating same, whereby illumination of the primary display may be varied between predetermined maximum and minimum intensities through movement of at least one of said co-operating members, while said secondary display is illuminated at constant intensity.

4. An animatedly illuminated display device comprising a case in which a viewing port is provided, a display having a translucent portion and supported in registry with said viewing port, a discharge tube type electric light source in said case, a pair of banded members disposed behind and spaced from said display for controlling illumination of the rear thereof, said banded members each having a plurality of parallel, alternate, opaque and non-opaque band-like areas, means co-operating with one of said banded members for reciprocating same transversely of said band-like areas, the amplitude of reciprocation being no greater than one band width and the opaque bands on one of said members registering with respective opaque bands on said other member in one limit position of banded member movement, whereby intensity of illumination of the display may be varied between predetermined limits.

5. A device according to claim 4, characterized by the fact that each opaque band of one of the members has one edge indented by non-opaque portions continuous with a respective adjacent non-opaque band, and that light is free to pass through said edge-indenting non-opaque portions without obstruction from the opaque bands of the co-operating member whereby the minimum intensity of illumination of the display by the constant light source is predetermined.

6. An animatedly illuminated display device comprising a case in which a viewing port is provided, a display at least a portion of which is translucent and which is supported in registry with and filling said viewing port, a light source in said case, a pair of banded members disposed in said case behind said display for controlling illumination thereof by light from said light source, said banded members having parallel, alternate, opaque and non-opaque band-like areas, one of said banded members having a non-opaque unbanded area, means for reciprocating one of said members between one limit position in which like bands are in superposed relation and another limit position in which unlike bands are in superposed relation, whereby the portion of the display in

registry with said non-opaque unbanded area may be constantly illuminated at predetermined intensity by said light source while illumination of another portion of said display in registry with the banded portions of said banded members may be varied between predetermined maximum and minimum intensity.

7. In a display device having a display and a discharge tube type source of constant intensity light behind and spaced from said display, display illumination varying means disposed between said light source and display, said illumination varying means comprising first and second spaced rolls journalled for rotation about respective parallel axes, an arm having a slot extending radially from said first roll, a crank rotatable about an axis parallel to and spaced from said first roll, means for rotating said crank, said crank co-operating with said slotted arm whereby rotation of the crank effects limited magnitude oscillatory angular rotation of the first roll at a predetermined frequency, a pair of co-operating members one of which is flat and stiff and the other of which is flexible, said flexible member being supported by and secured in co-operating relation to said rolls, said flat member being secured in fixed relation to said display and between said rolls in face-to-face relation to said flexible member, said co-operating members having similar opaque and non-opaque areas whereby oscillatory rotation of said first roll effects shifting of the flexible member relative to said stiff member between limit positions in which opaque areas of the flexible member are respectively in superposed relation to opaque areas and non-opaque areas of the stiff member for varying the intensity of display illumination between maximum and minimum values.

8. An animatedly illuminated display device comprising a case in which a viewing port is provided, a display at least a portion of which is translucent and which is supported in registry with and filling said viewing port, said display having first and second areas, a light source in said case, a pair of co-operating members the first member of which pair is in spaced relation to said display and the second member of which pair is movable relative to the first member of said pair, said first member having a non-opaque first area registering with a first area of the display to be illuminated at constant intensity and a second area registering with a second area of the display to be illuminated at varying intensity, said second area of said first member and said second member having similar evenly distributed opaque and non-opaque portions, means for moving said second member between one limit position in which opaque portions thereof register with opaque portions of said first member and a second limit position in which opaque portions of the second member overlap corresponding portions of non-opaque portions of said first member, whereby the area of the display registering with the first area of said first member may be illuminated at constant intensity while the area of the display registering with the second area of said first member may be illuminated at intensities varying between predetermined maximum and minimum intensities.

9. An animatedly illuminated display device comprising a case in which a viewing port is provided, a display at least a portion of which is translucent and which is supported in registry with and filling said viewing port, said display having first and second areas, a light source in said case, a pair of co-operating members the first member of which pair is in spaced relation to said display and the second member of which pair is movable relative to the first member of said pair, said first member having a non-opaque first area registering with a first area of the display to be illuminated at constant intensity and a second area registering with a second area of the display to be illuminated at varying intensity, a shadow box flange secured in fixed relation to said display and registering with the boundary between said first and second areas of the display, said shadow box flange extending from said display to a free edge in close, spaced relation to said pair of co-operating members and registering with the boundary between the first and second areas of said first member of said pair of co-operating members for precluding illumination of the first area of the display by light which passes through the second area of the first member, said second area of said first member and said second member having similar evenly distributed opaque and non-opaque portions, and means for moving said second member between one limit position in which opaque portions thereof register with opaque portions of said first member and a second limit position in which opaque portions of the second member overlap corresponding portions of non-opaque portions of said first member, whereby the first area of the display registering with the first area of said first member may be illuminated at constant intensity while the second area of the display registering with the second area of said first member may be illuminated at intensities varying between predetermined maximum and minimum intensity.

10. An animatedly illuminated display device comprising a case in which a viewing port is provided, a display at least a portion of which is translucent and which is supported in registry with and filling said viewing port, said display having first and second areas, a light source in said case, a pair of co-operating members the first member of which pair is in spaced relation to said display and the second member of which pair is movable relative to the first member of said pair, said first member having a non-opaque first area registering with a first area of the display to be illuminated at constant intensity and a second area registering with a second area of the display to be illuminated at varying intensity, a shadow box flange secured in fixed relation to said display and registering with the boundary between said first and second areas of the display, said shadow box flange extending from said display to a free edge in close, spaced relation to said pair of co-operating members and registering with the boundary between the first and second areas of said first member of said pair of co-operating members for precluding illumination of the first area of the display by light which passes through the second area of the first member, said second area of said first member and said second member having similar evenly distributed opaque and non-opaque portions, means for moving said second member between one limit position in which opaque portions thereof register with opaque portions of said first member and a second limit position in which opaque portions of the second member overlap corresponding portions of non-opaque portions of said first member, and means for conducting a constant quantity of light from said light source around said pair of co-operating members to said second area of the display for auxiliary illumination thereof, whereby the first area of the display registering with the first area of said first member may be illuminated at constant intensity while the second area of the display registering with the second area of said first member may be illuminated at intensities varying between predetermined maximum and minimum intensity.

11. An animatedly illuminated display device comprising a case in which a viewing port is provided, a display at least a portion of which is translucent and which is supported in registry with and filling said viewing port, said display having first and second areas, a light source in said case, a pair of co-operating members, the first member of which pair is in spaced relation to said display, and the second member of which pair is movable relative to the first member of said pair, a shadow box flange secured in fixed relation to said display and registering with the boundary between said first and second areas of the display, said shadow box flange extending from said display to a free edge in close, spaced relation

to said pair of co-operating members for precluding illumination of the first area of the display by light which passes through an area of said pair of co-operating members registering with the second area of the display, said first and second members having similar evenly distributed opaque and non-opaque portions, means for moving said second member between one limit position in which opaque portions thereof register with opaque portions of said first member and a second limit position in which opaque portions of the second member overlap corresponding portions of non-opaque portions of said first member, and means for conducting a constant quantity of light from said light source around said pair of co-operating members to said second area of the display for auxiliary illumination thereof, whereby said second area of the display may be more intensely illuminated than the first area and the intensity of illumination of both areas may be varied between respective different predetermined maximum and minimum values by reciprocation of said second member relative to said first member of the pair of co-operating members.

12. An antimatedly illuminated display device comprising a case in which a viewing port is provided, a display at least a portion of which is non-opaque and which is supported in registry with and filling the viewing port, said display having first, second and third areas, said third area being contiguous to an edge of the display, a light source in said case, a pair of co-operating members the first member of which pair is in spaced registering relation to the first, second and third areas of said display and the second member of which pair is movable relative to the first member of said pair, said first member having a non-opaque area registering with a first area of the display to be illuminated at constant intensity and a second area registering with said second and third areas of the display to be illuminated at varying intensities, at least one shadow box flange secured in fixed relation to said display and registering with the boundary between said first, second and third areas of the display, said shadow box flange extending from said display to a free edge in close spaced relation to said pair of co-operating members and at least a portion thereof registering with the boundary between the first and second areas of said first member of said pair of co-operating members for precluding illumination of the first area of the display by light which passes through the second area of the first member, said second area of the first member and said second member having similar evenly distributed opaque and non-opaque portions, means for moving said second member between one limit position in which opaque portions thereof register with opaque portions of said first member and a second limit position in which opaque portions of the second member overlap corresponding portions of non-opaque portions of said first member, and means for conducting a constant quantity of light from said light source around said pair of co-operating members to said third area of the display for auxiliary illumination of the third area, whereby the first area of the display registering with the first area of said first member may be illuminated at constant intensity by light passing through said pair of co-operating members while said third area of the display may be more intensely illuminated than the second area, and the intensity of illumination of the second and third areas may be varied between respective different predetermined maximum and minimum values by reciprocation of said second member relative to said first member of the pair of co-operating members.

13. An animatedly illuminated display device comprising a case in which a viewing port is provided, a display at least a portion of which is non-opaque and which is supported in registry with and filling the viewing port, said display having first, second, third and fourth areas, said third area being contiguous to an edge of the display, a light source in said case, a pair of co-operating members the first member of which pair is in spaced registering relation to the first, second, and third areas of said display and the second member of which pair is movable relative to the first member of said pair, said first member having a non-opaque area registering with a first area of the display to be illuminated at constant intensity and a second area registering with said second and third areas of the display to be illuminated at varying intensities, at least one shadow box flange secured in fixed relation to said display and registering with the boundary between said first, second, and third areas of the display, said shadow box flange extending from said display to a free edge in close spaced relation to said pair of co-operating members and at least a portion thereof registering with the boundary between the first and second areas of said first member of said pair of co-operating members for precluding illumination of the first area of the display by light which passes through the second area of the first member, said second area of the first member and said second member having similar evenly distributed opaque and non-opaque portions, means for moving said second member between one limit position in which opaque portions thereof register with opaque portions of said first member and a second limit position in which opaque portions of the second member overlap corresponding portions of non-opaque portions of said first member, and means for conducting a quantity of light from said light source around said pair of co-operating members respectively to said third and fourth areas of the display for auxiliary illumination of the third area and for illumination of the fourth area, whereby the first area of the display registering with the first area of said first member may be illuminated at constant intensity by light passing through said pair of co-operating members while said third area of the display may be more intensely illuminated than the second area, and the intensity of illumination of the second and third areas may be varied between respective different predetermined maximum and minimum values by reciprocation of said second member relative to said first member of the pair of co-operating members, and said fourth area may be illuminated at constant intensity by light passing around said pair of co-operating members.

14. An animatedly illuminated display device in accordance with claim 13, characterized by the fact that at least two viewing ports are provided in said case, that at least the fourth area of the display is in registry with and fills one of said ports and at least a plurality of other areas of the display are in registry with and fill one other viewing port.

15. In an animatedly illuminated display device for visual observation, the combination of a display adapted to be illuminated and comprising portions pervious to light rays, a light source adapted to direct light rays upon the display in a period of substantial continuity, whereby to render display material on the display visible to an observer, and a pair of relatively movable co-operating members superposed upon one another and interposed between the light source and the display, said relatively movable members comprising areas through which the light rays may pass from the light source, and complementary areas substantially opaque, adapted to be moved to and from a position wherein said substantially opaque areas are superimposed upon one another and to be moved to and from positions laterally of one another, whereby the movement of light rays from the light source to the display may be intercepted in alternately increased and decreased volume to alternately decrease and increase the luminosity and the visibility of the display material to an observer.

16. In an animatedly illuminated display device for visual observation, the combination of a display adapted to be illuminated and comprising portions pervious to light rays, a light source adapted to direct light rays upon

the display in a period of substantial continuity, whereby to render display material on the display visible to an observer, and a pair of relatively movable co-operating members superposed upon one another and interposed between the light source and the display, said relatively movable members comprising areas through which the light rays may pass from the light source, and complementary areas substantially opaque, adapted to be moved to and from a position wherein said substantially opaque areas are superimposed upon one another and to be moved to and from positions laterally of one another, said light source being elongated, extending transversely of opaque portions of said relatively movable members, whereby light rays may reach all parts of the display notwithstanding interpositioning of the opaque portions when superimposed, whereby the movement of light rays from the light source to the display may be intercepted in alternately increased and decreased volume to alternately decrease and increase the luminosity and the visibility of the display material to an observer.

17. In an animatedly illuminated display device for visual observation, the combination of a display adapted to be illuminated and comprising portions pervious to light rays, a light source adapted to direct light rays upon the display in a period of substantial continuity, whereby to render display material on the display visible to an observer, a pair of relatively movable co-operating members superposed upon one another and interposed between the light source and the display, said relatively movable members comprising areas through which the light rays may pass from the light source, and complementary areas substantially opaque, adapted to be moved to and from a position wherein said substantially opaque areas are superimposed upon one another and to be moved to and from positions laterally of one another, one of said superposed pair of relatively movable members provided with means for reciprocation, whereby the movement of light rays from the light source to the display may be intercepted in alternately increased and decreased volume to alternately decrease and increase the luminosity and the visibility of the display material to an observer.

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