CONTINUOUS DISPLAY DEVICE

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ABSTRACT

An illuminated continuously moving display device which is suspended from a ceiling and having a series of panels each containing separate visual displays, the panels being arranged to follow one another in series about a closed loop of oval configuration with the panels being tilted slightly with respect to the vertical for ease of viewing. Special belt drive means and special track and panel means are provided to allow the individual panels to move in proper position for display at all times and to separate so as to accommodate the difference in path lengths which is required to maintain the panels at their proper tilted position.

23 Claims, 9 Drawing Figures
CONTINUOUS DISPLAY DEVICE

This invention relates to visual display apparatus and more particularly it concerns novel arrangements for the presentation of continuously moving and easily seen pictorial and printed materials.

The present invention is particularly well suited to the presentation of advertising material at point-of-purchase locations where space is limited and yet where eye catching moving displays are desired. Supermarkets and department stores generally have relatively little space available for special advertising displays and in the past such establishments relied primarily on stationary signs and posters to advertise current sales and special offerings.

The present invention makes possible the use of ceiling areas for the presentation of visual displays. Moreover, with the present invention, only minimal interference is presented to overhead lighting systems. In fact, a large portion of otherwise unused light may be employed in the presentation of the illuminated displays.

The present invention also makes possible the presentation of ceiling mounted displays which are oriented at a convenient viewing angle, i.e., about 16° from the vertical, and yet are movable continuously about a loop of oval configuration.

According to the present invention there is provided a flexible driving loop, such as a belt, which moves along a predetermined closed course lying in a first plane. A guide track is provided to define a second closed course lying in a second plane displaced from but parallel to the first plane. A number of flexible display panel assemblies are secured along one edge to the driving loop to drive the display panel assemblies and means are provided to guide the display panel assemblies in the guide track.

The display panel assemblies are flexible for curving movement about the curved portions of the closed course; however, they are provided with sufficient resiliency so that they come back into flattened, extended condition after passing over the curved portions.

The present invention also provides means including collapsible intermediate panels for accommodating the separation which occurs between adjacent display panel assemblies as they pass about the curved portions.

According to a further feature of the present invention novel display panel assembly constructions are provided which permit simple and convenient removal of portions of individual display panel assemblies for repair or for replacement of their associated visual material.

The present invention, in a further aspect, also provides for internal illumination and provides novel means for adapting ordinary ceiling type fluorescent light fixtures to be used in this manner without however detracting seriously from the general illumination provided by these fixtures.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described more fully hereinafter. Those skilled in the art will appreciate that the conception on which this disclosure is based may readily be utilized as the basis of the designing of other structures for carrying out the purposes of this invention. It is important, therefore, that this disclosure be regarded as including such equivalent constructions as do not depart from the spirit and scope of the invention.

A specific embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings forming a part of the specification, wherein:

FIG. 1 is a perspective view illustrating a visual display device in which the present invention is embodied;

FIG. 2 is a view similar to FIG. 1 showing a portion of the internal construction of the visual display device;

FIG. 3 is a top plan view, partially cut away, of the visual display device of FIG. 1;

FIG. 4 is an enlarged section view taken along line 4—4 of FIG. 3;

FIG. 5 is a perspective view, partially cut away, showing a display panel assembly used in the display device of FIG. 1;

FIG. 6 is perspective view illustrating a panel display replacement operation performed on the apparatus of FIG. 1;

FIG. 7 is an exploded view illustrating display and intermediate expansion panels as arranged in the device of FIG. 1;

FIG. 8 is a fragmentary perspective view illustrating an adaptor plug arrangement utilized in the device of FIG. 1; and

FIG. 9 is a further fragmentary perspective view illustrating an electrical connection utilizing the adaptor plug of FIG. 8.

As shown in FIG. 1, a visual display device 10 is shown to be suspended from a ceiling 12 so that it extends downwardly therefrom approximately 1½ feet. The display device 10 is preferably mounted over an existing fluorescent lighting fixture modified as hereinbefore described. The lighting from the fixture is then utilized, in part, for internal or back illumination of display panels on the device 10. As will be appreciated from the following description, the major portion of the light originally provided by the fixture over which the device 10 is mounted, is still available for general illumination through the bottom of the device.

As can be seen in FIG. 1, the display device 10 includes an upper oval track 14 which is mounted flush against the ceiling 12. A lower oval track 16 of somewhat smaller size than the upper track, extends in a plane parallel to and beneath the plane of the upper track. A series of display panel assemblies 18 are arranged side by side to extend between the upper and lower oval tracks 14 and 16. Since the lower oval track 16 is both shorter and narrower than the upper oval track 14, the display panel assemblies are slanted at an angle approximately 16° with respect to the vertical. This provides optimum viewability to persons walking through the area in which the display apparatus is located.

The display panel assemblies 18 move around the upper and lower track 14 and 16 in the direction of the arrow A at a relatively slow speed, e.g., approximately one and one half circuits per minute.

Because of the difference in length of the upper and lower tracks 14 and 16, the upper edges of adjacent
panel assemblies 18 become separated at the curved ends of the tracks. In order to accommodate this separation there are provided expandable intermediate panels 20. During the movement of the display panel assemblies 18 along the straight courses of the tracks, these intermediate panels remain folded or collapsed to allow the adjacent panels to abut one another. The intermediate panels are not seen during their movement along the straight courses. However, during their passage around the curved end portions of the track, the panels unfold and expand. This expansion is greater at the top than at the bottom and so permits the difference in track lengths to be accommodated without distortion of the shape or position of the display assemblies 18 themselves.

It will be noted that the display panel assemblies 18 are provided with edge braces 22 which extend along their more vertical edges from top to bottom to provide stiffness between the upper and lower tracks 14 and 16. Removal clips 24 are provided at different locations along the edge braces 22 to facilitate removal and replacement of individual display panel assemblies in a manner to be described.

As indicated above, the display device 10 is preferably mounted over a modified fluorescent lighting fixture. The lighting from the fixture provides illumination from behind the various display panel assemblies 18. General illumination of the area is retained, however, by virtue of a rectangularly shaped bottom center panel 26 and two semicircularly shaped bottom end panels 28, which are of a translucent material, such as plastic, and which lie beneath the internal lighting source. The bottom panels are separated and supported by horizontal strips 30.

The general interior construction of the display apparatus 10 is illustrated in FIG. 2. As there shown, a fluorescent light fixture well 32 is surrounded by the upper track 14. A pair of upper horizontal cross braces 34 are attached to adjacent to the ceiling the light fixture well 32; and the upper oval track 14 is attached to the ends of these cross braces. A pair of vertical struts 36 extend downward and are attached from each of the upper horizontal cross braces 34. Each of the vertical braces is provided with upper and lower fluorescent light sockets 38. These sockets accommodate four fluorescent lamps 40 which extend horizontally between them in two tiers with two lamps in each tier. Electrical wires 42 extend from the socket 38 to adaptors 44 which draw electrical power from original sockets 46 within the light fixture well 32.

A pair of synchronized electrical drive motors 48 are mounted on brackets 50 attached to the lower ends of the vertical struts 36. These drive motors are provided with worn drive pinions 52 which engage worm gears 54 mounted to turn vertical drive axles 56 and associated drive drums 58. The synchronization of the drive motors 48 can be obtained electrically in known manner so as to cause the two drive drums 58 to turn in unison. A pair of drive belt supports 60, of L shaped cross section, extend along the straight courses between the two drive drums 58. These drive belt supports 60 are mounted on brackets 50 not shown in FIG. 2.

Turning now to FIGS. 3 and 4 it will be seen that a pair of longitudinal braces 62 extend horizontally between the lower ends of the vertical struts 36. A pair of lower horizontal cross braces 64 extend across and are attached to the longitudinal braces 62. As shown in FIG. 4, these cross braces bend downwardly in inverted U shaped configuration, and their lower ends are flanged outwardly as indicated at 66. Screws 68 pass through the lower track 16 into these flanges and serve to secure the lower track in place.

As can be seen in FIG. 4, the drive drums 58 are each formed with an upper bead 70 and a lower inwardly extending flange 72. A circular bottom plate 74, having a diameter slightly greater than that of the drum 58, is secured by rivets 76 to each drum flange 72. Each circular bottom plate 74 is also attached, by means of a screw fastener 78, to its associated vertical drive axle 56. In order to minimize illumination through the drum 58, the bottom plate 74 is cut out so as to form spokes extending between the screw fastener 78 and the periphery of the drum.

As further shown in FIG. 4, the upper horizontal cross braces 34 are secured to flange edges 80 of the light fixture well 32 by means of attachment clips 82. The upper oval track 14, in turn, is secured to the upper horizontal cross braces 34 by means of angle brackets 84, as shown in FIG. 3. The upper track 14 itself is of U shaped cross sectional configuration and is formed with a downwardly opening channel 86 which serves as a guide track for the display panel assemblies 18.

A strap-like drive belt 88 passes over the peripheries of the two drive drums 58 and extends along the drive belt supports 60 between the drums. Thus, as the drums turn in unison the drive belt is caused to follow a course corresponding to the lower track 16. Elongated rivets 90 extend laterally outward from the drive belt 88 at spaced apart locations therealong. These rivets secure the various display panel assemblies 18 to the drive belt in a manner such that, as the belt is driven by the drums 58, it moves the display panels 18 along the tracks 14 and 16.

During operation of the device, the electrical drive motors 48 operate through their associated drive pinions 52 and worm gears 56 to turn their associated drive drums 58. This in turn causes the belt 88 to move about the drums. As the belt moves, its rivets 90 pull on the lower edges of the display panel assemblies 18 to move them along the path defined between the upper and lower tracks 14 and 16. Each individual display panel assembly, with its associated printed or illustrative information passes continuously around the entire device so that it will be seen by anyone in sight range of the device no matter where he is standing.

During this movement, the individual display panel assemblies are illuminated continuously from behind by means of the fluorescent lamps 40. This illumination serves to facilitate viewing and at the same time it provides an attractive presentation. The major portion of the light from the fluorescent lamp 40 is recovered, however, for general illumination purposes; and this is achieved by virtue of the translucent bottom panels 26 and 28.

As the panel assemblies 18 move along they are maintained at a slight angle (e.g., approximately 16°) with respect to the vertical so as to optimize viewing convenience. Because of this, the panel assemblies undergo partial separation at the upper ends during their passage around the curved ends of the device. This partial separation is accommodated, as well as explained hereinafter, by virtue of the construction and mounting of the panel assemblies. The intermediate panels 20 are arranged to collapse behind the adjacent panel assem-
bilies 18, as shown in FIG. 3, during their passage along the straight courses of their movement, and to expand to fill the spaces between the panel assemblies during their passage around the curved ends of the device. The collapsing of the intermediate panels 20 is such that they extend substantially perpendicular to the display panel assemblies and thereby do not cause interference with the illumination of these panel assemblies by the lamps 40.

The construction of the individual display panel assemblies 18 is best seen in FIGS. 5 and 6. As can be seen therein, each display panel assembly is made up of a permanent portion 90 and a removable portion 92.

The permanent portion 90 comprises a generally rectangular inner sheet 94 of flexible transparent or translucent plastic material. Elongated edge channel members 96 are secured to the outer surface of the sheet 94 along its vertical edges, while elongated track follower strips 98 are secured to the inner surface of the sheet 94 in alignment with the edge channel members 96. Reverting to FIG. 4, it will be seen that each of the vertical edges of the inner sheet 94 is sandwiched between an associated one of the edge channel members 96 and its corresponding track follower strip 98. In addition, these members are held together by screws 100 which pass through them and the edge of the sheet 94 itself. As further shown in FIG. 4 the upper end of each track follower strip 98 is bent inwardly with respect to the display device to form a follower projection 102 which fits loosely in the channel formed by the upper track 14. The outer edge of the track itself projects into the space between the follower projection 102 and its associated channel member 96. In this manner the upper ends of the display panel assemblies 18 are guided around the upper track 14.

As can be seen in Figs. 4, 5, and 6, the lower ends of the channel members 96 extend downward below the lower edge of the inner sheet 94. Moreover, while the major portion of the length of the channel members 96 is of open channel configuration, opening outwardly of the display device, a lower portion 97 thereof, below the sheet 94, is of box-like configuration. As shown, openings 104 are provided in these lower portions 97, and the rivets 90 on the drive belt 88 fit loosely through these openings.

The upper edge of the inner sheet 92 is stiffened with an upper strip 106 of spring steel or similar material. This ensures that the upper edge of the inner sheet will remain extended during and after its passage around the curved ends of the upper track 14.

The ends of the upper strip 106 wrap around the upper end regions of the channel members 96 to provide retaining loops 108 for the removable portion 92 of the display panel assembly.

The removable portion 92 of the display panel assembly 18 comprises a pair of outer rectangular sheets 109 and 110 of flexible transparent plastic or similar material. The sheets 109 and 110 overlie each other and they are secured together along their lower and side edges to form a pocket. A display sheet 112 containing printed, pictorial or other visual material to be displayed, is contained within this pocket. A pair of elongated mounting braces 114 are secured along the side edges of the sheets 109 and 110. These mounting braces have cross sectional dimensions which enable them to fit snugly into the open channels formed along the channel members 96. As can be seen in FIG. 5 the upper ends of the mounting braces 114, beyond the upper edges of the sheets 109 and 110, are formed with upwardly projecting flanges 118 which are dimensioned to fit snugly up into the retaining loops 108.

The length of the mounting braces 114 is such that when their flanges 118 are pushed fully up into the retaining loops 108, the lower ends of the braces just clear the upper edges of the box-like lower portions 97 of the channel members 96. The lower ends of the braces 114 are provided with a taper 120 to enable them to slip down inside the box-like lower ends of the channels 96. Screws 122 or similar protrusions at the upper end of the tapers 120 abut the upper edge of the box-like lower ends of the channels 96 to limit the downward movement of the braces 114. As can be seen in FIG. 5 the length of the upwardly protruding flanges 118 is such that when the braces 114 are in their inserted position with the screws 122 abutting the upper edge of the box-like lower ends of the channels 96, the flanges 118 extend up into the retaining loops 108. The removable portion 92 of the display panel assembly 18 is thus secured to the permanent portion 90. Moreover, the permanent portion holds the removable portion fully extended so that the display sheet 112 is fully viewable. As shown the removal clips 24 are mounted on the mounting braces 114.

The removable portion 92 may be separately removed from the stationary portion 90 for repair or for replacement of its display sheet 112. This is preferably accomplished with the aid of a removal jig 130 shown in FIG. 6. The removal jig comprises a pair of rigid parallel slats 132 of sufficient length and of sufficient distance from each other to engage the removal clips 24 on the mounting braces 114. The slats are mounted on an elongated handle 134 which maintains them in fixed positional relation to each other and which also permits one to manipulate the jig 130 while on the floor.

As shown in FIG. 6, the removable portion 92 is removed by first causing the jig slats 132 to engage the removal clips 24. The jig 130 is then moved upwardly slightly to lift the lower ends of the mounting braces 114 up out of the box-like lower portions 97 of the channel members 96. The lower ends of the mounting braces 114 are then swung outwardly to clear the lower ends of the channel members 96 and the jig 130 along with the mounting braces 114 is lowered so that the flanges 118 pass down and out from the retaining loops 108. The removable portion 92, which is then held extended on the jig 130 by means of the removal clips 24, is lowered for repair or replacement of its display sheet 112.

It will be appreciated that the various removable portions 92 of the display panel assemblies 18 can be removed individually without affecting the overall operation of the device. This is because the permanent portions 90 of the display panel assemblies, together with the expandable intermediate panels 20 and the drive belt 88 constitute a complete operative chain which passes around the course defined between the upper and lower tracks 14 and 16.

FIG. 7 illustrates a portion of this chain. As shown, one of the expandable intermediate panels 20 is connected between each pair of adjacent display panel assemblies. The display panels 20 are of generally triangular configuration, with their base at the top, and their apex at the bottom to accommodate the difference between the upper and lower oval track lengths. Now
since the tracks have straight side portions and curved end portions and since for optimum viewing the angle of tilt of the panels with respect to the vertical should be constant, the accommodation of the difference in track lengths must be confined to the curved ends of the tracks. This is achieved by the mounting arrangements herein described wherein the individual display panel assemblies 18 are each attached, rather loosely, at two displaced points to the drive belt, while the upper ends of the panel assemblies are left free to follow loosely in the upper track 14 and the panel assemblies are resiliently biased, as by the spring steel strips 106 along their upper edges, toward a fully extended condition. A certain amount of dip occurs in the central regions of the display panel assemblies as they pass around the curved ends of the device; however, this is accommodated by the relatively flexible two point connection to the drive belt 88 and the loose engagement with the upper track 14.

The intermediate panels 20 actually do no pulling or pushing and therefore the orientation and positioning of the display panel assemblies 18 during their movement around the device is maintained by their own construction and mounting arrangements as described above. These intermediate panels 20 do, however, serve to prevent glare effects from light which would otherwise pass between the parted display panels as they pass around the curved ends of the device. Moreover, the intermediate panels 20 may themselves be provided with additional advertising or other informational or decorative material. While the intermediate panels 20 are collapsed and essentially hidden during their passage along the straight courses of the device (as seen in FIGS. 1 and 3) nevertheless, the fact that they unfold during movement to reveal previously hidden material, itself provides an attention attracting feature. The edges of the intermediate panels 20 may be secured to the permanent portions 90 of the display panel assemblies 18 by sandwiching them, along with the edges of the inner sheets 94, between the elongated channels 96 and their associated follower strips 98.

As indicated previously in connection with FIG. 2, the electrical power for the fluorescent lamps 40 may be obtained from the original sockets 46 within the light fixture well 32 by means of adaptors 44. The construction and operation of these adaptors is shown in FIGS. 8 and 9. As can be seen in FIG. 8, one of the original fluorescent sockets 46 includes an entrance channel 140 into which the prongs of a fluorescent lamp enter, one after the other. The channel 140 opens into a generally triangular recess 142 which accommodates a 90° rotation of the fluorescent lamp. Brass contact strips 144 in the recess 142 make contact with the lamp prongs when it is so rotated.

As also shown in FIG. 8, the plug adaptor 44 comprises a solid base portion 148 and a pair of prongs 150 projecting outwardly therefrom in the manner of fluorescent lamp prongs. The electrical wires 42 enter the base portion 148 and are connected to the prongs 150 therein. A spring steel clip 154 extends out from the side of the base portion 148.

The adaptor 44 is connected to the socket 46 in the same manner as a fluorescent lamp. That is, the adaptor prongs 150 are fitted, one after the other, down through the channel 140 and into the triangular recess 142. The adaptor is then rotated 90° to bring the prongs 150 into contact with the contact strips 144. This rotation also causes the steel clamp 154 to fit around the end of the socket 46, as shown in FIG. 9, to hold the adaptor against the socket. As can be seen, the wires 42 extend from the adaptor 44 to an associated one of the light sockets 38. In this manner electrical power may be brought to a new arrangement of fluorescent lamps without need for major revisions to existing equipment.

Although a specific embodiment of the invention is herein disclosed for purposes of explanation, various modifications thereof, after study of this specification, will be apparent to those skilled in the art to which the invention pertains.

What is claimed is:

1. A visual display apparatus comprising a flexible conveyor loop, means for guiding and driving said loop for recirculating movement along a first endless path lying in a horizontal first plane, a guide track arranged to define a second endless path horizontally offset with respect to said first path and in a second plane parallel to and above the first plane, one of said paths being longer than the other, a plurality of flexible display panels each having a first edge and an opposite edge, each panel being secured along said first edge to said conveyor loop and means for guiding each display panel along its said opposite edge to follow said guide track whereby said panels are moved along while tilted from the vertical for convenient and continuous viewing at all positions of said panels along said paths.

2. A visual display apparatus according to claim 1 wherein said display panels are each of composite construction having removable portions including display panel holding means and permanent portions for holding said removable portions.

3. A visual display apparatus according to claim 1 wherein said display panels are reinforced along the edges thereof which extend between said paths.

4. A visual display apparatus according to claim 1 wherein each of said flexible display panels is resiliently biased, along its said opposite edge, to a flattened extended condition.

5. A visual display apparatus according to claim 1 wherein said means for guiding and driving said loop comprises a pair of drums.

6. A visual display apparatus according to claim 5 wherein said means for guiding and driving said loop further comprises a pair of synchronous electric motors driveably coupled to said drums.

7. A visual display apparatus according to claim 1 wherein each display panel is loosely connected to said conveyor loop at two mutually displaced locations along its length.

8. A visual display apparatus according to claim 1 wherein collapsible intermediate panels are connected between adjacent ones of said flexible display panels, said intermediate panels having side edges connected to corresponding edges of adjacent display panels, said intermediate panels being bendable to allow movement of said of said side edges toward and away from each other for expansion and contraction of said intermediate panels.

9. A visual display apparatus according to claim 8 wherein said intermediate panels are of greater expanded extend along an edge thereof nearest said guide track.

10. A visual display apparatus according to claim 1 wherein each of said first and second endless paths is
of oval configuration with straight courses interconnecting semicircular ends.

11. A visual display apparatus according to claim 10 wherein the second endless path is larger than and surrounds the first path.

12. A visual display apparatus comprising an upper oval track, means for mounting said track to lie against a ceiling, a pair of drums, means mounting said drums to rotate in a lower plane parallel to and beneath said track, a flexible conveyor belt extending about said drums and lying along a lower oval path beneath said upper oval track, said lower oval path being smaller than and surrounded by said upper oval track, a plurality of display panels each having a first edge and an opposite edge and each being secured along said first edge to said belt and track engaging means along the opposite edge of each display panel and engaged with said upper track for following same.

13. A visual display apparatus according to claim 12 wherein said upper oval track and said lower oval path are relatively dimensioned such that said display panels extend at a substantially control angle with respect to the vertical as they move along between said track and said path.

14. A visual display apparatus according to claim 12 wherein collapsible intermediate panels are arranged between adjacent display panels.

15. A visual display apparatus according to claim 14 wherein said intermediate panels are of generally triangular shape with their base extending along said upper track and their apex located at said belt.

16. A visual display apparatus according to claim 14 wherein said intermediate panels are bendable inwardly of said tracks.

17. A visual display apparatus according to claim 12 wherein said display panels each include a permanent portion connected to said belt and engaging said upper track, and a removable portion detachable from said permanent portion.

18. A visual display apparatus according to claim 17 wherein said permanent portion of said display panels each comprise a flexible sheet-like member of generally rectangular configuration, a pair of elongated rigid members extending along opposite side edges of said sheet-like member and attached, at the ends thereof nearest the lower oval path, to said belt and loosely engaged at their other ends to said upper track and an elongated resilient bendable member attached to said sheet-like member along an edge thereof which extends nearest said upper track.

19. A visual display apparatus according to claim 17 wherein said permanent portions each include elongated rigid members forming side edges of the portions between the belt and the upper track and means on said rigid members for attachment of one of said removable portions.

20. A visual display apparatus according to claim 19 wherein said removable portions comprise a pair of flexible transparent sheet-like members forming a pocket for containing a display sheet and means for attaching the removable portion along its edges to the rigid members of the permanent portions.

21. A visual display apparatus comprising a support structure adapted to be suspended from a ceiling light fixture, a plurality of visual display panels having upper and lower edges, means for supporting said panels and moving same so that their upper edges follow a first closed path around said fixture and their lower edges follow a second closed path of a different length than and located below and horizontally offset with respect to said first path so that said panels remain tilted from vertical for convenient viewing, and lamps supported by said support structure for providing back illumination for said display panels.

22. A visual display apparatus according to claim 21 wherein said means for supporting said panels includes a lower track having a bottom opening for allowing emission of light from within said apparatus for general illumination.

23. A visual display apparatus according to claim 21 wherein said lamps are elongated fluorescent tubes extending generally horizontally within said apparatus between the upper and lower edges of said panels.
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,849,918 Dated November 26, 1974

Inventor(s) Dante V. Mazzocco, Sr.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 39, after the words "attached to"
   delete "adjacent to the ceiling";

   line 40, after "32" insert --adjacent to the
   ceiling--;

Column 4, line 64, "well as" to read --will be--.

Signed and sealed this 27th day of May 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks