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J. LICHTGARN

2,785,286

MOVING STAIRWAY PANELLING

Filed Nov. 8, 1952

2 Sheets-Sheet 1

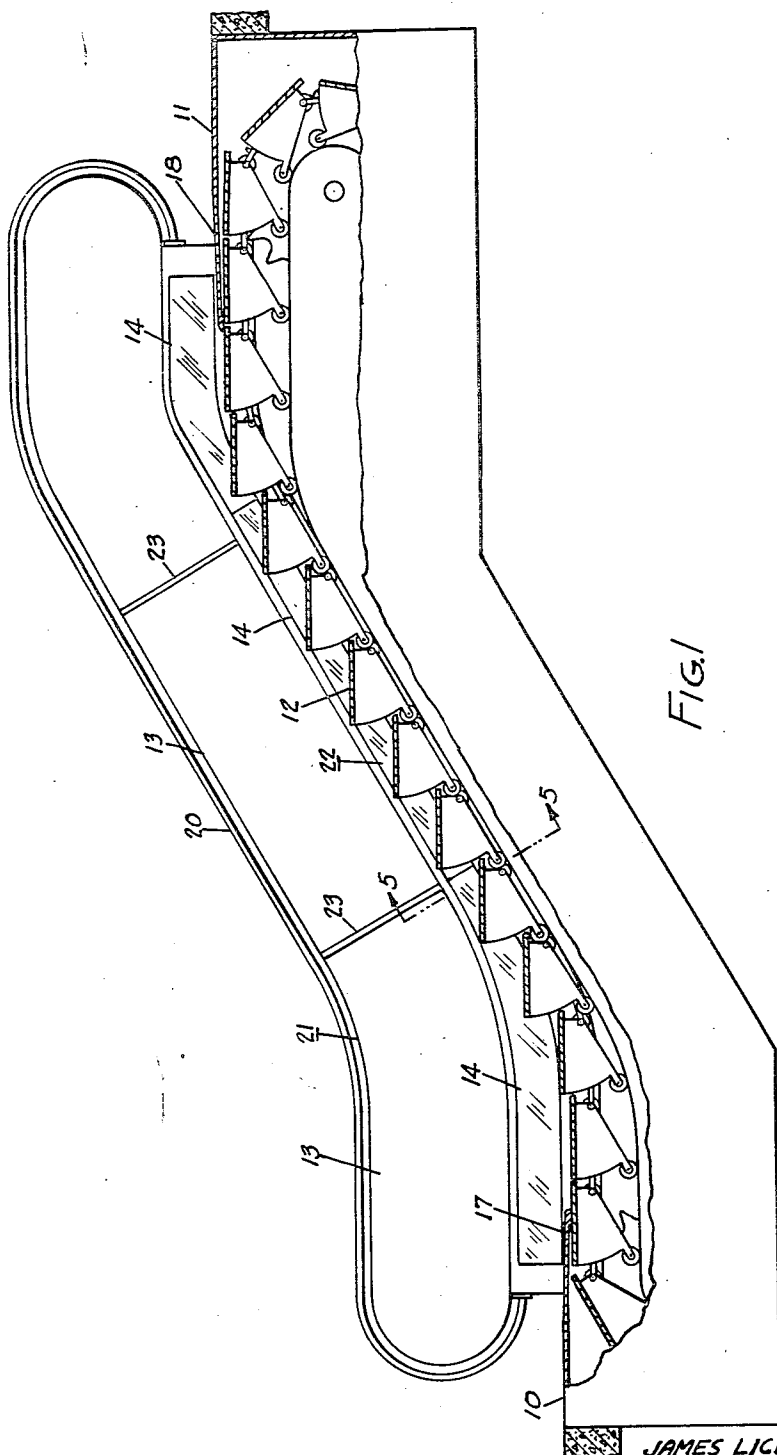


FIG. 1

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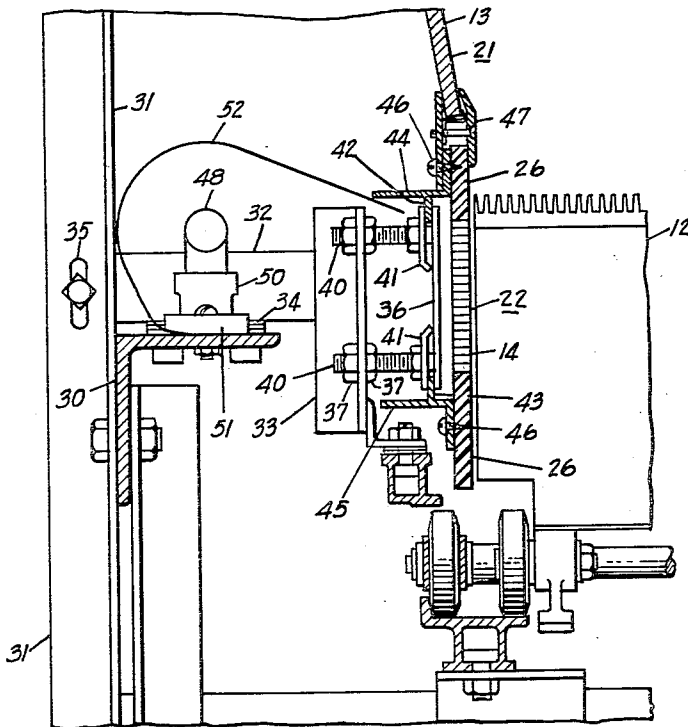


FIG. 5

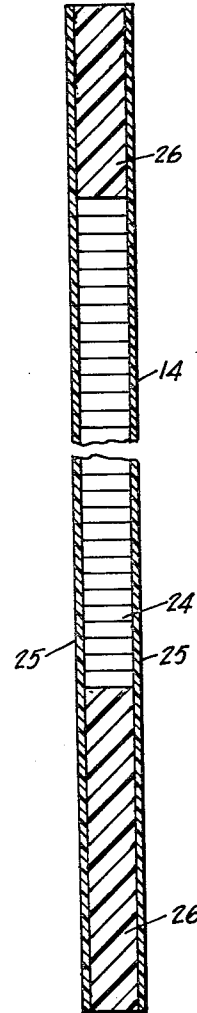


FIG. 2

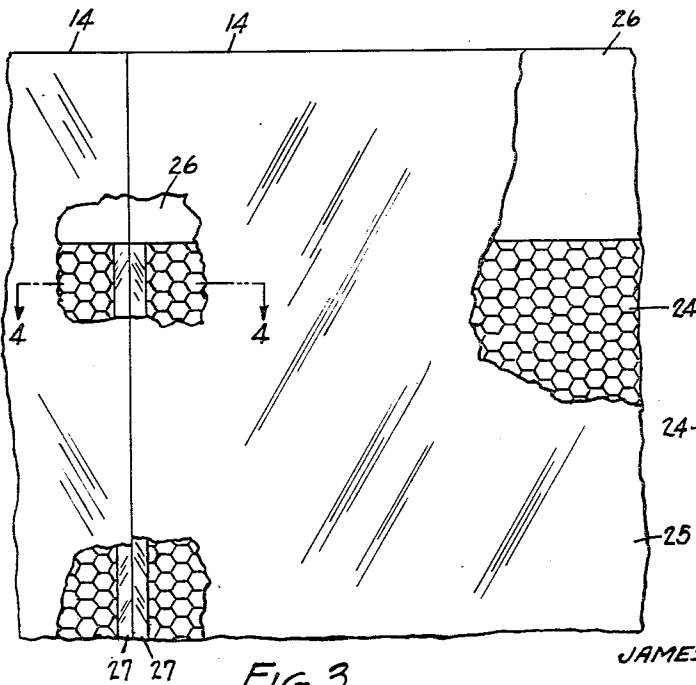


FIG. 3

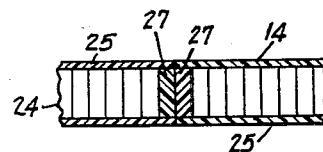


FIG. 4

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MOVING STAIRWAY PANELLING

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1 Claim. (Cl. 240—2)

The invention relates to the illumination of moving
stairways.

Moving stairways comprise an endless series of steps
running between balustrades from one level to another.
The steps emerge in platform formation from under a
combplate at the entrance to the stairway, gradually
change to a step formation in which they run to the
other end of the stairway, gradually change back to plat-
form formation and disappear under a combplate. It
is desirable to illuminate the steps, especially along the
section where the passengers step on to them at the en-
trance end of the stairway and thus avoid having them
straddle two steps so that it becomes necessary to realign
their feet when the steps move into step formation. Such
illumination is also of particular advantage at the exit
end of the stairway.

The object of the invention is to provide an illumi-
nating panel along the side of the steps beneath the
balustrading.

One feature of the invention is the provision of an
illuminated panel in which the light source may be brought
close to the panel without being visible to persons viewing
the panel.

A second feature of the invention is to provide a panel
having a pleasing architectural appearance.

Still another feature of the invention is the provision
of a rigid panel of the above general character.

Other features and advantages of the invention will
be apparent from the following description and appended
claim.

In carrying out the invention the skirt panelling be-
neath the balustrade panelling on each side of the mov-
ing stairway is made up of a number of panels compris-
ing core structures secured behind sheets of light trans-
mitting face material. Each core is constructed such that
it has a plurality of parallel openings transverse to the
plane of the face material, thus permitting light from a
source behind the panel to be transmitted through the
core structure and the face material to illuminate the
moving steps of the stairway.

In the drawings:

Figure 1 is a schematic representation in longitudinal
section of a moving stairway having particular reference
to the balustrade skirt panelling;

Figure 2 is a cross section of one of the skirt panels
showing constructional details thereof;

Figure 3 is an elevation view showing a portion of
two adjacent skirt panels;

Figure 4 is a view taken along line 4—4 of Figure 3
showing a portion of two adjacent panels;

Figure 5 is a detailed view in section of the moving
stairway taken along line 5—5 of Figure 1 showing the
source of illumination for the skirt panelling and the
means of fastening the skirt panelling to the moving stair-
way framework.

Reference will first be made to Figure 1 in which the
moving stairway comprises an endless series of steps 12
running between a lower landing 10 and an upper landing
11. Assuming an up travelling stairway, at the lower
landing the steps 12 emerge from under combplate 17,
travel a short distance in platform formation and then
gradually take a step formation. They thus move up
the incline and near the upper landing 11, gradually re-

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turn to a platform formation and disappear under comb-
plate 18. Moving in synchronism with the steps is hand-
rail 20. The interior side wall of the moving stairway
between the handrail and the steps comprises a balustrade
21. This balustrading is made up of individual balustrade
panels 13 with molding strips 23 covering the joints be-
tween each panel. Below the balustrade panels is the
skirt panelling 22 which likewise is made up of indi-
vidual panels but here, however, the panels designated
14 are simply butted together and no molding is used.
As the skirt panelling is located where it can inadvertently
be kicked and be subject to similar hard wear, it is gen-
erally assembled from panels of rigid ply-metal. This
invention contemplates the use of fabricated panels con-
structed as is shown in Figures 2, 3 and 4 to which
reference will now be made.

The panel comprises what is known as a core 24, a
face 25 and an edge band 26. These three elements
as assembled in a preferred construction will be considered
separately.

The core is the portion of the panel which lends rigidity
thereto and which thus resists the flexural stresses to
which the panel may be subject. Although many ma-
terials may be used in the core depending on the applica-
tion of the panel and the desired rigidity thereof, an
aluminum honeycomb core has been found satisfactory
for the use contemplated. This not only provides a rigid
construction which freely transmits light but also presents
a pleasing architectural effect, especially in view of the
light reflections obtained from the interior of the cell
structures.

Although the fabrication of a core may be accom-
plished by numerous methods, reference will be made
to but two ways of forming a honeycomb core. By one
method, sheets which have been corrugated to provide
parallel flat surfaces disposed alternately on either side
of a median plane are suitably bonded together to form
a honeycomb structure. Cores of the desired thickness
can then be sliced off the assembled honeycomb. In
another method of forming a core, flat sheets of the
core material are stacked one upon another. Each sheet
is bonded to the next adjacent sheet by spaced parallel
strips of adhesive. The strips of adhesive are arranged
such that those between say the second and the third
sheets are disposed between the adhesive strips between
the third and fourth sheets and the second and first sheets.
Strips are then sliced off the assembled sheets transverse
to the adhesive bond and the top and bottom layers
of the strip are separated to form an expanded honey-
comb.

The next portion of the panel to be considered is the
face 25. For the application herein disclosed a face of
light transmitting material, preferably transparent, is used.
Thus, the panel formed is an efficient transmitter of light.
A clear acrylic plastic has been found suitable as a face
material for use in a skirt panel.

The edge band 26 is to facilitate the mounting of the
panel to the moving stairway structure. For this, a num-
ber of materials may be used which may be opaque or
clear. In the preferred construction, an opaque plastic
edge band has been used except for the banding 27 at
the panel edge which butts the next adjacent panel, which
banding 27 is of clear plastic.

The assembly of the components into finished panels
may be accomplished by many methods depending on
the materials used for the core and the face and on the
adhesives used. In some instances, the air spaces in
the honeycomb are exhausted to secure a satisfactory
bond of the face material to the core. In an application
as herein contemplated, further consideration is given to
obtaining an even coating of adhesive over the edges of
the honeycomb so that the panel presents a uniform ap-

pearance. The following has been found a satisfactory means of fabricating a panel. All components are cut to size and trial fitted in an assembly jig. After trial fitting, the components are removed and the core and the acrylic faces, which have been used for the transparent face material, are coated with an adhesive solution having the following composition:

100 parts of methyl methacrylate monomer;
25 parts of methyl methacrylate polymer;
2 parts of benzoyl peroxide.

The component parts are then reassembled and a vacuum is produced within the panels by the removal of air through a small port in one of the edge bands, a perforation in each of the honeycomb cells of the core, enabling this operation to be effected. The vacuum causes atmospheric pressure to compress the panel. Meanwhile, the panel is heated to about 120° F. which brings about polymerization of the adhesive and results in a firm bond between core and face and edge bands. It is to be understood that other transparent face materials may be used such as a clear rigid vinyl plastic and other fabricating methods could, therefore, be employed.

The panels can also be assembled by other methods. For example, rather than bond the face material to the core, it will in many cases be satisfactory to simply bond the face material to the edge bands and permit the core to be held snugly in place by the edge bands and the face material. In such a case, the edge bands may be considered as forming a framework. This method of fabrication is particularly suitable to panels having large face areas. With this construction, if the face area is comparatively large, it may be desirable to place additional members as stiffening ribs in the panel to which the face material can be secured. These ribs divide the face into small areas wherein it is not secured to the core, thus reducing the tendency for the face to flex and move away from the core. Panels assembled in this manner obtain their rigidity from the framework and face alone; the core serving as a light louvre.

The construction of a panel as herein considered for light transmitting purposes has many advantages. By varying the size of the honeycomb openings the "cut off" angle is likewise varied. This angle is the maximum angle which a person's line of sight may make with the sides of the honeycomb and still enable a person to see through the honeycomb. Considering a honeycomb of a fixed thickness, the smaller the honeycomb opening the smaller the "cut off" angle and the closer a light source may be brought to the honeycomb without being visible to a person viewing the panel. This assumes, of course, that the line of sight of a person looking at the panel does not fall within the "cut off" angle, which condition is the prevailing one in the application herein disclosed. For such application, a core thickness of one-quarter inch ($\frac{1}{4}$ ") and a honeycomb opening of one-quarter inch ($\frac{1}{4}$ ") have been found satisfactory. It is to be understood, of course, that these dimensions can be varied depending on the ultimate use of the fabricated panel.

Reference will now be made to Figure 5. Moving stairway truss member 30 runs the full length of the stairway and it supports at spaced points posts 31. Post 31 and truss member 30 support angle bracket 32 which in turn supports angle bracket 33, the brackets being welded together. Provision is made for varying the vertical height of bracket 32 as by shims 34 and elongated hole 35 in post 31. Flat plate 36 is spaced from bracket 33 by nuts 37 and threaded bolts 40. Plate 36 in conjunction with clamps 41 firmly grasp ribs 42 and 43 on extrusions 44 and 45 respectively. The extrusions run the full length of the stairway and are supported at spaced points as herein described. The skirt panelling 22 is secured to the extrusions by means of screws 46 which enter the edge bands 26 of the panels 14. A mold-

ing strip 47 is secured over the joint between the balustrade 21 and the skirt panelling 22.

The light source 48 is positioned inside the balustrading and is illustrated as a fluorescent lamp. The lamp holder brackets 50 are mounted on a batten 51 which is secured to truss member 30. Although a fluorescent lamp is illustrated, it is to be understood that other type light sources, as for example, cold cathode lighting may be used. A reflector 52 is also provided for more effectively utilizing the available light. The skirt panelling, thus illuminated, presents a pleasing architectural appearance which is enhanced by the light reflections from the sides of the honeycomb openings in the core. The lighting and the reflectors run along the entire length of the stairway on both sides thereof. This arrangement insures complete shadowless illumination of the step treads from the time the steps emerge from under the combplate at the entrance end of the stairway to the time they disappear under the combplate at the exit end of the stairway.

While the invention contemplates the use of illuminating panels for use as moving stairway skirt panelling, similar panels may be used for the balustrade panelling. The illuminated panels may also be located only where the moving steps emerge from under or disappear under the combplates, particularly at the entrance end of the stairway. Also, light sources of various colors may be used or face material of transparent colored materials may be used to obtain different lighting effects. In addition, the skirt panelling may be illuminated in other ways. Also, the panel may find ready use in other applications in which an illuminated panel is desired. In certain applications it may be desirable to have a translucent rather than a transparent panel face. In addition, the core need not be of a honeycomb pattern but may assume any other geometric design.

It is thus apparent that many changes could be made from the disclosure without departing from the scope or spirit of this invention and, therefore, all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

A moving stairway in which an endless series of steps run from one landing to another between a pair of balustrades, each of which comprise skirt panelling at the sides of the steps and balustrade panelling above the skirt panelling, and in which the stairway is illuminated by means of transmitted light from illuminating means within the balustrades, characterized in that the skirt panelling is formed of abutting light transmitting panels through which said light is transmitted, each light transmitting panel comprising a frame formed of plastic edge bands and plastic intermediate stiffening ribs forming sections, front and back plates of light transmitting plastic material bonded by polymerization to said edge bands and stiffening ribs, with the front plate presenting a smooth outer surface adjacent the steps, and a honeycomb core of light reflective material positioned within each section between said plates, and that the illuminating means are in back of the skirt panelling, the openings of said cores being transverse to said sheets to direct the light onto said steps.

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