

Oct. 12, 1965

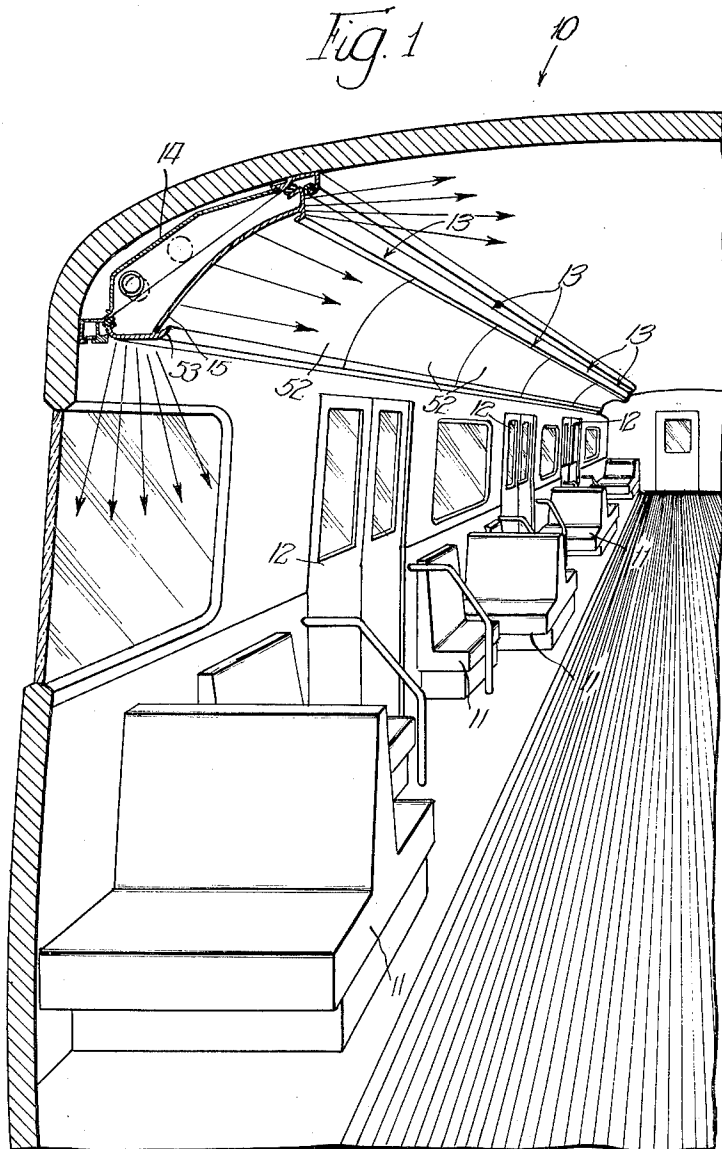
N. H. SCHWENKLER

3,211,904

LIGHTING FIXTURE

Filed March 6, 1964

3 Sheets-Sheet 1



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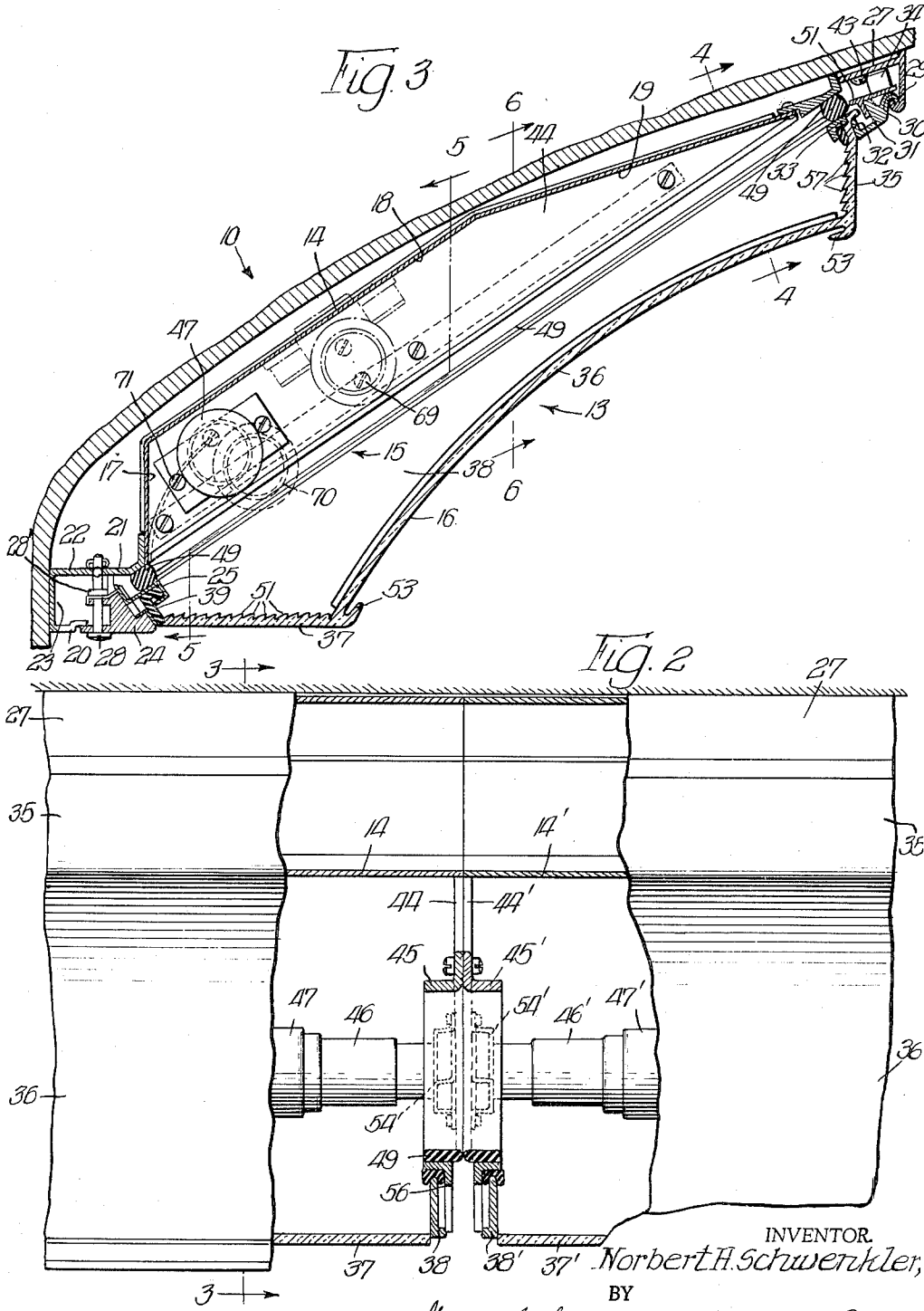
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

Fig. 8

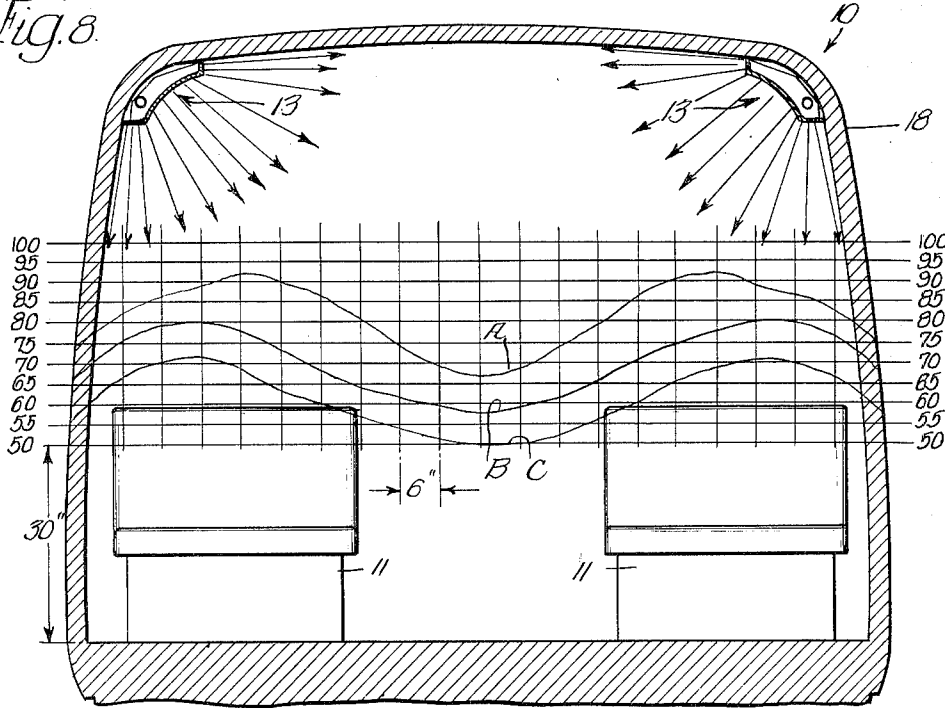


Fig. 7

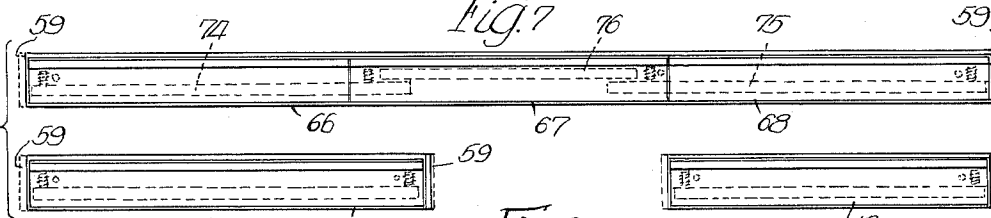


Fig. 5

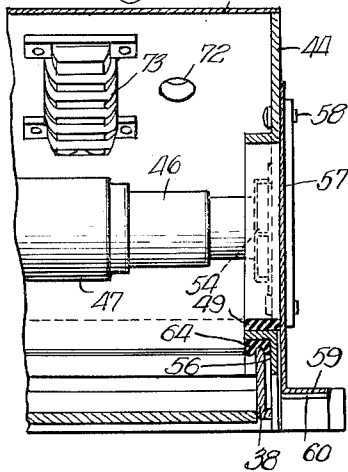


Fig. 6

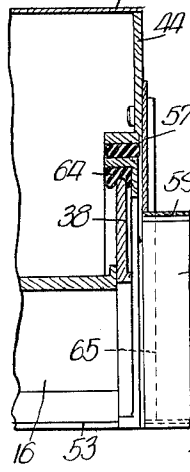
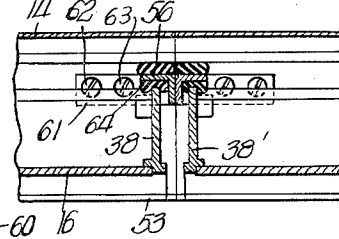


Fig. 4



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3,211,904

LIGHTING FIXTURE

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Filed Mar. 6, 1964, Ser. No. 350,002
2 Claims. (Cl. 240—7.35)

This application is a continuation-in-part of my co-pending application, Serial No. 256,431, filed February 5, 1963, and relates to lighting fixtures in general, and more specifically is directed towards a multi-purpose light fixture of compact design which provides for substantially even intensity light concentrated in a pre-selected area while simultaneously providing general illumination of lesser orders of intensity for advertising display and general lighting purposes.

It is an object of this invention to provide a new and improved form of lighting fixture of simplified and uncomplicated design capable of establishing at least one area of concentrated illumination of substantially even intensity and at least one area of general illumination of a lesser order of intensity with both areas being established as a direct result of the unique arrangement and design of the basic fixture parts.

Another object of this invention is to provide a new and improved lighting fixture particularly adapted for efficient cornice type mounting in a vehicle, such as a passenger carrying train, subway car, bus or the like, with the fixture being capable of simultaneously providing multiple areas of controlled illumination including one area of concentrated light as well as areas of general illumination for display purposes and passenger safety.

A further object of the invention is to provide a new and improved vehicle interior lighting arrangement utilizing a unique form of light fixture of uncomplicated design having a light transmission panel associated therewith which has distinctly arranged light transmitting sections for establishing multiple illumination areas, including one area for general illumination, another area for concentrated illumination and still another for advertising illumination.

It is a further object of this invention to provide a light fixture of simplified design which is exceedingly flexible in that additional light sources may be added without generally affecting the level of intensity in the concentrated area or requiring change in the fixture construction.

It is a further object of this invention to provide a new and improved light fixture of simplified design which provides multi-purpose lighting while being easily shaped to fit in a wide variety of environments without requiring design change.

Further and fuller objects will become readily apparent when reference is made to the accompanying drawings wherein:

FIG. 1 is a fragmentary perspective sectional view of a portion of the interior of a passenger vehicle provided with the new and improved lighting fixture of the present invention;

FIG. 2 is a fragmentary elevational view of adjacent end portions of a pair of lighting fixtures with portions broken away to illustrate the relative positioning of adjacent fixtures when mounted in an end-to-end arrangement;

FIG. 3 is a transverse section through one of the light fixtures as viewed generally along the lines 3—3 of FIG. 2;

FIG. 4 is a fragmentary section of an end portion of a fixture taken generally along the lines 4—4 of FIG. 3

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FIG. 5 is a cross sectional view of an end portion of the fixture taken generally along the lines 5—5 of FIG. 3;

FIG. 6 is a fragmentary cross sectional view taken along the lines 6—6 of FIG. 3 illustrating the construction of the longitudinal center section at one end of the fixture;

FIG. 7 is a schematic elevational view of two types of fixture arrangements; and

FIG. 8 is a graphic representation illustrating the level of illumination intensity of the fixture when used in connection with the vehicle illustrated in FIG. 1.

Modern day transportation facilities such as trains, subways, buses, and the like have been designed with the passenger's comfort specifically in mind. One facet of passenger comfort which is of primary importance is the necessity of providing adequate interior lighting to permit the passengers to read, while keeping initial expenditures within reasonable economic limits. Individual or spot type reading lamps are not only objectionable from the standpoint of excessive cost, but if used alone also serve to create areas of diverse levels of light intensity which oftentimes contributes to passenger eye discomfort. When considered for use in connection with short haul, low cost transportation systems, installation and maintenance of suitable individual or spot type lighting systems is considered prohibitive largely for economic reasons.

The present invention is particularly adapted for use in transportation facilities such as subways, buses and the like due to its rather flexible design, low cost of installation and maintenance, and the type of lighting provided. When the present invention is used in one of the above enumerated environments, it simultaneously provides: an area of concentrated substantially even intensity light for passenger reading purposes; a second area of indirect concentrated light for general illumination purposes; and, an intermediate area of diffused light for display and advertising illumination. A single light is adequate as a source for the multiple purposes stated, or a double source may be used without requiring modification of the fixture, thus exemplifying the flexibility and versatility of the design.

As previously noted, the fixture is of uncomplicated construction when compared with existing devices which do not provide the advantages noted, generally including a light source housing, a light source and a light transmission panel with the panel being of a subdivided nature to provide the selected areas of illumination discussed above.

Referring now to FIG. 1, reference character 10 indicates approximately one half of the interior of a passenger transporting vehicle. The vehicle includes along opposite side wall areas a series of spaced passenger accommodating means such as the seats indicated at 11. A plurality of passenger door loading areas 12 may also be provided in the side walls of the vehicle to facilitate passenger ingress and egress. A generally arcuate cornice is provided at the junction of each side wall and ceiling portion and serves as a mounting for the cornice type lighting arrangement of the present invention which includes a plurality of longitudinally elongated lighting fixtures 13 which are arranged in end-to-end abutting relation. Generally, the lighting fixture arrangement extends the full length of the car as well as being symmetrically arranged on opposite sides of the longitudinal center line of the car.

As is evident upon inspection of FIG. 1, the available area for mounting the fixture is quite limited, the lower limit being defined by the windows and doors while the ceiling of the car in most instances defines the upper limit. The total vertical depth or thickness of the fixture is lim-

those passengers standing or arising from their seats to leave the vehicle.

It is necessary to utilize the cornice area for mounting in order to provide adequate illumination over the seats for reading, as well as to provide for the proper inclination and maximum area for effective advertising and indirect general illumination. The limitation imposed by the shape of the available mounting area necessitates a unique design as will become evident. Since the vertical depth or fixture thickness is also limited as noted above, problems are encountered as to the placement of the light source to provide the necessary lighting efficiency, while avoiding bright spots which cause discomfort to the passenger and are considered to be injurious to the eyes over prolonged periods. Additional sources are oftentimes added to balance bright spots, however, this is objectionable in that it results in a substantial increase in the initial cost of the fixture as well as being quite costly to operate. It will become evident that a single source strategically placed in a properly designed fixture can not only serve the diverse needs within the cost and space limitations imposed, but also provide the greatest advantages.

Referring now particularly to FIGS. 2 and 3, each lighting fixture 13 basically includes a light source housing 14, a light source 15 mounted within the housing 14 and a light transmitting panel assembly 16 enclosing the housing 14 and light source 15. As is best seen in the cross sectional view of FIG. 3, the housing 14 is of generally concave configuration to conform to the generally arcuate configuration of the cornice area joining the side wall and ceiling portions. As seen in FIG. 1, the light transmitting panel 16 is longitudinally elongated, presenting an exterior or outward appearance of being generally concave at its central section with the area of concavity being sharply defined by a horizontal lens portion at the lower end, and a generally vertical lens portion at the upper end.

The housing 14 may be formed of relatively thin metal and as seen in FIG. 3, is shaped to provide a plurality of angularly related flat surfaces 17, 18 and 19. A coating of primer may cover the outside of the housing 14 for preservation of the metal surface with the interior suitably finished to provide the necessary reflective characteristics. For this purpose, a white high gloss enamel surface has been used with excellent results since the reflections from this type of surface due to the low order of incidence angle is, for all practical purposes, the same as a specular surface while being less expensive to produce. The foregoing presupposes proper placement of the light source 15 relative to a housing designed within the concepts set forth hereinafter.

A longitudinal mounting rail 22 supports the lower margin of the light fixture 13. Lower and upper leg members 20 and 21 form a channel which permits the mounting rail 22 to be easily affixed to the car wall by means of a series of fasteners 23 which are ultimately hidden from view. A continuous door or trim rail 24 abuts the lower leg member 20 and provides a mounting for a sealing flange 25 which is joined thereto by means of a threaded fastener or the like. The upper portion of the sealing flange 25 is spaced from a diagonally extending portion on the upper leg member 21 of the mounting rail 22 to provide a longitudinally continuous pair of spaced sealing flanges.

The door rail 24 may be removably joined to the mounting rail 22 by a series of fasteners 28 which extend through the door rail 24 into engagement with the upper leg 21 on the mounting flange 22. A nylon retainer washer 28' may be provided on the shank of the fastener 28 allowing the door rail 24 to be released from the mounting rail 22 to gain access to the interior while maintaining the fastener 28 on the door rail 24.

The upper longitudinal margin of the housing 14 is affixed to a longitudinally continuous hinge rail 27 by

the hinge rail 27 into suitable holes in the ceiling to join the housing to the vehicle. The upper or hinge rail 27 includes a continuous depending hook-like hinge portion 29 which receives therein a co-operating hook-like hinge portion 30 forming a part of a longitudinally continuous hinge member 31 which joins the light transmitting panel assembly 16 to the upper rail 31 for swinging movement.

An upwardly and inwardly projecting flange portion 32 on the hinge member 31 engages the underside of an outwardly and upwardly projecting flange portion 33 integral with the light transmitting panel assembly 16. A retainer clip 51 holds the flanges 31 and 33 in engagement being hooked at one end into a shallow channel formed adjacent the flange 33 and extending outwardly over the hinge member 31 terminating adjacent the hook shaped portions 29 and 30. A wave spring 34 acts through the end of the retainer clip 51 to maintain the hook-like hinge portions 29 and 30 in mutual engagement, while permitting the same to freely pivot relative to the rail during the opening and closing of the fixture.

The light transmitting panel assembly 16 is generally U-shaped as viewed in cross section and is closed at both ends to form a generally box-like structure. A longitudinally extending vertically disposed lens portion 35 is formed at the inner marginal portion being integral with an intermediate display section 36 which merges with a longitudinally extending generally horizontal lens section 37. The sections 35-37 may be integrally formed from any suitable material such as plastic material or the equivalent with the entire panel being readily fabricated by extrusion when formed of plastic or the like. It is contemplated that the extruded section will be cut to the appropriate length and the end wall sections suitably attached thereto. The upright end wall sections 38 may be also formed from plastic material having lower marginal edge portions which generally conform to the cross sectional configuration of the light transmitting panel assembly 13. The vertical depth of the fixture adjacent the lens section 35 is less than the vertical depth at the horizontal section to increase the available head room towards the center of the vehicle.

The horizontal lens section 37 of the light transmitting panel 16 is provided at its terminal or marginal edge with an upwardly projecting hook-like portion 39 which is received within a U-shaped mounting portion on the sealing flange 25. When the door rail 24 is released by releasing the fasteners 28, the light transmitting panel assembly 16 may pivot in an arcuate path about the upper hinge rail 27 to gain access into the interior of the fixture. When the light transmitting panel assembly is in the position shown, a continuous gasket 49 is clamped between the leg members 21 and the locking flange 25 to seal the inner marginal edges of the housing and light transmitting panel assembly 16 against stray light and/or dust. The gasket 49 also extends transversely of the fixture, being squeezed between the end panels 38 and the end plates 44 on the housing, as well as longitudinally between the flange 33 on the panel 16 and the upper hinge rail 27 to provide a continuous marginal seal.

As noted above, the opposite ends of the housings are partially closed off by end plates 44 having inner flanged marginal edge portions 45 for co-operation with the gasket 49. Light source mounting means in the form of channel shaped flanged socket mounting members 54 are suitably joined to the inner surface of the end plates 44. Mounted on the socket mounting members are sockets 46 of known type which suitably mount therebetween a tube type fluorescent lamp 47 serving as the light source.

As seen in the cross sectional view of FIG. 2, when the fixtures are arranged in end-to-end relation as shown schematically in the top half of FIG. 7, the adjacent fixture is of identical construction having an end plate 44' terminating in a lower marginal flange 45'. A socket mounting member 46' is illustrated at 54' providing a

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