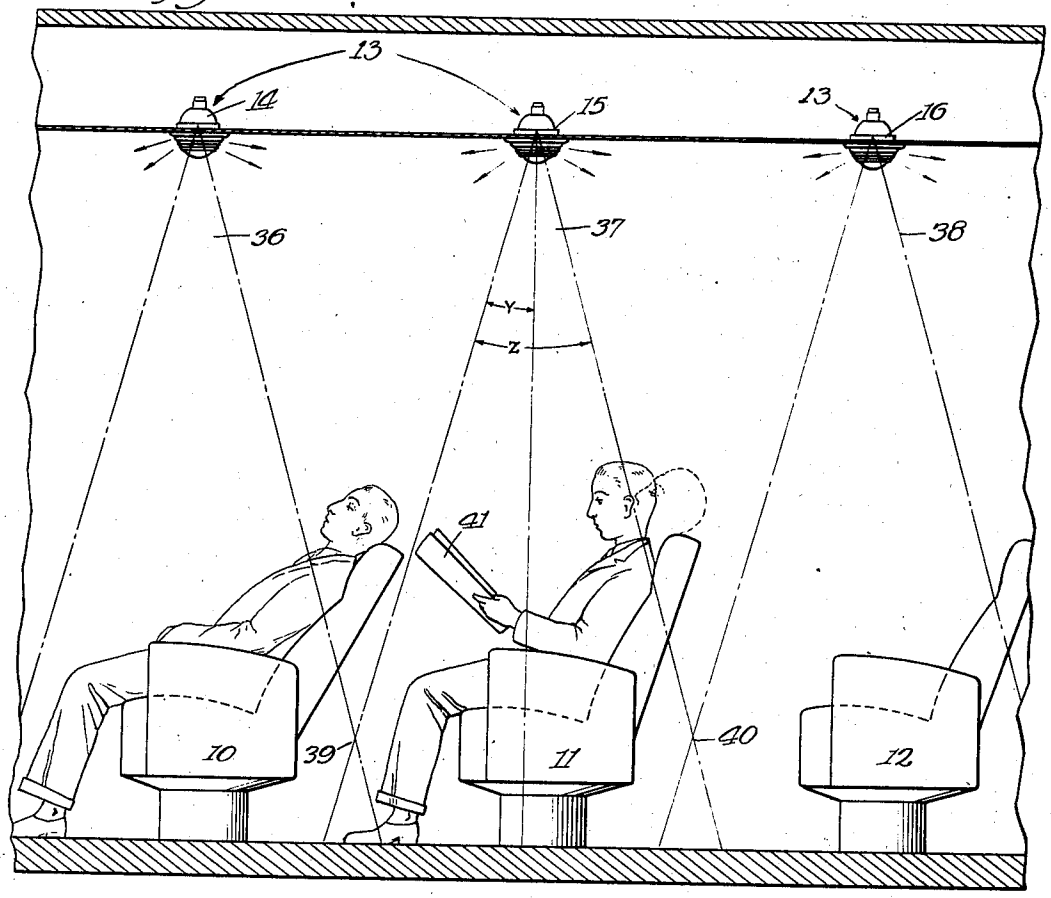
June 11, 1940. L. L. STEWART 2,204,327

LIGHTING FIXTURE FOR RAILWAY CARS AND THE LIKE

Filed Dec. 31, 1937 2 Sheets-Sheet 1

Fig. 1



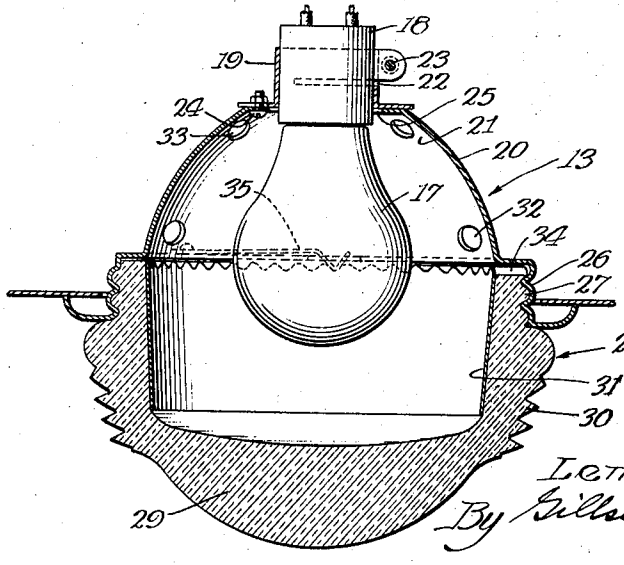


Fig. 2

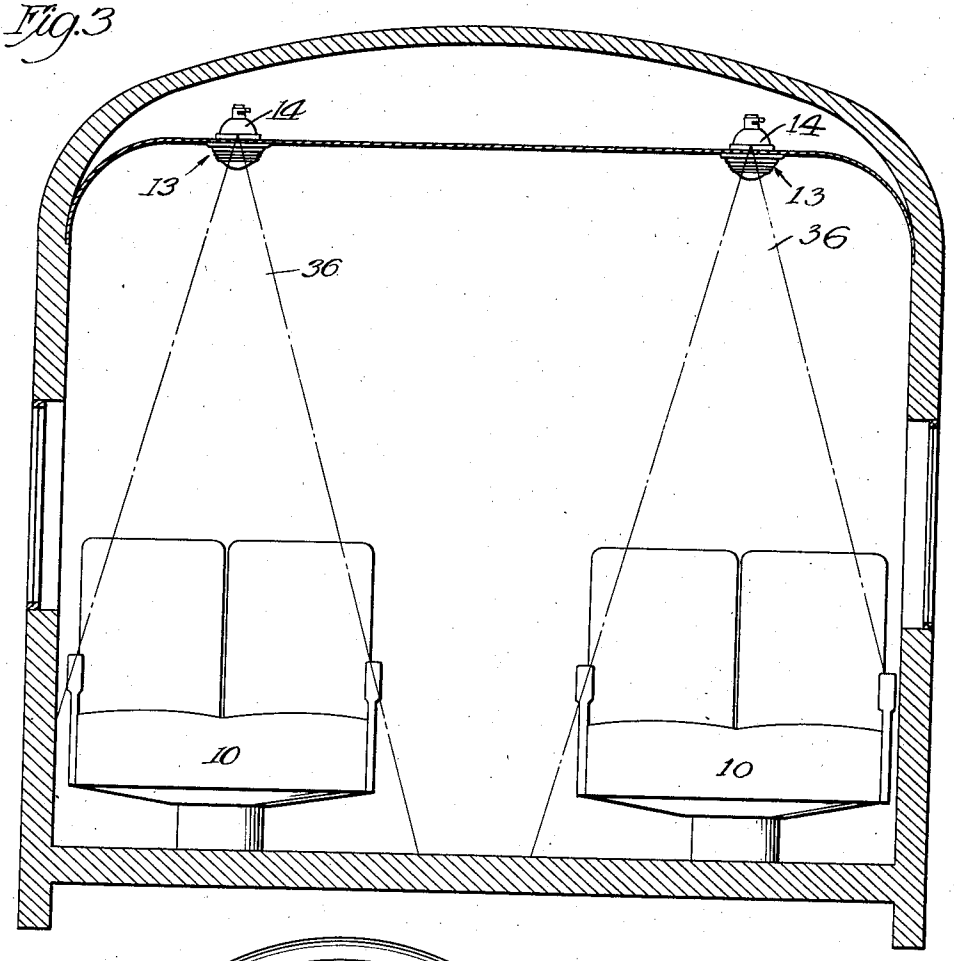
Inventor:
Lemuel L. Stewart
By Gilson, Mann & Gilson
Attys.

June 11, 1940. L. L. STEWART 2,204,327

LIGHTING FIXTURE FOR RAILWAY CARS AND THE LIKE

Filed Dec. 31, 1937 2 Sheets-Sheet 2

Fig. 3



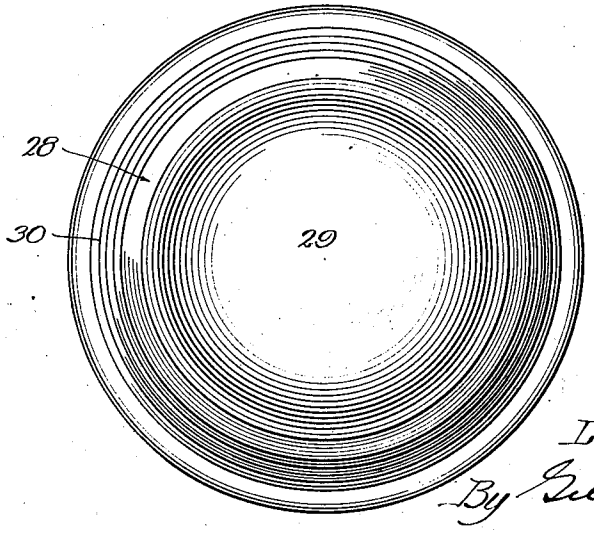


Fig. 4

Inventor:
Lemuel L. Stewart
By Gilson, Mann & Kof
Attys.

Patented June 11, 1940 2,204,327

UNITED STATES PATENT OFFICE

2,204,327

LIGHTING FIXTURE FOR RAILWAY CARS AND THE LIKE

Lemuel L. Stewart, Elkhart, Ind., assignor to The Adlake Company, a corporation of Illinois

Application December 31, 1937, Serial No. 182,861

1 Claim. (Cl. 240—7.35)

Due to limitations in available power, lighting fixtures used on railway cars, buses, and the like should provide sufficient illumination at the reading plane for easy reading, but no more general illumination than is required for practical purposes. Highly efficient, specially designed lighting fixtures are necessary to meet specifications of this kind, and it is the principal object of this invention to provide such fixtures and to so arrange and control their distribution of illumination that the vehicle can be adequately and comfortably illuminated with a minimum amount of electrical power.

In U. S. Patent No. 2,020,273, issued November 5, 1935, to Patent License Corporation of Chicago, assignee of Albert L. Arenberg, the general problem of illuminating vehicles, where power is limited, is recognized, and the tendered solution is to utilize a lighting unit over each car seat throwing vertical beams which have a spread sufficient to cause the reading plane for any given car seat to fall within the overlapped beams of the overhead lighting unit and the lighting unit immediately in front of that unit. The patentee claims that the overlapping of beams from adjacent units on the reading plane gives rise to great efficiency in properly illuminating the reading plane without producing glare or other objectionable lighting characteristics.

It is the object of this invention to improve on the Arenberg arrangement by intensifying the illumination of the reading plane directly below each fixture without increasing the power input into the fixture, and at the same time to control the distribution of light so as to keep the beam of light out of the eyes of the passenger seated below the fixture when he is in a semi-reclining or reclining position. This is accomplished by narrowing the light beam issuing from each fixture to increase its efficiency by limiting the beam more nearly to the reading plane area below and preventing the beam from one fixture from extending to the reading plane of the passenger seated directly in front or in back of the fixture. It is a well known fact that a given beam of light falling on an inclined plane produces illumination on the plane which is equal to the illumination on a normal plane multiplied by the cosine of the angle which the inclined plane makes with respect to the beam of light. Where the angle is large, the illumination is almost zero.

By applying this rule to the particular arrangement of lights and seats disclosed in Fig. 1, it is evident that the greatest intensity of light on the reading plane over each seat is produced by the fixture directly over that seat, and that, if the beam of light from either the fixture directly in front or in back of this seat were spread so as to illuminate the reading plane over this seat midway between these fixtures, the added illumination produced on this reading plane would be almost negligible, and, at the same time, by spreading this beam of light the intensity of the light on the reading plane directly below each fixture is greatly reduced.

It follows, therefore, that, for a given number of lumens input, by narrowing the beam of light issuing from each fixture the foot candle illumination of the reading plane below is intensified, thereby increasing the efficiency of each fixture.

It is also evident that, by narrowing the light beam from each fixture to prevent overlapping of light beams on any reading plane, the reflection which would be produced from glossy paper from which the passenger may be attempting to read will be greatly reduced, if not eliminated.

Another advantage is that a person may rest his head on the back of the seat, or in the event the seats are reclining, can rest in an inclined position without having the beam of the lighting unit overhead or in rear striking his eyes. This is a great advantage in coaches which make overnight runs, and there are many in such use today.

These and other advantages will become apparent as the disclosure proceeds and the description is read in conjunction with the accompanying drawings, in which

Fig. 1 is a diagrammatic, elevational view taken along the aisle of a railway coach equipped with a lighting system constructed in accordance with this invention;

Fig. 2 is a cross-sectional view showing the preferred form of lighting unit;

Fig. 3 is a transverse cross-sectional view through the car; and

Fig. 4 is a bottom plan view of the lighting unit.

The interior of a railway coach is shown in Fig. 1 having seats 10, 11 and 12 arranged in tandem, which for convenience may be called first, second and third seats. Directly over each seat is a lighting unit, generally designated 13, the unit over seat 10 being designated 14, the unit over seat 11 being designated 15, and the unit over seat 12 being designated 16, or the three units may be referred to for convenience as the

first, second and third lighting units, respectively.

The lighting units 13 each comprise a lamp 17 of standard make which is supported in a socket 18 adjustably held by a collar 19 mounted on the top flat surface of a reflector 20. The reflector 20 is shown as a sheet metal stamping having a highly polished, chrome plated, or otherwise mirrored reflecting surface 21, and the most suitable contour for the reflecting surface may be readily determined by persons skilled in the art.

The collar 19 is split, as indicated at 22 to provide a jaw which when loosened, permits the lamp socket 18 (and hence the lamp 17) to be raised and lowered, and the socket may be clamped in any desired position by drawing the jaws of the clamp together with a screw 23.

The lamp 17 may also be adjusted laterally by unloosening the screw 24, whereupon the collar 19 with the lamp and socket may be moved to its desired lateral position within an enlarged opening 25 in the top of the reflector, after which the screw 24 is tightened to hold the adjustment.

The mouth of the reflector is provided with screw threads 26 to receive mating threads 27 of the lamp cover, generally designated 28. This cover is preferably made of glass, or other transparent material, as for example certain plastics of which the following are the most desirable:

Phenol-formaldehyde compound
Urea formaldehyde compound
Methyl-methacrylate resin
Cellulose acetate

The cover includes a lens portion 29 having a radius of curvature and other optical properties suited for the formation of a vertical beam which preferably has a circular cross section but which may have a somewhat elliptical cross section in order to provide better coverage of adjacent seats (see Fig. 3). The exact size and shape of the beam may be adjusted within limits by vertical and lateral adjustments of the lamp 17 and the range of desirable beam widths for a car and seat arrangement of given proportions (as illustrated in Fig. 1) is indicated by the angles Y and Z.

The desired foot candle illumination of the reading plane determines to a large extent the wattage of the lamp that is used, but the general illumination of the car interior, in addition to that furnished by the light beams, must also be considered. In the lighting unit shown in the drawings, particularly in Fig. 2, the side distribution or general illumination is controlled by annular ribs or prisms 30, and if desired, a color screen 31 may be interposed between the light source and the inner side wall of the cover 28 to add a touch of color to the main vertical beam, and a greater amount of color to the light rays which provide general illumination.

The reflector 20 is preferably ventilated as indicated at 32 and 33 although the use of suitable material, such as aluminum, for the reflector 20 may obviate the need for ventilating openings.

The top edge of the cover 28 is serrated, as indicated at 34, to cooperate with a spring pawl 35 which prevents the cover from being accidentally loosened by the car jarring.

By referring to Fig. 1, it will be seen that the beams, or shafts of light 36, 37 and 38, of the lighting units 14, 15 and 16, respectively, intersect at points 39 and 40 which are substantially below the reading plane. The reading plane for the seat 11 is indicated by the paper 41 held by the person occupying the seat, and it will be seen that this reading plane is adequately covered when the beam has a longitudinal width corresponding to the angle Y. This dimension of the beam can be increased to correspond with the angle Z without departing from the spirit of the invention, for when the beam has this angle, the person in seat 10 can rest in an inclined position with the car seat thrown to a corresponding position without having his eyes in either the overhead beam, or the beam directly in rear. Likewise, the person sitting in seat 11 can rest his head on the back of seat 11 (without having the seat reclined) and not have his eyes in any one of the beams from the overhead lighting units.

Obviously this arrangement more nearly suits actual conditions than any other lighting system heretofore devised, for with this system, not only is the car efficiently illuminated, but each passenger can suit his own convenience in the matter of reading or resting.

When the vertical beam is limited in its longitudinal spread to an angle corresponding to the angle Y, the lens 29 must have a shape which provides a somewhat wider transverse distribution of the beam to accommodate adjacent seats, or double lens may be used.

It should be understood that the reflector behind the lamp may have various shapes and finishes, as conditions and personal preference require.

Although the invention has been described with particular reference to railway coaches, it may also be advantageously used in other vehicles or locations.

The means of accomplishing the desired ends may be widely varied and the specific description and illustration of a preferred form of the invention are merely in compliance with section 4888 of the revised statutes. The claim, therefore, is to be construed as broadly as the prior art will permit.

I claim:

In a vehicle having a first, second, and third seat arranged in tandem, each seat having a movable back adapted to be tilted to a reclining position and also each seat being closely adjacent to the reading plane over the seat behind, a lighting unit over each seat, each of said lighting units comprising means including a source of light for directing a beam of light downwardly from the source onto the reading plane below the beam, the beams from adjacent fixtures intersecting substantially at the floor line so as to provide illumination over the floor area between the seats, the beam for each seat providing adequate illumination of the reading plane immediately below but being restricted so as to pass in front of the eyes of the occupant in the seat directly below when the occupant is resting his head on the back of the seat and in back of the eyes of the occupant of the seat directly ahead when the latter occupant is in a reclining position.

LEMUEL L. STEWART.