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[54] TURN SIGNAL INDICATING SYSTEM

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[52] **U.S. Cl.**.....**340/87,** 340/81, 340/107, 350/153, 350/154

[51] **Int. Cl.**.....**B60q 1/38**

[58] **Field of Search**.....340/52, 55, 67, 73, 81; 40/34; 350/153, 157, 159

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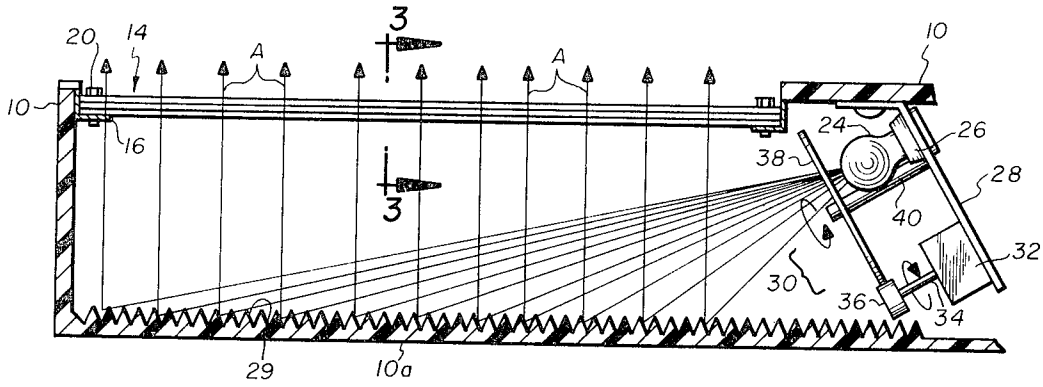
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Attorney—Lane, Aitken, Dunner & Ziems

[57] **ABSTRACT**

A turn signal indicating system for a vehicle wherein a rotary and a stationary polarized sheet are mounted with respect to an end of a vehicle, along with a light source. A light intercepting sheet having a pattern of embossed lines formed thereon is disposed in the path of the light between the polarized sheets so that, upon rotation of the rotary sheet, traveling shadows are produced which give the illusion of linear motion in the direction to be turned.

9 Claims, 7 Drawing Figures



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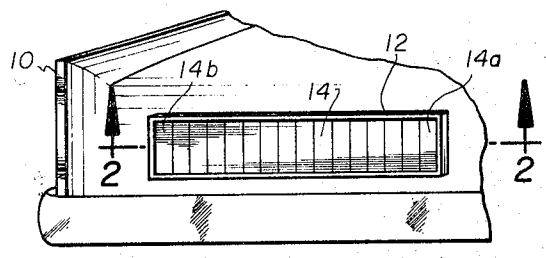


FIG. 1

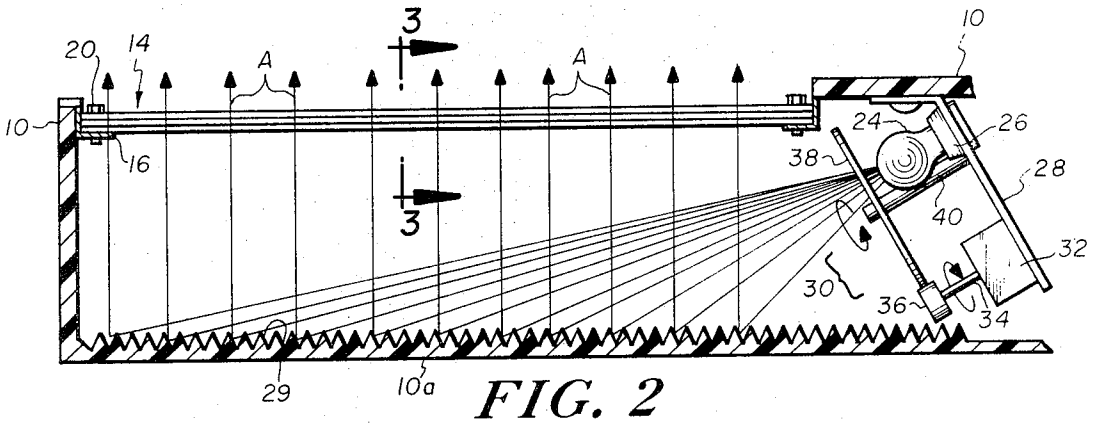


FIG. 2

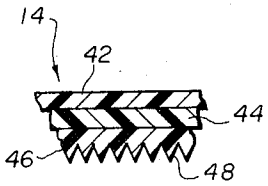


FIG. 3

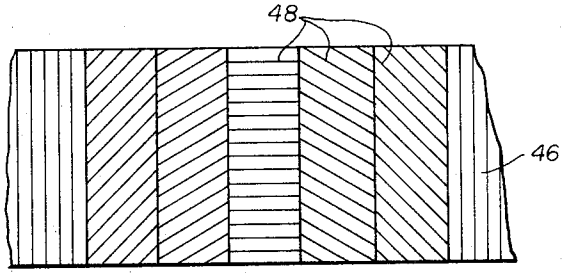


FIG. 4

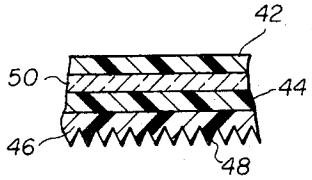


FIG. 5

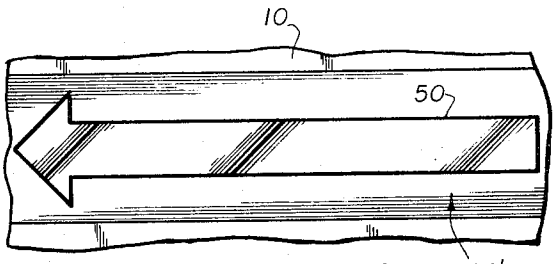


FIG. 6

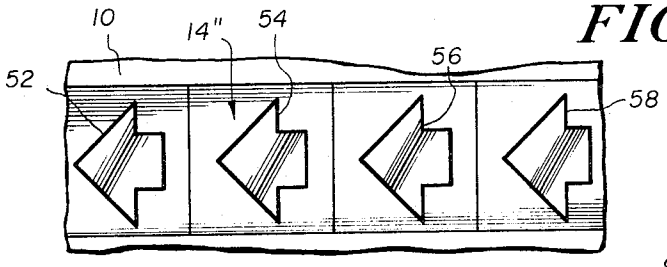


FIG. 7

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TURN SIGNAL INDICATING SYSTEM

BACKGROUND OF THE INVENTION

In my earlier U.S. Pat. No. 3,437,401 a light intercepting sheet is disclosed which can be interposed between a stationary polarized sheet and a rotary polarized sheet. Light passing through the three components will produce traveling shadows which give the illusion of motion. The light intercepting sheet can be embossed with a wide variety of patterns of motion lines and by relating these patterns to art work placed in front of the stationary polarized sheet, the portions of the art work overlying the patterns of motion lines will appear to be animated.

SUMMARY OF THE INVENTION

It is an object of the present invention to apply the above arrangement to a turn signal indicating system for a vehicle so that, upon a signal from the driver of the vehicle, the system will give the illusion of linear motion in the direction to be turned. This motion can take several forms. For example, it can appear as a sequential or continuous lighting of a series of successive portions of a strip of a light transmitting material, such as the type normally utilized in connection with the tail lights or brake lights of a vehicle. Also, the motion may appear as a sequential, off and on, or continuous movement of letters or figures on the tail light, such as, one or more arrows.

Other objects and features of the invention will become apparent to one skilled in the art when referring to the following description taken in conjunction with the accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a partial rear perspective view of a vehicle incorporating the system of the present invention;

FIG. **2** is an enlarged sectional view taken along the line **2—2** of FIG. **1**;

FIG. **3** is an enlarged fragmentary sectional view taken along the line **3—3** of FIG. **2**;

FIG. **4** is an example of a light intercepting sheet having a pattern embossed thereon to obtain a linear motion effect in accordance with the present invention;

FIG. **5** is a view similar to FIG. **3**, but depicting an alternate arrangement of the laminated sheets of the present invention;

FIG. **6** is a partial view of a signal pattern utilizing the sheet of FIG. **5**; and

FIG. **7** is a view similar to FIG. **6**, but showing still another signal pattern.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. **1** and **2**, the rear portion of a passenger car is shown in general by the reference numeral **10**. An elongated opening **12** is formed in the rear corner of the car **10** and receives a laminated plastic unit **14**, consisting of several sheets of plastic material bonded together, as will be described in detail later. A second unit **14** (not shown) is disposed on the other side of the car.

A small light bulb **24** is mounted in a socket **26** fixed to an internal bracket **28** mounted on the body of the car **10**. The light bulb **24** faces, and extends at an angle with respect to, a reflecting layer **29** disposed on a wall **10***a* of the car body, which wall is parallel to, and spaced from the unit **14**. The reflecting layer **29** has a plurality of parallel ridges as shown in FIG. **2**, so that the light rays from the light bulb **24** will be reflected in a direction perpendicular to the plane of the unit **14**, as indicated by the arrows A.

A polarizing unit, shown in general by the reference numeral **30**, is positioned adjacent the light bulb **24**. It comprises a small electric motor and gear reduction unit **32** mounted on the bracket **28**, and having an output shaft **34** which drives a friction wheel **36**. The friction wheel drivingly engages the edge of a circular disc or sheet **38** of a polarized material rotatably mounted on the end of a shaft **40** mounted on the bracket **28**. The sheet **38** extends between the light bulb **24** and the reflecting layer **29** to intercept and polarize the light passing to the layer **29**.

As best seen in FIG. **3**, the laminated unit **14** comprises three sheets of plastic material **42**, **44** and **46** which may be bonded together by a suitable transparent adhesive to form a three ply lamination. The sheet **42** is a light-transmitting, preferably colored, material, such as the plastic type normally used for tail lights. The sheet **44** is a sheet of polarized material, and the sheet **46** is a plastic light intercepting sheet embossed under heat and pressure with a pattern of linear motion lines **48** as shown, for example, in FIG. **4**. The embossing process orients molecules of the plastic sheet relative to the lines **48** to create the motion effect to be described. Reference is made to my above-identified application for a more detailed description of the sheets **38**, **44** and **46**, and particularly the light intercepting sheet **46**.

Upon a left-hand turn signal being initiated by the driver of the vehicle in a conventional manner by actuating the turn signal lever of the car, the light bulb **24** will be turned on, and the motor and gear reduction unit **32** will be energized to rotate the polarized sheet **38**. The light from the light bulb **24** will pass through and be polarized by the rotatable polarized sheet **38**. Due to the angular position of the light bulb, a relative wide dispersion of polarized light will be directed towards the reflecting layer **29** and reflected outwardly to illuminate the entire length of the unit **14**.

As disclosed in detail in my above application, the pattern of linear motion lines **48** embossed on the surface of the light intercepting sheet **46**, together with the rotating polarized sheet **38** and the stationary polarized sheet **44** produces traveling shadows beginning at the right end **14***a* of the laminated unit **14**, and traveling in a direction from right to left to the left end **14***b* of the unit **14**, as viewed from the rear of the car shown in FIG. **1**. Specifically, each of the rectangular portions of the unit **14** as shown in FIGS. **1** and **2** will appear light and dark in a sequence determined by the motion lines embossed on the light intercepting sheet to give a pronounced appearance of linear motion which clearly emphasizes a left turn. When the turn signal lever returns to its neutral position, the light bulb **24** and the motor **32** are de-energized.

It is understood that the light bulb **24** and the laminated unit **14** also function together as a tail light or brake light. The vehicle's electrical system is designed so that upon actuation of the brake, the lights **24** of both tail light units are turned on but the motor and gear reduction **32** are not energized. This causes the light to be reflected from the material **29** outwardly through the laminated unit **14** without any illusion of motion.

In accordance with a further feature of the present invention, a light transmitting figure of one or more arrows pointing in the direction to be turned can be incorporated in the system to produce an illusion of animated linear motion of the arrow or arrows. This is achieved by providing a transparent sheet **50** in the unit **14'**, as shown in FIG. **5**, which has art work thereon in the form of an arrow **50** (FIG. **6**).

In the embodiment of FIG. **6**, the light intercepting sheet **46** overlies only the figure of the arrow on the unit **14'**. The polarized light passing through the remaining area of the unit **14'** produces an on-off blinking effect due to the rotation of the rotary polarized sheet **38** relative to the polarized sheet **44**. This occurs simultaneously with the linear movement of the arrow itself. If desired, the entire transparent sheet **50** can be made opaque with the exception of the portion defining the arrow. With this arrangement only the arrow would appear to be animated to indicate a left turn when the turn signal lever is actuated.

Referring to FIG. **7**, a unit **14''** is shown which illustrates a modification of the arrangement of FIG. **6**. A plurality of arrows **52–58** are provided instead of one long arrow **50** as in FIG. **6**, and the light intercepting sheet **48** employed in the units **14** and **14'** is eliminated. The unit **14''** has the three sheets **42**, **50** and **44** of FIG. **5** with the four arrows being formed on the transparent sheet **50** by opaquing the area

thereof surrounding the arrows so that only the arrows are illuminated when the turn signal lever is actuated as previously described. With this arrangement, the four arrows **52–58** will continuously blink on and off during the time the left turn signal lever is actuated to signal a left turn.

If desired, the four arrows could be changed to letters to spell out the word "slow" and the light bulb **24** and electric motor unit **32** of both tail light units arranged to be energized when the driver applies the brakes of the car. The tail lights on each side of the car would then have the words "slow" blinking on and off while the brakes are applied and one or the other tail light blinking on and off when the turn signal lever is actuated as previously described.

If desired, the laminated unit **14** may be formed in a number of other ways than disclosed above. For example, in the embodiment of FIG. **3**, the unit may be a two ply lamination in which the polarized sheet **44** is omitted. In this case, the face of the light intercepting sheet **46** which does not have the embossed lines **48** thereon may be treated with a polarizing ink to polarize the area thereof overlying the embossed lines, as described in my aforementioned patent. The sheets **46** and **42** would then be bonded together by suitable transparent adhesive. Also, the sheet **42** may be omitted and the sheet **44** or the sheet **46** (treated with a polarizing ink) exposed to the exterior of the vehicle. Both of these alternatives are also possible with the embodiment of FIG. **5**, and, in addition, the transparent sheet **50** may also be omitted and the art work simply painted on the surface of the sheet **46** which has been polarized by the polarizing ink. As a still further alternative, the art work could be painted on the inner face of the sheet **42**, and the sheet **50** omitted or, conversely, the sheet **42** could be omitted and the sheet **50** exposed to the exterior of the vehicle.

In the event it is desired to maintain the sheet **42** as a separate component in either of the above embodiments so that it could be used as a tail light face plate in other applications, a unit incorporating the light intercepting sheet, the layer of polarized material, and the art work in any of the above combinations described above can then simply be placed in an overlying position with respect to the face plate.

The illusion of motion also can be obtained without the embossed line intercepting sheet **46** by using the teaching of the U.S. Pat. No. to Yates 3,054,204 granted on Sept. 18, 1962 or the U.S. Pat. No. to Burchell, et al. 2,393,968, granted on Feb. 6, 1946. In accordance with the patent to Yates, the stationary polarized sheet **44** can be made of a plurality of rectangular pieces of polarized material each having its polarizing axes oriented at a progressively varying angle relative to the preceding piece. This, in effect, forms the linear motion line pattern shown in FIG. **4**. This multi-piece, polarized sheet could then cooperate with the rotary polarized sheet **38** to produce the illusion of motion previously described.

To use the teaching of the patent to Burchell, et al., the stationary polarized sheet **44** would be retained and the embossed light intercepting sheet **46** would be replaced by a transparent sheet having a plurality of separate pieces of birefringent material, such as Scotch tape, arranged thereon at progressively varying angles to again, in effect, form the linear motion pattern of FIG. **4**. This fabricated sheet would then cooperate with the stationary polarized sheet **44** and the rotary polarized sheet **48** to produce an illusion of motion similar to that previously described.

What is claimed is:

1. In combination, a motor vehicle including a body having at least one open face; and a turn signal unit mounted on said vehicle, said turn signal unit comprising a polarized sheet rotatably mounted on said body, drive means mounted on said body for rotating said polarized sheet, a source of light mounted on said body and directed towards said polarized sheet, control means on said vehicle for controlling the energization of said drive means and light source, reflecting means mounted on said body for reflecting the light from said source passing through said polarized sheet in a direction longitudinally of said vehicle and through said open face, means mounted on said body for defining at least one light intercepting pattern of motion lines extending across said open face and intercepting the reflected light from said reflecting means, and means for polarizing said reflected light, said pattern of motion lines being oriented relative to said reflecting means and said polarizing means to produce shadows traveling laterally with respect to said vehicle and in a single direction to indicate the particular direction of turn.

2. The combination of claim **1** wherein said means for defining said pattern of motion lines comprises a light intercepting sheet extending across said open face.

3. The combination of claim **2** further comprising a light transmitting member extending across said open face in a spaced relation to said reflecting means and in the path of said reflected light.

4. The combination of claim **3** wherein said polarizing means is in the form of a stationary polarized sheet disposed adjacent said light intercepting sheet.

5. The combination of claim **4** wherein said light intercepting sheet, said stationary polarized sheet, and said light transmitting member are all bonded together by a transparent adhesive to form a laminated unit.

6. The combination of claim **1** wherein said light source and said polarized sheet are mounted relative to said body in a manner so that the light passing through said polarized sheet is directed at an angle to the longitudinal axis of said vehicle.

7. The combination of claim **1** wherein said reflecting means is adapted to reflect said light in a direction away from said polarized sheet and said light source.

8. The combination of claim **1** further comprising a light transmitting layer having a figure thereon disposed in the path of said light in a position to be illuminated and animated.

9. The combination of claim **8** wherein said figure is an arrow pointing in the direction to be turned, and wherein said traveling shadows produce an illusion of animated linear motion of said arrow in the direction to be turned.

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