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United States Patent [19]

Pastrick et al.

[11] **Patent Number:** 5,371,659[45] **Date of Patent:** Dec. 6, 1994[54] **REMOTE-ACTUATED EXTERIOR VEHICLE SECURITY LIGHT**[75] Inventors: **Todd W. Pastrick**, Grand Haven;
Linda K. Molenkamp, Fruitport;
Roger L. Koops, Holland, all of Mich.[73] Assignee: **Donnelly Corporation**, Holland,
Mich.[21] Appl. No.: **11,947**[22] Filed: **Feb. 1, 1993**[51] Int. Cl.⁵ **B60Q 1/26**[52] U.S. Cl. **362/83.1**[58] Field of Search **362/83.1**[56] **References Cited****U.S. PATENT DOCUMENTS**

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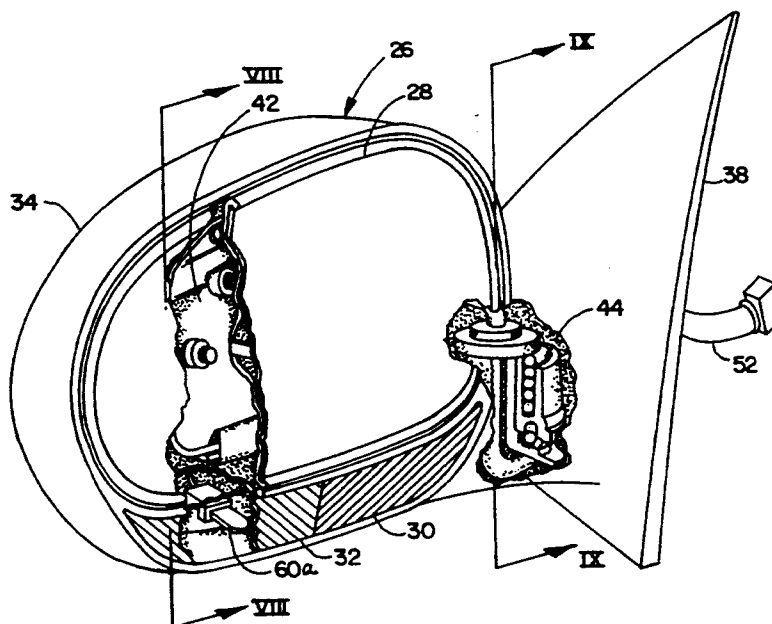
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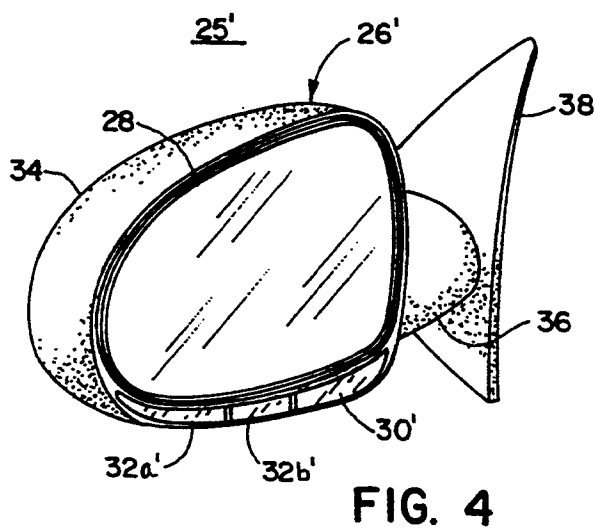
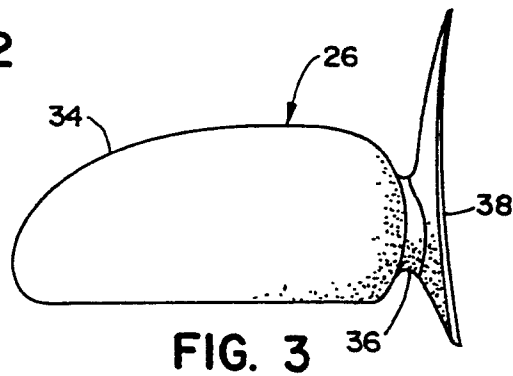
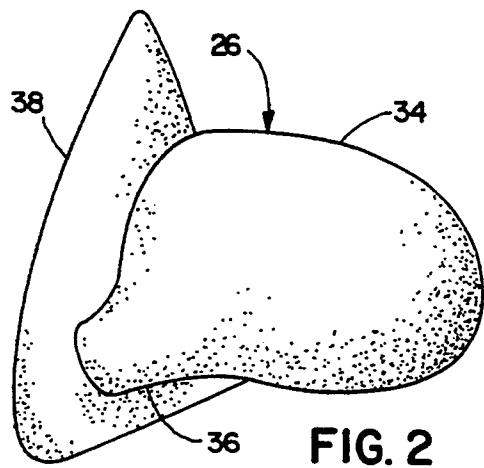
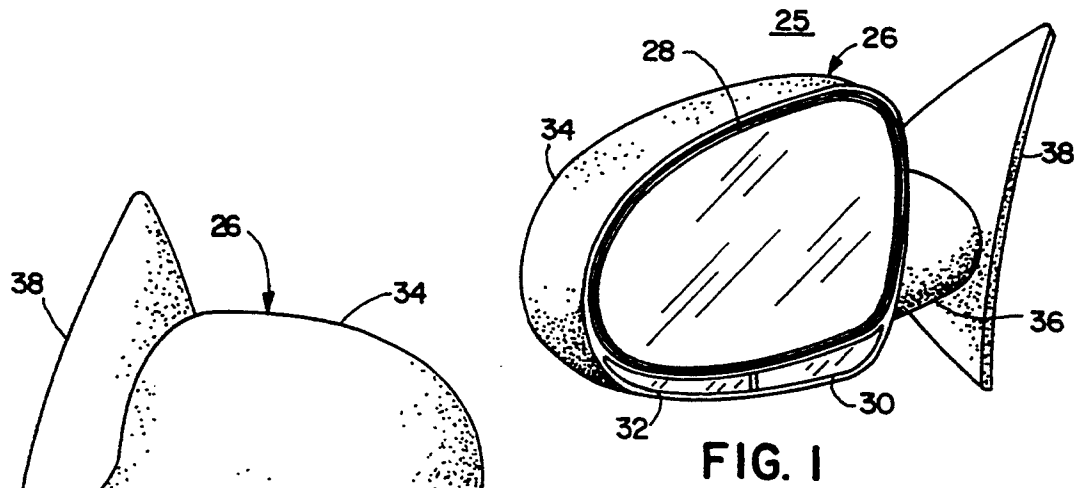
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Primary Examiner—Carroll B. Dority*Attorney, Agent, or Firm*—Price, Heneveld, Cooper,
DeWitt & Litton[57] **ABSTRACT**

A floodlight that is adapted to projecting a pattern of light from the housing of a vehicle exterior mirror on an area adjacent a portion of the vehicle in order to create a lighted security zone in that area. The pattern extends laterally onto the vehicle and downwardly and rearwardly of the mirror housing. In this manner, the lighted security zone extends from the vehicle door to the rear of the vehicle. An actuator for the floodlight includes a base unit in the vehicle and a remote transmitter wherein the base unit is responsive to a signal from the remote transmitter in order to actuate the floodlight. The actuator may further include a lockout device in order to prevent actuation of the floodlight during operation of the vehicle. A signal light is additionally included in the exterior mirror housing in order to project a second pattern of light from the mirror housing extending laterally away from the vehicle and rearwardly of the vehicle. In this manner, the second pattern cannot be directly observed by the driver of the vehicle but may be observed by the driver of another vehicle passing the equipped vehicle. The signal light operates in unison with a turn signal, brake signal, or both, of the equipped vehicle.

45 Claims, 8 Drawing Sheets



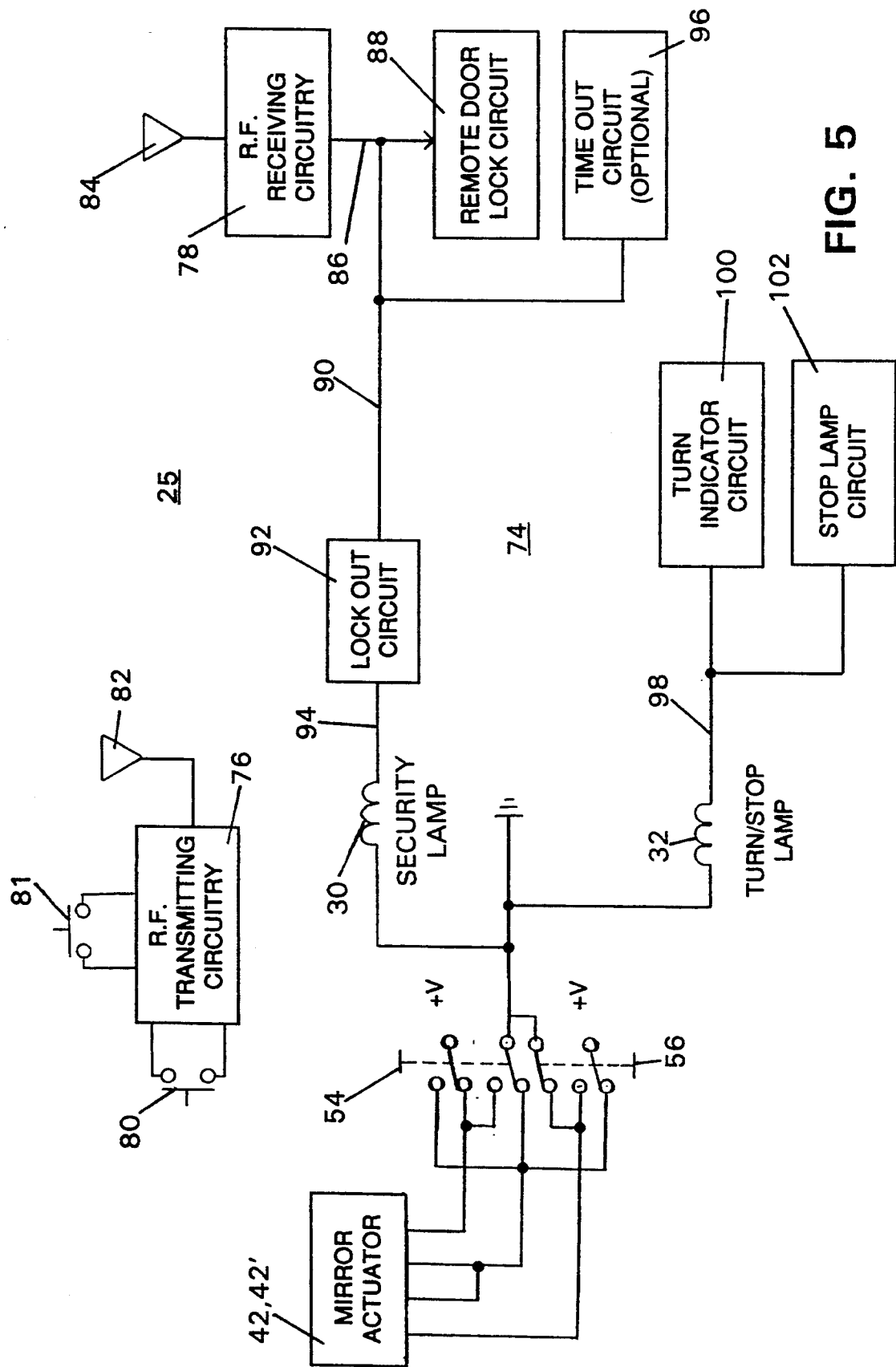
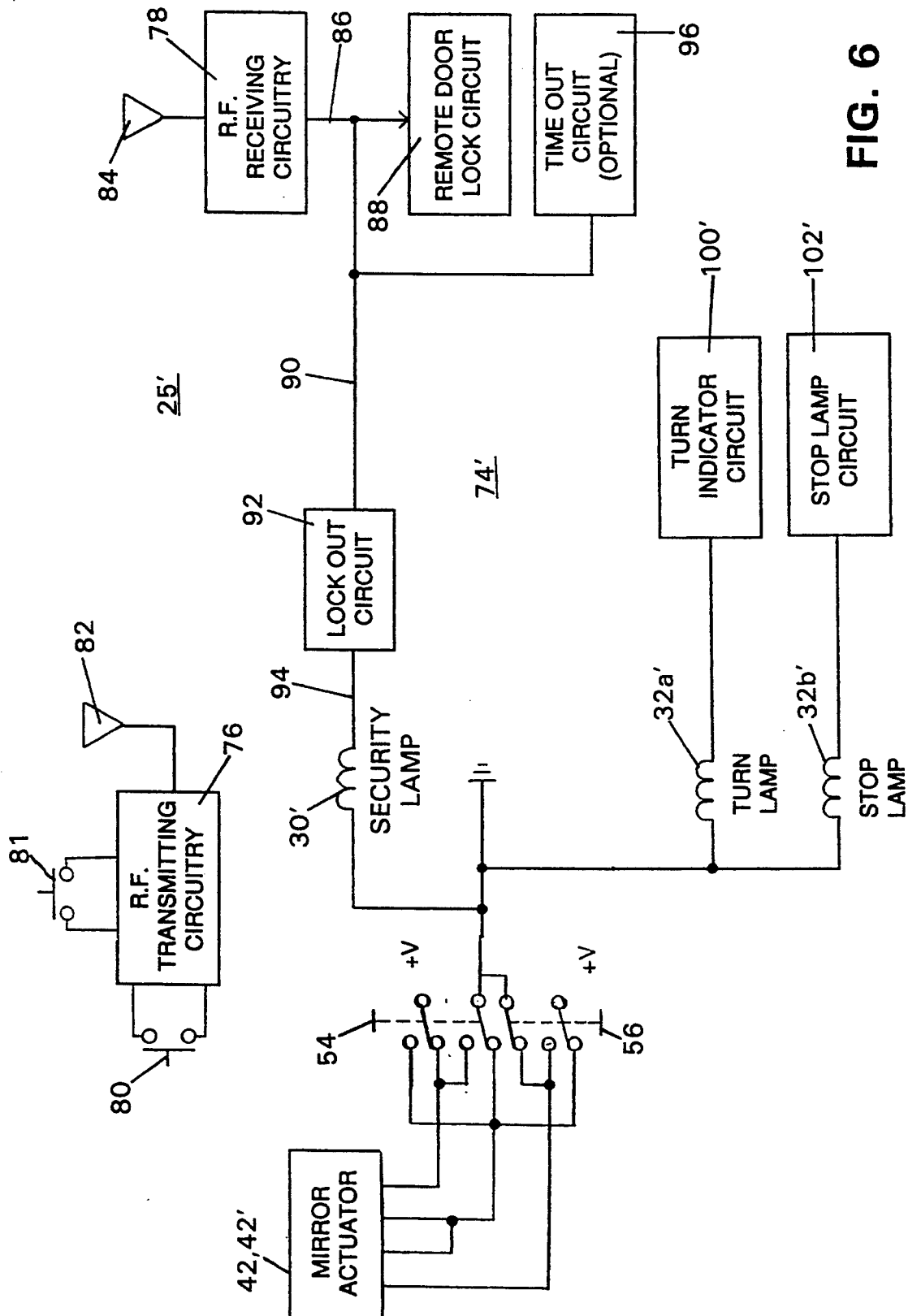
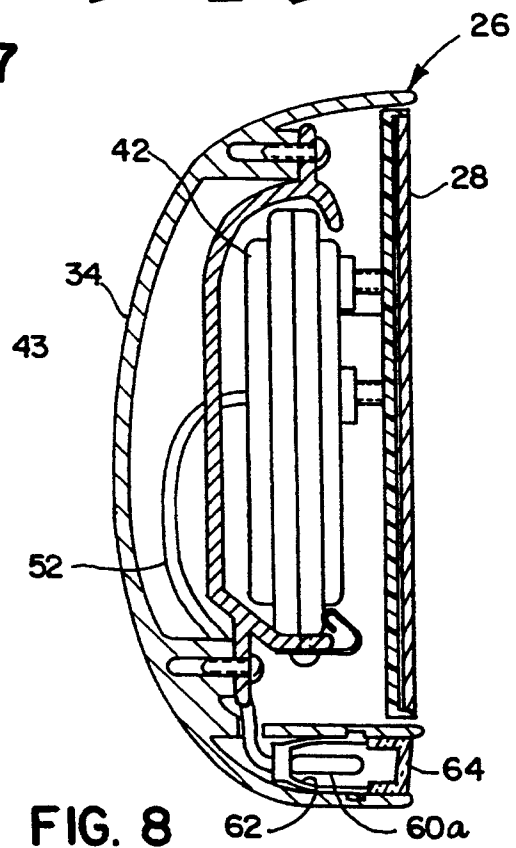
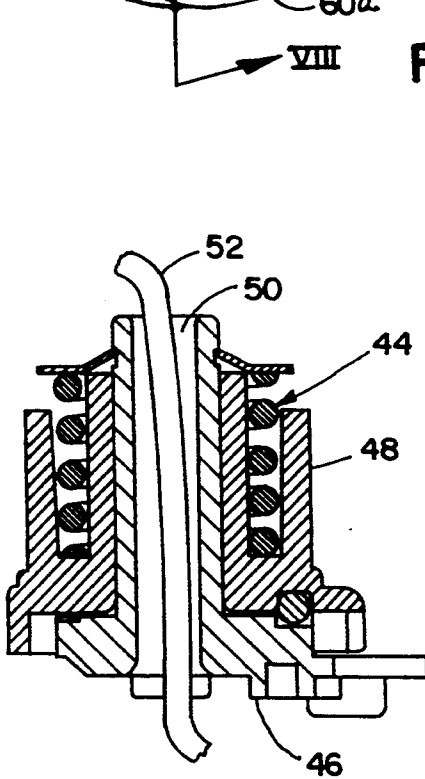
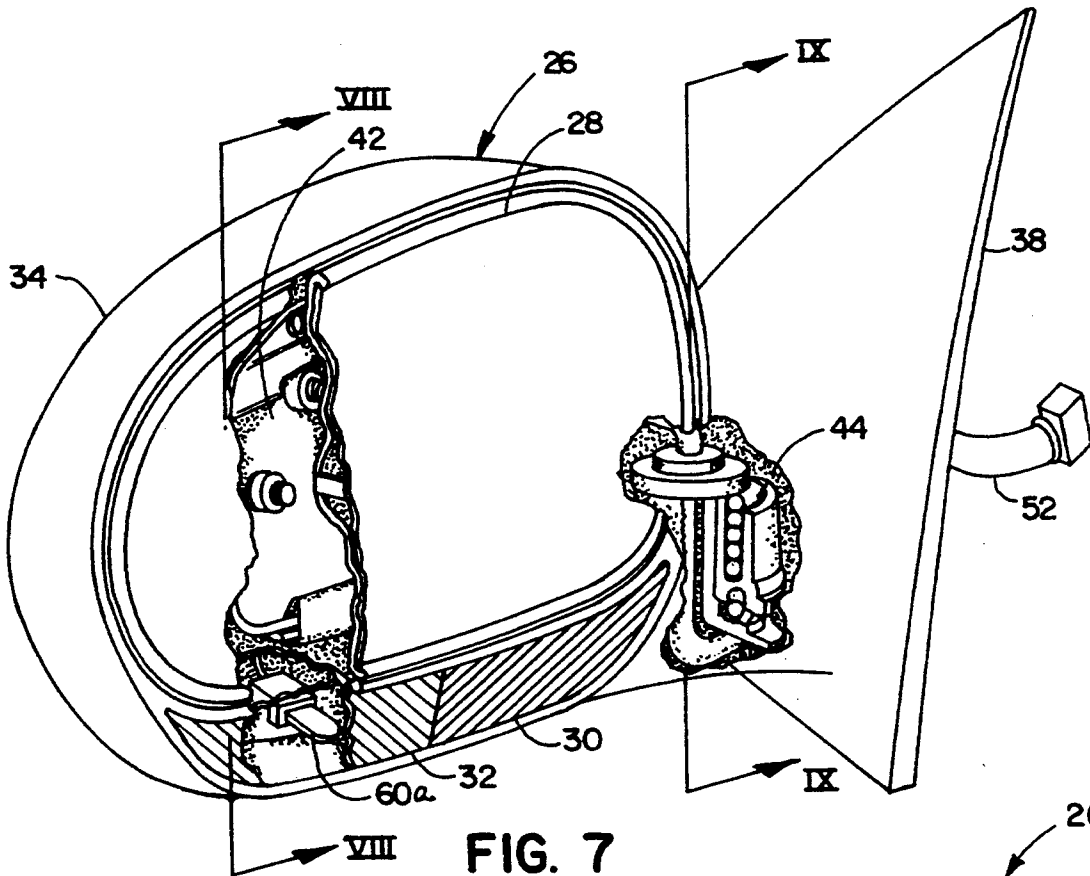


FIG. 5





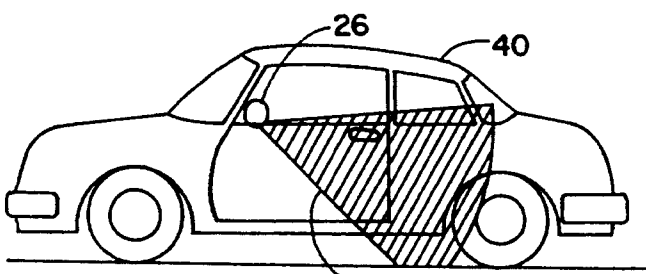


FIG. 10

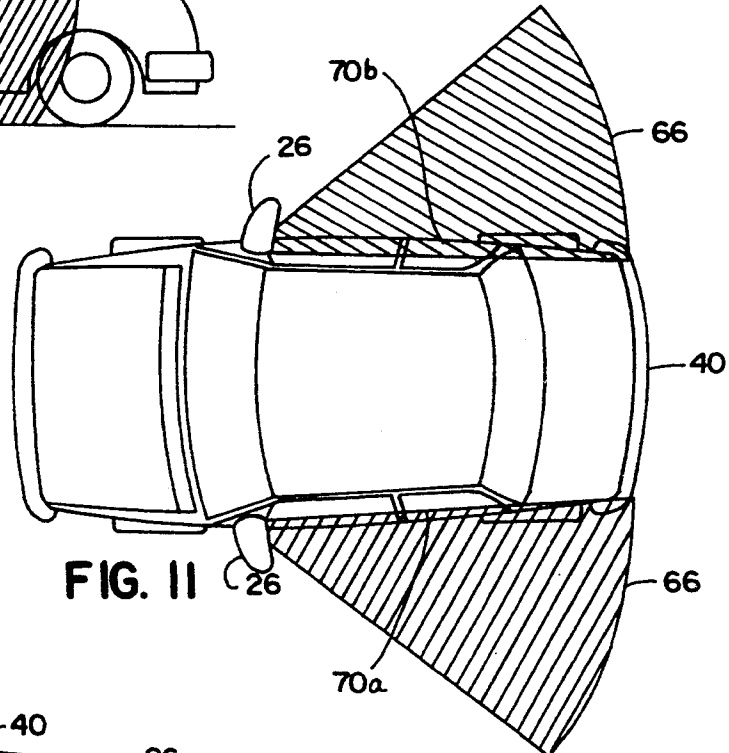


FIG. 11

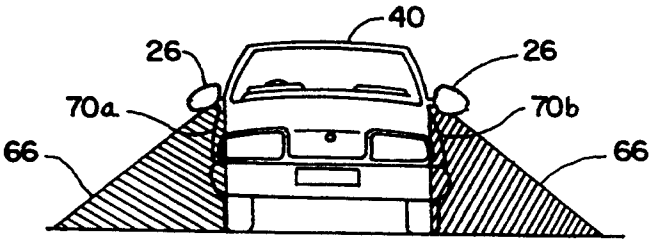


FIG. 12

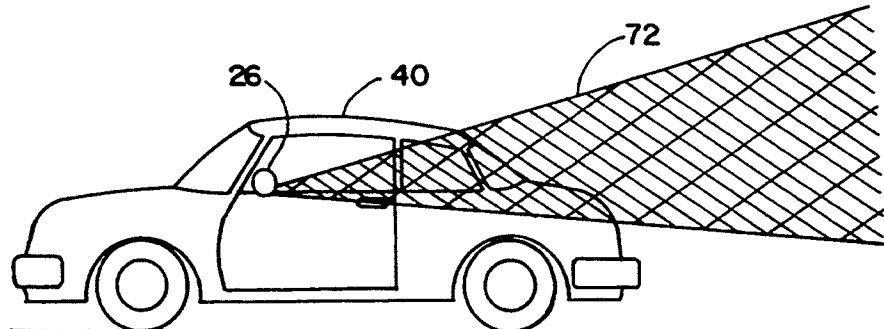


FIG. 13

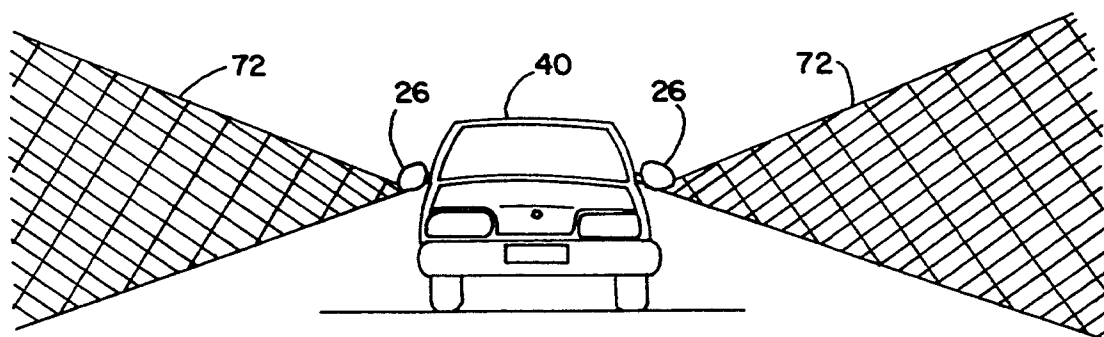
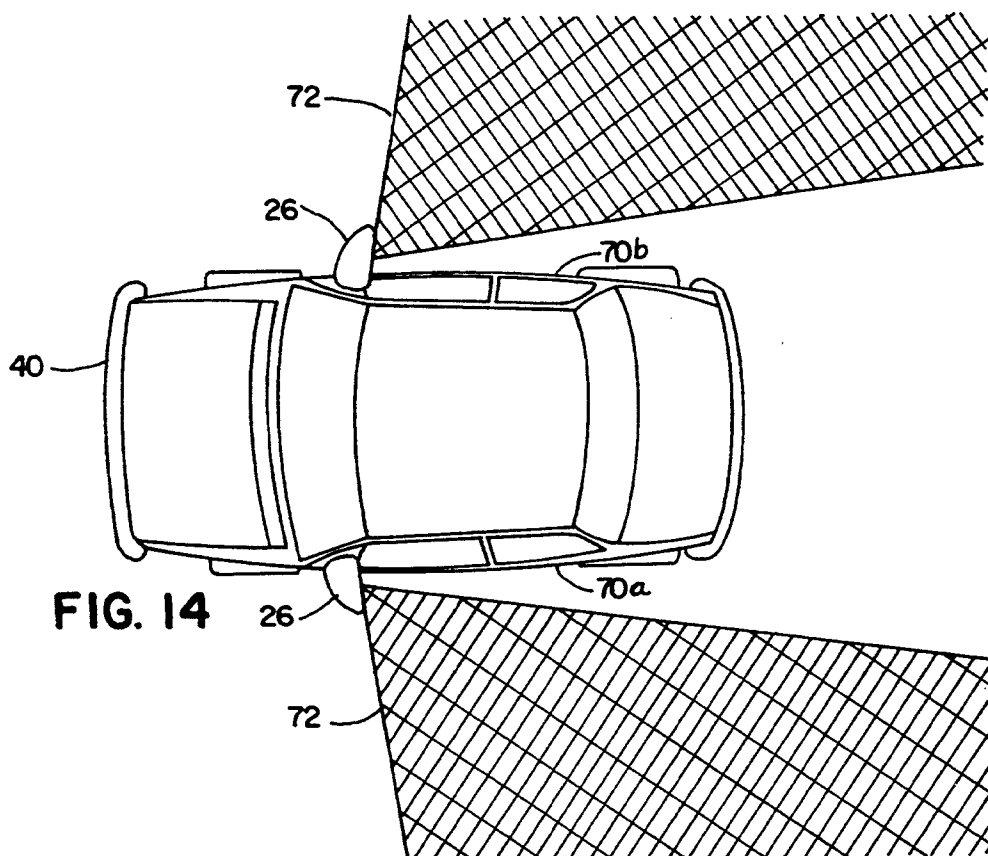


FIG. 15

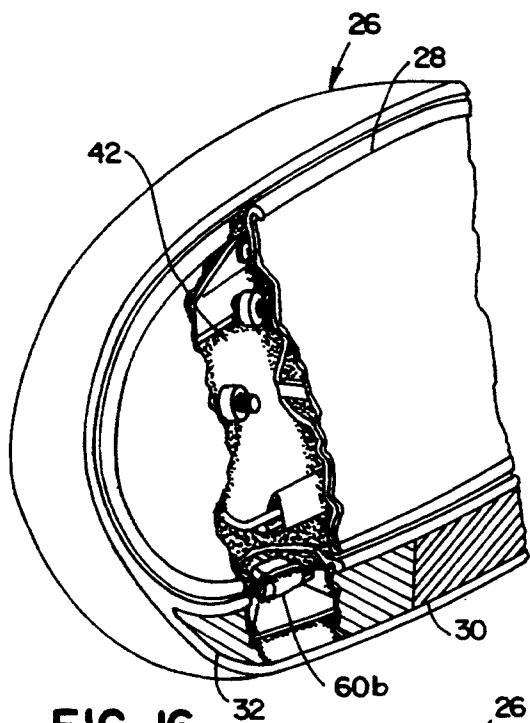


FIG. 16

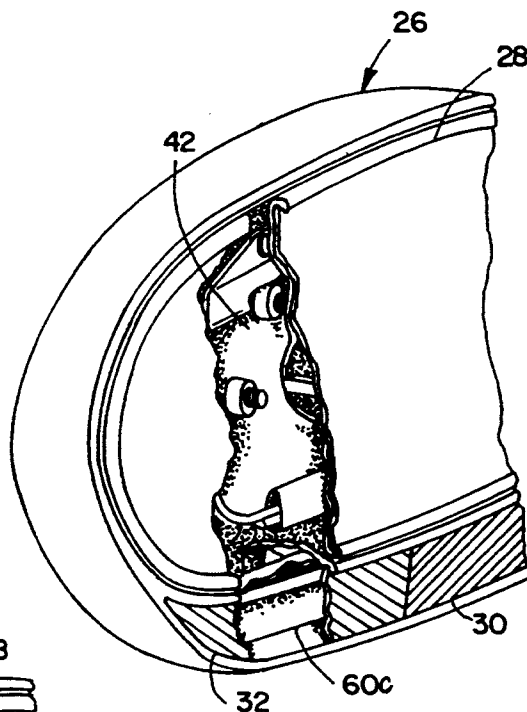


FIG. 17

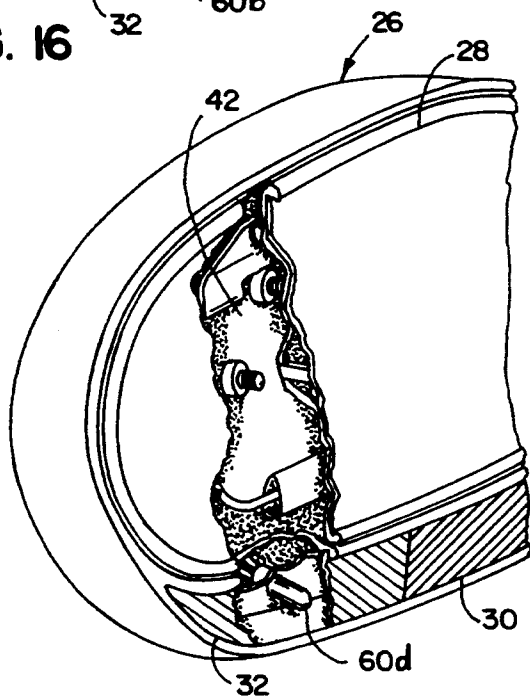


FIG. 18

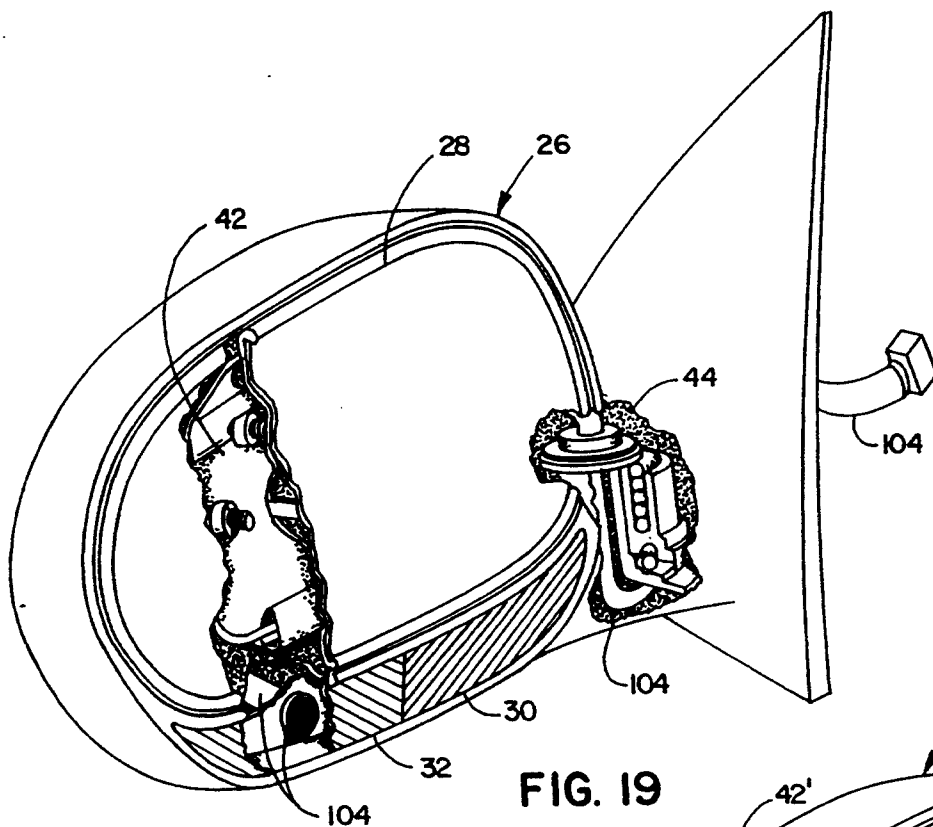


FIG. 19

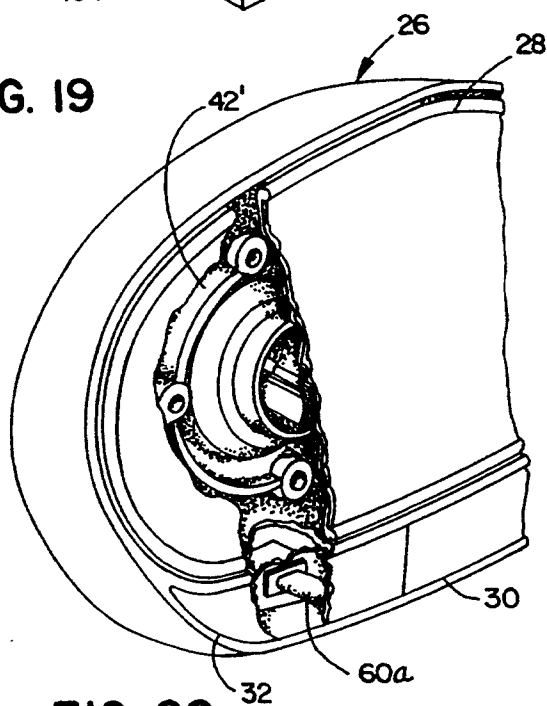


FIG. 20

REMOTE-ACTUATED EXTERIOR VEHICLE SECURITY LIGHT

BACKGROUND OF THE INVENTION

This invention relates generally to security systems for vehicles and, more particularly, to remotely actuated, personal safety lighting systems. The invention is particularly adapted to incorporation in the exterior mirrors of a vehicle.

Personal security in and around vehicles has become an important concern. In particular, an increasing number of assaults and robberies are committed in parking lots while occupants are entering and exiting vehicles. While remote-operated, keyless entry systems have been incorporated in vehicles in order to unlock the vehicle and illuminate interior lights, such systems merely expedite entry to the vehicle and do not, per se, enhance security around the vehicle. Accordingly, a need exists for a vehicle security system to increase the security for vehicle occupants while entering and exiting the vehicle. Any such system would need to be aesthetically pleasing and not burdensome in use.

SUMMARY OF THE INVENTION

The present invention is intended to provide a personal safety feature for a vehicle in the form of a floodlight adapted to projecting light generally downwardly on an area adjacent a portion of the vehicle in order to create a lighted security zone in the area. Advantageously, the floodlight is preferably positioned in the housing of an exterior mirror having a reflective element also positioned in the housing. According to an aspect of the invention, an actuator is provided for the floodlight including a base unit in the vehicle and a remote transmitter. The base unit is responsive to a signal from the remote transmitter in order to actuate the floodlight. This allows the vehicle operator to actuate the floodlight from a distance in order to establish the security zone prior to approaching the vehicle.

According to another aspect of the invention, an actuator for the floodlight includes a lockout device in order to prevent actuation of the floodlight during operation of the vehicle. According to yet a further aspect of the invention, a signal light that is adapted to projecting light generally rearwardly of the vehicle is included in the exterior mirror housing. An actuator for the warning light is connected with the stoplight circuit, turn signal circuit, or both the stoplight and turn signal circuit, of the vehicle in order to actuate the warning light when either the stoplight or turn signal is being actuated.

According to yet another aspect of the invention, the floodlight is adapted to projecting a pattern of light from the housing on an area adjacent a portion of the vehicle that extends laterally onto the vehicle and downwardly and rearwardly of the vehicle. In this manner, a security zone is established from the vehicle door to the rear of the vehicle. The signal light is adapted to projecting a pattern of light extending laterally away from the vehicle and rearwardly of the vehicle. In this manner, the pattern generated by the signal light cannot be substantially observed by a driver of the vehicle. However, the pattern generated by the signal light may be observed by a driver of another vehicle passing the vehicle equipped according to the invention.

The floodlight and signal lights may be generated by a light emitting diode positioned in the housing, a vacuum fluorescent lamp positioned in the housing, an incandescent lamp positioned in the housing or a light source in the vehicle and a light pipe between the light source and the mirror housing.

By providing a lighted security zone adjacent the vehicle, users can observe suspicious activity around the vehicle. The pattern of light generated by a security light according to the invention establishes a security zone around, and even under, the vehicle in the important area where the users enter and exit the vehicle. The provision for remote actuation of the security light provides a deterrent to ward off persons lurking around the protected vehicle while the users are still at a safe distance from the vehicle. The provision for a lockout circuit ensures that the security light will not inadvertently be actuated while the vehicle is in motion. The invention, further, conveniently combines a signal light that acts in unison with the vehicle's turn signal, brake light, or both, with the security light in an exterior mirror assembly. The signal light may be designed to be observed by other vehicles passing the equipped vehicle but not directly by the driver of the equipped vehicle.

These and other objects, advantages and features of this invention will become apparent upon review of the following specification in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view taken from the front of a mirror assembly (rear of the vehicle) incorporating the invention;

FIG. 2 is a rear view of the mirror assembly in FIG. 1;

FIG. 3 is a top view of the mirror assembly in FIG. 1; FIG. 4 is the same view as FIG. 1 of an alternative embodiment of the invention;

FIG. 5 is a block diagram of a control system according to the invention;

FIG. 6 is a block diagram of an alternative embodiment of a control system according to the invention;

FIG. 7 is a breakaway perspective view of the system in FIG. 1 revealing internal components thereof;

FIG. 8 is a sectional view taken along the lines VIII—VIII in FIG. 7;

FIG. 9 is a sectional view taken along the lines IX—IX in FIG. 7;

FIG. 10 is a side elevation of a vehicle illustrating the security zone light pattern generated by a security light according to the invention;

FIG. 11 is a top plan view of the vehicle and light pattern in FIG. 10;

FIG. 12 is a rear elevation of the vehicle and light pattern in FIG. 10;

FIG. 13 is a side elevation of a vehicle illustrating the light pattern generated by a signal light useful with the invention;

FIG. 14 is a top plan view of the vehicle and light pattern in FIG. 13;

FIG. 15 is a rear elevation of the vehicle and light pattern in FIG. 13;

FIG. 16 is the same view as FIG. 7 of a first alternative light source according to the invention;

FIG. 17 is the same view as FIG. 7 of a second alternative light source;

FIG. 18 is the same view as FIG. 7 of a third alternative light source;

FIG. 19 is the same view as FIG. 7 of a fourth alternative light source; and

FIG. 20 is the same view as FIG. 7 of the invention embodied in an alternative mirror structure.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now specifically to the drawings, and the illustrative embodiments depicted therein, a vehicle personal security lighting system 25 includes an exterior mirror assembly 26 having a conventional reflectance element 28, a security light 30, preferably white, or clear, and a signal light 32, preferably red, incorporated in a housing, or casing, 34. Casing 34 is connected by a neck 36 to a stationary panel or sail 38 adapted for incorporation with the forward portion of the vehicle side window assembly, and which mounts mirror assembly 26 to the door of a vehicle 40 (see FIG. 10). Reflectance element 28 may be any of several reflectors, such as glass coated on its first or second surface with a suitable reflective layer or layers, such as those disclosed in U.S. Pat. No. 5,179,471, the disclosure of which is hereby incorporated by reference herein, or an electro-optic cell including a liquid crystal, electrochromic, or electrochemichromic fluid, gel or solid-state compound for varying the reflectivity of the mirror in response to electrical voltage applied thereacross as disclosed in U.S. Pat. No. 5,151,824, the disclosure of which is hereby incorporated by reference herein.

With reference to FIGS. 7 and 8, as is conventional, reflectance element 28 is mounted to a bracket 43 by an actuator 42. Casing 34 is mounted to bracket 43. Actuator 42 provides remote positioning of reflectance element 28 on two orthogonal axes. Such actuators are well known in the art and may include a jackscrow-type actuator 42 such as Model No. H16-49-8001 (right-hand mirror) and Model No. H16-49-8051 (left-hand mirror) by Matsuyama of Kawagoe City, Japan, as illustrated in FIG. 7, or a planetary-gear actuator 42' such as Model No. 540 (U.S. Pat. No. 4,281,899) sold by Industrie Koot BV (IKU) of Montfoort, Netherlands, as illustrated in FIG. 20. As is also conventional, the entire casing 34 including actuator 42, 42' is mounted via bracket 43 for breakaway motion with respect to stationary panel 38 by a breakaway joint assembly 44. Breakaway joint assembly 44 (FIG. 9) includes a stationary member 46 attached to vehicle 40, a pivoting member 48 to which bracket 43 and casing 34 are attached, and a wire-way 50 through which a wire cable 52 passes. Wire cable 52 includes individual wires to supply control signals to actuator 42, 42', as well as signals to control the level of reflectivity, if reflective element 28 is of the variable reflectivity type noted above, such as an electrochromic mirror. Power may also be supplied through cable 52 for a heater (not shown) as disclosed in U.S. Pat. No. 5,151,824 in order to evaporate ice and dew from reflective element 28.

With reference to FIG. 5, actuator 42, 42' receives a first set of reversible voltage signals from a switch 54, in order to bidirectionally pivot in one axis, and a second set of reversible signals from a switch 56, in order to bidirectionally pivot in the opposite axis, as is conventional. Switches 54 and 56 are actuated by a common actuator (not shown) that is linked so that only one of the switches 54 and 56 may be actuated at a time. In this manner, actuator 42, 42' may utilize one common conductor for both switches 54, 56.

Each of the security light 30 and signal light 32 includes a light source 60 and reflector 62 behind a lens 64 (FIG. 8). Light source 60, reflector 62 and lens 64 are designed for security light 30 to project a pattern 66 of light, such as white light, through a clear, non-filtering lens, in order to establish a security zone around the vehicle (FIGS. 10-12). Pattern 66 extends rearward from mirror assembly 26. Vertically, pattern 66 contacts the ground at 68 in the vicinity of entry and exit by the vehicle occupants (FIGS. 10 and 12). Laterally, pattern 66 fans out into contact with the side 70a, 70b of the vehicle. This contact washes the sides of the vehicle to reflect the light in order to further illuminate the area in order to establish the security lighting zone (FIGS. 11 and 12). In a preferred embodiment, pattern 66 extends rearwardly from mirror assembly 26 without projecting any portion of the pattern forwardly of the mirror assembly.

Signal light 32 generates a light pattern 72, which is directed generally horizontally rearwardly of vehicle 40 (FIGS. 13-15). Pattern 72 is laterally directed substantially away from side 70a, 70b of vehicle 40 so that the driver of vehicle 40 does not directly intercept pattern 72, although a minor intensity (such as 10%) of the pattern is intercepted by the driver in order to provide awareness of the actuating of the signal light. Pattern 72 fans laterally away from side 70a, 70b to an extent that is parallel the face of reflectance element 28, which is substantially perpendicular to side 70a, 70b (FIG. 14). Thus, the driver of another vehicle (not shown) passing vehicle 40 on the left or right side of vehicle 40 will intercept pattern 72 while the vehicle is behind and beside vehicle 40. Although, in the illustrated embodiment, lens 64 of signal light 32 is substantially planar, lens 64 of signal light 32 could be made to wrap around the outward side of casing 34 in order to function as a side marker for the vehicle as is required in some European countries.

Vehicle mirror assembly security system 25 is actuated by a control system 74 (FIG. 5). Control system 74 includes means for actuating security light 30 including a remote transmitting device 76 and a stationary receiving device 78. Transmitting device 76 may be remotely carried by the vehicle operator and includes switches 80 and 81 in order to actuate the transmitting circuitry to transmit a signal from antenna 82, which is received by antenna 84 of receiving device 78. Receiving device 78 is mounted in the vehicle, such as in the vehicle trunk compartment, and includes an output 86 in order to operate remote door lock circuit 88, as is conventional. Output 86 is, additionally, provided as an input 90 of a lockout circuit 92, whose output 94 is supplied to security lamp 30. Input 90 may additionally be actuated by a timeout circuit 96, which is conventionally supplied in a vehicle in order to dim the interior lights, following a slight delay, after the occurrence of an event, such as the opening and closing of the doors of the vehicle. Signal light 32 is actuated on line 98 from either a turn indicator circuit 100 or a stop lamp indicator circuit 102, both of which are conventionally supplied with vehicle 40.

In operation, when the operator actuates switch 80 of transmitting device 76, receiving device 78 produces a signal on output 86 in order to cause remote door lock circuit 88 to unlock the doors. Alternatively, actuation of switch 81 on remote transmitting device 76 causes receiving device 78 to produce a signal on output 86 to cause remote door lock circuit 88 to lock the vehicle

doors. The signal on output 86 actuates security lamp 30 provided that lockout circuit 92 does not inhibit the signal. Lockout circuit 92 responds to operation of the vehicle in order to avoid actuation of security lamp 30 when the vehicle is in motion. Such lockout circuits are conventional and may be responsive to placing of the vehicle transmission in gear or sensing of the speed of the vehicle, or the like. Security lamp 30 is also actuated, in response to interior lighting device timeout circuit 96, whenever the interior lights of the vehicle are being actuated by timeout circuit 96, provided that lockout circuit 92 does not inhibit the signal from security lamp 30. This is provided in order to allow security lamp 30 to be actuated in response to the entry to, or exit from, vehicle 40 without the operator utilizing transmitting device 76 to lock or unlock the doors. Signal lamp 32 is actuated in response to turn indicator circuit 100 whenever the operator moves the indicator stick in the direction of that particular signal lamp 32. Signal lamp 32 may additionally be actuated from stop lamp circuit 102 in response to the driver actuating the vehicle's brakes.

In the embodiment illustrated in FIGS. 1 and 5, lens 64 of signal lamp 32 is adapted to filter the light provided from lamp 32 so as to be red and is provided for vehicles 40 in which the stop lamps and rear turn indicator lamps are, likewise, red. Because signal lamp 32 shines red, pattern 72 is restricted from extending forward of the vehicle. This is in order to comply with regulations prohibiting red lights from causing confusion with emergency vehicles by shining forward of the vehicle.

For vehicles having red stoplights and amber turn indicators in the rear, a vehicle mirror security assembly 25' includes an exterior mirror assembly 26' and a control system 74' (FIGS. 4 and 6). Exterior mirror assembly 26' includes a security light 30', preferably white or clear, and a pair of signal lights 32a' and 32b'. Signal light 32a' is amber and is actuated directly from turn indicator circuit 100'. This amber color can be provided either by an amber light bulb or source, or a filtering lens providing an amber color. Signal light 32b' is red and is actuated directly from stop lamp circuit 102'. Each of the light patterns generated by signal lights 32a' and 32b' substantially correspond with light pattern 72. The light pattern generated by security light 30' is substantially equivalent to pattern 66. With the exception that turn signal indicator circuit 100' actuates signal light 32a' and stop lamp circuit 102' actuates signal light 32b', control system 74' operates substantially identically with control circuit 74.

In the illustrated embodiment, light source 60, for both security light 30 and signal light 32, may be supplied as a conventional incandescent or halogen lamp 60a (FIG. 7). Alternatively, a conventional incandescent fuse lamp 60b may be used (FIG. 16). Alternatively, a vacuum fluorescent lamp 60c, which is available in various colors, may be used (FIG. 17). Alternatively, a light emitting diode 60d may be used (FIG. 18). As yet a further alternative, a fiber optic bundle 104 forming a light pipe may be positioned to discharge light behind lens 64. Fiber optic bundle 104 passes through breakaway joint 44 in wire-way 50 in order to transmit light from a source (not shown) within vehicle 40. By way of example, lens 64 may be supplied as a segmented lens, a prismatic lens, or a Fresnel lens in order to generate light patterns 66 and 72. Bracket 43 and breakaway joint 44 are marketed by Donnelly Cor-

poration, the present assignee, of Holland, Mich. The remote actuator composed of remote transmitting device 76 and stationary receiving device 78 may be radio frequency coupled, as is conventional. Alternatively, they may be infrared coupled as illustrated in U.S. Pat. No. 4,258,352.

Although the invention is illustrated in a mirror assembly utilizing an automatic remote actuator, it may also be applied to manual remote actuators and handset actuators. As previously set forth, reflectance element 28 may be conventional or may be supplied as an electrochromic self-dimming mirror. Although the invention is illustrated with breakaway joint 44, the invention may also be applied to mirrors that are rigidly mounted to the vehicle.

Changes and modifications in the specifically described embodiments can be carried out without departing from the principles of the invention, which is intended to be limited only by the scope of the appended claims, as interpreted according to the principles of patent law including the Doctrine of Equivalents.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An exterior rearview mirror system for a vehicle comprising:

an exterior mirror including a housing and a reflective element positioned in said housing;

a floodlight projecting light from said housing generally downwardly on an area adjacent a portion of the vehicle in order to create a lighted security zone in said area; and

an actuator for said flashlight including a base unit in the vehicle and a remote transmitter, wherein said base unit is responsive to a signal from said remote transmitter in order to actuate said floodlight, and wherein said actuator includes a lockout device in order to prevent actuation of said floodlight during operation of the vehicle.

2. The mirror system in claim 1 wherein said actuator further includes connection with an interior light circuit of the vehicle in order to actuate said floodlight when the interior lights of the vehicle are actuated.

3. The mirror system in claim 1 wherein said actuator further includes connection with an interior light circuit of the vehicle in order to actuate said floodlight when the interior lights of the vehicle are actuated.

4. An exterior rearview mirror system for a vehicle comprising:

an exterior mirror including a housing and a reflective element positioned in said housing;

a floodlight projecting light from said housing generally downwardly on an area adjacent a portion of the vehicle in order to create a lighted security zone in said area;

an actuator for said floodlight including a base unit in the vehicle and a remote transmitter, wherein said base unit is responsive to a signal from said remote transmitter in order to actuate said floodlight; and a warning light on said exterior mirror for projecting light from said exterior mirror generally rearwardly of the vehicle and another actuator for said warning light including a connection with at least one of a stoplight circuit and a turn signal circuit of the vehicle in order to actuate said warning light when at least one of said stoplight and said turn signal are being actuated.

5. An exterior rearview mirror system for a vehicle comprising:

an exterior mirror including a housing and a reflective element positioned in said housing;

a floodlight projecting light from said housing generally downwardly on an area adjacent a portion of the vehicle in order to create a lighted security zone in said area;

an actuator for said floodlight including a base unit in the vehicle and a remote transmitter, wherein said base unit is responsive to a signal from said remote transmitter in order to actuate said floodlight; and first and second warning lights on said exterior mirror, each adapted for projecting light from said housing generally rearwardly of the vehicle and actuators for said first and second warning lights including a connection with a stoplight circuit of the vehicle in order to actuate one of said first and second warning lights when the stoplights are being actuated and a connection with a turn signal circuit of the vehicle in order to actuate the other one of said first and second warning lights when the turn signal is being actuated.

6. The mirror system in claim 1 wherein said floodlight projects a pattern of light extending laterally onto the vehicle and downwardly and rearwardly of the vehicle, wherein the lighted security zone extends from the vehicle door to the rear of the vehicle.

7. An exterior rearview mirror system for a vehicle comprising:

an exterior mirror including a housing and a reflective element positioned in said housing;

a floodlight for projecting a pattern of light from said housing on an area of ground adjacent a portion of the vehicle in order to create a lighted security zone in said area, said pattern extending laterally onto the vehicle and downwardly and rearwardly of the vehicle, wherein said lighted security zone extends from the vehicle door to the rear of the vehicle; and

an actuator for said floodlight including a lockout circuit in order to prevent actuation of said floodlight during operation of the vehicle.

8. The mirror system in claim 7 wherein said actuator includes a base unit in the vehicle and a remote transmitter, wherein said base unit is responsive to a signal from said remote transmitter in order to actuate said floodlight.

9. An exterior rearview mirror system for a vehicle comprising:

an exterior mirror including a housing and a reflective element positioned in said housing;

a floodlight for projecting a pattern of light from said housing on an area of ground adjacent a portion of the vehicle in order to create a lighted security zone in said area, said pattern extending laterally onto the vehicle and downwardly and rearwardly of the vehicle, wherein said lighted security zone extends from the vehicle door to the rear of the vehicle; and

an actuator for said floodlight including a base unit in the vehicle and a remote transmitter, wherein said base unit is responsive to a signal from said remote transmitter in order to actuate said floodlight, and wherein said actuator includes a lockout device in order to prevent actuation of said floodlight during operation of the vehicle.

10. The mirror system in claim 9 wherein said actuator further includes connection with an interior light circuit of the vehicle in order to actuate said floodlight when the interior lights of the vehicle are being actuated.

11. An exterior rearview mirror system for a vehicle comprising:

an exterior mirror including a housing and a reflective element positioned in said housing;

a floodlight for projecting a pattern of light from said housing on an area of ground adjacent a portion of the vehicle in order to create a lighted security zone in said area, said first pattern extending laterally onto the vehicle and downwardly and rearwardly of the vehicle, wherein said lighted security zone extends from the vehicle door to the rear of the vehicle;

an actuator for said floodlight; and

a signal light adapted to projecting another pattern of light from said housing and connected with at least one of a stoplight circuit and a turn signal circuit of the vehicle in order to actuate said signal light when at least one of the stoplights and turn signal are being actuated.

12. The mirror system in claim 11 wherein said another pattern of light extends laterally away from the vehicle and rearwardly of the vehicle wherein said another pattern can be observed directly by a driver of another vehicle passing said vehicle but not by a driver of said vehicle.

13. The mirror system in claim 11 wherein each of said floodlight and said signal light are generated by an incandescent lamp positioned in said housing.

14. The mirror system in claim 11 wherein each of said floodlight and said signal light are generated by a light emitting diode positioned in said housing.

15. The mirror system in claim 11 wherein each of said floodlight and said signal light are generated by a vacuum fluorescent lamp.

16. The mirror system in claim 11 wherein each of said floodlight and said signal light are generated by a light source in the vehicle and a light pipe between said light source and said housing.

17. The mirror system in claim 11 wherein said floodlight generates said first pattern through a non-filtering lens wherein said first pattern of light is white.

18. The mirror system in claim 11 wherein said signal light generates said another pattern through a filtering lens wherein said second pattern is red or amber.

19. An exterior rearview mirror system for a vehicle comprising:

an exterior mirror including a housing and a reflective element positioned in said housing;

a floodlight adapted to projecting light from said housing generally downwardly on an area adjacent a portion of the vehicle in order to create a lighted security zone in said area; and

an actuator for said floodlight including a lockout device in order to prevent actuation of said floodlight during operation of the vehicle.

20. The mirror system in claim 19 wherein said actuator further includes connection with an interior light circuit of the vehicle in order to actuate said floodlight when the interior lights of the vehicle are being actuated.

21. The mirror system in claim 19 further including a signal light adapted to projecting light from said housing generally rearwardly of the vehicle and connected

with at least one of a stoplight circuit and a turn signal circuit of the vehicle in order to actuate said signal light when at least one of the stoplights and turn signal are being actuated.

22. The mirror system in claim 19 further including first and second signal lights, each adapted to projecting light from said housing generally rearwardly of the vehicle and connected with one of a stoplight circuit and a turn signal circuit of the vehicle wherein one of said first and second signal lights is actuated when the stoplights are being actuated and the other one of said first and second signal lights is actuated when the turn signal is being actuated.

23. The mirror system in claim 19 wherein said floodlight projects a pattern of light extending laterally onto the vehicle and downwardly and rearwardly of the vehicle, wherein the lighted security zone extends from the vehicle door to the rear of the vehicle.

24. An exterior mirror system for a vehicle comprising:

- an exterior mirror including a reflective element and a housing for said reflective element;
- a security light projecting light generally downwardly from said housing on at least an area adjacent a portion of the vehicle in order to create a lighted security zone in said area; and
- an actuator for said security light including a lockout circuit that will avoid inadvertent actuation of said security light during operation of said vehicle.

25. The mirror system in claim 24 wherein said actuator includes a base unit in the vehicle and a remote transmitter, wherein said base unit is responsive to a signal from said remote transmitter in order to actuate said security light.

26. The mirror system in claim 24 wherein said actuator includes connection with an interior light circuit of the vehicle in order to actuate said security light when the interior lights of the vehicle are being actuated.

27. The mirror system in claim 24 wherein said actuator includes a timeout circuit that deactuates said security light after a delay upon occurrence of a given event.

28. The mirror system in claim 24 further including a signal light adapted to projecting a pattern of light from said housing generally rearwardly of the vehicle and connected with at least one of a stoplight circuit and a turn signal circuit of the vehicle in order to actuate said signal light when at least one of the stoplights and turn signal are being actuated.

29. The mirror system in claim 28 wherein said pattern of light extends laterally away from the vehicle wherein said pattern can be observed directly by a driver of another vehicle passing said vehicle but not by a driver of said vehicle.

30. The mirror system in claim 28 wherein said security light is generated by an incandescent lamp.

31. The mirror system in claim 30 wherein said signal light is generated by at least one light emitting diode.

32. The mirror system in claim 28 wherein said signal light is generated by at least one light emitting diode.

33. The mirror system in claim 24 wherein said security light is generated by an incandescent lamp.

34. The mirror system in claim 24 wherein said reflective element is an electrooptic mirror.

35. The mirror system in claim 34 wherein said reflective element is an electrochromic mirror.

36. An exterior mirror system for a vehicle comprising:

- an exterior mirror including a reflective element and a housing for said reflective element;
- a security light projecting light generally downwardly from said housing on at least an area adjacent a portion of the vehicle in order to create a lighted security zone in said area;
- an actuator for said security light; and
- a signal light adapted to projecting a pattern of light from said housing generally rearwardly of the vehicle and connected with at least one of a stoplight circuit and a turn signal circuit of the vehicle in order to actuate said signal light when at least one of the stoplights and turn signal are being actuated.

37. The mirror system in claim 36 wherein said pattern of light extends laterally away from the vehicle wherein said pattern can be observed directly by a driver of another vehicle passing said vehicle but not by a driver of said vehicle.

38. The mirror system in claim 36 wherein said actuator includes a connection with an interior light circuit of the vehicle in order to actuate said security light when the interior lights of the vehicle are being actuated.

39. The mirror system in claim 36 wherein said actuator includes a base unit in the vehicle and a remote transmitter, wherein said base unit is responsive to a signal from said remote transmitter in order to actuate said security light.

40. The mirror system in claim 36 wherein said actuator includes a timeout circuit that deactuates said security light after a delay upon occurrence of a given event.

41. The mirror system in claim 36 wherein said security light is generated by an incandescent lamp.

42. The mirror system in claim 41 wherein said signal light is generated by at least one light emitting diode.

43. The mirror system in claim 36 wherein said signal light is generated by at least one light emitting diode.

44. The mirror system in claim 36 wherein said reflective element is an electrooptic mirror.

45. The mirror system in claim 44 wherein said reflective element is an electrochromic mirror.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 5,371,659
DATED : December 6, 1994
INVENTOR(S) : Todd W. Pastrick, Linda K. Molenkamp and Roger L. Koops

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

Column 5, line 65:

"40" should be --40--.

Column 6, claim 1, line 33:

"flashlight" should be --floodlight--.

Column 7, claim 7, line 44:

"outing" should be --during--.

Column 7, claim 9, line 63:

"reinore" should be --remote--.

Column 8, claim 11, line 13:

After "said" (second occurrence) delete "first".

Column 8, claim 17, line 45:

After "said" delete "first".

Signed and Sealed this
Fifteenth Day of August, 1995

Attest:



BRUCE LEHMAN

Attesting Officer

Commissioner of Patents and Trademarks



US005371659C1

(12) **EX PARTE REEXAMINATION CERTIFICATE (5709th)****United States Patent****Pastrick et al.**(10) **Number:** **US 5,371,659 C1**(45) **Certificate Issued:** **Mar. 20, 2007**(54) **REMOTE-ACTUATED EXTERIOR VEHICLE SECURITY LIGHT**(75) Inventors: **Todd W. Pastrick**, Grand Haven, MI (US); **Linda K. Molenkamp**, Fruitport, MI (US); **Roger L. Koops**, Holland, MI (US)(73) Assignee: **Donnelly Corporation**, Holland, MI (US)**Reexamination Request:**

No. 90/006,906, Jan. 14, 2004

Reexamination Certificate for:Patent No.: **5,371,659**
Issued: **Dec. 6, 1994**
Appl. No.: **08/011,947**
Filed: **Feb. 1, 1993**

Certificate of Correction issued Aug. 15, 1995.

(51) **Int. Cl.**
B60Q 1/26 (2006.01)(52) **U.S. Cl.** **362/494; 362/540; 362/464**(58) **Field of Classification Search** **362/494, 362/540**

See application file for complete search history.

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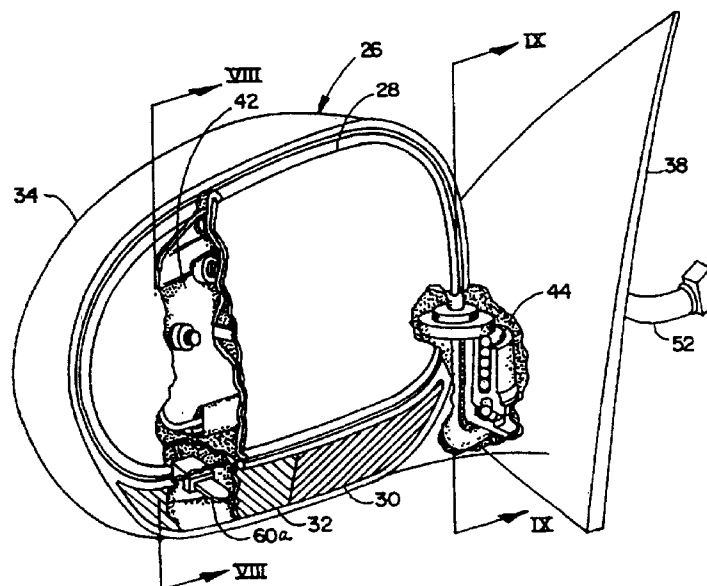
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Primary Examiner—Charles Craver(57) **ABSTRACT**

A floodlight that is adapted for projecting a pattern of light from the housing of a vehicle exterior mirror on an area adjacent a portion of the vehicle in order to create a lighted security zone in that area. The pattern extends laterally onto the vehicle and downwardly and rearwardly of the mirror housing. In this manner, the lighted security zone extends from the vehicle door to the rear of the vehicle. An actuator for the floodlight includes a base unit in the vehicle and a remote transmitter wherein the base unit is responsive to a signal from the remote transmitter in order to actuate the floodlight. The actuator may further include a lockout device in order to prevent actuation of the floodlight during operation of the vehicle. A signal light is additionally included in the exterior mirror housing in order to project a second pattern of light from the mirror housing extending laterally away from the vehicle and rearwardly of the vehicle. In this manner, the second pattern cannot be directly observed by the driver of the vehicle but may be observed by the driver of another vehicle passing the equipped vehicle. The signal light operates in unison with a turn signal, brake signal, or both, of the equipped vehicle.



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EX PARTE
REEXAMINATION CERTIFICATE
ISSUED UNDER 35 U.S.C. 307

THE PATENT IS HEREBY AMENDED AS
INDICATED BELOW.

Matter enclosed in heavy brackets [] appeared in the patent, but has been deleted and is no longer a part of the patent; matter printed in italics indicates additions made to the patent.

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

The patentability of claims 1, 2, 6–10 and 19–35 is confirmed.

Claims 4, 5, 11–18 and 36–45 are cancelled.

Claim 3 is determined to be patentable as amended.

New claims 46–75 are added and determined to be patentable.

3. The mirror system in claim [1] 7 wherein said actuator further includes connection with an interior light circuit of the vehicle in order to actuate said floodlight when the interior lights of the vehicle are actuated.

46. *An exterior mirror system for a vehicle comprising: an exterior mirror including a reflective element and a housing for said reflective element;*

a security light projecting light generally downwardly from said housing on at least an area adjacent a portion of the vehicle in order to create a lighted security zone in said area;

an actuator for said security light;

a signal light adapted to projecting a pattern of light from said housing generally rearwardly of the vehicle and connected with at least one of a stoplight circuit and a turn signal circuit of the vehicle in order to actuate said signal light when at least one of the stoplights and turn signal are being actuated;

said security light actuating to project light from said housing generally downwardly in response to occurrence of an event other than receipt of a signal from a remote transmitter, said event selected from the group consisting of a) an opening of a door of the vehicle and b) a closing of a door of the vehicle and wherein said security light ceases to project light from said housing after a time interval has elapsed, said time interval defined by an interior lighting timeout circuit.

47. *The mirror system in claim 46 wherein said actuator includes a base unit in the vehicle and a remote transmitter, wherein said base unit is responsive to a signal from said remote transmitter in order to actuate said security light.*

48. *The mirror system in claim 46 wherein said security light comprises an incandescent lamp.*

49. *The mirror system in claim 48 wherein said signal light comprises at least one light emitting diode.*

50. *The mirror system in claim 46 wherein said signal light comprises at least one light emitting diode.*

51. *The mirror system in claim 46 wherein said reflective element comprises an electrooptic mirror.*

52. *The mirror system in claim 51 wherein said reflective element comprises an electrochromic mirror.*

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53. *The mirror system in claim 46 wherein said security light projects a pattern of light extending laterally onto the vehicle.*

54. *An exterior rearview mirror system for a vehicle comprising:*

an exterior mirror including a housing and a reflective element positioned in said housing;

a floodlight projecting light from said housing generally downwardly on an area adjacent a portion of the vehicle in order to create a lighted security zone in said area;

an actuator for said floodlight including a base unit in the vehicle and a remote transmitter, wherein said base unit is responsive to a signal from said remote transmitter in order to actuate said floodlight;

a warning light on said exterior mirror for projecting light from said exterior mirror generally rearwardly of the vehicle and another actuator for said warning light including a connection with at least one of a stoplight circuit and a turn signal circuit of the vehicle in order to actuate said warning light when at least one of said stoplight and said turn signal are being actuated; and said floodlight actuating to project light from said housing generally downwardly in response to occurrence of an event other than a receipt by said base unit of a signal from said remote transmitter, said event selected from the group consisting of a) an opening of a door of the vehicle and b) a closing of a door of the vehicle and wherein said floodlight ceases to project light from said housing after a time interval has elapsed, said time interval defined by an interior lighting timeout circuit.

55. *The mirror system in claim 54 wherein said floodlight comprises an incandescent lamp.*

56. *The mirror system in claim 55 wherein said warning light comprises at least one light emitting diode.*

57. *The mirror system in claim 54 wherein said warning light comprises at least one light emitting diode.*

58. *The mirror system in claim 54 wherein said reflective element comprises an electrooptic mirror.*

59. *The mirror system in claim 58 wherein said reflective element comprises an electrochromic mirror.*

60. *The mirror system in claim 54 wherein said floodlight projects a pattern of light extending laterally onto the vehicle.*

61. *An exterior rearview mirror system for a vehicle comprising:*

an exterior mirror including a housing and a reflective element positioned in said housing;

a floodlight for projecting a pattern of light from said housing on an area of ground adjacent a portion of the vehicle in order to create a lighted security zone in said area, said pattern extending laterally onto the vehicle and downwardly and rearwardly of the vehicle, wherein said lighted security zone extends from a vehicle door to the rear of the vehicle;

an actuator for said floodlight;

a signal light adapted to projecting another pattern of light from said housing and connected with at least one of a stoplight circuit and a turn signal circuit of the vehicle in order to actuate said signal light when at least one of the stoplights and turn signal are being actuated;

said floodlight actuating to project light from said housing generally downwardly in response to occurrence of an event other than receipt of a signal from a remote

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transmitter, said event selected from the group consisting of a) an opening of a door of the vehicle and b) a closing of a door of the vehicle and wherein said floodlight ceases to project light from said housing after a time interval has elapsed, said time interval 5 defined by an interior lighting timeout circuit.

62. The mirror system in claim 61 wherein said actuator includes a base unit in the vehicle and a remote transmitter, wherein said base unit is responsive to a signal from said remote transmitter in order to actuate said floodlight. 10

63. The mirror system in claim 61 wherein said floodlight comprises an incandescent lamp.

64. The mirror system in claim 63 wherein said signal light comprises at least one light emitting diode.

65. The mirror system in claim 61 wherein said signal light comprises at least one light emitting diode. 15

66. The mirror system in claim 61 wherein said reflective element comprises an electrooptic mirror.

67. The mirror system in claim 66 wherein said reflective element comprises an electrochromic mirror. 20

68. The mirror system in claim 61 wherein said floodlight projects a pattern of light extending laterally onto the vehicle and downwardly and rearwardly of the vehicle, wherein the lighted security zone extends from the vehicle door to the rear of the vehicle. 25

69. An exterior rearview mirror system for a vehicle comprising:

an exterior mirror including a housing and a reflective element positioned in said housing;

a floodlight projecting light from said housing generally downwardly on an area adjacent a portion of the vehicle in order to create a lighted security zone in said area; 30

an actuator for said floodlight including a base unit in the vehicle and a remote transmitter, wherein said base unit is responsive to a signal from said remote transmitter in order to actuate said floodlight; 35

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first and second warning lights on said exterior mirror, each adapted for projecting light from said housing generally rearwardly of the vehicle and actuators for said first and second warning lights including a connection with a stoplight circuit of the vehicle in order to actuate one of said first and second warning lights when the stoplights are being actuated and a connection with a turn signal circuit of the vehicle in order to actuate the other one of said first and second warning lights when the turn signal is being actuated; and

said floodlight actuating to project light from said housing generally downwardly in response to occurrence of an event other than a receipt by said base unit of a signal from said remote transmitter, said event selected from the group consisting of a) an opening of a door of the vehicle and b) a closing of a door of the vehicle and wherein said floodlight ceases to project light from said housing after a time interval has elapsed, said time interval defined by an interior lighting timeout circuit.

70. The mirror system in claim 69 wherein said floodlight comprises an incandescent lamp.

71. The mirror system in claim 70 wherein said first and second warning lights comprise at least one light emitting diode. 25

72. The mirror system in claim 69 wherein said first and second warning lights comprise at least one light emitting diode.

73. The mirror system in claim 69 wherein said reflective element comprises an electrooptic mirror.

74. The mirror system in claim 73 wherein said reflective element comprises an electrochromic mirror.

75. The mirror system in claim 69 wherein said floodlight projects a pattern of light extending laterally onto the vehicle. 35

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