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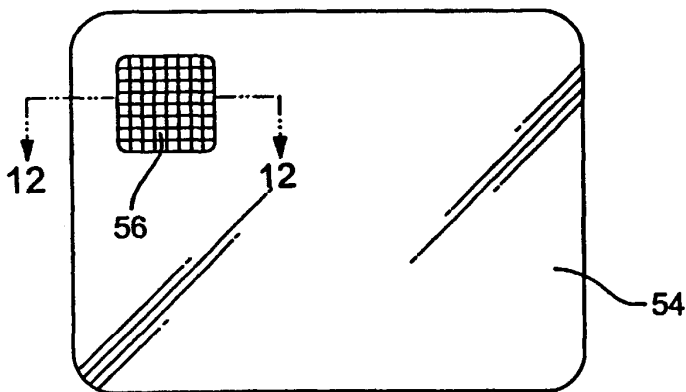
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(54) Title: COMPOUND AUTOMOTIVE REARVIEW MIRROR

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(57) Abstract: A composite mirror includes a main viewing mirror (40) and an auxiliary blindzone viewing mirror (36) juxtaposed to expose the vehicle blindzone to the operator.

Compound Automotive Rearview Mirror

Field of Invention

5 The present invention relates generally to mirrors having multiple surfaces of differing magnification and, particularly, to the application of such mirrors as external side rearview automotive operator aides.

10 Background of the Invention

 Originally, motor vehicles, particularly passenger cars, did not have mirrors to assist the driver. Early in this century however, both inside and outside mirrors were added to automotive vehicles to provide rearward and
15 limited lateral visibility. As the number of vehicles and driving speeds increased, rearward visibility became ever more important.

 Today, all passenger cars have a mirror centrally located inside the vehicle. This mirror is the primary mirror. It provides a wide viewing angle,
20 giving an excellent view to the adjacent lanes at a distance of two or more car lengths to the rear. However, it is deficient in that it is unable to view the adjacent lanes at distances of less than one to two car lengths to the rear. In an effort to eliminate this deficiency and to provide rearward visibility when the rear window is blocked, outside mirrors were added to vehicles.

25 Presently, passenger cars are required by law to have a unit magnification outside rearview mirror on the driver's side. A unit magnification mirror is a plane mirror which produces the same size image on the retina as that which would be produced if the object were viewed directly from the same
30 distance. Furthermore, as provided in Federal Motor Vehicle Safety Standard 111 (FMVSS 111), "The mirror shall provide the driver a field of view of a level road surface extending to the horizon from a line perpendicular to a longitudinal plane tangent to the driver's side of the vehicle at the widest point, extending 8 feet out from the tangent plane 35 feet behind the driver's eyes,

with the seat in the rear most position.” FMVSS 111 thus effectively determines the size of the mirror, which a manufacturer must provide. The size will vary among different manufacture’s vehicles because of the placement of the mirror on the vehicle with regard to the driver’s seat location.

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Unfortunately, outside mirrors meeting FMVSS 111 still do not provide adequate adjacent lane visibility to view cars that are in the range of one car length to the rear. That is, a blindzone exists where a vehicle is not visible in either the inside mirror or the outside mirror. Even a glance over the shoulder may not be adequate to observe a vehicle in the blindzone. For many vehicles, the door pillar between the front and rear doors obscures the view to the blindzone. Furthermore, this obstruction is not obvious to most drivers, and they may assume that the “over the shoulder glance” has allowed them to see the blindzone when in reality it has not.

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Rearward vision in automobiles is mathematically described in a paper published by the Society of Automotive Engineers (SAE) in 1995. That paper is designated as SAE Technical Paper 950601. It is entitled, The Geometry of Automotive Rearview Mirrors – Why Blindzones Exist and Strategies to Overcome Them, by George Platzer, the inventor of the present invention. That paper is hereby incorporated by reference.

20

A common method of overcoming the blindzone is to add a spherically convex blindzone-viewing mirror to the required plane main mirror. Spherically convex mirrors provide a wide field of view, but at the penalty of a reduced image size. However, this may be acceptable if the mirror is only used to indicate the presence of a vehicle in the blindzone and it is not used to judge the distance or approach speed of vehicles to the rear. Simply placing a round segment of a convex mirror on the main mirror surface, as is commonly done with stick-on convex mirrors, does not solve the problem. Doing so can provide a view to the rear which includes the blindzone, but it will also show much of the side of the car, the sky and the road surface, which are distracting and extraneous to the safe operation of the vehicle. What is required is a convex blindzone-viewing mirror that shows the driver primarily

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only the blindzone. In this way, if the driver sees a vehicle in the blindzone-viewing mirror, he knows it is unsafe to move into the adjacent lane. All extraneous and distracting information should be removed from the blindzone-viewing mirror. Furthermore, by eliminating the irrelevant portions of the bull's-eye mirror, the remaining portion can have a larger radius of curvature, thereby increasing the image size for the given amount of area that is to be allocated to the convex mirror.

Other problems with add-on mirrors are that they:

- may interfere with the requirements of FMVSS 111;
- may substantially decrease the plane main mirror viewing angle;
- interfere with cleaning, especially when there is ice on it; and
- appear as an unsightly excrescence on the main mirror. A blindzone-viewing mirror that is provided by a car manufacturer must not appear to be an afterthought, but rather an integral part of the mirror.

Summary of the Invention

One object of the present invention is to provide a unit magnification main mirror, which meets the requirements of FMVSS 111 and simultaneously provides a blindzone-viewing mirror having a magnification of less than unity that is in application able to show an automobile driver's side blindzone.

Another object of the invention is to provide a less than unit magnification mirror that meets the requirements of FMVSS 111 on the passenger's side and simultaneously provides a blindzone-viewing mirror having a magnification of less than unity that is able to show the driver the blindzone on the passenger's side.

Yet another object of the invention is to provide a mirror having a combination of two surfaces of different magnification that is not objectionable in appearance.

Still another object of the invention is to provide a mirror having a combination of two surfaces of different magnification that is inexpensive and easy to manufacture.

5 In a preferred embodiment of the invention, a less than unit magnification mirror is located in the upper and outer region of a unit magnification mirror, and it is optimized in size and orientation to provide primarily only a view of the blindzone while leaving the region surrounding it available to meet the requirements of FMVSS 111. The less than unit
10 magnification mirror is integral with the unit magnification mirror. In yet another preferred embodiment of the invention, the unit magnification main mirror includes means operative to selectively vary the intensity of the reflection from the main mirror while maintaining a relatively fixed reflection intensity characteristic of the auxiliary mirror.

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Brief Description of the Drawings

In the drawings, wherein for clarity certain details may be omitted from one or more views:

20 Figure 1, is a plan view of an automobile on a three-lane highway depicting the field of view of the outside mirrors and the blindzones;

Figure 2, is a diagram showing the requirements of FMVSS 111 for the horizontal field of view of the driver's outside mirror;

25 Figure 3, is a diagram showing the requirements of FMVSS 111 for the vertical field of view of the driver's outside mirror;

Figure 4, is an image of the road as seen in the driver's outside mirror showing the effect of the requirements of FMVSS 111 on the horizontal width and the vertical height of the mirror;

30 Figure 5, is a perspective drawing showing how a less than unit magnification mirror can be placed on the driver's outside mirror to avoid conflicting with the requirements of FMVSS 111 and yet provide a wide angle mirror to observe the blindzone;

Figure 6, is a front view of the mirror of Figure 5;

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