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Griebel

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[54] **METHOD AND APPARATUS FOR DETERRING WRONG WAY DRIVERS**

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[51] **Int. Cl.** **G08g 1/02**

[58] **Field of Search** ..... 340/45, 31 R, 22, 114 B; 49/35, 49; 246/111, 112, 113, 114, 125, 125.5, 126, 127, 292, 293, 294, 304, 307, 309, 343, 374; 256/1; 404/1, 6, 9

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[57] **ABSTRACT**

A method and apparatus for deterring wrong-way drivers by providing a barrier member across a one-way thoroughfare at an acute angle to the direction of traffic flow, the barrier being of sufficient height to contact the automobile tires of wrong-way drivers and to deflect the same, thereby deflecting wrong-way motor vehicles into a suitable traffic reception area.

13 Claims, 6 Drawing Figures

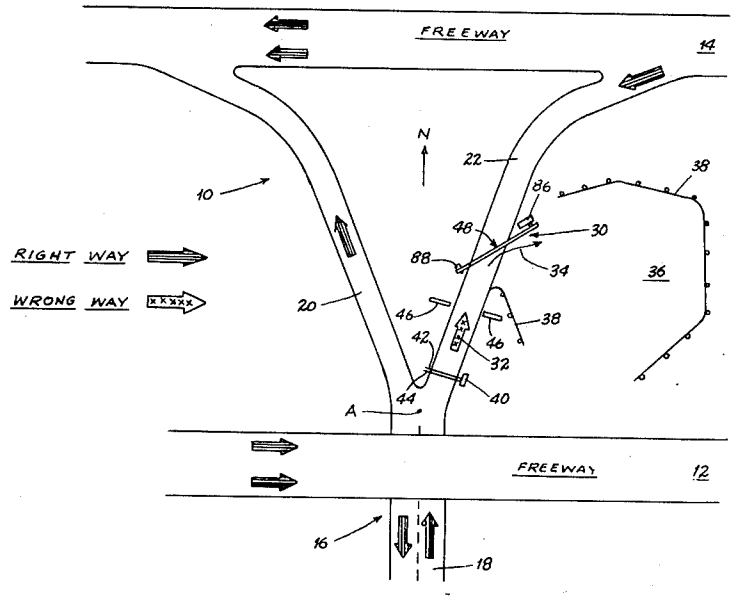


Fig. 1.

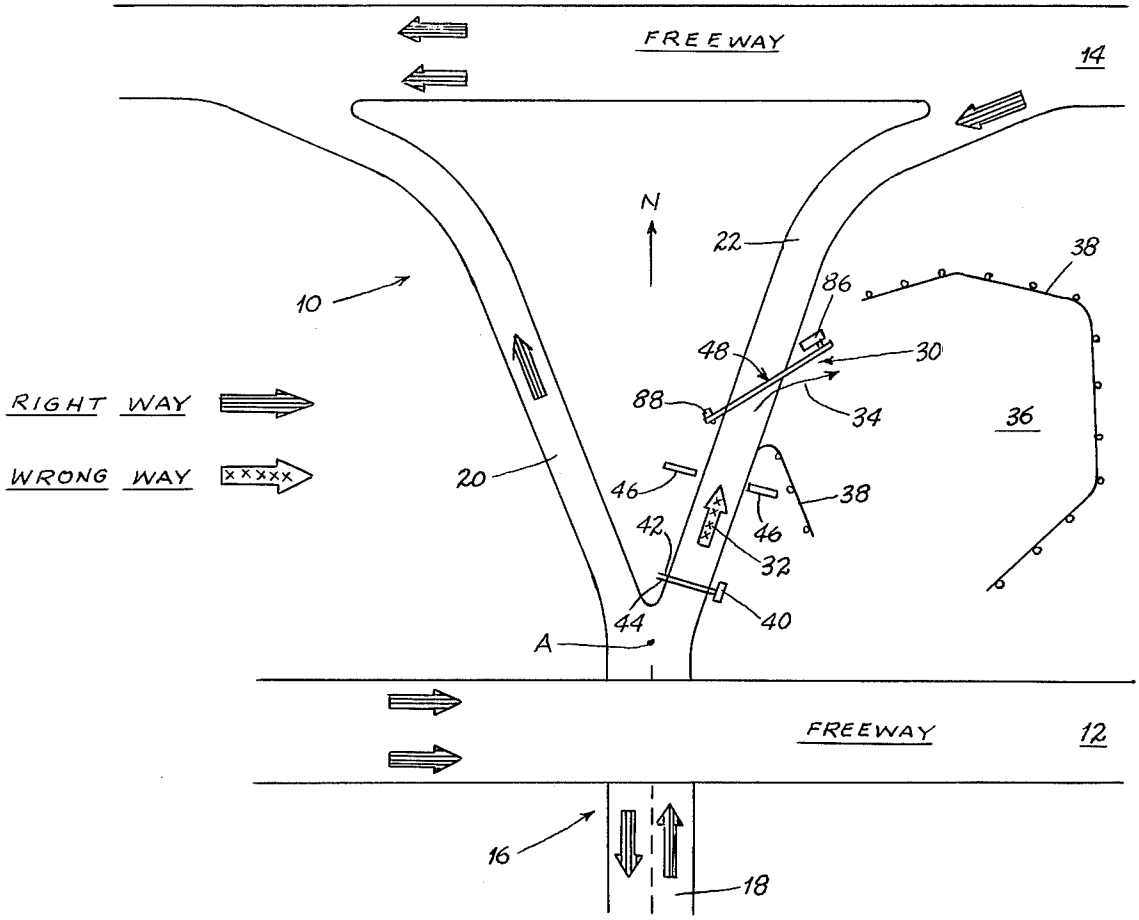


Fig. 5.

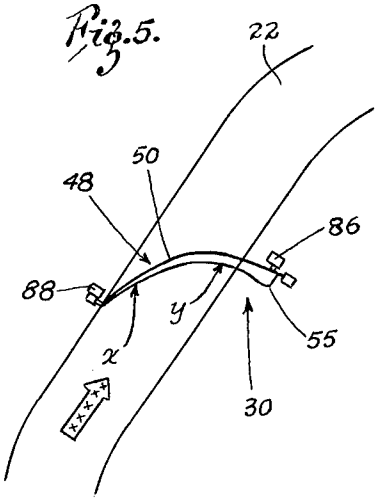


Fig. 4.

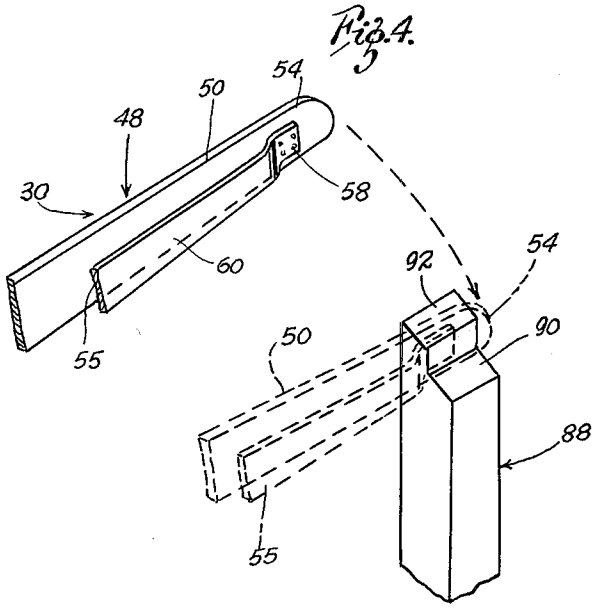


Fig. 6.

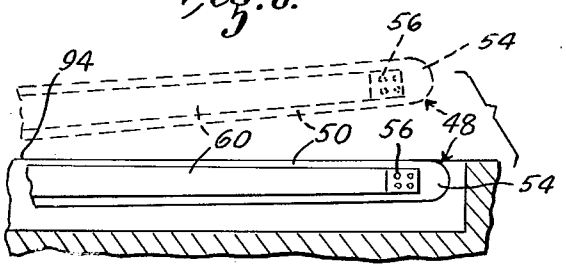
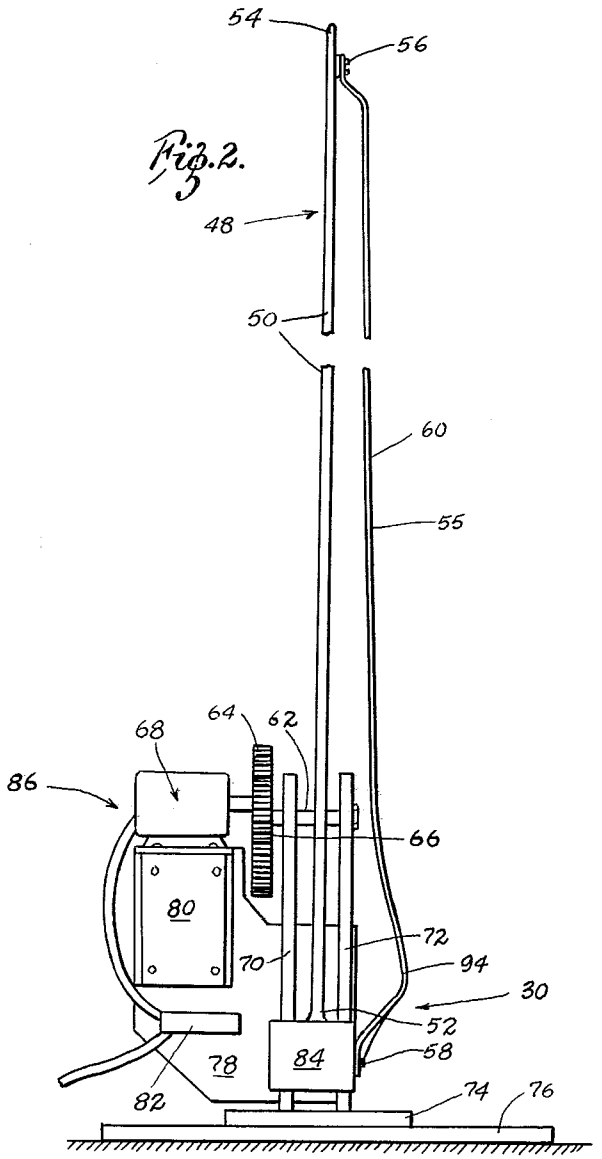


Fig. 3.

Fig. 2.



METHOD AND APPARATUS FOR DETERRING WRONG WAY DRIVERS

SUMMARY OF THE INVENTION

The present invention relates to driving safety and particularly to a method and apparatus for deterring motor vehicles from traveling the wrong-way on one-way thoroughfares.

Wrong-way driving has long been a serious problem on American highways. For example, wrong-way accidents have been reported as accounting for about 6 percent of the fatalities on California highways. Wrong-way driving accidents occur predominantly at night, and predominantly involve drivers who have been drinking.[1]

1. A.C. Estep, *Wrong Way Driving On California Freeways* 1961–1972 (Presentation at American Association of State Highway Officials, 1972 Summer Meeting of the Operating Sub-committee on Traffic Engineering, July 16, 18, 1972 at Dearborn, Michigan.)

Many devices have been tested in an effort to reduce or eliminate wrong-way driving accidents. In one method, for example, a one-way thoroughfare was provided across its width with upwardly extending spikes adapted to puncture the tires of wrong-way drivers. This apparatus, however, reportedly did not effectively disable an automobile traveling at speeds above about 15 miles an hour. Further, it was reported that at speeds of 30 miles an hour or more, right-way drivers could not tell whether the spikes were pointed towards them or away from them. Another device involved a movable barrier across the highway into which wrong-way motor vehicles would crash. Although such a device might prevent wrong-way driving, it would nonetheless cause severe damage to wrong-way vehicles and their occupants. A third, and continuing, method involves the use of various signs and devices having flashing lights, the latter being energized by detection of a wrong-way vehicle. Such a detection device, which employs pneumatic tubes extending across the thoroughfare, is described in the previously mentioned Estep report. Flashing lights and signs, however, are apt to confuse or be ignored by drunk drivers, and this method of deterring wrong-way drivers accordingly has serious drawbacks.

It is an object of the present invention to provide a deterrent to wrong-way drivers which is positive acting and causes minimal, if any, damage to wrong-way vehicles and their occupants.

It is another object of the invention to provide a positive-acting, wrong-way vehicle deterrent which is simple in operation and which can be inexpensively produced and installed.

It is another object of the invention to provide an apparatus for preventing passage of a wrong-way vehicle on a one-way thoroughfare which does not interfere with the passage of right-way traffic and which is rendered inoperative for deterring traffic in the event of a power failure.

Briefly, the present invention relates to an apparatus for deterring motor vehicles from traveling the wrong-way on one-way thoroughfares. The apparatus includes a traffic deflection means having open and closed positions and which is capable, in the closed position, of deflecting wrong-way traffic from the one-way thoroughfare. A traffic reception area is positioned so as to receive the wrong-way traffic so deflected. The apparatus also includes control means which is capable of sensing the presence of wrong-way traffic and of energizing the traffic deflection means to cause the latter to assume its closed position.

REFERRING TO THE DRAWING

FIG. 1 is a schematic representation of the intersection of a freeway thoroughfare with a two-lane thoroughfare, showing an apparatus of the invention in operative position;

FIG. 2 is a rear view of a portion of an apparatus of the invention in its open position as the same is mounted in position along a one-way thoroughfare;

FIG. 3 is a side view of the apparatus shown in FIG. 2;

FIG. 4 is a prospective view, shown partially broken away, of a portion of an apparatus of the invention, the movement thereof being shown in dotted lines;

FIG. 5 is a schematic representation of a one-way thoroughfare provided with a modified apparatus of the invention; and

FIG. 6 is a schematic representation of an embodiment of the device, in partial section, modified to fit flush with the roadway in its normal open position and to pivot upwardly to its closed position as shown in phantom lines.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to FIG. **1**, the intersection **10** of a freeway with eastbound lanes **12** and westbound lanes **14** with a north-south thoroughfare **16** is shown, the intersection being of admittedly poor design from a safety standpoint. Northbound traffic in lane **18** desiring to enter westbound freeway lanes **14** must cross over the dividing line in the north-south thoroughfare at point A and enter lane **20.** Westbound freeway traffic desiring to exit south on the north-south freeway must use left hand exit lane **22** and hence must also cross over the dividing line in north-south thoroughfare **16** at point A. Particularly for the northbound traffic in lane **18,** this intersection is most confusing since the northbound driver is apt to remain in the righthand lane **18** and thus enter freeway exit lane **22** going the wrong way.

In accordance with my invention, and with further reference to FIG. **1,** a traffic deflector **30** is provided at an angle across lane **22,** the deflector having opened and closed positions, as will be subsequently described. In its closed position, as shown in FIG. **1,** the traffic deflector does not provide a barrier which positively stops the motion of the wrong-way motor vehicles which strike it. Instead, the traffic deflector of my invention operates to deflect, i.e., change the direction of motor vehicles which come in contact therewith. As shown in FIG. **1,** traffic moving in the direction of the arrow **32** in lane **22** will be deflected off the lane to the right, as shown by arrow **34.** The thus-deflected traffic thereupon enters a traffic reception area **36,** which may be at least partially bounded by fence **38,** in which area the so-deflected traffic may come to a halt and may effect a turn-around, entering lane **22** in the correct (southerly) direction. In a preferred embodiment, that portion of the deflector which, in its closed position, is capable of contacting motor vehicles is at a height sufficient to contact the tires of such motor vehicles to cause the tires to turn, but yet is of insufficient height to contact and thus cause damage to the body of a motor vehicle. In its open position, the deflector of my invention permits traffic to pass without interruption.

The movement of wrong-way traffic into lane **22** is sensed by control means, represented as **40** in FIG. **1.** This control means may include a pair of pneumatic road tubes **42, 44** which are laid across the roadway of lane **22** so as to be run over by traffic using this lane. The direction of traffic is sensed by the sequence in which the pneumatic road tubes are struck; a wrong-way (northerly) motor vehicle strikes tube **44** before tube **42,** and an appropriate signal is generated in response thereto by controller **40.** The pneumatic tubes and controller are referred to at page **21** of the Estep presentation referred to above. Such devices have long been used as counters for monitoring traffic flow and also for the purpose of measuring the speed of passing motor vehicles, and need not be described here in detail. As mentioned, the controller **40** generates a predetermined electric signal when the pneumatic road tubes are struck in the sequence **44–42,** and this signal is led to the traffic deflector **30,** causing the latter to assume its closed position. The signal generated by controller **40** may also be employed to illuminate signs **46** in an effort to halt a wrong-way motor vehicle before it comes into contact with deflector **30.**

Referring now to FIGS. **2** and **3,** the traffic deflector **30** may be provided with a longitudinal barrier member shown generally as **48,** the latter including a first rigid, break-resistant longitudinal member **50** which may be of steel or other strong material tapered along its length from its butt end **52** to its extending end **54,** and a second longitudinal member **55** longitudinally connecting along a portion of the length of rigid member **50** by means of rivets or the like at **56** and **58,** the second member **55** being sufficiently resilient to at least partially cushion the impact of automobile tires with the deflector **30.** As such, longitudinal member **55** may be of spring steel or other appropriate material, and is preferably provided with a tire-contacting outer surface **60** which is a low friction surface so as to reduce friction between it and rubber motor vehicle tires. I contemplate the use of a polished steel surface, or a surface coated with a lubricant such as a grease or other material. Members **50** and **55** may be bent in dog-leg fashion as shown at **61** and **63,** FIG. **3** so that the tire-contacting surface **60** of member **55** is of tire-contacting height (e.g., 6–12 inches) when the defector is in the closed position. Longitudinal member **50** is supported at a point near its butt end **52** by shaft **62** which in turn is connected through reducing gears **64** and **66** to motor and clutch assembly **68.** Shaft **62** is rotatably supported by vertical, heavy frame members **70** and **72** which in turn are rigidly attached to steel support members **74** and **76,** the latter member being affixed to the ground by means of cemented-in posts or the like (not shown). Attached across one edge of vertical frame members **70** and **72** is a steel plate **78** which in turn bears bracket **80** having an upper surface to which is connected the motor-clutch assembly **68.** Also supported on plate member **78** is timing device **82,** the purpose for which will be subsequently explained. A protective housing (not shown) is provided about the drive mechanism which includes gears **64** and **66,** motor-clutch assembly **68,** plate support member **78,** timing device **82** and associated electrical connections.

At its butt end **52,** longitudinal member **50** is provided with weighting material such as iron block **84** of sufficient weight to urge longitudinal member **50** to pivot about shaft **62** into the open position as depicted in FIGS. **2** and **3.**

Clutch and motor assemblies such as represented by **68** in FIGS. **2** and **3** are known to the art. For example, it is contemplated that a Model 305 Stationary Field Bearing Mounted Pin Drive Clutch-Coupling and Clutch such as that marketed by Eaton Yale & Towne, Inc. of Kenosha, Wis. may be coupled to a ¼ horsepower, 1750 rpm electric motor through an appropriate speed reducer such as a size 22 Cleveland Type AB Modular Worm Gear Speed Reducer manufactured by the Eaton Corporation of Cleveland, Ohio. The so-described clutch couples (i.e., transmits motion of) the drive motor to shaft **62** only when energized by an electrical current; in the absence of current, barrier member **48** is accordingly able to pivot freely, and will normally assume the open position under the influence of iron block **84.** Thus, in the event of a power failure at a moment when the deflector is in the closed position, the clutch will become disengaged and barrier member **48** will return to its upright, open position under the influence of iron block **84.**

Timing switch **82,** mounted upon plate support member **78,** is provided to limit the time period during which barrier member **48** may remain in its closed position. Upon reception by timing switch **82** of a predetermined signal from the controller **40** indicating the approach of a wrong-way vehicle, the timing switch provides current to the motor-clutch assembly **68,** thus turning on the motor and engaging the clutch whereupon barrier member **48** is quickly lowered into the closed position. After a pre-determined time interval has elapsed (e.g., 5–10 seconds) timing switch **82** discontinues current to the motor-clutch assembly, whereupon barrier member **48** is quickly returned to the upright, open position by weighting material **84.** Timing switch **82** may be, for example, of the type presently employed in the operation of traffic control lights. If a timing switch is employed which is unable to tolerate the electric energy required to energize motor-clutch assembly **68,** then a suitable solenoid switch between the motor-clutch assembly and line power may be employed, the switch being controlled by the output of timing switch **82.**

Referring again to FIG. **1,** the drive assembly and supporting frame structure **86** is mounted at one edge of lane **22** so that barrier member **48,** when in a closed position, extends across lane **22** at an angle oblique to a line normal to the direction of traffic flow in lane **22.** The closer this angle approaches 90°, the more easily will the tires of a wrong-way motor vehicle be deflected so as to divert the vehicle into traffic reception area **36.** As this angle approaches 90°, however, the length of barrier member **50** must increase in order to extend across the lane. It is contemplated that this angle must not be less than about 45° nor more than about 80°.

FIG. **5** depicts another embodiment wherein the barrier member **48** is curved so as to present a concave surface to oncoming wrong-way drivers. Thus the angle subtended by the barrier member **50** with respect to a line normal to the direction of traffic flow in lane **22** increases as the barrier extends from the lane edge adjacent the traffic reception area to the other lane edge. Thus, the left front tire of a wrong-way motor vehicle would first contact the barrier member at the point represented by X in FIG. **3,** and would be continously deflected to sharper angles as this tire is guided along the

barrier member towards point Y, thereby to more gently deflect the motor vehicle from the lane.

Referring now to FIGS. **1, 4** and **5**, the extending end **54** of the barrier member **48** contacts retaining member **88** when the barrier member has attained its closed position, barrier member **88** being positioned on the other side of the thoroughfare and a suitable distance upstream (with respect to wrong-way drivers) from the drive assembly **86.** In one embodiment, a projection **92** arises from the downstream portion of the upper surface **90** of the retaining member (downstream with respect to wrong-way traffic) so as to provide a step-like surface adapted to engage extending end **54** of the barrier member **48.** When the barrier member is in its closed position, projection **92** serves to prevent extending end **54** of the barrier member from being moved when the barrier member is struck by a wrong-way motor vehicle. On the other hand, should the situation arise wherein a right-way vehicle strikes the barrier, extending end **54** may be disengaged from the retaining member **88** by sliding across upper surface **90.** In this respect, it it contemplated that ground plates **74** and **76** (FIGS. **2** and **3**) may be adapted to pivot one upon the other so that barrier member **48,** when struck by a right-way vehicle, may cause the traffic deflector **30** to pivot about a verticle axis extending through ground plates **74** and **76,** thus removing the barrier member **48** from the lane of traffic. In another embodiment, the longitudinal members **50** and **55** may be suitably hinged along their length adjacent the connection thereof with shaft **62** so that these barrier members may only pivot on such hinges out of lane **22** when struck by right-way vehicles, such hinges not permitting pivoting when such members are struck from the opposite direction by wrong-way drivers. In its closed position, the height of barrier member **55** is adjusted so that the barrier will preferably contact the tires but not the body of vehicles striking it, a distance, for example, of about 6–12 inches.

Although described primarily with reference to a barrier member capable of pivoting into and out of the roadway about a horizontal axis (shaft **62**), it will be understood that my invention is applicable as well to other deflection devices adapted to assume open and closed positions across a traffic thoroughfare. In another embodiment, shown in FIG. **6,** a suitable barrier member **50** may extend obliquely across a thoroughfare as described above, the barrier itself, when in its open position, being flush with the roadway surface **94** and being adapted to pivot about appropriate horizontal hinges to assume an upright closed position when energized by signals from the control means. Further, with reference to the apparatus depicted in FIGS. **1–5** hereof, it should be understood that the drive assembly **86** of the apparatus need not be located downstream with respect to the direction of wrong-way drivers, but instead may be upstream. In FIG. **2,** the resilient barrier member **55** is depicted as containing an outwardly extending curve or hump in the vicinity of the drive assembly **86.** When the device of FIG. **2** is positioned as depicted in FIG. **1,** the outwardly curved surface of resilient barrier member **55** is the last portion of the barrier member which is encountered by the tires of a motor vehicle as the motor vehicle leaves the highway. This outwardly curved suface is provided to further protect the frame members and the drive assembly from contact with the thus-deflected motor vehicle.

It is to be understood that the foregoing description and the accompanying drawing have been given by way of illustration and example. It is also to be understood the changes in form of the elements or steps, rearrangement of parts or steps, and substitution of equivalent elements or steps, which will be obvious to those skilled in the art, are contemplated as within the scope of the present invention which is limited only by the claims which follow.

What is claimed is:

1. An apparatus for deterring motor vehicles from traveling the wrong-way on one-way thoroughfares which comprises

a. traffic deflection means having open and closed positions, said open position permitting traffic to pass without interruption, and said closed position preventing the passage of wrong-way traffic by deflecting the same from said thoroughfare, said traffic deflection means remaining normally in said open position until energized into said closed position by reception of a predetermined signal, the traffic deflection means having a longitudinal barrier member which, in said closed position, extends across said thoroughfare at an angle oblique to a line normal to the direction of traffic flow on said thoroughfare, and at a height sufficiently high to cause contact thereof with motor vehicle tires so as to force the same to turn and thus deflect said vehicle from said thoroughfare, but at a height sufficiently small to substantially avoid contact with the leading body structure of motor vehicles;

b. a traffic reception means in a location to receive wrong-way traffic so deflected by said traffic deflection means and capable of permitting said traffic to turn around and re-enter said thoroughfare in the correct direction; and

c. control means for controlling the position of said traffic deflection means, said control means being capable of sensing the presence of wrong-way traffic, of generating a predetermined signal in response thereto, and of sending said signal to said traffic deflection means to cause the latter to assume said closed position.

2. The apparatus of claim **1** including timing means for limiting to a predetermined time period the interval during which said traffic deflection means remains in said closed position.

3. The apparatus of claim **1** including means moving said traffic deflection means into said closed position in response to said predetermined signal.

4. The apparatus of claim **3** including means for returning said traffic deflection means to its open position in the event of malfunction while in the closed position.

5. The apparatus according to claim **1** wherein said longitudinal barrier member includes a rigid, break-resistant, longitudinal member and a resilient longitudinal member longitudinally connected along a major portion of the length of said first member, said second member being adapted to contact tires of motor vehicles when said traffic deflection means is in its closed position and being sufficiently resilient to at least partially cushion the impact of automobile tires with said traffic deflection means.

6. The apparatus of claim **1** including first and second support means, said first support means being mounted at one edge of said thoroughfare and having said longi-

tudinal barrier member pivotally connected adjacent one end thereof to said first support menas, said second support means being mounted to the other edge of said thoroughfare in position to contact the other end of said barrier member to restrain the same from horizontal movement in at least one direction upon impact of said barrier member with automobile tires.

7. The apparatus of claim **6** wherein said pivotal attachment of said longitudinal barrier member to said first support means enables said barrier member to attain a horizontal, closed position or a substantially vertical, open position.

8. The apparatus of claim **7** including drive means mounted to said first support member and adapted to move said barrier from said open to said closed position.

9. The apparatus according to claim **8** wherein said longitudinal barrier member includes weighting means carried by an end of said longitudinal barrier member adjacent said first support and adapted to urge said member to assume its open position, said apparatus including a motor and clutch means operatively coupling said motor and said barrier member and adapted to transmit motion from said motor to said barrier member only when energized, whereby, in the event of a power failure, said barrier member will return and be maintained in its open position under the influence of said weighting means.

10. The apparatus of claim **9** including timing means for limiting to a predetermined time period the interval during which said motor may continuously remain energized, whereby said barrier member may remain in its closed position only during said predetermined time period.

11. The apparatus of claim **1** wherein said thoroughfare includes a groove thereacross wherein is pivotally mounted said longitudinal barrier member, said barrier member in its closed position being flush with the surface of said thoroughfare and in its open position extending upwardly from the surface of said thouroughfare.

12. Apparatus for deterring motor vehicles from traveling the wrong-way on one-way thoroughfares which comprises

a. traffic deflection means having open and closed positions and capable, in said closed position, of deflecting wrong-way traffic from said thoroughfare at an angle oblique to a line normal to the direction of traffic flow on said thoroughfare; and

b. control means capable of sensing the presence of wrong-way traffic and, in response thereto, energizing said traffic deflection means to cause the latter to assume said closed position.

13. A method of deterring motor vehicles from traveling the wrong way on one-way thoroughfares, comprising providing a longitudinal barrier member capable of assuming open and closed positions in response to predetermined signals derived from a traffic sensor, generating a signal in the traffic sensor in response to wrong-way traffic, transmitting the signal to the barrier, moving the barrier from an open position to a closed position at an oblique angle to a line normal to the direction of traffic flow along said thoroughfare and positioning the barrier at a heighth sufficient to cause the barrier member to engage automobile tires to physically turn the same and deflect said motor vehicle from said thoroughfare into a traffic reception area in response to these signals.

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