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HIGHWAY DIVIDING LINE CHANGING SYSTEM

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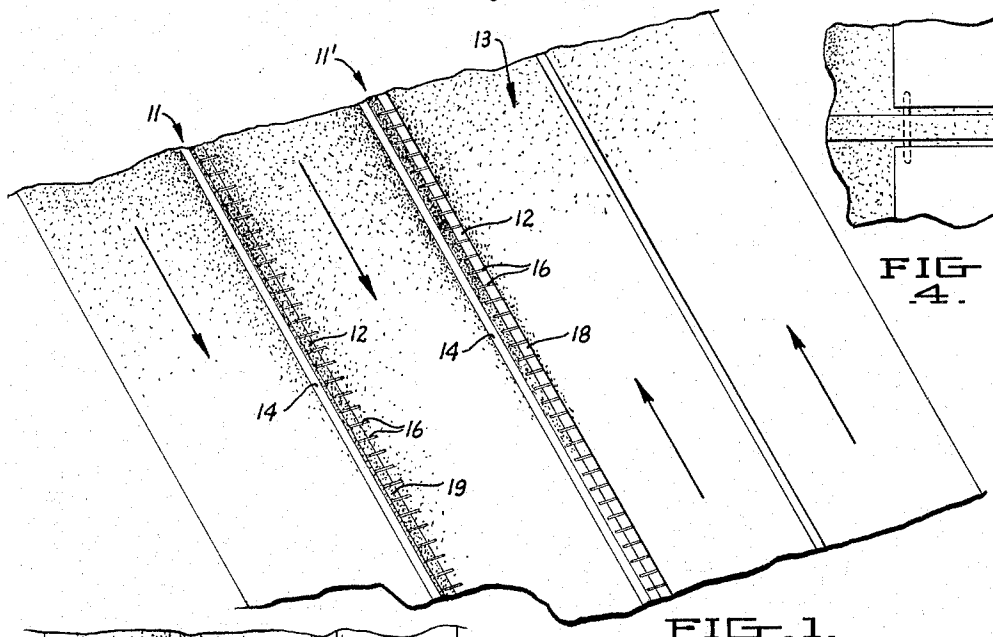



FIG. 1.



FIG. 4.

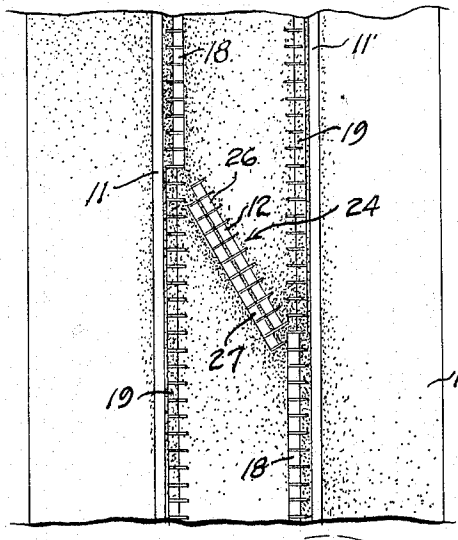



FIG. 5.

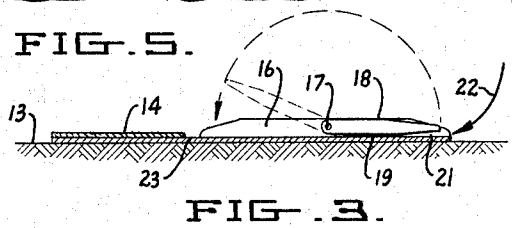



FIG. 3.

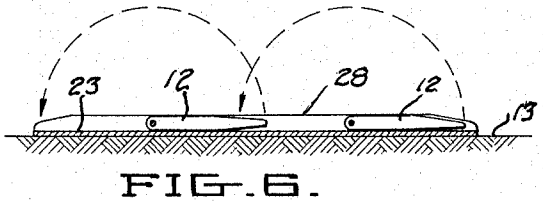



FIG. 6.

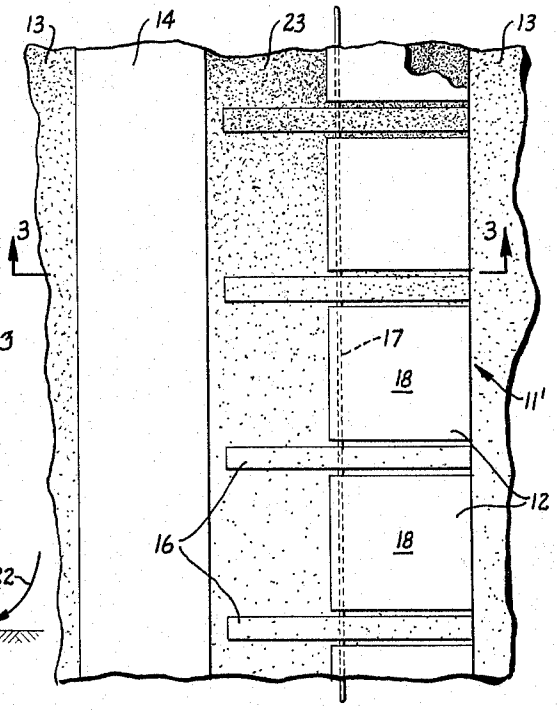



FIG. 2.

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# HIGHWAY DIVIDING LINE CHANGING SYSTEM

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The present invention relates generally to control systems for the management of traffic streams by the adjustable division of a roadway between two oppositely moving streams of traffic, and is more particularly directed to an improved system for selectively changing the double dividing line of a multilane highway from one position of lane separation to another.

In metropolitan areas, the flow of roadway traffic is subject to periodically fluctuating loads. During a period of the morning, most of the traffic flows in one direction and during a similar period of the late afternoon and evening, most of the traffic flows in the opposite direction. During times between these peak traffic periods, the flow of traffic in both directions is substantially equal. In order to efficiently use multi-lane highways under fluctuating load conditions of the foregoing type, it is the usual practice to correspondingly vary the number of lanes which may be used by the oppositely moving streams of traffic at different hours of the day. For example, with a four lane highway, three lanes are provided in the direction of heaviest traffic flow and one lane in the opposite direction during the peak traffic periods. During the non-peak hours, two lanes are provided in each direction. Various systems have been devised for accomplishing such change in the number of lanes in each direction, however, these existing systems have not proven entirely satisfactory.

One system which is extensively employed entails the placement of a large number of plastic tubes or cones on the roadway where the dividing line is desired. Each of these elements must be moved by hand several times each day in order to vary the dividing line position. Aside from the substantial labor cost thus involved, the demounted elements are hazardous in that they are constantly knocked or blown over into the path of moving vehicles.

In another system, dividing lines are comprised of curb-like barriers which may be lowered flush with the highway surface or raised substantially above same between adjacent lanes. The installation cost of such a system is extremely high as is the continuing maintenance cost thereof. Furthermore, the high vertical curbs of the barriers have proven dangerous obstacles to motor vehicles.

Still another system of traffic control utilizes an overhead traffic signal system which indicates the direction of traffic flow to be followed in the respective lanes. With this system there is a tendency for drivers to disregard the signals because they are remotely displaced from the roadway.

It is to be noted that none of the foregoing existing traffic control systems utilize a divider strip or line on the surface of a highway which can be selectively converted to a double line. Such a strip would overcome all of the disadvantages of the existing system in that the strip would be permanently disposed at the surface of a highway rather than being demounted or remotely positioned overhead. Likewise, the strip would not protrude substantially above the highway surface or require recesses in the highway surface.

It is therefore an object of the present invention to provide a highway dividing line changing system wherein a surface strip is selectively convertible from a double line to a single line, and vice versa.

Another object of the invention is the provision of a highway dividing line changing system which includes



a permanently positioned line and a changeable parallel adjacent line which can be selectively changed from the color of the permanently positioned line to the color of the roadway to thus facilitate changeover from a double to a single line.

It is still another object of the invention to provide a highway dividing line changing system of the class described wherein the changeable line is defined by a plurality of line segments each having light and dark color surface portions and being selectively movable or reversible between a first position horizontally exposing the light color surface portion, and a second position obscuring the light color surface portion, whereby a line is defined when the light color surface portions are exposed and the line vanishes when the light color surface portions are obscured.

It is yet another object of the invention to provide a highway dividing line changing system of the class described wherein the line segments may be rapidly changed between their first and second positions from a moving vehicle.

One other object of the invention is to provide a dividing line changing system which may be provided as a built-in part of a roadway, or alternatively as a mountable unit which can be attached to the surface of a roadway.

It is a further object of the invention to provide a highway dividing line changing system which is of relatively low cost in initial installation and of relatively low cost in continuing maintenance.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawing accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawing and description may be adopted within the scope of the invention as set forth in the claims.

FIGURE 1 is a perspective view of a section of roadway having lane dividing lines in accordance with the dividing line changing system of the present invention.

FIGURE 2 is a plan view of a preferred embodiment of the dividing line changing system.

FIGURE 3 is a transverse sectional view taken at line 3—3 of FIGURE 2, and illustrating the changeover of the reversible line segments of the system from their double line to single line position.

FIGURE 4 is a fragmentary plan view depicting a modified form of pivotal mounting means for the reversible line segments of the dividing line changing system.

FIGURE 5 is a plan view of a section of roadway including a lane merging switch section of the dividing line changing system as employed at points of changeover in the number of lanes provided in opposite directions.

FIGURE 6 is a transverse sectional view of the lane merging switch section of FIGURE 5.

In its broader aspects, the dividing line changing system of the present invention comprises a plurality of longitudinally aligned dividing line segments secured to a roadway surface in parallel relation to a permanently positioned lane dividing line which is typically of a light color. Each of the segments has a light color surface portion, usually matching the color of the permanent line, and a dark color surface portion substantially matching the color of the roadway pavement. The segments are arranged to be selectively reversible or movable between one position wherein the light color surface portion is horizontally exposed and a second position wherein the light color surface portion is obscured while the dark color surface portion is exposed. Thus by reversing the segments between their alternative positions, a

second line may be provided parallel to the permanent line or a pavement colored strip may be provided such that only the permanent line appears. As a result, the lane dividing line is selectively convertible to a double or a single line. Where the lane dividing lines of a multi-lane highway are provided in the foregoing manner the number of lanes of traffic in opposite directions may hence be readily changed by appropriate conversion of the lane dividing lines between their single and double line conditions. The system further includes a lane merging switch section of reversible line segments which facilitates a gradual or merging type of changeover in the double dividing line from one lane position to another.

It will be appreciated that various alternatives are possible in the provision of a dividing line changing system of the type briefly outlined above. For example, the light and dark surface portions of the respective segments may be provided on a single face thereof. The segments may then be mounted for translation relative to an opening of a cooperating pavement colored mark. In one position of translation the light surface portions of the segments are disposed within the mark and hence obscured while the dark surface portions are exposed. In another position of translation, the light surface portions are disposed without the mask and hence exposed together with the dark surface portions. More preferably, however, the dividing line changing system is provided as illustrated in the drawing.

Referring now to the drawing, the dividing line changing system is indicated at **11** and preferably includes a plurality of plates **12** disposed in longitudinal alignment at the surface of a roadway **13** in parallel spaced relation to a permanently positioned lane dividing line **14**. The plates **12** comprise the previously mentioned reversible members and in the present case are mounted adjacent one side edge of the plates for pivotal movement about a longitudinal axis at the roadway surface. In this regard, a plurality of transversely extending shallow ribs **16** are preferably secured to the roadway in longitudinal spaced relationship laterally adjacent the permanent dividing line **14**. The plates are disposed between adjacent ones of the ribs and hingedly connected thereto as by means of a longitudinal pin **17** extending centrally through the ribs and through the interposed plates adjacent one side edge thereof, or the like. Alternatively short pins **20** extending through each rib and secured to the ends of adjacent plates may be employed as indicated in FIGURE 4 to facilitate pivoting thereof. The short pins facilitate the ready removal of the plates for maintenance purposes. The length of the ribs **16** is preferably substantially twice the transverse width of the plates **12** and the height of the ribs is preferably substantially equal to the thickness of the plates. The upper surfaces of the plates are hence substantially flush with the upper surfaces of the ribs and the plates extend transversely from substantially the center line of the ribs to one side thereof. The width of the plates is substantially equal to the width of the permanent line **14**. One face **18** of each plate is light colored to preferably match the color of the permanent dividing line **14**, while the reverse face **19** of the plate is dark colored to simulate the color of the roadway pavement. The plates may thus be pivoted over, as indicated by the dashed arrow of FIGURE 3, between horizontal positions wherein the light and dark faces **18**, **19** are respectively exposed to view. In this regard, as shown in FIGURE 1, the plates of the system **11** are all disposed to expose the dark faces **19** such that only the permanent line **14** is visible as a single line between adjacent lanes. The plates of the system **11'**, on the other hand are all disposed to expose the light faces **18** which with the permanent line hence provide a visible double line between adjacent lanes. With the plates of the systems **11**, **11'** positioned as indicated in FIGURE 1, there are provided two lanes of traffic in each direction. Of course by reversing the illustrated positions of the plates of systems **11**, **11'**, three lanes of traffic are provided in one direction and one lane in the opposite direction. It will be thus appreciated that the number of traffic lanes in opposite directions may be readily adjusted to accommodate fluctuating traffic loads merely by pivoting the plates **12** from one position to the other.

It is of course desirable that the plates be shifted from one position to the other in a minimum of time during the accomplishment of lane changeover. In this regard, it is desirable that movement of the plates be accomplishable from a moving vehicle. Various schemes are possible for this purpose, for example, plate movement may be effected magnetically from a moving vehicle. Preferably, however, the plates are arranged to be moved by compressed air directed at the plates from a moving vehicle. More particularly, the faces **18**, **19** are tapered in the direction of the free side edge of the plate, as shown in FIGURE 3, or otherwise formed such that a small crack **21** exists between the plate and subjacent surface at the free side edge of the plate. Hence, a blast of air directed at the free side edges of the plates, as indicated by the arrow **22**, enters the crack **21** and rapidly pivots the plates to reverse their positions. In this manner, the positions of the plates may be quickly reversed from a moving vehicle.

The ribs **16** may be embedded in the roadway or otherwise directly affixed to the road surface in the provision of the dividing line changing system of the present invention. In an alternative arrangement the system may be provided as a completely mountable unit. More particularly, as shown in FIGURE 3, the ribs **16** may be transversely secured to a longitudinally elongated backing strip **23** upon which the permanent line **14** may, or may not, be also provided as desired. The backing strip is flexible and in this case the pin **17** is also made somewhat flexible or is otherwise arranged to provide some degree of flexibility at the hinged connections between the plates and ribs. The entire unit may then be loosely rolled and in installation unrolled upon the surface of a roadway and the backing strip secured thereto.

It will be appreciated that at points of a roadway where the number of lanes in opposite directions changes (i.e., increases in one direction and decreases in the opposite direction), an abrupt changeover would be extremely hazardous. More particularly, there might be, for example, three lanes in one direction and one lane in the opposite direction over a given section of roadway which in a following section changes to two lanes in each direction. In the event the change were abrupt, one lane would instantaneously switch from use for traffic flow in one direction to use for traffic flow in the opposite direction and head on collisions would be eminent. To obviate this situation the line changing system of the present invention includes a lane merging switch section for employment at these points of a roadway where lane changeover occurs. More particularly, as illustrated in FIGURES 5 and 6 the lane merging switch section **24** includes parallel rows **26**, **27** of reversible line segments such as the pivotal plates **12**. The plates are pivotally connected adjacent one of their side edges to transverse ribs **28** which are substantially similar to the ribs **16** but approximately twice their length. The switch section extends diagonally between adjacent ones of the changeable lane dividing lines, e.g., between lines **11** and **11'**. The switch section preferably extends for a substantial distance such as a quarter mile such that lane changeover or merger is accomplished gradually. Thus it will be appreciated that with the plates **12** of the dividing lines **11** and **11'** and of the switch section **24** in the positions indicated in FIGURE 5, a gradual increase from two to three lanes is provided in one direction and from one to two lanes in the opposite direction. In the event two lanes in each direction are to be provided through the position of the switch section, the two rows **26**, **27** of

plates **12** thereof are pivoted over to their reverse positions to expose the dark pavement colored faces thereof. Those of the plates of line **11** having their light colored faces exposed are reversed to expose their dark colored faces. Conversely those of the plates of line **11'** having their dark colored faces exposed are reversed to expose their light colored faces. Line **11'** is thus now a double line extending past the position of the switch and dividing the roadway into two lanes in each direction.

What is claimed is:

**1.** A highway dividing line changing system comprising a plurality of longitudinally aligned reversible line segments secured to a roadway surface in parallel relation to a permanently positioned lane dividing line, said segments respectively having light and dark color surface portions, and means mounting said segments for movement between a first position wherein said light color surface portions are horizontally exposed and a second position wherein said light color surface portions are obscured while said dark color surface portions are horizontally exposed.

**2.** A highway dividing line changing system comprising a plurality of longitudinally aligned plates pivotally secured adjacent one side edge upon a roadway surface for movement about a longitudinal axis in laterally adjacent parallel relation to a permanently positioned lane dividing line, said plates having opposite horizontal faces of respectively light and dark colors.

**3.** A highway dividing line changing system according to claim **2**, further defined by said horizontal faces of said plates having relatively depressed portions extending from the free side edges of the plates to thereby define cracks between the plates and the subjacent surface into which air may be directed to effect pivoting of the plates.

**4.** A highway dividing line changing system according to claim **3**, further defined by said horizontal faces of said plates being tapered in the direction of the free edges thereof.

**5.** A highway dividing line changing system comprising a plurality of transverse ribs disposed in longitudinally spaced apart relation upon a roadway surface laterally adjacent a permanently positioned lane dividing line, and a plurality of plates disposed between said ribs, each of said plates hingedly connected adjacent a side edge thereof to said ribs at the longitudinal center line thereof, each of said plates having opposite horizontal faces of respectively light and dark colors.

**6.** A highway dividing line changing system according to claim **5**, further defined by said horizontal faces having relatively depressed portions extending from the free side edges of said plates.

**7.** A highway dividing line changing system according to claim **5**, further defined by said ribs being secured to a flexible backing strip and the hinged connections between said plates and ribs being flexible.



**8.** A highway dividing line changing system comprising a plurality of reversible line segments disposed upon a roadway surface, said segments each having light and dark color surface portions, and means mounting said segments for movement between first and second positions wherein said light and dark color surface portions are respectively exposed.

**9.** A highway dividing line changing system comprising a plurality of longitudinally aligned plates pivotally secured adjacent one side edge upon a roadway surface, said plates having opposite horizontal faces of respectively light and dark colors.

**10.** A highway dividing line changing system comprising a pair of changeable parallel spaced lane dividing line means, each of said line means including a plurality of longitudinally aligned reversible line segments disposed upon a roadway surface in parallel relation to a permanently positioned lane dividing line, said segments respectively having light and dark color surface portions, and means mounting said segments for movement between first and second positions wherein said light and dark color surface portions are respectively exposed, and lane merging switch means extending diagonally between said dividing line means, said switch means including a pair of parallel spaced rows of longitudinally aligned reversible line segments having light and dark color surface portions and mounted for movement between first and second positions wherein said light and dark color surface portions are respectively exposed.

**11.** A highway dividing line changing system comprising first and second pluralities of longitudinally aligned plates respectively pivotally secured adjacent one side edge upon a roadway surface for movement about longitudinal axes in laterally adjacent parallel relation to permanently positioned lane dividing lines, and third and fourth parallel spaced aligned pluralities of plates extending diagonally between said first and second pluralities of plates and pivotally secured adjacent one side edge upon said roadway surface, said pates having opposite horizontal faces of respectively light and dark colors.


**References Cited by the Examiner**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,143,433 | 1/1939 | Curtis | 94—1 |
| 2,260,051 | 10/1941 | Pardee | 94—1 |
| 2,287,685 | 6/1942 | Jelinek | 94—1 |
| 2,931,279 | 4/1960 | Wiswell | 94—1.5 |


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