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Duckett et al.

[11] **3,792,679**

[45] **Feb. 19, 1974**

[54] **SELF-RIGHTING ROAD MARKER**

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[73] Assignee: **American Molded Products Ltd.**, Sausalito, Calif.

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[21] Appl. No.: **259,698**

Related U.S. Application Data

[62] Division of Ser. No. 69,008, Sept. 2, 1970, Pat. No. 3,705,566.

[52] **U.S. Cl.** ..... **116/63 P**, 40/125 H, 40/145 A

[51] **Int. Cl.** **E01f 9/10**

[58] **Field of Search** ..... 116/63, 63 P; 40/125 N, 116/145 A; 94/1.5; 350/97

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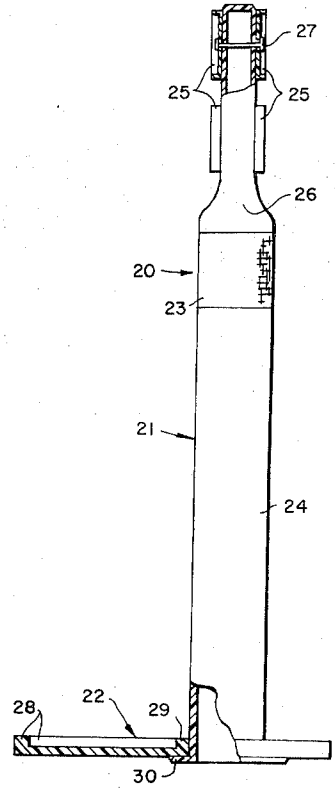
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[57] **ABSTRACT**

A road marker comprises a vertically disposed member, such as a cone, attached to a horizontally disposed elastomeric base. The marker is constructed to have a very low center of gravity and to permit a substantial portion of the base to remain in contact with the ground to constantly maintain the marker's pivot axis and center of gravity substantially within the confines of the base. In addition to such positioning of the marker's pivot axis and center of gravity, means for automatically self-righting the marker comprises a suitably composed and constructed base which exhibits predetermined degrees of elasticity and flexibiliy.

13 Claims, 11 Drawing Figures



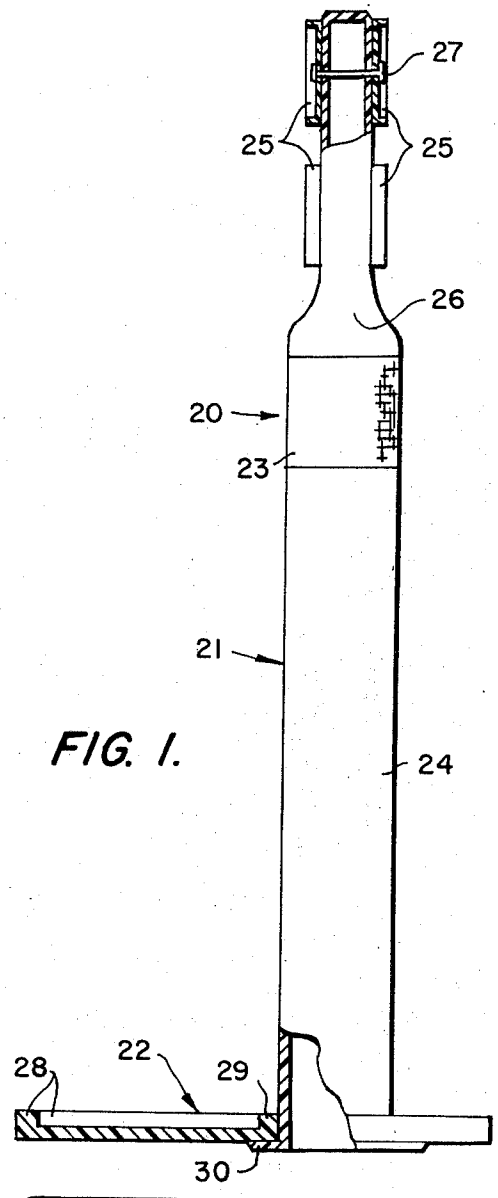


FIG. 1.

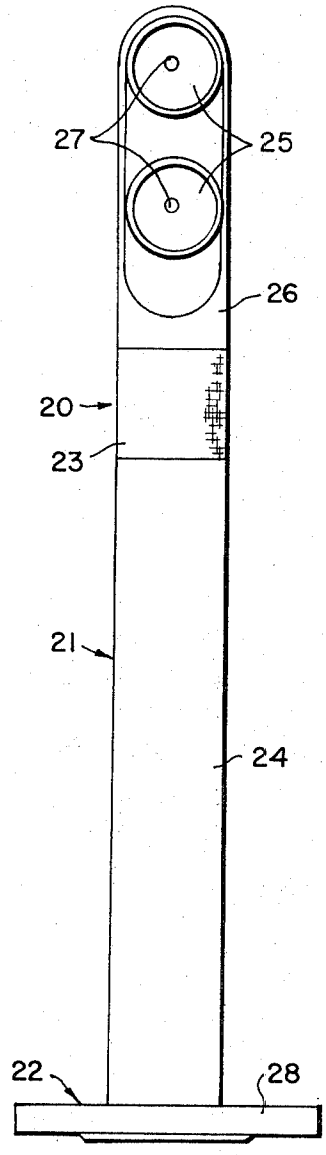


FIG. 2.

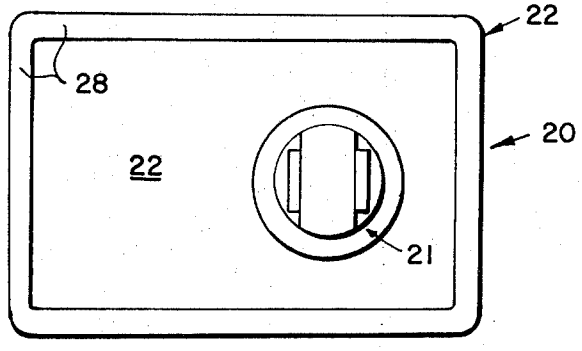
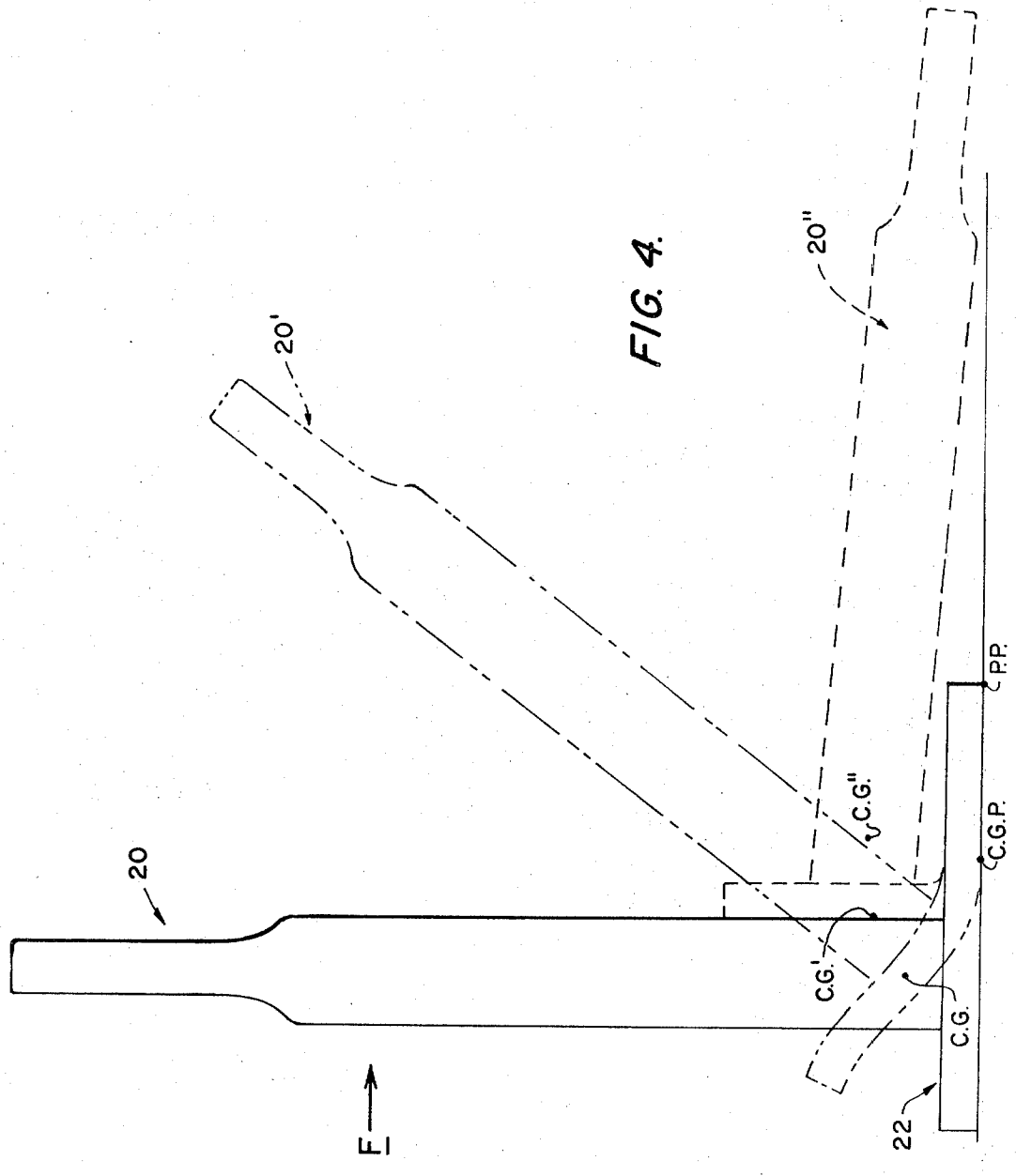


FIG. 3.

FIG. 4.



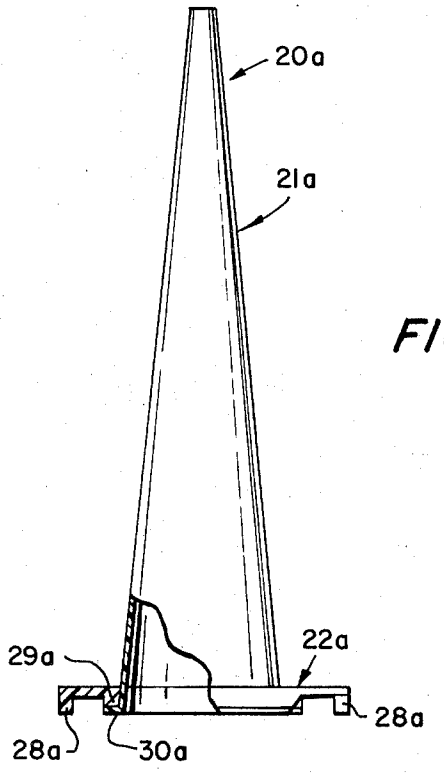


FIG. 5.

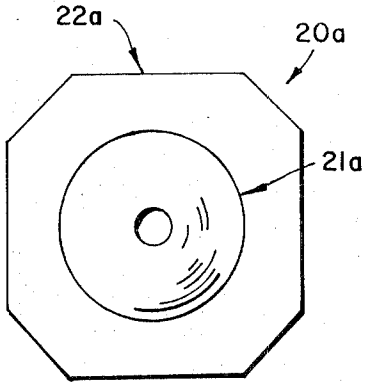


FIG. 6.

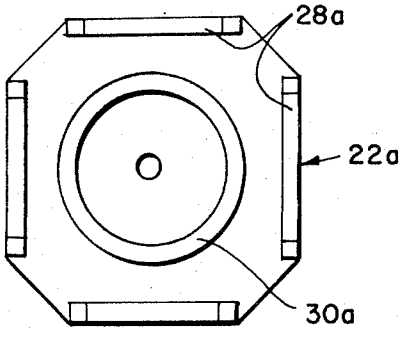
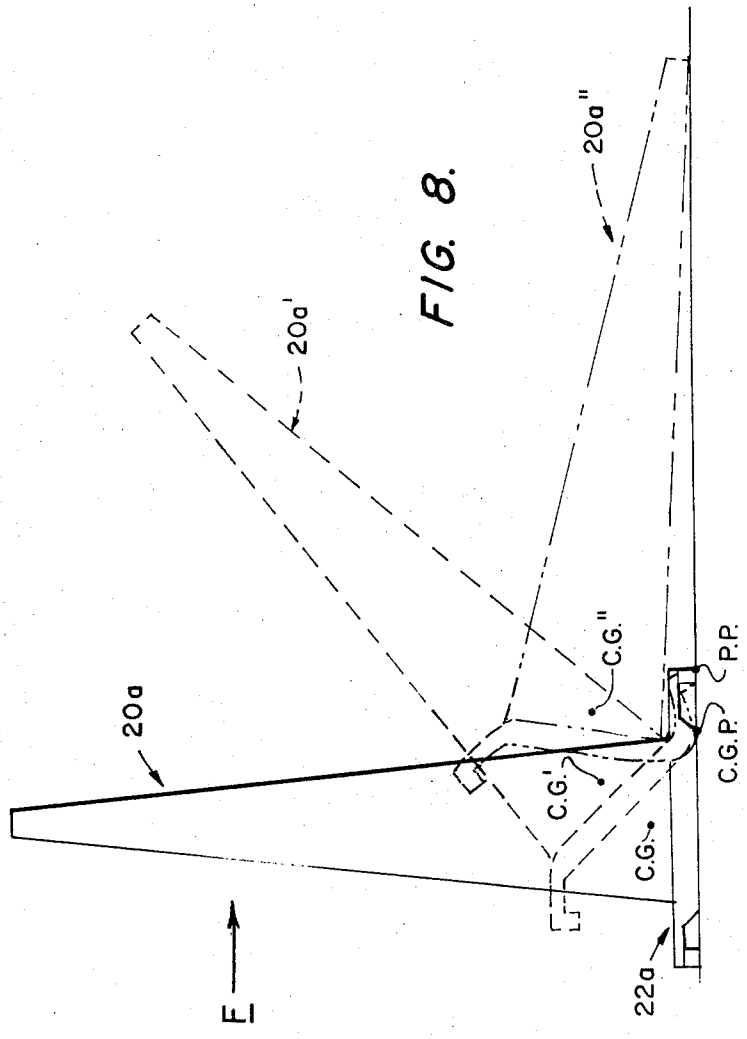


FIG. 7.

FIG. 8.



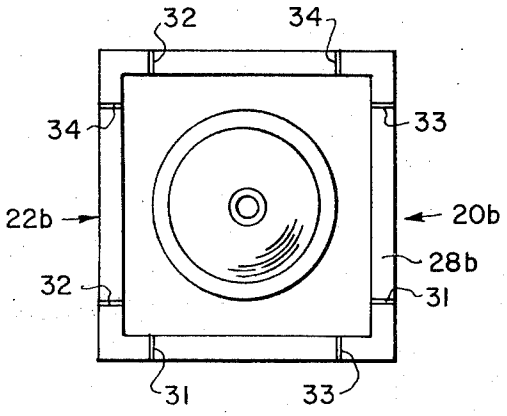


FIG. 10.

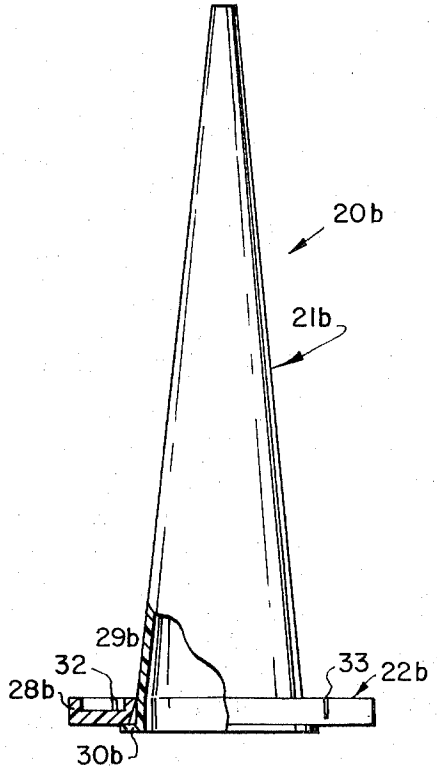


FIG. 9.

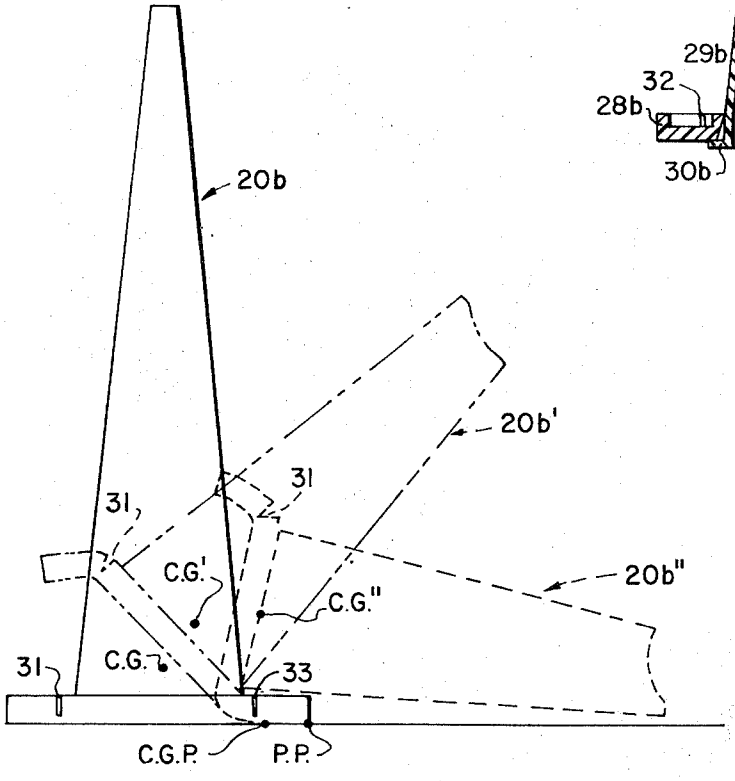


FIG. 11.

SELF-RIGHTING ROAD MARKER

CROSS-REFERENCE TO RELATED APPLICATION

This application is a Divisional Application of U.S. Pat. application Ser. No. 69,008, filed on Sept. 2, 1970 for "Self-Righting Road Delineator," now U.S. Pat. No. 3,705,566.

BACKGROUND OF THE INVENTION

Road markers, and like devices normally comprise an upstanding cone attached to a semi-rigid base. When such devices are struck by an automobile, for example, they normally pivot about an outer edge thereof. Due to their inherent construction, such devices do not exhibit a self-righting capability and thus require manual effort to restore them to their functional, upright position when they tip over.

SUMMARY AND OBJECTS OF THIS INVENTION

An object of this invention is to overcome the above, briefly described problem by providing a non-complex and economical road marker which is inherently capable of self-righting itself when tipped over. Such device comprises a vertically disposed and conically shaped member having a flexible and elastomeric base attached thereto. The base is constructed to constantly maintain a substantial portion of the base in contact with the ground and the marker's pivot axis and center of gravity substantially within the confines of the base.

In the first hereinafter described road marker embodiment, the self-righting moment is primarily induced due to the high degree of "elastic memory" or spring-back exhibited by the base. The base for a second embodiment has less elasticity and more flexibility to essentially combine the two characteristics for self-righting purposes. A third marker embodiment primarily induces the self-righting moment due to the high degree of flexibility designed into the base by way of material composition and/or by mechanical features. In particular, such flexibility aids in properly locating the marker's shifting center of gravity "under center" relative to the base's pivot axis during a tipping and self-righting cycle. As will be further described, the above flexibility and elasticity characteristics may be suitably varied to induce a self-righting moment to satisfy any particular delineator application.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects of this invention will become apparent from the following description and accompanying drawings wherein:

FIGS. 1–4 are views of the "Self-Righting Road Delineator" which is the subject of above-mentioned U.S. Pat. No. 3,705,566;

FIG. 5 is a partially sectioned, side elevational view of a second road marker embodiment;

FIGS. 6 and 7 are top and bottom plan views, respectively, of the FIG. 5 road marker;

FIG. 8 is a view similar to FIG. 4, but schematically illustrating the FIGS. 5–7 road marker during a tipping and automatic self-righting cycle;

FIG. 9 is a partially sectioned, side elevational view of a third road marker embodiment;

FIG. 10 is a top plan view of the FIG. 9 road marker; and

FIG. 11 is a view similar to FIG. 8, but schematically illustrating the FIGS. 9 and 10 road marker during a tipping and automatic self-righting cycle.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1–3 illustrate a "Self-Righting Road Delineator" 20, which is the subject of U.S. Pat. No. 3,705,566, comprising an upstanding cylindrical post 21 having a base 22 attached thereto. The hollow post, the thickness of which has been substantially enlarged (approximately five times) for illustration purposes, may comprise a lightweight and semi-rigid plastic material such as ethylene vinyl acetate. A light reflecting strip or reflector 23 may be adhesively or otherwise suitably secured to the post to be readily detected when light is shone thereon.

In addition, identical pairs of conventional reflectors 25 may be suitably attached to a reduced neck portion 26 of the post by means of conventional fasteners 27. If so desired, one or two reflectors may be attached to only one side of the post for delineating purposes. In addition, the post material is preferably translucent and may be colored light orange or the like to further enhance the delineating desiderata.

Horizontal base 22 may comprise a rectangular configuration (FIG. 3) bordered by an upstanding ridge 28. An annular collar portion 29 of the base defines a circular opening which receives cylindrical portion 24 of the post therein. The post may have a horizontally disposed flange 30, integrally formed as a molded part thereof, frictionally engaging the bottom of the base for retention purposes. If so desired, the flange may be adhesively or otherwise suitably secured to the base.

Referring to FIG. 4, the physical and chemical properties of the base are such that it is afforded the desired elasticity and flexibility to permit the post to be tilted clockwise to its extreme horizontal position 20'' and to automatically self-right itself to its full line vertically disposed position 20. In one specific application, the elastomeric base 22 exhibited the following physical and chemical characteristics and properties:

PHYSICAL PROPERTIES

Weighted Base Material

Durometer (Shore A)	45
Tensile at 100% elong.	100 No./in²
Tensile at 200% elong.	140 No./in²
Tensile Ultimate	150 No./in²
Elongation Ultimate	225%
Specific Gravity	2 (17.2 No./gal.)(128.7 No./ft³

CHEMICAL CONTENT (By weight)

11%—P.V.C. Resin (Polyvinylchloride)
22%—Plasticizor (Primary)
66⅜%—High Density Filler (Lead Powder)
½%—Stabilizer (Heat)
⅛%—Pigment

The delineator comprised the following dimensions:
Total Height = 40.0 in.
Size of Base 22 = 18.0 in. × 12.0 in. × 1.5 in.
Height of Flanges 28 = 0.75 in.
Thickness of Flange 28 = 0.875 in.
Dia. of Post 21 = 4.0 in.
Wall Thickness of Post 21 = (Approx.) 0.1 in.

It should be understood that the above is by way of example only and that the base's physical and chemical properties may be suitably varied to comply with a par-

ticular delineator application. In particular, the automatic self-righting moment of the above example of the FIGS. 1–3 embodiment is primarily induced by the "elastic memory" or resiliency of the base.

As illustrated in FIG. 4, a conventional road marker (not shown) will normally tend to pivot about an external pivot point or axis P.P. when subjected to an external force F. In contrast thereto, the device of this invention will exhibit a low center of gravity C.G. which will tend to pivot about a pivot line or axis C.G.P. approximately through positions C.G.′ and C.G.″ when the tipped mass of the device is pivoted through positions 20′ and 20″.

It should be noted that a substantial, horizontal portion of the base, positioned to the right of C.G.P., will constantly remain in contact with the ground. The base's "elastic memory" induces the self-righting moment even though C.G.″ is moved to an over-center position relative to C.G.P. In particular, since the shifting center of gravity C.G. of the deflected mass and pivot axis C.G.P. are constantly maintained substantially within the confines of the base and further due to the inherent "elastic memory" of the base, the device will "spring-back" to automatically self-right itself from the horizontal position 20″ back to its normal position 20.

The degree of induced "spring-back" increases in direct proportion to the degree of clockwise pivoting of the device and need only return C.G. to an under center position relative to C.G.P. The influence of gravity thereafter returns the device to position 20.

Such spring-back is primarily occasioned at upper portions of the base and flange 28, positioned closely adjacent to pivot axis C.G.P. In actual practice, bent upper portions of the base and flange (FIG. 3) are placed in pronounced compression whereas the oppositely disposed or lower base portions are inversely placed in tension to induce the self-righting moment. The bent flange portions, in particular, will be subjected to considerable tension/compression and will actually bulge outwardly to aid in such self-righting function.

FIGS. 5–7 illustrate a road marker 20*a*, which functions similar to the FIGS. 1–4 device but combines the base's flexibility and resiliency to induce the self-righting moment. In particular, the base is designed to exhibit somewhat greater flexibility and lesser resiliency than the FIGS. 1–4 base. Such road marker comprises an upstanding and conically shaped delineating member 21*a* and base 22*a* which may be composed of substantially the same material as that used for the post and base of the first described embodiment.

In this embodiment, a downwardly extending flange 28*a* is formed discontinuously about the octagonally shaped base with each flange portion being chamfered at each end thereof (FIG. 7). An annular flange 29*a* extends downwardly to engage a radially outwardly extending flange 30*a* of cone 21*a*. As in the above described embodiment, flange 30*a* may be adhesively or otherwise suitably secured to flange 29*a* although normally a press-fit relationship therebetween has proved sufficient for retention purposes.

Referring to FIG. 8, when the road marker is tipped over from its normal, vertical position 20*a* to its fully down or horizontal position 20″, by an external deflecting force F, it will self-right itself automatically. When the cone is at intermediate position 20*a*′ the center of gravity C.G. of the cone assembly is pivoting in an arc about pivot axis C.G.P. rather than pivot point P.P. which, as above suggested, is the normal pivot point or axis for conventional road markers. In such intermediate second position, the center of gravity C.G.′ of the tipped mass is still maintained to the left of pivot axis C.G.P.

Therefore, at this intermediate position the road marker will automatically return to its original, upright position 20*a* upon removal of deflecting force F primarily due to the influence of gravity. When the road marker is deflected to its fully down position 20*a*″, it should be noted that the shifted center of gravity C.G.″ is positioned only slightly over center (compared to FIG. 4) relative to C.G.P. Such positioning of a substantial portion of the tipped mass to the left of C.G.P. is aided by a substantial trailing portion of the base which flexes downwardly and counterclockwise (FIG. 8) towards the underside of the base.

Even though C.G.″ is slightly "over-center" relative to the pivot axis, upon release of the deflecting force the road marker will automatically return to its fully upright position 20a. In particular, such slight over-center relationship is overcome by a relatively small (compared to FIG. 4) self-righting moment induced by the inherent spring-back or resiliency of the bent base portions adjacent to pivot axis C.G.P.

Although a portion of flange 28*a* (FIG. 7) is eliminated adjacent to pivot axis C.G.P., primarily to mechanically increase the flexibility thereat, the remaining bent base portions adjacent thereto will be suitably compressed/tensioned to induce self-righting. The self-righting moment need only be sufficient to return C.G.″ to the left of C.G.P. in FIG. 8 whereafter the influence of gravity will function to restore the road marker to its upright position. It should be further noted that the portions of the base between axes C.G.P. and P.P. will substantially remain in their same position in contact with the ground or pavement during the entire tipping cycle.

FIGS. 9 and 10 illustrate a road marker embodiment 20*b* comprising a conically shaped member 21*b* formed of substantially the same material as the above described corresponding members. However, a base 22*b* is formed to exhibit a yet greater degree of flexibility and less resiliency than the FIGS. 5–7 base for purposes hereinafter described. The square-shaped base comprises an upwardly extending circumferential flange 28*b* and an inboard annular flange 29*b* defining an opening for receiving the cone 21*b* therein.

An annular flange 30*b* of the cone may be secured to the base if so desired. Pairs of aligned slits 31–32 and 33–34 are formed at least part way through the flange 28*b* and disposed vertically therein to mechanically increase the flexibility at selected portions of the base. Such flexibility aids in correctly positioning the shifting center of gravity C.G. to primarily induce the hereinafter described self-righting moment.

As noted in FIG. 11, when the base moves from its vertical or normal position 20*b* to its full down or substantially horizontal position 20*b*″, rearwardly disposed pair of slits 31–32 function to permit a substantial trailing portion of the base to pivot counterclockwise toward the underside of the base. The center of gravity C.G.″ of the tipped mass tends to remain leftwardly and in under center relationship with respect to pivot axis C.G.P. Such positioning of C.G.″ primarily

induces the self-righting moment due to the influence of gravity.

Simultaneously therewith, the forwardly disposed pair of slits 33–34 and adjacent base portions next to pivot axis C.G.P. are placed in tension/compression to provide a secondary inducement of the self-righting moment, depending on the desired resiliency designed into the base. Although in FIG. 11 the self-righting moment is primarily induced by the suitably calculated flexibility of the base, it should be understood that the base could be designed to exhibit increased resiliency adjacent to C.G.P. to primarily induce the self-righting moment. For example, variance of the width and depth of slits 31–34, changes in dimensions of the base and selective changes in the composition of the base material will largely determine the desired flexibility/resiliency relationship.

It should be noted that the drawings, and in particular FIGS. 4, 8 and 11, are primarily intended to illustrate the principles of this invention and do not necessarily reflect exactly calculated configurations thereof. For example, the flexed trailing portion of the base in FIG. 11 may require a larger volume for certain road marker applications to assure occurrence of the under center relationship C.G.'' relative to C.G.P.

What is claimed is:

1. A normally upstanding road marker comprising a vertically disposed conically shaped, hollow delineating member having a horizontally disposed base attached thereto, said base being constructed and composed of a material exhibiting sufficient combined flexibility and elasticity to induce a self-righting moment for automatically self-righting said road marker when it pivots clockwise about a pivot axis of said base upon deviation from its normally upstanding position to a position wherein said delineating member approaches a horizontal position, the center of gravity of said road marker being positioned at least closely adjacent to said base, said pivot axis being positioned substantially within the confines of said base to define a substantial base portion constantly remaining substantially horizontal and in contact with ground due to the base's flexibility when said base is flexed and said delineating member is tipped towards said horizontal position.

2. The invention of claim 1 wherein the self-righting moment for said road marker is primarily induced due to the inherent elasticity of said base material which places upper portions of said base, adjacent to said pivot axis, in progressively increased compression upon tipping of said delineating member towards said horizontal position.

3. The invention of claim 1 wherein said self-righting moment for said raod marker is primarily induced due to the combined elasticity and flexibility of said base which places upper portions of said base, adjacent to said pivot axis, in progressively increased compression upon tipping of said delineating member towards a horizontal position and simultaneously permits a substantial trailing portion of said base to flex downwardly counterclockwise toward an underside of said base to urge the shifting center of gravity of the tipped portion of said road marker toward an under center relationship relative to said pivot axis.

4. The invention of claim 1 wherein the self-righting moment for said road marker is primarily induced due to the inherent flexibility of said base which permits a substantial trailing portion of said base to flex downwardly counterclockwise towards an underside of said base to constantly maintain said center of gravity in under center relationship relative to said pivot axis.

5. The invention of claim 1 wherein said base material has a tensile strength at 100 percent elongation approximating 100 lb. per in.^{2}.

6. The invention of claim 5 wherein said base material has a tensile strength at 200 percent elongation approximating 140 lb. per in.^{2}.

7. The invention of claim 1 wherein said base material has a specific gravity approximating 2.0.

8. The invention of claim 1 wherein said base material comprises an elastomer having a high density metal admixed therein.

9. The invention of claim 8 wherein said metal is a powder.

10. The invention of claim 8 wherein said metal is lead.

11. The invention of claim 1 wherein said base is octagonally shaped and comprises a discontinuous outer flange formed on the underside of said base to extend downwardly from said delineating member.

12. The invention of claim 1 wherein said base comprises an upwardly extending circumferental flange having at leaast two pairs of aligned slit means formed in spaced relationship therein for mechanically increasing the flexibility of a substantial portion of said base upon flexing thereof.

13. The invention of claim 12 wherein said base is rectangular and four pairs of said slit means are formed in said flange.

* * * * *