Nov. 18, 1969 J. B. KEATS 3,478,714

SIGNAL DEVICE

Filed Aug. 5, 1968

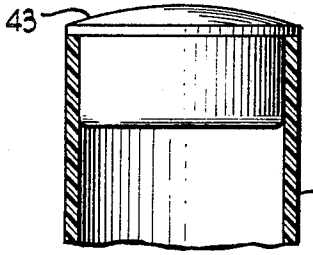
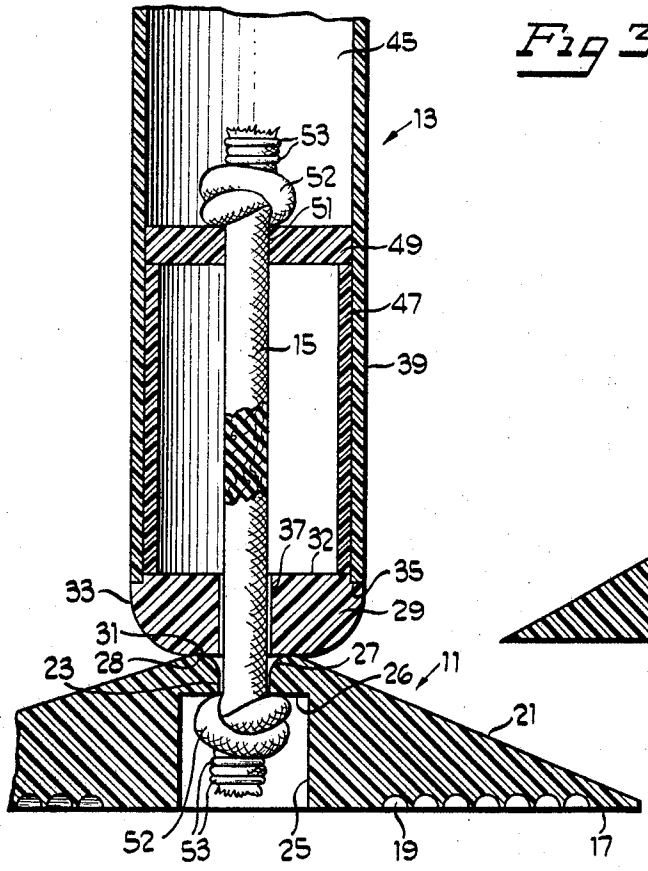


Fig 1



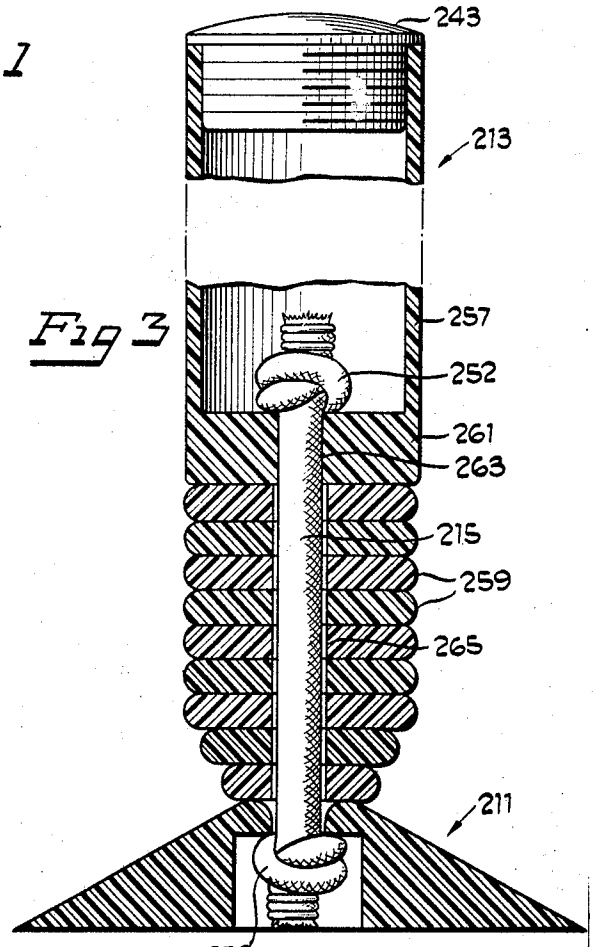


Fig 3

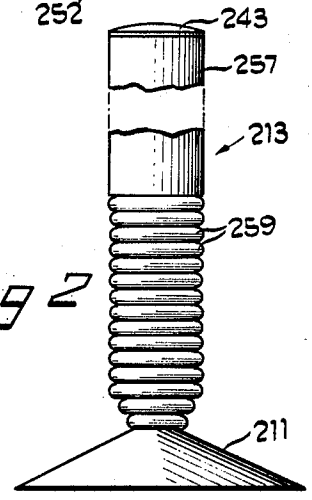


Fig 2

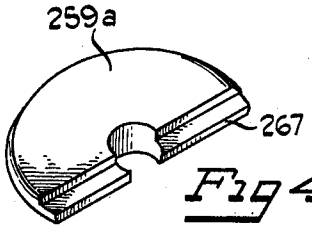


Fig 4

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United States Patent Office 3,478,714 Patented Nov. 18, 1969

3,478,714

SIGNAL DEVICE

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Filed Aug. 5, 1968, Ser. No. 750,113
Int. Cl. E01f 9/10
U.S. Cl. 116—63 3 Claims

ABSTRACT OF THE DISCLOSURE

A resiliently supported roadway signal device including a base to be secured to the roadway, an elongated standard adapted to provide a warning signal and a tensioned elastic member connected between the base and the standard to yieldably retain the standard upon the base.

BACKGROUND OF THE INVENTION

This invention relates to a signal device for roadway marking. More particularly, it relates to a signal device which is resiliently supported to yield upon impact and thereafter return to its initial position.

Many forms of roadway marking or signaling devices have been devised which yield upon impact and return to their initial operative position after removal of the deflecting force. Such devices typically include a vertical standard or pole supported upon the roadway designed to be readily visible to motorists. They have found wide acceptance both as delineators and as markers to indicate turning lanes at intersections or to warn of impending dangers such as the presence of bridge abutments, high curbing, construction work or other road hazards

Visual appreciation of these markers warns the motorists of the impending danger or, in the event of failure to perceive their presence, impact with the vehicle accomplishes the necessary warning without damage to the vehicle. The marker thereafter returns to its initial position to continue the warning function.

Certain of these markers have been constructed of resilient tubes made of rubber or other suitable material connected to a base secured to the roadway. Upon impact, the tube merely bends to accommodate passage of the vehicle and thereafter the resilient nature of the tubular material restores the marker to its initial position.

Others include a rigid standard connected to a supporting base by a yieldable spring arrangement which allows the standard to bend from its vertical position upon impact. Still others include complicated pivot and counterweight arrangements which apply a restoring force to the marker. These latter devices require significant modification of the roadway to accommodate the counterweight arrangement beneath the surface of the pavement.

The devices described, while providing an adequate warning of impending danger, have not proven to be the ultimate solution to roadway marking. Both the resilient tube and spring supported markers are susceptible to destruction or permanent damage by excessive repetition of impact or impact by heavy vehicles. The pivot and counterweight arrangements are prohibitively expensive to manufacture and install and are easily damaged, rendering them useless as a safety marker.

Accordingly, it is the principal object of the present invention to provide an improved form of resiliently supported signal device capable of withstanding impact without damage or deterioration of warning capability.

It is another important object of the present invention to provide an improved form of resiliently supported signal device which includes a tensioned elastic element which retains the marker in its operative position and

provides a restoring force to the marker after displacement by vehicular impact.

SUMMARY OF THE INVENTION

Very generally, the signal device of the present invention includes a generally vertical standard supported upon a base adapted for connection to a roadway. The standard is retained upon the base by an elastic member connected between the base and the standard. The distance between the connection is greater than the free length of the elastic member thus placing the elastic member in tension and causing it to retain the standard in place upon the base. Deflection of the standard from its vertical position causes further elongation of the elastic member increasing the tension and establishing a restoring force which returns the standard to its initial position after removal of the deflecting force. Another form of the invention includes a plurality of stacked discs interposed between the base and the standard in surrounding relation to the elastic member.

DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a fragmentary sectional view of a signal device illustrating various features of the present invention;

FIGURE 2 is an elevational view of a slightly modified form of the invention;

FIGURE 3 is a fragmentary elevational sectional view of the device shown in FIGURE 2; and

FIGURE 4 is a perspective view of a portion of the device shown in FIGURE 2.

DETAILED DESCRIPTION

Turning now to the drawing, there is shown in FIGURE 1 a signal device illustrative of the principles of the present invention.

The signal device includes a base **11**, a generally vertical standard **13**, and a connector **15**.

The base **11** is generally circular or disc shaped and includes a generally flat bottom wall **17** which is suitable for attachment to a road surface. In this connection the bottom wall is provided with a plurality of circular grooves **19** which provide an excellent bonding surface if adhesive is utilized to connect the base to the road surface. Alternatively, any suitable fasteners may be used such as screws, bolts, rivets or the like.

The base further includes a conical or tapered upper surface **21** which presents a minimal obstruction to the passage of the wheel of a vehicle.

A central aperture **23** is provided in the base **11** which communicates with a counter bore **25** open at the bottom wall **17** and defining a retainer wall **26**. The aperture **23** further defines a wide mouth or flared opening **27** adjacent the upper surface **21** which forms a circular transitional ridge **28**.

The elongated standard **13** is relatively long to insure presentation of a clearly visible warning signal to a passing motorist. In the embodiment illustrated, the standard is of a generally cylindrical shape, however, any suitable cross section such as square, triangular or hexagonal would be equally appropriate.

The elongated standard **13** includes a ring **29** disposed in overlying relation to the flared opening **27** of the base **11**. The ring **29** includes a planar surface **31** and a support surface **32**. The planar surface **31** has a diameter slightly larger than the maximum diameter of the flared opening **27** of the base **11** and supports the standard upon the base along the ridge **28**. The support surface **32** is generally parallel to the planar surface **31** and extends outwardly of the longitudinal axis of the standard terminating in a peripheral groove **35**.

The ring **29** further includes a semi-spherical surface

33 extending between the planar surface 31 and the peripheral groove 35.

A central bore 37 is provided in the ring 29 which is in general vertical alignment with the aperture 23 of the base 11.

The outer peripheral surface of the standard is defined by a tubular member 39 secured to the ring 29 at the peripheral groove 35 which is appropriately sized to receive the end of the tube. The outer peripheral surface of the tube may be coated with reflective material to improve effectiveness as a warning signal at night and in addition may include any appropriate legend or painted pattern to attract the attention of motorists.

A cap 43 is secured to the tubular member at the end opposite the end connected to the ring 29. The cap 43, tubular member 39 and ring 29 thus define an internal cavity 45 sealed from exposure to adverse elemental conditions.

The cap may take any suitable shape. It may include a domed outer surface as illustrated or alternatively it may include an upwardly extending portion to which is secured additional reflective material.

Interiorly of the cavity 45, there is provided an elongated spacer 47 having an outer diameter approximately equal to the inner diameter of the tubular member 39. It includes an end disposed in contact with the support surface 32 of the ring 29 and on opposite end terminating intermediate the ring 29 and the cap 43.

A transverse wall 49 is supported internally of the cavity 45 by the spacer 47. This wall includes a central aperture 51 in general vertical alignment with the bore 37 of the ring 29 and the opening 27 of the base 11.

The connector 15 is secured to both the standard 13 and base 11 and yieldably retains the standard in position. The connector 15 is a resilient elastic member which may be elongated or stretched upon application of force and which will thereafter contract to its initial length. A suitable material for this application is elastic "shock cord" which includes an inner core of elastic material covered with a double sheath of knitted nylon, Dacron or other similar synthetic material designed to accommodate elongating and contraction of the resilient portion.

To eliminate vandalism, stainless steel thread, best seen in FIGURE 1, or other hard metal wire is knitted along with the synthetic threads and interposed in adequate quantity to preclude cutting of the elastic member with a knife or hack saw.

The elastic member 15 extends through the aperture 51 of the wall 49, the central bore 37 of the ring 29 and the aperture 23 of the base 11.

A restraining knot 52 is tied in the elastic member at the transverse wall 49 which engages the wall and prevents passage of the member through the aperture 51. A similar restraining knot 52 is tied at the opposite end of the member which is disposed within the counter bore 25 and which engages the retainer wall 26 to prevent movement of the elastic member through the central aperture 23 of the base 11. A pair of pressure rings 53 are secured to the free ends of the member outwardly of the knots to prevent unravelling of the sheath and inadvertant untying of the knots.

The free length of the portion of the elastic member extending between the restraining knots 52 is less than the distance between the upper surface of the wall 49 and the retainer wall 26. Thus, when installed the elastic member is elongated or stretched placing it in tension. This produces a force which retains the planar surface 31 of the ring 29 in contact with the base 11 and supports the standard in a vertical position. Should the standard receive a deflecting force such as that imparted by a striking vehicle, further elongation of the elastic member will result allowing the standard to move from the vertical position until the deflection force is removed. The additional deflection will increase the tension of the elastic member creating a restoring force which will return the standard to its initial position after removal of the deflecting force.

During deflection, the semi-spherical surface 33 of the ring 29 rolls along the conical surface 21 of the base 11 defining a line of contact between the ring 29 and base 11. Upon return, the point of contact between the surface 33 and surface 21 acts as a fulcrum facilitating restoration of the standard to its initial vertical position.

Should the standard 13 be displaced longitudinally upon impact, the elastic member 15 will contact the flared portion 27 of the aperture 23. The flared shape prevents damage to the outer sheath of the member 15. In this regard the central bore 37 of the ring 29 includes rounded edges to prevent damage to the elastic member.

While the signal device described may be made of any suitable material, it is contemplated that plastic such as ABS plastic is particularly suitable for all elements except the elastic member and the compressed rings. An example of plastic which may be used in this application is Cycolac (registered trademark) plastic. This material is extremely durable and resistant to deterioration from the elements or damage from impact. In addition, separate elements of the standard 13 may readily be assembled by solvent welding.

Utilization of the materials described provides an additional advantage with respect to production of a warning signal. Impact of a vehicle with the rigid hollow standard produces an audible sound which will awaken a drowsing motorist. This warning signal will continue as the vehicle passes over the device and the standard contacts various parts of the vehicle. The plastic material, while providing the audible signal will prevent damage to the vehicle.

Turning now to the embodiment of FIGURES 2 to 4, there is illustrated a slightly modified form of the invention.

As in the previously described embodiment, the signal device includes a base 211, a standard 213 and a connector 215 resiliently supporting the standard upon the base.

As best seen in FIGURE 3, the standard includes a tubular section 257 generally similar to the standard 13 of the embodiment of FIGURE 1 and additionally including a plurality of separate spacer rings 259.

The tubular section 257 defines the outer peripheral surface of the standard and includes a cap 243 which is secured to the tubular portion at an upper end by threads.

An opposite end of the tubular section includes a bottom wall 261 provided with a central aperture 263.

The rings 259 are stacked intermediate the bottom wall 261 of the tubular section and the base 211. Each ring 259 includes a central aperture 265 aligned upon the vertical centerline of the signal device. The outer peripheral edges of the stacked rings define a continuation of the standard outer peripheral surface and may include reflective material or a painted pattern.

As illustrated, the outer diameter of the rings adjacent the standard 213 is essentially equal to the outer diameter of the standard. Two successive rings adjacent the base 13 have sequentially reduced outer diameters. Any other desired arrangement however may be used such as, for example, a standard made entirely of stacked discs interposed along a tensioned elastic member between a base and a wall such as the wall 261.

The connector 215 is essentially identical to the elastic member of the embodiment of FIGURE 1. It extends through the central aperture 263 of the bottom wall and the central apertures 265 of the rings 259.

The elastic member is connected to the bottom wall 261 by a knot 252 and to the base by a similar knot. The free length of the elastic member between the knots is less than the total thickness of the bottom wall 261, stacked rings 259 and base 211. Therefore when installed, the elastic member is placed in tension. The

force created by elongation of the elastic member retains the tubular section **257** and stacked rings **259** in position upon the base. Deflection of the standard by vehicular impact causes further elongation of the elastic member creating a restoring force which re-establishes the initial position of the elements after impact.

Utilization of the stacked discs **259** eliminates the radial 90° bend experienced by the elastic shock cord upon deflection when a completely rigid standard is used. When subjected to impact, the disc are free to shift laterally and the elastic member assumes an arc. This reduces the tension occasioned by deflection and reduces the load and torque to which the restraining knots are subjected. Also, the ability of the discs to move laterally absorbs a portion of the energy of initial impact reducing the force imparted to the tensioned elastic member.

In addition, wear is distributed over the entire length of the elastic member surrounded by the discs rather than concentrated at two points of contact as would be the case with the rigid standard directly retained upon the base.

This arrangement further reduces the motion of the upper end of the standard when returning to its initial position after impact. The arced shape of the elastic element and lateral movement or sliding action of the discs minimizes wobbling.

Referring particularly to FIGURE 4 there is shown a ring segment **259***a*. This segment is essentially identical to one half of one of the rings **259** shown in FIGURES 2 and 3 and includes a lap flange **267**. Two such segments may be stacked with the flanges **267** overlapped to form a continuous ring **259**.

Additional tension may be established in the elastic member **215** by moving the tubular portion **257** in a direction away from the base **211** and inserting a pair of ring segments **259***a*. If plastic such as ABS plastic is used to form the ring segments, the halves may be readily fastened together to form a unitized ring by solvent welding. The compressive force imparted by the tensioned elastic element insures effective bonding of the lapped joint. These ring segments may be added as the elastic member becomes relaxed over the period of its useful life to restore and maintain initial tension.

As can be appreciated a signal device has been provided which includes a tensioned elastic member resiliently supporting a warning standard upon a base and which allows deflection of the standard upon vehicular impact and provides for return of the standard to its initial position after removal of the deflecting force.

Various features of the invention have been particularly shown and described. However, it must be appreciated that various modifications may be made without departing from the scope of the invention.

What is claimed is:

1. A signal device comprising: a base adapted to be secured to a roadway, an elongated standard adapted to provide a warning signal yieldably retained upon said base to allow deflection thereof with respect to said base upon impact, said standard including a tubular section having a bottom wall, and including a plurality of stacked spacer rings intermediate said bottom wall and said base, each said spacer ring including a pair of planar surfaces disposed in stacked supporting relationship with adjacent spacer rings and slidable laterally thereon, the axial thickness of each said spacer ring between said planar surfaces being substantially less than the diameter thereof, and a connector including a tensioned elastic member connected to said base and to said standard, deflection of said standard causing elongation of said elastic member increasing the tension thereof.

2. A signal device as claimed in claim **1** wherein said base and said bottom wall of said tubular section and said spacer rings include apertures disposed upon a common centerline and said elastic member extends through said apertures.

3. A signal device as claimed in claim **1** wherein at least one of said spacer rings is formed of a pair of spacer segments including overlapped flanges secured together to form a continuous spacer ring.

References Cited

UNITED STATES PATENTS

925,342	6/1909	Johnson.	
1,250,064	12/1917	Whims	94—1.5
1,341,318	5/1920	Hannagan	40—145
1,384,365	7/1921	Walsh	40—145
1,435,363	11/1922	Wood.	
1,694,044	12/1928	Thompson	272—78
2,103,410	12/1937	Frei	94—1.5

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U.S. Cl. X.R.

40—145; 94—1.5