July 28, 1970 T. G. CURTNER 3,521,862

HIGHWAY BREAKAWAY GUARD

Filed Oct. 15, 1968

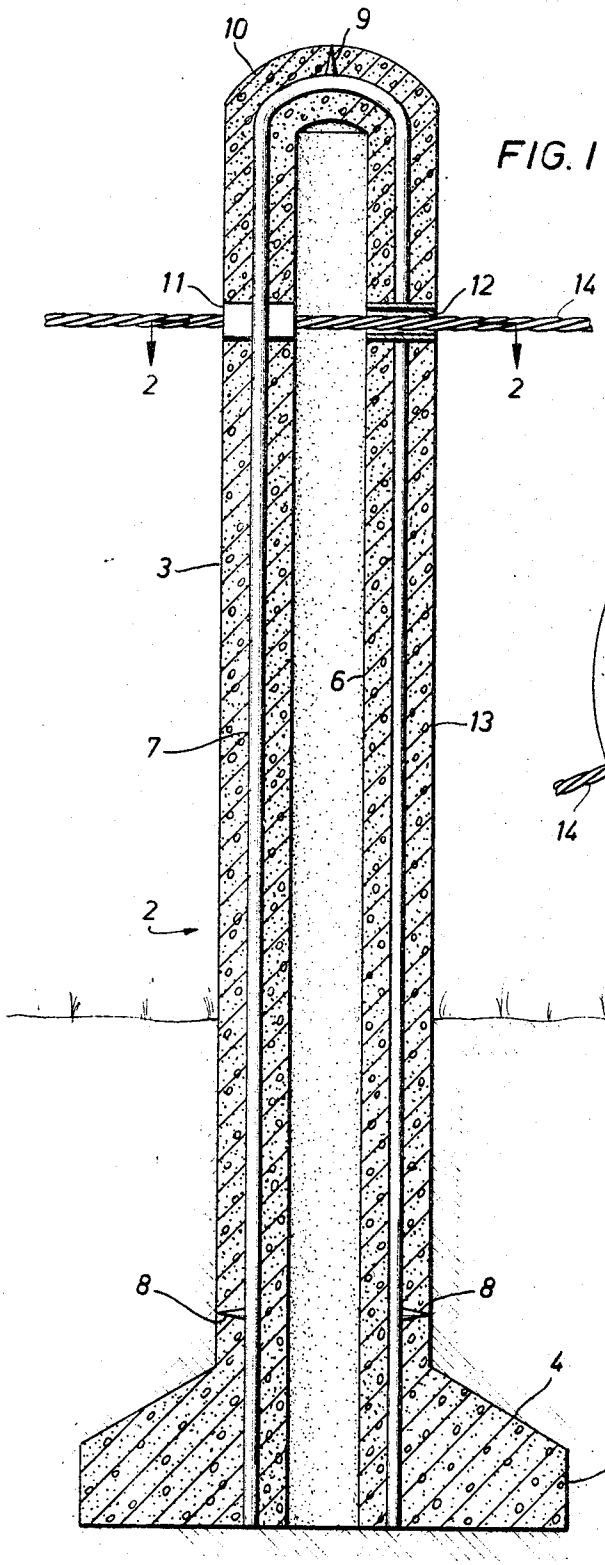


FIG. 1

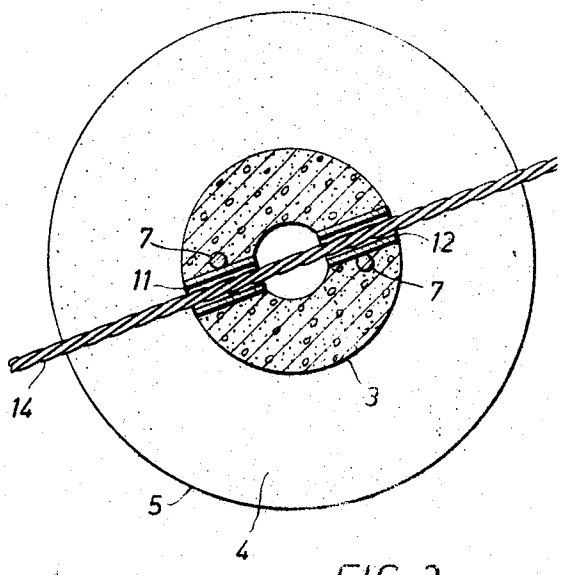


FIG. 2

Tim G. Curtner
INVENTOR

BY Arnold, Roylance, Kruger & Durkee
ATTORNEYS

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HIGHWAY BREAKAWAY GUARD

Tim G. Curtner, Rte. 14, Box 1626-A,
Houston, Tex. 77040

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ABSTRACT OF THE DISCLOSURE

A highway guard post or fence post is provided which is preferably formed of impact molded concrete. The post is hollow, and has a closed and rounded upper end, and a flanged or bellbottom base. A single reinforcing rod, having an inverted U-shaped configuration, is provided for strength purposes, and a pair of cable-supporting sleeves are disposed in the walls of the post, diametrically of the post and opposite each other, and fastened on opposite sides of the rod, whereby the cable passes diametrically through the upper end of the post, and whereby the legs of the rod are each equidistantly spaced between the inside and outside surfaces of the post.

BACKGROUND OF THE INVENTION

This invention relates to the art of concrete fence posts, and more particularly to an improved breakaway structure suitable for use as a highway guard post or fence post.

It is well known to provide guard fences about the outer circumferences of curves in highways, especially along those curves which are expected to carry high speed vehicular traffic. It is also well known that such posts or fences are intended to indicate the limits of the highway and to restrict vehicles to travel within these limits.

It is nevertheless preferable, however, that such posts yield under impact from a colliding vehicle, in order that the occupant of the vehicle will not be injured.

The cost of each mile of modern highway is fantastically high, and consqeuently, there have been many attempts to provide satisfactory fences and guard rails at a reduced price. Since the major cost of a so-called "breakaway" fence is primarily the cost of the fence posts, the continuing objective is to provide a highway fence or guard post which is inexpensive as well as strong enough to resist minor impacts and normal deterioration, but which is also frangible under heavier impacts, such as that of a colliding vehicle.

The most common type of frangible highway guard or fence post is still a simple creosoted wooden post embedded in the earth and provided with a metal band about its upper end. This metal band may be reflective whereby it is visible at night under a beam of light, and it may include a suitable fastener for attachment to a cable which may be strung between adjacent spaced-apart posts to provide fencing.

Although the foregoing wooden guard or fence post is one of the oldest types of posts used for highway purposes, it is nevertheless superior in most respects to most other types of posts. It is quite strong (if large enough), yet it will uproot or snap off at ground level when struck by a vehicle traveling at a relatively moderate speed. Furthermore, such a post is relatively cheap to manufacture and to install.

On the other hand, the conventional wooden highway guard or fence post has a number of substantial disadvantages. For example, it is cumbersome and heavy. Such posts are also subject to deterioration and damage from water, and if they are installed in areas having heavy annual rainfall or which are subject to occasional flooding, they must be frequently replaced. Moreover,

such posts are cheap only if they are to be installed near the areas where they are made, and if they must be transported any substantial distance, their cost will be multiplied many times.

Thus, it may be seen that the purchase cost of wooden posts which are installed along highways running through timber areas, such as those in Louisiana and East Texas, will be relatively cheap since they may be cut from the trees bordering the highway. However, these areas endure heavy annual rainfall and the soil is also quite damaging to embedded wooden posts. Consequently, the initial cost of wooden posts in such areas is often more than offset by their short useful life.

On the other hand, wooden fence or guard posts which are installed along highways through dry arid regions such as Arizona will usually have a very long useful life. However, this advantage is neutralized by the fact that such areas do not provide the timber from which the posts can be made. Accordingly, the cost of transporting finished posts from the timbered areas or origin to their arid destination raises the overall initial cost of the posts to a substantial figure.

There have been various attempts to provide prefabricated or preformed concrete fence posts, for the reason that the raw materials for such a post will always be relatively near at hand, and for the obvious reason that such a post may be expected to be relatively impervious to damage or deterioration because of either water or the character of the soil. For examples of such posts, see U.S. Pats. No. 1,033,987; No. 1,085,042; No. 1,339,819; and No. 2,578,165. Nevertheless, the fact that the great majority of the many guard or fence posts presently in place along highways is ample proof that the conventional wooden post is still the most economical and suitable post for this purpose.

These disadvantages of the prior art are overcome with the present invention, and a prefabricated concrete post is provided which is especially suited to use as a frangible highway guard or fence post.

SUMMARY OF THE INVENTION

In a preferred embodiment of the present invention, an improved structure is provided which is particularly suited for use as a highway guard post or fence post. More particularly, the post is preferably a hollow prefabricated or pre-cast concrete cylinder having a rounded closed upper end (when erected), and having an enlarged bell-like lower end to provide stability when embedded in the earth in a conventional manner. Strength is provided by a single U-shaped metal reinforcing rod located equidistantly between the inside and outside surfaces (except in the area of the bellbottom or flanged end) by means of suitable spacers as will hereinafter be explained in detail. A pair of metal tubes or sleeves may be perpendicularly attached to the legs of the rod adjacent or near its U-end, whereby a suitable cable may be passed through the embedded post.

As will be apparent, a highway guard or fence post constructed according to the concept of the present invention will be quite sturdy insofar as ordinary impacts are concerned which are not of a collision nature. On the other hand, it will readily give under a heavy impact of a magnitude such that if the impact is due to a colliding vehicle, and if the post resisted the impact, injury would surely result to the occupant of the vehicle. Moreover, an array of guard posts of this type, especially when a steel cable is strung between and through them, will function as an arresting gear which yields but does not snap under impact from a colliding vehicle, but which slows and eventually arrests the vehicle. Even if the post received the impact directly, and if the concrete portion fractures under the force of the impact, the reinforcing

rod will yield and bend rather than break, and thus the post itself will contribute to the arrest of the vehicle.

The post may be provided with any dimensions desired. However, it will be apparent that the dimensions selected will determine the strength of the post and thus the dimensions may be preselected for the purpose of establishing the minimum force required for a colliding vehicle to snap or shear off the post.

These and other features and advantages of the present invention will be apparent from the following detailed description, wherein reference is made to the figures in the accompanying drawing.

DRAWING

FIG. 1 is a cross sectional representation, partly pictorial, of an illustrative fence or guard post suitable for highway purposes and constructed according to the concept of the present invention.

FIG. 2 is a different cross sectional representation of the structure depicted in FIG. 1 and further depicting the concept of the present invention.

DETAILED DESCRIPTION

Referring now to FIG. 1, there may be seen a representative embodiment of a concrete post assembly **2** preferably formed by impact molding. More particularly, there may be seen how the configuration of the post **2** includes a hollow shank **3** with a closed and rounded upper end or head **10**. The lower end is preferably formed with an enlarged bellbottom **4**, which may have a squared-off toe **5**, to provide a stabilizing base for the hollow post **2**.

As may be seen in FIG. 1, a U-shaped steel reinforcing rod **7** is preferably provided for strength purposes. As shown, the rod **7** gives the post **2** a further advantage when struck by a vehicle, as contrasted with a conventional wooden post. The wooden post will snap off, if struck with sufficient force, thereby permitting the colliding vehicle to travel off the highway and into another more serious hazard such as a wall or ditch. The post **2** depicted in FIG. 1 is specifically intended and designed to snap off when struck by a vehicle moving at a high speed. In the case of the post **2**, the rod **7** will maintain a link between the shank **3** and the bellbottom **4**, whereby the bellbottom **4** will tend to act as a drag and thereby to help arrest the vehicle.

As may be seen in FIG. 1, the arms of the rod **7** preferably extend the full length of the post **2**. A pair of spacers **8** preferably formed of a galvanized or cadmium plated metal may be welded or otherwise attached to the legs of the rod **7** at a suitable location within the shank **3** and adjacent the bellbottom **4** end of the post **2**, for the purpose of locating the legs of the rod **7** equidistantly between the inside surface **6** and the outside surface **13** of the shank **3** of the post **2**. Similarly, a suitable spacer **9** which may also be formed of a galvanized or cadmium plated metal, may be welded or otherwise suitably secured to the upper U-end of the rod **7**, and at or near the apex of the bend, in order to equidistantly space the rod **7** between the inside and outside surfaces of the head **10** of the post **2**.

Referring again to FIG. 1, there may be seen a pair of cable sleeves **11** and **12** fixed in a confronting relationship, one to the other, in opposite sides of the shank **3** and preferably near the head **10** of the post **2** for the purpose of providing a cable passageway substantially diametrically through the post **2**. More particularly, sleeves **11** and **12**, which may be formed of tubing having an inside diameter substantially larger than the diameter of the cable and preferably formed of galvanized or cadmium plated metal, are preferably arranged on opposite sides of the rod **7**, to permit their longitudinal axes to be coincident with the diameter line of the post **2**.

Referring now to FIG. 2, there may be seen a top view of the cross section of the shank **3** of the post **2** depicted in FIG. 1, including a representation of the hollow shank **3**, the bellbottom **4** end of the post **2** including the squared-off toe **5**, and further showing the sleeves **11** and **12** are located diametrically opposite each other. As will be seen from the manner in which the cable **14** passes through the sleeves **11** and **12** along the diameter of the shank **3**, this arrangement of the sleeves **11** and **12** on opposite sides of the legs of the rod **7** is the most advantageous from the standpoint of the strength of the shank **3** of the post **2**. If the sleeves **11** and **12** were attached to the same side of the rod **7**, either the rod **7** could not be spaced equidistantly between the inside surface **6** and the outside surface **13** of the post **2**, or else the sleeves **11** and **12** could not be located along the diameter of the shank **3** of the post **2**.

As illustrated in FIG. 2, the cable **14** is substantially smaller than the inside diameters of the sleeves **11** and **12**. This makes it easier to run the cable through each of an array of pre-installed posts **2** without binding in the sleeves **11** and **12**, in case the cable **14** or another post is struck by a vehicle, whereby the tendency of the cable **14** to twist as well as pull the post **2** is greatly reduced. Thus, the impact from a vehicle on the cable **14** may pull or otherwise dislodge an adjacent post partially or wholly out of the earth without necessarily fracturing it.

It is a feature of the post **2** depicted generally in the drawing that it be sized so as to break or shear under the impact of a moving vehicle, the force of the impact being of at least a preselected minimum magnitude. Further, it is a feature of the post **2** that it include an enlarged base portion preferably having a bellbottom configuration, and a rounded and closed upper end, and formed of impact molded concrete. Another feature is the inclusion of a U-shaped steel reinforcing rod disposed along substantially the entire length of the post and equidistantly spaced between the inner and outer surfaces of the rounded and closed upper end and substantially the entire length of the shank of the post except for the base portion. Finally, it is especially a feature of the post that a pair of metal sleeves or the like are fastened to opposite sides of the rod whereby such sleeves provide a cable passage diametrically through the post. Alternatively, the cable passage may be formed of sleeves or bars positioned in the manner indicated for sleeves **11** and **12** in the drawing, but separate or detachable from the rod **7**, whereby such sleeves or bars may be withdrawn after the post has been cast and completed.

It is within the concept of the present invention to fabricate the post **2** of a preselected color, by including a suitable coloring agent as one of the constituents of the concrete. In addition, the post **2** may be made suitably reflective by embedding or molding a reactor member in its surface. Alternatively, a reflective or luminescent surface may be obtained either by applying a reflective or luminescent paint or other material to its exterior surface either before or after it has been cured, or by including a suitable additional ingredient in the concrete.

It should be noted that the spacers **8** are usually sufficient to keep the legs of the rod **7** coupled to and embedded in the bellbottom base portion **4** of the post **2** when the upper or shank portion **3** is broken or sheared off by the force of a colliding vehicle. However, additional spacers of longer length may be attached to the legs of the rod **7** below spacers **8** and within the bellbottom base **4**.

Many other modifications and variations may be made in the structures and procedures described herein without substantial departure from the essential concept of the present invention. Accordingly, it should be clearly understood that the forms of the invention described herein and depicted in the accompanying drawings, are exemplary only and are not intended as limitations on the scope of the present invention.

What is claimed is:

1. A vehicle arresting apparatus for use as a highway guard post or fence post or the like, comprising

an elongated hollow body member impact-molded of concrete and having a closed upper end and an open lower end and base portion for stabilizing and anchoring,

said body member being frangible in response to a buff force received generally perpendicularly of the longitudinal axis of said body member and of at least a preselected magnitude,

a reinforcing rod member having a generally U-shaped configuration impact-molded longitudinally in said body member and spaced between the inside and outside surfaces thereof along substantially the length of said body member, and

a pair of confronting tubular members aligned substantially diametrically in said body member adjacent said closed upper end and substantially perpendicularly of said longitudinal axis to provide and define a passageway therethrough for slidably supporting a cable,

said tubular members being further disposed in opposite sides of said body member and adjacent opposite sides of said rod member.

2. The apparatus described in claim **1**, wherein said base portion of said body member has a generally bellbottom-like configuration.

3. The apparatus described in claim **2**, wherein said body member further includes a closed and rounded top portion at said other end from said bellbottom base portion.

4. The apparatus described in claim **3**, wherein said rod member is spaced generally equidistantly between the inner and outer surfaces of said body member.

5. The apparatus described in claim **4**, further comprising

first and second spacing members fixed to said rod member adjacent said bellbottom base portion of said body member for anchoring said rod member to said base portion and for spacing said rod member generally equidistantly between the inner and outer longitudinal surfaces of said body member, and

a third spacing member fixed to the loop portion of said rod member for spacing said loop portion generally equidistantly between the inner and outer surfaces of said closed and rounded top portion of said body member.

6. The apparatus described in claim **5**, further including a cable means slidably disposed in said cable passageway.

7. The apparatus described in claim **6**, wherein said cable means is loosely movable in said passageway in a direction diametrical to said body member.

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DENNIS L. TAYLOR, Primary Examiner

U.S. Cl. X.R.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,521,862 Dated July 28, 1970

Inventor(s) Tim G. Curtner

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 4, line 51, "reactor" should read --reflector--;

Col. 5, line 4, after "anchoring" should be inserted --said body member--.

SIGNED AND
SEALED
OCT 20 1970

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents