United States Patent

[11] 3,570,376

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[54] **BREAKAWAY POST**
12 Claims, 12 Drawing Figs.

[52] U.S. Cl. 94/1.5
[51] Int. Cl. E04h 12/04
[50] Field of Search 52/731, 98, 99, 38, 728, 301; 94/1.5; 287/20.92; 138/157, 158, 161; 40/145; 94/1.5; 52/98, 728, 731; 138/161

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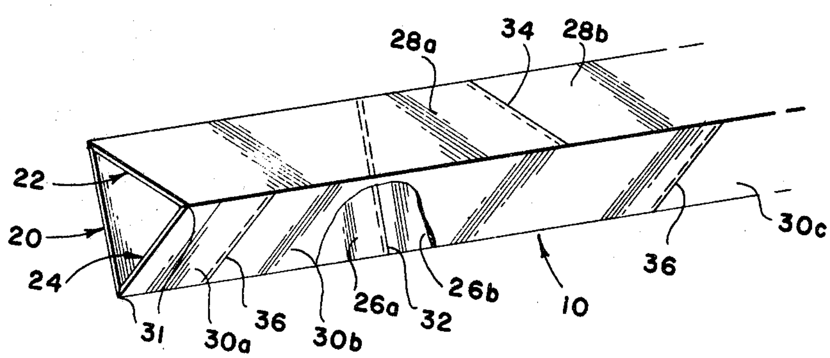
ABSTRACT: A breakaway post is provided for supporting highway signs or the like. The post is made from independent flat rectangular segments arranged end to end to form three panels, with the segments secured together along their side edges to form a hollow post having a triangular cross section. A plurality of breakaway lines to start the breakup of the post upon impact by an automobile or the like are provided by the ends of the segments. The ends of the segments of any one panel are staggered longitudinally with respect to the ends of the segments of the other panels except at the top and bottom of the post. Staggering of the ends of the segments results in a post having sufficient strength to withstand wind loading even when signs are attached to the post.



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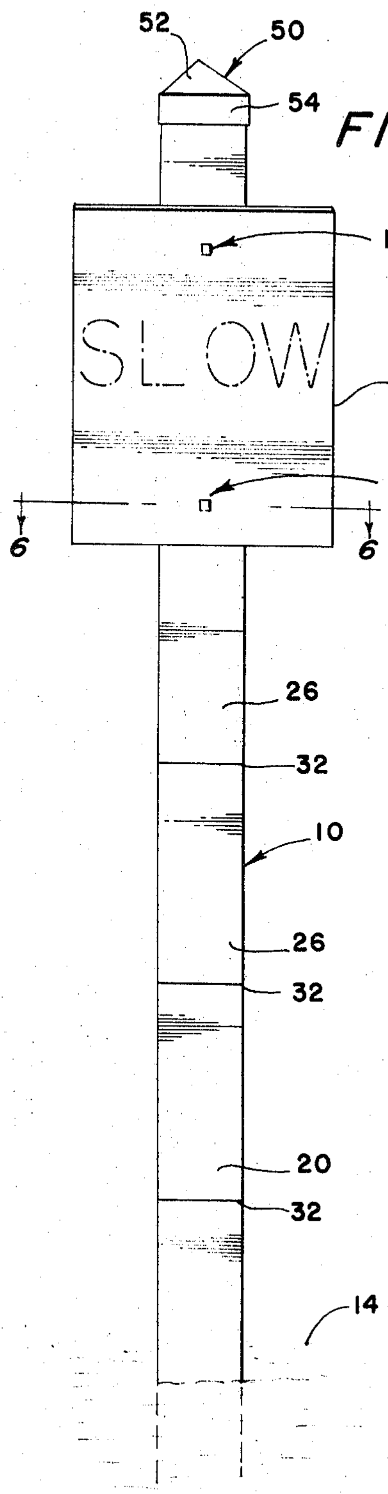
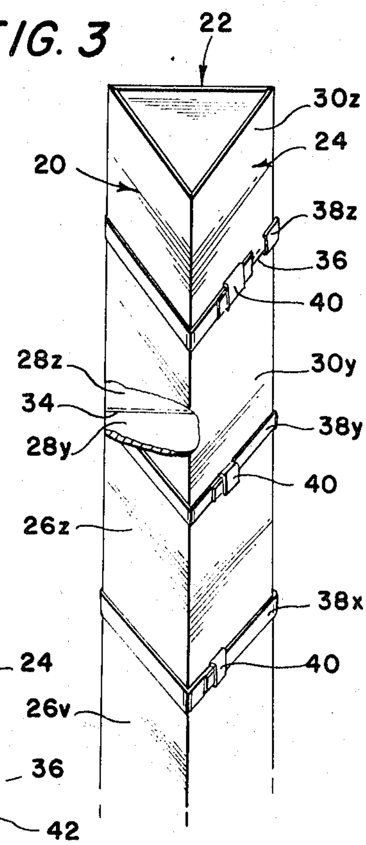


FIG. 1

FIG. 3



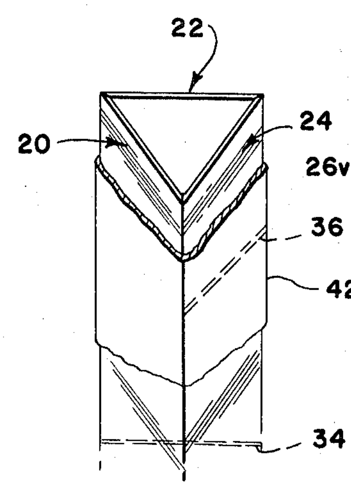


FIG. 4

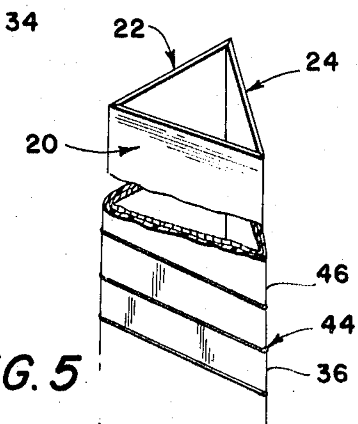


FIG. 5

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FIG. 2

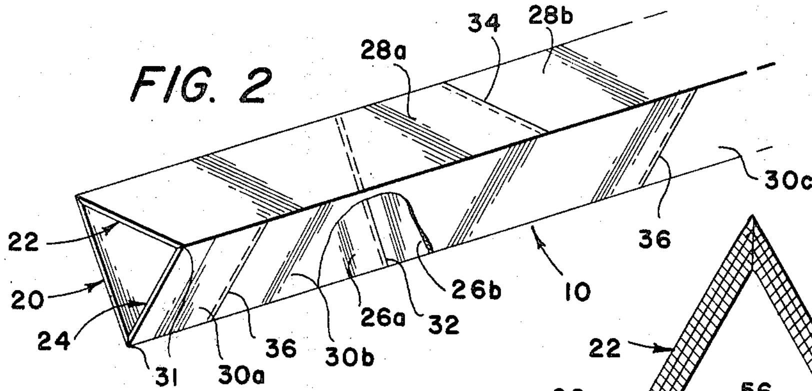


FIG. 6

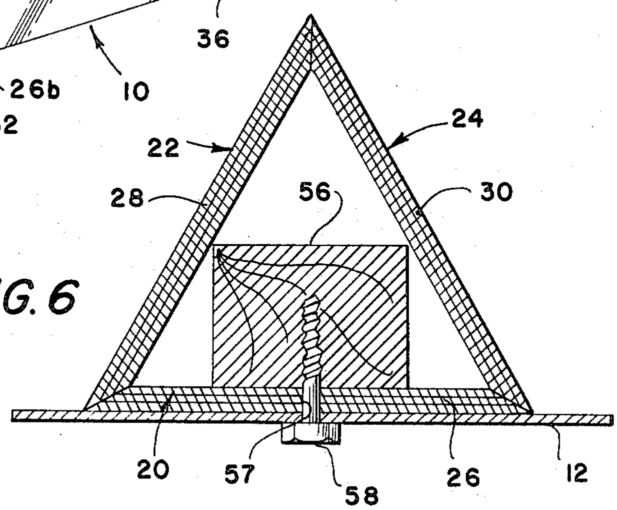


FIG. 7

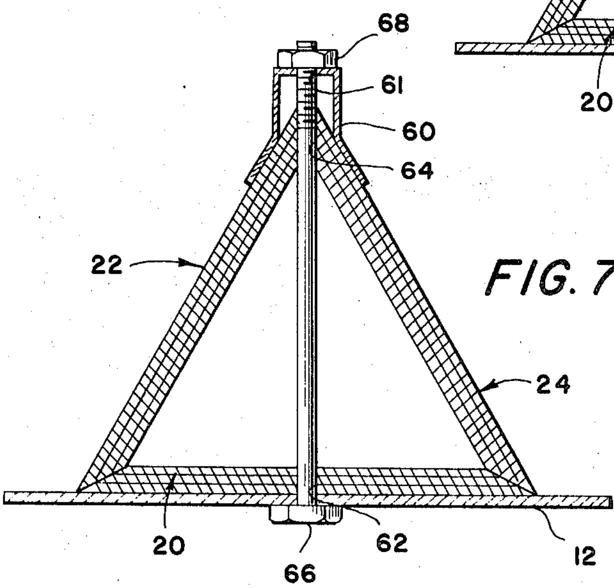
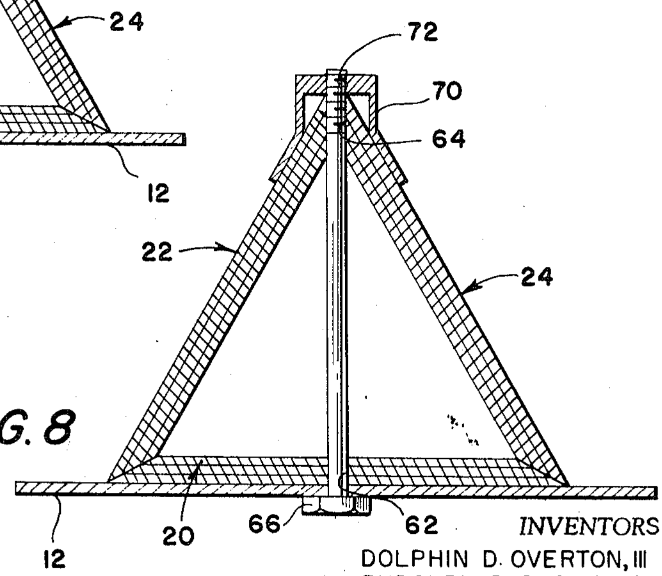


FIG. 8



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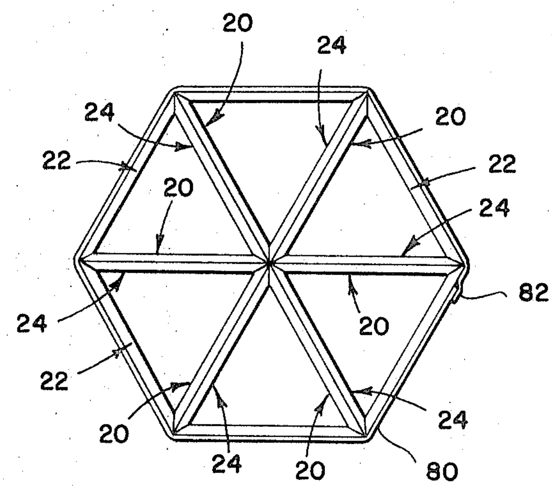

FIG. 11

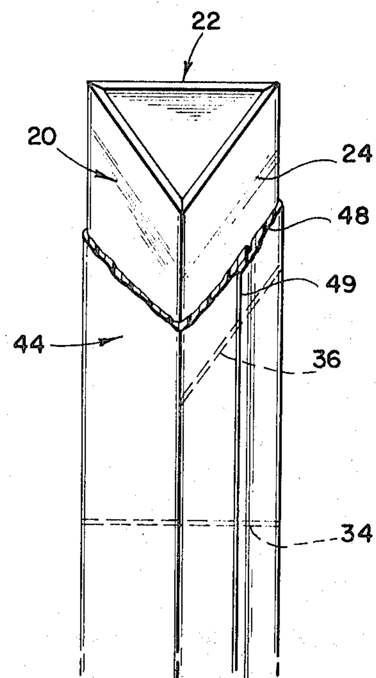

FIG. 9

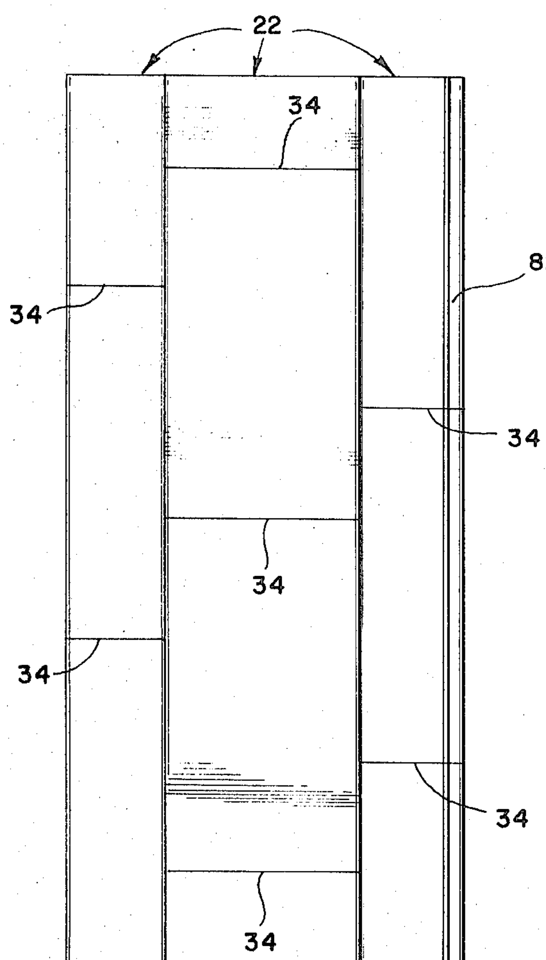

FIG. 10

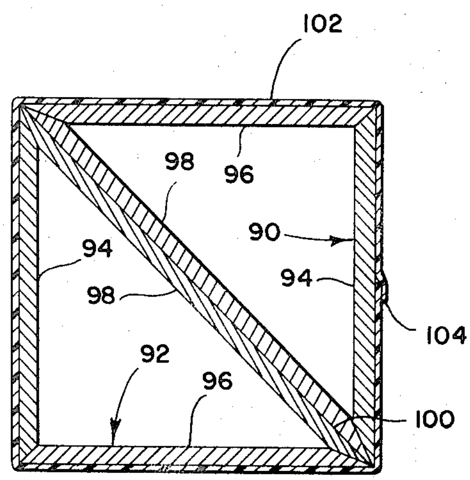

FIG. 12

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BREAKAWAY POST

This invention relates to posts, and more particularly to posts which breakaway readily when struck by an automobile or the like.

All types of roads, from secondary roads to interstate highways, require many signs and other highway markers to inform a driver where he is and where and how he should proceed. Also, artificial lighting of the more densely traveled routes, and many intersections, is desirable. Highway lights, signs, and markers usually must be elevated on posts above the ground for good visibility.

The menace of highway sign and light posts to the safety of a motorist whose car hits the post has been long recognized. For a number of years the U. S. Bureau of Public Roads has sponsored research designed to provide highway support structures that are less of an impact hazard for a motorist.

Many factors besides safety go into the design of supports for roadside signs or the like. The supports should be (a) strong and stable when subjected to wind forces, (b) easy to install and maintain, (c) capable of being installed near a roadway to provide for maximum visibility of a sign or the like, and (d) designed for an aesthetic appearance.

A common support structure for signs located on interstate highways has consisted of vertical wide flange steel beams that are anchored to a concrete base. This support will support a readable sign, is easily maintained, and is strong and stable when the sign is subjected to wind forces. This type of sign structure, however, may be lethal to the occupants of a vehicle that happens to hit the support structure.

Among the characteristics of a highway support structure that contribute to the severity of a collision are the mass, the structural rigidity or stiffness, and the resistance to horizontal shearing force of the support members. A vehicle which runs into a massive, rigid sign support member with great resistance to shearing force may be suddenly stopped, thus causing damage to the vehicle and injury to the occupants.

The need for support structures strong enough to resist wind forces and minor impacts that may be encountered along a highway precludes merely reducing the size and strength of existing highway support structures to a degree where they are no longer dangerous to the motorist. If the cross-sectional dimensions of existing posts are simply reduced in size, or if the posts are made of weaker materials, the posts may fail under wind load.

Various attempts have been made to reduce the capacity of sign posts to resist shearing forces caused by a vehicle striking the post without reducing the ability of the post to resist overturning moments caused by wind forces on the sign. It has been proposed to weaken posts used as support structures for signs by reducing the shear capacity of the lower portion of the post, that is, the portion of the post below the level of vehicle bumpers. If the shear capacity of the post is reduced in this manner, a severe impact by a vehicle severs the post below bumper level and the vehicle may continue its forward movement without harmful rapid deceleration of the vehicle. Posts designed to be sheared by the impact of a vehicle that strikes the posts are called breakaway posts.

Breakaway posts eliminate the problem of stopping too quickly a vehicle that hits the post but they create another safety hazard. The inertia possessed by the upper portion of the post after it has been severed from the lower portion of the post that is embedded in the ground, may be dangerous. For example, if a heavy solid wooden post is sheared by impact from a vehicle that strikes the post, the upper portion of the post is often sent flying through the air. The flying post is a potentially lethal missile to people in the vicinity of the post and even to the occupants of the vehicle itself. Tests have shown that the severed upper portion of breakaway posts often are thrown into a path that results in a secondary impact with the vehicle.

Breakaway supports have also been made of structural steel members but these posts possess economic disadvantages because of the amount of labor they require for fabrication, assembly, and maintenance. Also, the steel breakaway supports like the wooden breakaway posts present a safety hazard if the upper portion is severed by a vehicle, because the severed upper portion of the support remains intact and may possess sufficient inertia to injure people in the vicinity, and even the occupants of the vehicle.

Accordingly, it is a primary object of this invention to provide a new and improved breakaway post which presents a minimal hazard to motorists.

A further object of the invention is to provide a low cost breakaway post that is convenient to fabricate and assemble.

A still further object of the invention is to provide a new and improved breakaway post that will fail under heavy impacts such as caused by an automobile, but that possesses sufficient structural strength to support a highway sign or the like and to resist wind load and other forces to which such a post is commonly subjected.

Another object of the invention is to provide a lightweight post which minimizes damage to an object which rams the post.

Still another object of the o invention is to provide a new and improved breakaway post that presents a reduced secondary impact hazard to the vehicle and its occupants.

Yet another object of an embodiment of the invention is to provide a post that is easily visible day and night and under adverse weather conditions.

An additional object of an embodiment of the invention is to provide posts with good resistance to weathering.

Additional objects and advantages of the invention will be set forth in part in the description which follows, and in part will be obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention may be realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

To achieve the foregoing objects and in accordance with the purpose of the invention as embodied and broadly described herein, the post of this invention comprises at least three panels, each of said panels being formed of a plurality of independent segments arranged end to end, and means for securing the panels together along their edges to form a hollow triangular post, with the ends of the segments of any one panel being staggered longitudinally between the top and bottom of the post with respect to the ends of the segments of the other panels. The ends of the segments provide breakaway lines to start the breakup of the post upon receiving an impact from a vehicle or the like, while at the same time the staggering of the ends of the segments permits the post to have sufficient strength at its breakaway lines to withstand wind forces and other light impacts without the post being sheared.

Preferably, the means for securing the panels together along their edges include edge connecting means for securing the edges of the panels together and/or wrapping means extending around the outside of each of the panels for holding the panels in the form of a triangular post. The edge connecting means is preferably an adhesive. The wrapping means may comprise bands spaced longitudinally along the post, or a thin wrap of metal or plastic that covers the outer surface of the panels. It is presently preferred that the plastic wrap comprise a sheet of plastic that is spirally wrapped over the outside surface of the panels.

Desirably, the post includes means for improving the visibility of the post. This means may be a part of the wrapping means such as a brightly colored plastic, or a highly polished metal, or it may be a bright paint directly on the post, or a sheet of colored or reflective metal that covers at least one panel of the post to increase the visibility of the post when this panel is positioned perpendicular to the highway.

In a preferred embodiment of the invention, the segments are made of plywood. It is preferred that the side edges of the segments be mitered to facilitate securing the segments in edge-to-edge relationship to form the triangular post.

Posts formed according to the invention may also include end securing means for releasably attaching together the ends of the adjoining segments within each of the panels to add additional strength to the panels but with the joints being weak enough that they will yield on impact and thus not destroy the ability of the panels to breakaway at the ends of the segments.

It is desirable that the new and improved posts of this invention include a top for covering the top edge of the three panels to prevent the entry of moisture in the hollow space between the three panels, and mounting means for permitting a sign to be secured to the post.

The invention may also be described as a support structure comprising a plurality of hollow triangular posts, with each of the posts including at least three panels, each of the panels being formed of a plurality of independent segments arranged end to end, and means for securing the segments together along their edges to form a hollow triangular post with the ends of the segments of any one panel being staggered longitudinally between the top and bottom of the post with respect to the ends of the segments of the other panels, the longitudinal axes of said posts aligned in a parallel relationship with at least one panel of each post abutting a panel in another post; and means for securing said posts in a parallel aligned relationship.

Desirably the perimeter of the support structure of this invention is formed by at least one panel from each of the posts in the support structure and has the shape of a regular polygon.

The invention consists in the novel parts, constructions, arrangements, combinations, and improvements shown and described. The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention.

Of the drawings:

FIG. 1 is a perspective view of a post constructed according to the invention with a sign mounted thereon;

FIG. 2 is a perspective view of the bottom portion of the post of FIG. 1 with a portion of one panel of the post cut away;

FIG. 3 is a perspective view of the top portion of another embodiment of a post constructed in accordance with the invention and including a band-type wrapping means;

FIG. 4 is a perspective view of the top portion of another embodiment of a post constructed in accordance with the invention and including a metallic-sheet-type wrapping means;

FIG. 5 is a perspective view of the top portion of another embodiment of a post constructed in accordance with the invention and including a plastic-film-type wrapping means;

FIG. 6 is a sectional view along line 6–6 of the post of FIG. 1 that illustrates one embodiment of mounting means for mounting a sign on the post;

FIG. 7 is a sectional view corresponding to FIG. 6 that illustrates another embodiment of mounting means;

FIG. 8 is a sectional view corresponding to FIG. 6 that illustrates a modification of the mounting means illustrated in FIG. 7;

FIG. 9 is a perspective view of another embodiment of the post constructed in accordance with the invention and including a plastic film wrapping means;

FIG. 10 is a side elevation of the top portion of a support structure constructed in accordance with the invention with the securing means omitted;

FIG. 11 is a top plan view of the support structure of FIG. 10 with securing means illustrated; and

FIG. 12 is a horizontal section of another embodiment of the support structure of this invention.

As shown in FIG. 1, a post generally **10** is provided on which a sign **12** may be mounted by mounting means generally **16**. Post **10** is shown embedded in the ground **14**.

According to the invention, post **10** is formed by three panels with each of the panels being made of a plurality of independent segments arranged end to end. The ends of the segments of any one panel are staggered longitudinally with respect to the ends of the segments of the other panels except at the top and bottom of the post. The ends of the segments provide breakaway lines to start the breakup of the post upon the impact of an automobile or the like on the post. However, at the same time, the staggering of the segments gives the post sufficient strength to withstand wind forces and light impacts.

As here embodied, and as best illustrated in FIG. 2, post **10** includes three panels generally **20**, **22**, and **24** arranged to form a triangular hollow post.

The triangular shape of the post has been selected since it allows maximum rigidity of the assembled post while still maintaining a low mass.

Each of the panels is made from a plurality of independent segments arranged end to end, panel **20** being formed by segments **26**, panel **22** being formed by segments **28**, and panel **24** being formed by segments **30**. A plurality of breakaway lines **32**, **34**, and **36** are formed at the ends of segments **26**, **28** and **30**, respectively.

Throughout the length of the post the ends of segments **26** of panel **20** are staggered longitudinally along the post with respect to the ends of the segments **28** and **30** of the other panels. In similar manner, the ends of segments **28** are staggered longitudinally along the post with respect to the ends of segments **26** and **30**. However, the ends of the segments are desirably aligned in the same plane at the top and bottom of the post. As seen in FIG. 2, the bottom end of segments ***26a***, ***28a***, and ***30a*** terminate in a plane transverse to the longitudinal axis of the post.

Each of the segments has a flat rectangular shape and has mitered longitudinal edges to facilitate the securing of the segments in edge-to-edge relationship to form the triangular post and to provide miter joints that enhance the structural rigidity of the post. It will be obvious to those skilled in the art that the length of the segments within a panel could vary and that the dimensions of segments making up one panel could vary from the dimensions of segments making up the other panels. For example, the length and width of segments **26** could differ from the length and width of segments **28** and **30**. Preferably, however, the dimensions of all the segments are identical so that the segments may be used interchangeably during assembly of the post. It is desirable that the length of the segments be approximately 6 feet with breakaway lines thus spaced every 2 feet along the post. The presence of breakaway lines at about 2 foot intervals positions a breakaway line between ground level and the level of the vehicle bumpers when the post is anchored in the ground. Also, breakaway lines 2 feet apart do not excessively weaken the post.

To align the segment ends at the top and bottom of the post in a common plane, the length of the segments at the top and bottom ends of the post may be varied by cutting the segments before or after assembly of the segments into the post. With reference to FIG. 2, segments ***26a*** and ***30a*** are made shorter than a standard length segment such as segment ***30b***. The variation of the length of segments ***26a*** and ***30a*** allows the bottom end of the post **10** to terminate in a plane transverse to the longitudinal axis of the post. The same alignment is achieved at the top of the post in a similar manner.

The thickness of the segments may be varied to vary the load carrying ability of the post. The use of thick segments will result in posts that may be used as support structures for even large highway signs.

The segments are made from any strong lightweight material that may be shaped into segments with the side edges of the segments capable of being secured to each other. Plywood is a preferred material of construction for the segments because it is strong, and lightweight, and may be easily fabricated into segments of the desired size and shape.

As illustrated in FIG. 2, by longitudinally staggering the ends of the segments of one panel (for example panel 24) with respect to the ends of the segments of the other panels (panels **20** and **22**) except at the ends of the post, each intermediate segments (that is, each segment not at the end of the post) contacts the side edges of two segments in each of the other two panels. For example, intermediate segment *30b* in panel

24 contacts the side edges of segments 28*a* and 28*b* of panel 22, and the side edges of segments 26*a* and 26*b* of panel 20. The longitudinal relationship of the segments wherein each intermediate segment of a panel contacts two segments in each of the other two panels allows continuous assembly of the post as will be later discussed in detail.

In accordance with the invention means are provided for securing the segments together along their edges. The means for securing the segments along their edges may be edge connecting means for securing the side edges of the segments of one panel to segments in the other panels, or wrapping means that extend over the outside of all three panels for holding the three panels in the form of a triangular post, or a combination of edge-connecting means and wrapping means. The edge-connecting means may comprise conventional fasteners such as nails, staples, screws and the like. Adhesives are a preferred edge-connecting means for plywood segments to avoid splitting of the plywood segments.

In the embodiment illustrated in FIGS. 1 and 2, the means for securing the segments along their edges include edge-connecting means in the form of an adhesive 31 that is applied along the mitered edges of the segments 26, 28, and 30 and that physically connects the edges of the segments to each other.

In the embodiments illustrated in FIGS. 3—5, the means for securing the segments along their edges include wrapping means extending around the outside of each of the panels to hold the three panels in the form of a triangular post. The wrapping means preferably weatherproofs the post and improves the visibility of the post.

Referring now specifically to the embodiment illustrated in FIG. 3, the post is constructed in a similar manner to the embodiment of FIGS. 1 and 2 except that wrapping means rather than edge securing means are used to secure segments 26, 28, and 30 in the triangular relationship. As here embodied, the wrapping means comprise a plurality of bands 38 that are wrapped around the outside of the panels under tension and secured while still under tension by clips 40.

The bands 38 are preferably positioned on the breakaway lines 32, 34, and 36 because this positioning of the bands helps prevent moisture from reaching the interior of the posts through the openings at the breakaway lines 32, 34, and 36. This positioning of the bands, which are preferably made of steel, also provides a stable post with good resistance to overturning moments caused by wind loading.

The means for securing the segments along their edge may include both bands 38 and edge connecting means such as an adhesive.

The wrapping means of the invention may also comprise a thin metallic sheet that is wrapped about the outside of the panels. In the embodiment illustrated in FIG. 4, a post similar to the post of FIG. 1 is assembled using edge connecting means such as glue to secure the segments in their triangular relationship. A thin metallic sheet 42 is provided that is wrapped about the outside of all three panels 20, 22, and 24, and secured by conventional means such as adhesive (not shown). Metallic sheet 42 provides a thin wrap of metal of a thickness that will readily shear at one or more areas adjacent the breakaway lines in the panels when the post is subjected to an impact force such as an automobile hitting the post. The metallic sheet is preferably steel or aluminum and is colored, painted or has reflective material applied thereto to improve the visibility of the post.

In the presently preferred embodiment of the invention the means for securing the segments along their edges includes a wrapping means of plastic and an edge connecting means of adhesive. The film or coating of plastic may be reverse printed or color impregnated to improve the visibility of the post and may be selected to be a material such as polyvinylfluoride that protects coloring material on the post from deterioration due to the infrared rays of the sun.

The embodiment illustrated in FIG. 5 is similar to the post of FIGS. 1 and 2 in that it includes a plurality of segments arranged end to end to form three panels with the ends of the segments of any one panel staggered longitudinally with respect to the ends of the segments of the other panels. The segments are glued together at their edges. In the post of FIG. 5, the post is additionally secured by wrapping means comprising a plastic coating generally 44 that is applied to the outside of each of the panels 20, 22, and 24 by spirally wrapping a strip 46 of plastic film about the panels with successive widths of the strip placed in an overlapping relationship. The strip 46 thus forms convolutions on the assembled post.

The presently preferred embodiment of the post of this invention, illustrated in FIG. 9, is similar to the post of FIG. 5 except that the plastic coating of FIG. 9 generally 44, that is applied to the outside of the panels 20, 22, and 24, is formed by overlapping a continuous sheet of plastic film 48. Preferably, the sheet of film has a width that slightly exceeds the perimeter of the assembled panels so that it may be folded over the panels with the edges of the sheet overlapped and glued at 49.

Means for improving the visibility of the post may be secured on the outer surface of the panels. For example, the post may be painted with a bright colored paint to improve its visibility and also its weather resistance, or a thin metal sheet such as aluminum may be positioned over the panels and subsequently covered with a layer of plastic film to improve the visibility of the post. The plastic film may be printed with stripes or the like to further improve the visibility.

As another means for improving the visibility of the post, the plastic coating 44 may be dyed easily visible colors or have reflecting material coated or printed on its inner or reverse surface to increase the visibility of the post. Also, two plastic strips 46 of contrasting colors may be used in spirally wrapping the post in alternate spirals to give a "barber pole" effect to a post.

If desired, the ends of segments 26, 28, and 30 may be releasably attached to the adjoining ends of the other segments in their respective panels, by end-connecting means, for example by butt gluing. Preferably, the end-connecting means are selected so that they release or fail prior to failure of the segments when the post is subjected to a shearing force. Consequently, releasably attaching the ends of each of the segments to each adjoining segment facilitates assembly of the post without destroying the ability of the panels to breakaway at the ends of the segments when subjected to an impact of an automobile or the like.

The wrapping means illustrated in FIGS. 3, 4, and 5 may be designed to increase the weather resistance of the post by covering the ends of each segment of the panel and at least partially sealing the post at the segment ends against the entry of moisture and foreign elements. The wrapping means illustrated in FIGS. 4 and 5 form a protective barrier that extends completely around the exterior of each of the panels.

To prevent the entry of moisture as rain or snow into the hollow central portion of the post, a cap, generally 50, as shown in FIG. 1, is provided for covering the top of the post. Cap 50 includes a triangular horizontal panel 52 and three vertical flanges 54 depending therefrom. The cap may be made of a variety of materials including wood, plastic, or metal.

In accordance with certain embodiments of the invention, the post may include mounting means for permitting a sign or the like to be secured to the post. In the embodiment illustrated in FIG. 6, the mounting means comprises a block 56 mounted on panel 20, a hole 57 in panel 20 and a wood screw 58. Block 56 may be mounted on panel 20 by conventional means such as nails (not shown). The sign 12 is secured to the post by the screw 58 that extends through the sign 12, through hole 57 in panel 20, and into block 56.

Another embodiment of the mounting means is illustrated in FIG. 7. Here a bracket 60 is mounted on the outside of the edge seam of panels 22 and 24. Panel 20 which is opposite the bracket includes a hole 62 that is aligned with a hole 61 in bracket 60. The edge seam between panels 22 and 24 includes a hole 64 aligned with both hole 61 in bracket 60 and hole 62 in panel 20. A bolt 66 is inserted through a sign 12, through hole 62 in panel 20, through hole 64 along the edge seam, and through hole 61 in bracket 60. A nut 68 engages the threaded end of bolt 66 to hold it in place.

FIG. 8 illustrates a variation of the mounting means of FIG. 7. The mounting means illustrated in FIG. 8 includes a bracket 70 having a threaded central hole 72 while the hole 61 in bracket 60 of FIG. 7 is not threaded. Consequently a nut is not necessary to hold the bolt in place in the embodiment of FIG. 8.

In accordance with the invention, a support structure may be provided that includes a plurality of the hollow triangular posts having the construction described above and means for securing the posts together into a unitary support structure with their longitudinal axes aligned parallel to each other. The support structures of the invention possess desirable strength and rigidity characteristics in relation to their mass and may be used as telephone poles or the like.

FIGS. 10 and 11 illustrate a support structure formed by six hollow triangular members. The individual hollow triangular members of this embodiment have the structure of the triangular post in illustrated in FIG. 2.

The longitudinal axes of the individual posts are aligned parallel to each other. The outside edges of two of the panels, panels 20 and 24 of each post, abut the outside edge of a panel 24 of one adjacent post and the panel 20 of another adjacent post, respectively, and the third panel 22 of each post forms part of the perimeter of the post.

Preferably, the attached posts from a support structure having the perimeter of a polygon such as the regular hexagon of FIG. 9 with one panel from each post forming a portion of the perimeter of the support structure.

The means for securing individual posts together in the support structure may be any conventional means such as adhesives and fasteners (nails or staples), or wrapping means such as the sheet 80 of plastic, film illustrated in FIG. 11, extending around the perimeter of the support structure. Preferably the width of sheet 80 slightly exceeds the perimeter of the assembled support structure so that the edges of the sheet overlap at 82.

As shown in FIG. 10, the breakaway lines 34 in the panels making up the outside of the support structure may be staggered to give the structure a high degree of strength in relation to its mass. When compared to a solid wooden post of comparable strength, support structures made from a plurality of triangular hollow posts present a reduced impact hazard to a vehicle because of their significantly smaller mass and because of their tendency to crush and shatter upon impact.

The posts of the invention may also be used in fence support structures. The reduced impact hazard of such support structures makes them especially desirable for use in fences located at the boundary of a highway right-of-way. If a rectangular structure is desired for fencing, the panels may be assembled into a hollow right triangular cross-sectional post such as shown in FIG. 12, and two or more such right triangular posts may be attached together to form a support structure having a rectangular perimeter.

Referring to FIG. 12, the rectangular support structure includes two identical hollow triangular posts 90 and 92. Posts 90 and 92 each include panels 94, 96, and 98 with each panel made from a plurality of segments with the ends of the segments in one panel staggered in relation to the ends of the segments of the other two panels as described in the embodiment of FIG. 2.

Panels 94 and 96 form the perimeter of the support structure and the outside surfaces of these panels form a right angle at their juncture. Panel 98 of post 90 and panel 98 of post 92 are positioned in abutting relationship and are held together by an adhesive 100 that is applied along the plane of contact of the panels 98 and by a plastic sheet 102 that is wrapped around the perimeter of the support structure and glued at overlap 104.

The assembly of the post of FIGS. 1 and 2 may proceed as follows. The segments 26*a*, 28*a*, and 30*a* that make up one end of the post are arranged to form a hollow triangular member with the interior ends of the segments 26*a*, 28*a*, and 30*a* being staggered longitudinally with respect to each other. Edge connecting means such as glue is provided to secure the segments together along their adjacent edges.

With reference to FIG. 2, it can be seen that if the bottom of the post is the starting point, portions of segments 26*a* and 28*a* extend longitudinally above segment 30*a* when attached thereto. Segment 30*b* is then attached by glue to the edges of the longitudinally extending portions of segments 26*a* and 28*a*. Subsequently, segment 26*b* is attached by glue to portions of segments 28*a* and 30*b*. The assembly of the post continues with new segments being attached to longitudinally extending the portions of segments previously attached together in the triangular hollow configuration.

The assembly of the segments according to the above-described method may proceed continuously to produce a post of indeterminate length. Individual posts of any desired length may be cut from the assembled segments.

The post may subsequently be painted to improve its visibility and weather resistance. Preferably, a top is attached to the upper edges of the panels to prevent entry of moisture into the hollow central area of the post and mounting means are provided to permit a sign to be secured to the post. The mounting means of FIGS. 7 and 8 may be provided in the field just prior to installation. Preferably, if the mounting means of FIG. 6 are utilized, the block 56 is attached to panel 20 prior to or during the assembly of the segments 26, 28, and 30.

If desired, wrapping means such as illustrated in FIGS. 3—5, may be provided in place of or in addition to edge connecting means for holding the post in a hollow triangular configuration. If an adhesive is used as the edge connecting means to initially secure the segments in a hollow triangular configuration, it is preferable that the wrapping means be applied to the post immediately after application of the adhesive to help hold the segments of the post together until the adhesive has set.

The assembly of the post of FIG. 3 may proceed in a manner very similar to the assembly procedure described above for the posts illustrated in FIGS. 1 and 2. The top three segments 26*z*, 28*z*, and 30*z* at the top of the post are arranged in a hollow triangular configuration. Portions of segments 26*z* and 28*z* extend below segment 30*z* so the edges of segment 30*y* can be aligned in contact with these portions. Segments 26*z*, 28*z*, and 30*z* are secured together along their edges by wrapping band 38*z* under tension about the segments and securing the band with clip 40. Subsequently, the edges of segment 28*y* are aligned with the protruding edges of segments 26*z* and 30*y* and band 38*y* is wrapped about these segments and secured by clip 40. The assembly of the post continues in the manner described above by continuously adding segments along the post and banding the added segment to the adjacent segments that project from the assembled post structure.

In the assembly of the embodiment illustrated in FIG. 5, the plastic strip is preferably wound around the panels just after the segments have been arranged in a triangular hollow configuration and after the application of the adhesive. The plastic wrapping material may be wound about the panels under tension to hold the panels in a triangular configuration while the adhesive applied to the edges of the segments is setting. Subsequently, the plastic may be fused to the panels by heating the plastic-wrapped panels above the melting point of the plastic.

It will be obvious to those skilled in the art that the plastic coating 44 may be applied to posts using other procedures. For example, a plastic envelope conforming generally to the shape of the triangular post may be placed around the panels of the post, and subsequently contracted to securely grip the outside of the post by pulling a vacuum inside the envelope. The plastic may then be fused to the panels by the application of heat. Plastic materials which may be used as wrappers for the posts include a variety of film-forming synthetic organic polymers such as polyvinyl chloride, polyethylene, polypropylene, polyethylene teriphthalate such as "Mylar" produced by the duPont Co., and polyvinylfluoride, such as "-Tedlar," produced by the duPont Co.

It will be obvious to those skilled in the art that assembly of the posts could proceed by first releasably attaching together the ends of adjoining segments such as **26***z* and **26***y*, and **28***z* and **28***y*, and **30***z* and **30***y* illustrated in FIG. **5** by, for example, butt gluing to form panels and then subsequently securing the edges of the panels together. This procedure is particularly advantageous where the post is to be assembled by using bands, a metallic sheet, or plastic film wrapping means without edge-connecting means.

The assembly of the support structures of FIGS. **10** and **11** is initiated after completion of the assembly of the individual hollow triangular posts by aligning the six individual posts with the panels **20** and **24** of each post abutting the panel **24** on one adjacent post and the panel **20** on another adjacent post, respectively. If desired the abutting posts may be glued together. Subsequently, plastic sheet **83 82** is wrapped around the perimeter of the assembled posts and sealed at **82**.

The assembly of the support structure of FIG. **12** proceeds in a similar fashion with the additional step of the applying an adhesive to the outer surfaces of one or both of the panels **98** of posts **90** and **92** prior to bringing these posts into abutting contact.

If the intended use of a support structure of the invention requires that a protective wrapper and/or means for improving its visibility be provided, it is desirable to apply the wrapper and/or means for improving the visibility of the perimeter of the support structure after alignment of the individual posts in the desired cross-sectional configuration of the support structure.

The term "post" as used in the specification and claims is intended to encompass primarily members directly anchored in the ground. However, the "posts" can also be used to perform other functions. For example, the "post" may be horizontally disposed between guard rails connected by tension cables to increase the visibility of the guard rails assembly. In this use, the posts would be suspended by insertion of the tension cables connecting the guard rails through the hollow central opening of the posts.

In accordance with the invention new and improved post and support structures have been provided which may be fabricated, assembled and maintained at low cost. The post is designed to provide breakaway lines to start the breakup of the post upon impact from a vehicle or the like. The triangular configuration of the post and the staggering of the ends of the segments making up each panel of the post give the post sufficient strength to withstand wind forces and other light impacts without breaking away. Further, the post, when struck by a vehicle, does not present a serious secondary impact hazard to the vehicle because the post tends to crush and disintegrates at the first impact and also any large portions of the post which remain intact after the first impact, will have a small mass and will have the ability to again break away at the time of the second impact. The triangular hollow configuration of the post makes the post when constructed of plywood, or other suitable materials, relatively strong and relatively light in weight.

The invention in its broader aspects is not limited to the specific details shown and described, but departures may be made from such details within the scope of the accompanying claims without departing from the principles of the invention and without sad sacrificing its chief advantages.

We claim:

1. In a support structure to be positioned adjacent a highway in a location where vehicles straying from the roadway could impact the structure, the improvement comprising a vertically disposed breakaway post, said breakaway post comprising three flat planar panels, each of said panels being of a uniform cross section throughout its length and formed of a plurality of independent segments arranged end to end in an end-abutting relationship, each of said segments having a rectangular shape in the plane of the panel it forms, and a trapezoidal cross section, and consisting of a single sheet of plywood with the end edges of each segment being planar and extending perpendicularly to the planes formed by the side edges of said segment, adhesive means connecting the side edges of segments in one panel with the side edges of segments in the other two panels in a mitered abutting relationship, the three panels forming a hollow triangular post; the end of the segments of any one panel being staggered longitudinally between the top and bottom of the post with respect to the ends of the segments of other panels so that the ends of said segments provide breakaway lines to start the breakup of the post upon receiving an impact from a vehicle or the like while at the same time the staggering of the ends of said segments permits the post to have sufficient strength at its breakaway lines to withstand wind forces and other light impacts without the post being sheared.

2. The invention of claim **1** including an information-bearing sign affixed on said breakaway post.

3. The invention of claim **1** including a light reflective sheet that covers at least one panel of said breakaway post.

4. A support structure comprising: a plurality of triangular members, each of said members including at least three flat planar panels, each of said panels being formed of a plurality of independent segments arranged end to end, and means for securing said segments together along their edges to form a hollow triangular member with the ends of the segments of any one panel being staggered longitudinally between the top and bottom of the member with respect to the ends of the segments of the other panels, the longitudinal axes of said members aligned in a parallel relationship with at least one panel of each member abutting a panel in another member; and means for securing said members in a parallel aligned relationship.

5. The support structure of claim **4** wherein the perimeter of the support structure is formed by at least one panel from each of said members in said support structure.

6. The support structure of claim **4** wherein the perimeter of the support structure is a regular polygon formed by one panel from each of said members.

7. The support structure of claim **5** wherein said support structure has a square perimeter and is made up of two members the cross section of which are right triangles.

8. The support structure of claim **6** wherein the perimeter of the support structure is in the form of a regular hexagon and the support structure is made of six members.

9. The support structure of claim **6** wherein said means to secure said members in parallel aligned relationship is comprised of a film of plastic wrapped around the perimeter of the support structure.

10. The support structure of claim **7** wherein said means to secure said members in parallel aligned relationship is comprised of a film of plastic wrapped around the perimeter of the support structure.

11. The support structure of claim **9** wherein the abutting panels of said members are glued together.

12. The support structure of claim **10** wherein the abutting panels of said members are glued together.