Dec. 20, 1966 G. T. TRIGILIO 3,292,569

WARNING DEVICE FOR DISABLED HIGHWAY VEHICLES

Filed Dec. 18, 1964

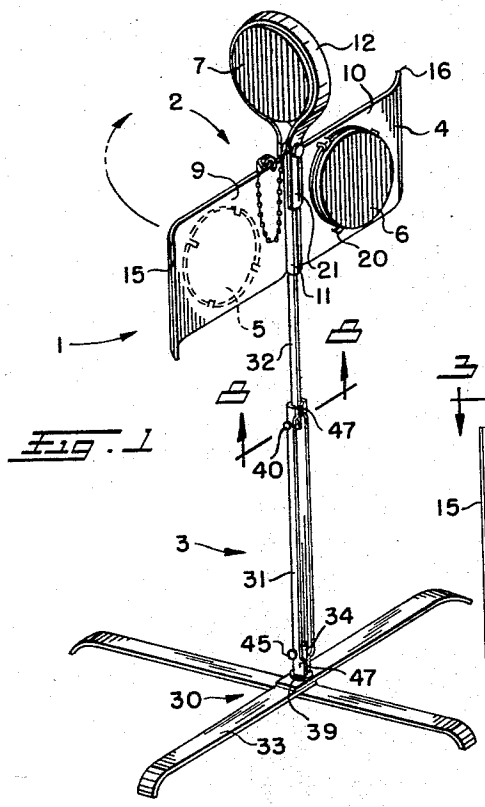


Fig. 1

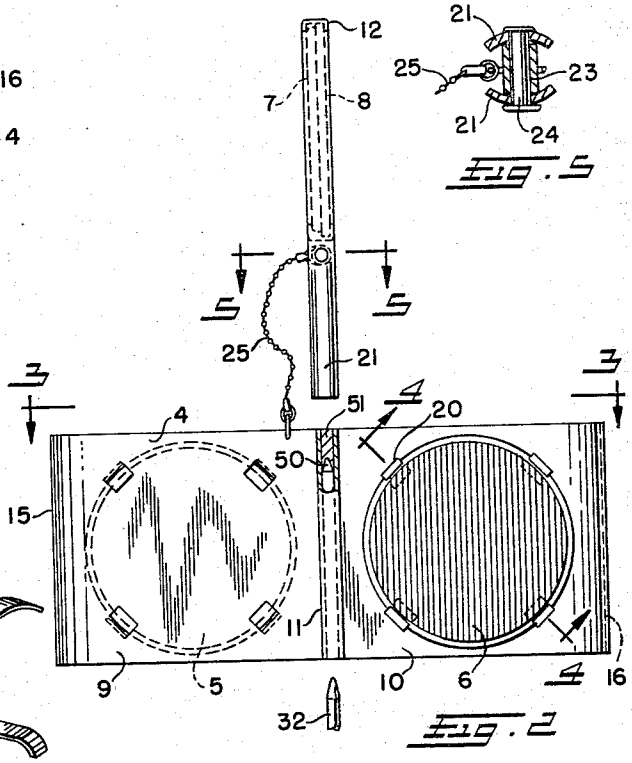


Fig. 2

Fig. 5



Fig. 4

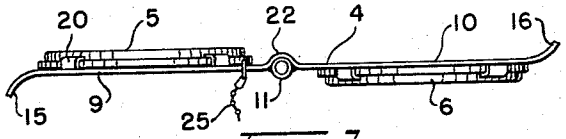


Fig. 3

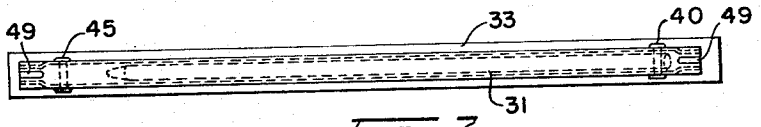


Fig. 7

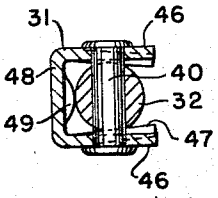


Fig. 8

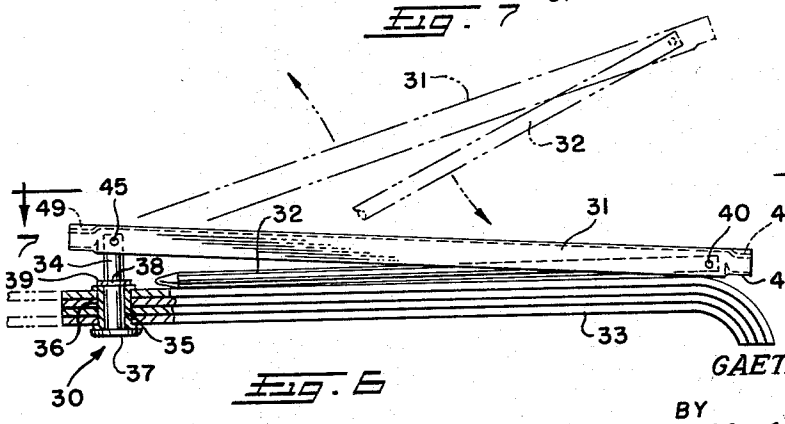


Fig. 6

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WARNING DEVICE FOR DISABLED HIGHWAY VEHICLES

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This invention relates generally, as indicated, to a warning device for disabled highway vehicles and, more particularly, to a device which is adapted to be positioned alongside a roadway and in close proximity to a stopped auto, truck, or other such vehicle to warn oncoming traffic of its presence, thereby minimizing the possibility of an accident.

Although traffic signalling or warning devices of both the stationary and rotating type are not new, those which have been available in the past have proved to be not entirely satisfactory due to their inability always to attract the attention of approaching motorists in sufficient time for them to take the precautions which are necessary to avoid an accident, regardless of the weather conditions. Those warning devices which are stationary, for example, can generally be seen for substantial distances only when they are disposed adjacent a relatively straight roadway, and even then they are not visible to the oncoming traffic unless they are properly positioned. Moreover, the signals given by such stationary warning devices are usually not distinctive or unusual enough to attract the attention of the drivers, and even if they do, the signals are often mistaken for conventional roadway markings used to designate bridges, curves, etc.

Those warning devices which are adapted to rotate, on the other hand, many times are not visible when there is an insufficient breeze to rotate the reflecting surfaces thereof due to their location with respect to each other, and even when the breeze is sufficient to cause rotation, the light reflected by such reflecting surfaces is often not distinctive enough always to attract the motorists' attention.

It is therefore a principal object of this invention to provide a warning device which will readily attract the attention of oncoming motorists for substantial distances and keep their attention until they have safely passed the warning device, whether it be daylight or nighttime, clear, raining, or snowing.

It is another object to so construct such a warning device that it requires no power for its operation, is substantially maintenance free, and has a long and useful life.

Still another object is to provide a warning device with rotating reflectors, the relative disposition and number of which are such that at least one reflector will be visible at all times to oncoming motorists when in the sight path of the device.

Another object is to mount the reflectors on a support stand in such a manner that they will rotate about a fixed axis even in a slight wind, or when there is no wind at all, provided the device is sufficiently close to the highway to be in the draft created by passing vehicles.

Yet another object is to mount the reflectors of the warning device at different levels and at different angles in order to achieve a flashing effect when the reflectors are rotated and light is striking them.

Still another object is to mount one reflector at one level with its axis coinciding with the axis of rotation of the device and a pair of reflectors on a different level with their axes spaced from the axis of rotation, whereby the velocity of the one reflector will be slower than the velocity of the pair of reflectors and thus not flash as rapidly as the pair of reflectors.

Another object is to provide a warning device which

can be folded in a novel manner into a very compact unit for storage in a vehicle when not in use.

Other objects and advantages of the present invention will become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully discussed and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail a certain illustrative embodiment of the invention, this being indicative, however, of but one of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

FIG. 1 is an isometric view of a preferred form of warning device in accordance with the present invention;

FIG. 2 is an enlarged, exploded fragmentary elevation view, partially broken away, of the reflectors and support rod therefor;

FIG. 3 is a top plan view of the reflectors mounted on the wind vane of the device as viewed from the plane of the line 3—3 of FIG. 2;

FIG. 4 is an enlarged partial section taken on the plane of the line 4—4 of FIG. 2;

FIG. 5 is a horizontal section taken on the plane of the line 5—5 of FIG. 2;

FIG. 6 is an enlarged elevation view, partially broken away, of the support stand in its folded condition;

FIG. 7 is a top plan view of the support stand of FIG. 6; and

FIG. 8 is an enlarged horizontal section taken on the plane of the line 8—8 of FIG. 1.

Referring now to the drawing, and first of all to FIGS. 1 and 2, the preferred form of warning device of the present invention is generally indicated at **1** and comprises a reflector assembly **2** mounted on a support stand **3** for rotational movement about the longitudinal axis thereof. The reflector assembly **2** includes a vane **4** on which there is mounted a plurality of reflectors, preferably four in number, designated **5**, **6**, **7**, and **8**. As shown, the reflectors **5** and **6** are mounted directly on the arms **9** and **10**, respectively, of the vane **4**, but on opposite sides so that the reflective surfaces of such reflectors face in opposite directions and are laterally spaced from the central tubular portion **11** thereof. The third and fourth reflectors **7** and **8**, on the other hand, are vertically spaced from and positioned at right angles to the reflectors **5** and **6**, such reflectors **7** and **8** being disposed back to back and secured to the central tubular portion **11** of the vane **4** by means of a frame **12** in a manner which will be explained more fully hereafter. Accordingly, when the reflector assembly **2** is rotatably supported by the support stand **3**, the wind is trapped by the oppositely turned ends **15** and **16** of the vane **4**, which causes the vane and thus the reflectors **5**, **6**, **7**, and **8** to rotate about the vertical axis of the central tubular portion **11**. When rotated, the lower reflectors **5** and **6** will alternately reflect the light directed thereagainst by the headlights of approaching automobiles and the like so as to give the effect of a flashing light. The reflectors **7** and **8**, too, will alternately reflect the light omitted from oncoming headlights to give a flashing effect, but at a higher level, since the reflectors **7** and **8** are positioned above the reflectors **5** and **6**. Moreover, the interval between flashes from the lower reflectors **5** and **6** will be shorter than will the interval between flashes from the reflectors **7** and **8**, since the reflectors **5** and **6** are radially spaced from the rotating axis of the reflector assembly, but not the upper reflectors **7** and **8**, and thus the velocity of the lower reflectors **5** and **6** will be greater than the velocity of the upper reflectors **7** and **8**. Accordingly, such an arrangement of the reflectors is effective to give two distinctly different flash patterns

which will quickly draw the attention of oncoming motorists and will hold their attention until after they have passed the warning device. Of course, if desired, it should be understood that the lower reflectors **5** and **6** could also be mounted back to back and in alignment with the rotating axis of the reflector assembly as are the upper reflectors **7** and **8**, in which case the interval between flashes of the lower reflectors **5** and **6** and upper reflectors **7** and **8** would be the same.

As evident, before these two different flash patterns will occur, the reflector assembly **2** must be rotating, and not so fast that the lower reflectors become a blur. However, regardless of the speed at which the reflector assembly is rotating, the number and relative disposition of the reflectors **5**, **6**, **7**, and **8** are such that at least one reflector will always be visible when the lights from an oncoming vehicle strike the warning device. This is true even when the reflector assembly is stationary or rotating very slowly, since at least one reflector can be seen at all times from any point in its line of sight, and one reflector will always come into view before another reflector goes out of view. Moreover, in a strong wind, although the rotation of the reflector assembly **2** may be so fast that the lower reflectors **5** and **6** are not clearly visible, the velocity of the upper reflectors **7** and **8** will be much slower still to reflect a distinct and effective flashing light.

Of course, the speed at which the reflector assembly **2** rotates is dependent upon the velocity of the wind, since the stronger the wind, the greater will be the amount of air trapped by the vane **4** in a given amount of time. However, it doesn't require a strong wind to cause rotation of the reflector assembly **2**, first of all, because the assembly is well balanced, and also because of the mounting of the reflector assembly **2** on the support stand **3** and the light weight of the reflector assembly, as will be subsequently more fully discussed. As a matter of fact, even when there is substantially no wind, if the warning device **1** is disposed sufficiently close to the roadway, the draft created by passing vehicles will be sufficient to keep the reflector assembly rotating most of the time.

While it has not been found necessary to provide vanes on the sides of the reflectors **7** and **8** to assist the vane **4** in effecting rotation of the reflector assembly, this could obviously be done if desired. Also, instead of disposing the reflectors **7** and **8** back to back, such reflectors could be positioned away from the axis of rotation of the reflector assembly, but preferably closer thereto than the reflectors **5** and **6**. Moreover, the size of the vane **4** could be increased to increase the amount of air trapped thereby and thus increase the speed of rotation of the reflector assembly if desired.

While the tendency of the reflector assembly **2** to rotate goes up as the velocity of the wind increases, the drag caused by the back to back reflectors **7** and **8** also goes up with increases in wind velocity. Accordingly, it has been found that the reflector assembly will generally rotate at a relatively uniform speed even though the velocity of the wind is not substantially uniform, although of course extremes in wind conditions will cause noticeable changes in the rotational speed of the reflector assembly.

Preferably, the vane **4** is made of aluminum and has a plurality of tabs **20** punched therein for holding the reflectors **5** and **6** in place, as perhaps best shown in FIG. 4. If made from aluminum, it is also preferred that the aluminum not be painted or coated. However, the vane **4** could also readily be made of other materials such as white plastic, in which case it is desired that the reflectors **5** and **6** be glued or cemented to the vane **4**.

The size and shape of the reflectors are not critical, but it has been found that circular reflectors of 4 inch diameters are quite effective in achieving the desired results. Also, it is preferred that the reflectors be red in color and made of plastic, but it should be apparent that other colors and reflector materials may be used.

As previously indicated, the reflectors **7** and **8** are mounted to the vane **4** by means of a metal frame **12**. The frame **12** surrounds the reflectors **7** and **8** with the ends **21** thereof extending outwardly therefrom in parallel spaced relation, the spacing between and curvature of such ends **21** being such that they match and thus are slidable on the outer surfaces of the central tubular portion **11** and the central channel **22** in the vane **4**, in which the tubular portion **11** is securely disposed, as by welding (see FIG. 3).

The proper spacing between the ends **21** of the frame **12** is maintained by disposing therebetween a bushing **23** (FIG. 5) held in place by a rivet **24**. Thus, the upper reflectors **7** and **8** may be readily slipped off and on the vane **4** for quick disassembly and assembly of the reflector assembly. To ensure against loss of the upper reflectors **7** and **8** when removed from the vane **4**, a safety chain **25** is provided, one end of which is attached to the bushing **23**, and the other end of which is attached to the vane **4**.

While it is preferred that the frame **12** be made of metal, it could also be made of plastic, in which case the frame would be molded integrally with the reflectors **7** and **8**.

Turning now to the construction of the support stand **3**, such stand consists of a base member **30**, a channel member **31** extending perpendicularly from the base member **30**, and a rod **32** extending in the same direction as the channel member **31** and secured to the outer end thereof. The base member **30** includes a plurality of legs **33**, preferably four in number and approximately ten inches long so that when they are positioned in the manner shown in FIG. 1, for example, they will form a sufficient support to prevent tipping over of the warning device **1** even in a very strong wind, and on uneven surfaces.

It is desirable that the support stand be collapsible so that the same may be readily stored in a relatively small space in a vehicle when not in use. Accordingly, in the preferred form shown, the inner ends of the legs **33** are rotatably secured together by means of a base pin **34** and bushing **35** extending through apertures **36** in the inner ends of the legs, such pin **34** having an enlarged head **37** on one end and a groove **38** in which there is disposed a snap ring **39** for holding the legs **33** on the pin **34** and bushing **35**. As illustrated in FIGS. 6 and 7, the legs **33** are of similar shape, but are progressively longer so that they may be folded to a position whereat they are in alignment with each other.

One end of the rod **32** extends for a short distance into the adjacent end of the channel member **31** and is secured thereto by means of a rivet **40** so that the same may be folded from the extended position shown in FIG. 1 to a position within the channel member **31** in the manner shown in FIG. 6. Likewise, there is a pin connection **45** between the other end of the base pin **34** and the other end of the channel member **31** so that the channel member **31** may be folded from the upright position shown in FIG. 1 to the position shown in FIG. 6 whereat the channel member **31** is in alignment with and substantially parallel to the folded legs **33**. It is desirable that the connection between the rod **32** and channel member **31** be sufficiently loose and the channel member **31** be sufficiently large that when the channel member **31** and rod **32** are folded in the manner shown in FIG. 6, the weight of the rod **32** is sufficient to cause the free end of the rod **32** to drop slightly away from the channel member **31** so that it may be easily gripped and moved to its extended position upon movement of the channel member **31** toward its extended position, such movements being illustrated in phantom in FIG. 6.

In order to ensure that the rod **32** and channel member **31** remain in their extended positions as long as desired, the ends of the side walls **46** of the channel member **31** are crimped inwardly at **47** to provide a spring force for retaining the rod **32** and channel member **31** in vertical alignment with the base pin **34**. Note, in

particular, FIG. 8 in this respect, which shows in detail the crimped side walls **46** of the upper end of the channel member **31**, the lower end being identical. Also, the ends of the bight portion **48** of the channel member **31** are preferably crimped inwardly at **49** to ensure straight vertical alignment of the base pin **34**, channel member **31**, and rod **32** when such channel member and rod are in the extended positions.

The free end of the rod **32** is preferably rounded or bullet shaped as shown in FIG. 2 for ready receipt in a socket **50** of a plug **51** disposed in one end of the tubular portion **9** of the reflector assembly **2**. Not only does this connection permit free rotation of the reflector assembly **2** when disposed on the support stand **3**, but it also permits ready assembly and removal of the reflector assembly from the support stand for storage when desired.

From the above discussion, it should now be quite evident that the warning device of the present invention is very effective in attracting attention, and has particular utility in warning oncoming motorists that they are approaching a disabled vehicle and the like along the highway. However, such a warning device may also be used at construction or excavation sites, to warn either motorists or pedestrians that there may be danger. Further, such a device could be used quite effectively in advertising to attract the attention of would-be customers.

Of course, this warning device is most effective in attracting attention at night, but it also is quite useful in attracting attention in the daytime, because of its rotation, its unusual shape, and because of the ability of its reflective surfaces to reflect sunlight.

Other modes of applying the principles of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I therefore, particularly point out and distinctly claim as my invention:

1. A warning device comprising a support stand and a reflector assembly rotatably mounted on said support stand, said reflector assembly including a wind vane symmetrically disposed about the axis of rotation of said reflector assembly, a pair of reflectors mounted on opposite sides of said vane and laterally spaced in opposite directions from said axis of rotation, and at least one other reflector vertically spaced from said pair of reflectors, said other reflector being supported by said vane for rotational movement therewith, the spacing between said other reflector and said axis of rotation being different than the spacing between said pair of reflectors and said axis of rotation, whereby upon rotation of said reflector assembly, light is reflected by said reflectors in such a manner as to give two distinctly different light flash patterns.

2. A warning device comprising a support stand and a reflector assembly rotatably mounted on said support stand; said reflector assembly comprising a vane symmetrically disposed about the axis of rotation of said reflector assembly, a first pair of reflectors mounted on opposite sides of said vane and laterally spaced in opposite directions from said axis of rotation, and a second pair of reflectors vertically spaced from said first pair of reflectors, said second pair of reflectors being disposed back to back in alignment with said axis of rotation and supported by said vane for rotational movement therewith; and said support stand comprising a plurality of support legs, means mounting said support legs for movement from a spread apart position to a stacked position whereat said legs are in alignment with each other, a support member, means mounting said support member for movement from an extended position whereat said support member is substantially at right angles to said support legs to a folded position whereat said support member is substantially parallel with said support legs,

a rod member, and means mounting said rod member for movement from an extended position whereat said rod member is aligned with said support member and extending outwardly therefrom to a folded position whereat said rod member overlies said support member.

3. The warning device of claim **1**, wherein there are two other reflectors vertically spaced from said pair of reflectors as aforesaid, said two other reflectors being mounted back to back in alignment with said axis of rotation and disposed at right angles to said pair of reflectors, whereby at least one reflector will always be visible regardless of the speed at which said reflector assembly is rotating.

4. A warning device for warning oncoming motorists of an obstruction and the like comprising a reflector assembly and a support stand for supporting said reflector assembly, said support stand comprising a plurality of support legs, means mounting said support legs for movement from a spread apart position to a position whereat said legs are stacked one on top of the other, a support member, means mounting one end of said support member to said support legs for movement from an extended position whereat said support member is substantially at right angles to said support legs to a folded position whereat said support member is substantially parallel with said support legs, a rod member, and means mounting one end of said rod member to the other end of said support member for movement from an extended position whereat said rod member extends outwardly from and substantially parallel with said support member to a folded position whereat said rod member overlies said support member, said means for mounting one end of said support member to said support legs as aforesaid comprising a pin extending at right angles from said support legs, the outer end of said pin being pivotally connected to said one end of said support member to permit folding of said support member as aforesaid, said one end of said support member being channel shaped for receipt of the outer end of said pin therewithin when said support member is in such extended position, the side walls of said one channel shaped end being crimped inwardly to provide a spring force for retaining said outer end of said pin therewithin as aforesaid to hold said support member in such extended position.

5. A warning device comprising a support stand and a reflector assembly rotatably mounted on said support stand, said reflector assembly including means for trapping the wind to cause rotation of said reflector assembly, a first pair of oppositely facing laterally spaced reflectors secured to said reflector assembly for rotational movement therewith, and a second pair of oppositely facing reflectors vertically spaced from said first pair of reflectors and also secured to said reflector assembly for rotational movement therewith, the lateral spacing between said second pair of reflectors being different than the spacing between said first pair of reflectors, whereby upon rotation of said reflector assembly, light will be reflected by each pair of reflectors in such a manner as to give two distinctly different light flash patterns.

6. The device of claim **4**, wherein said means mounting one end of said rod member to the other end of said support member comprises a pivotal connection between the adjacent ends of said rod member and support member to permit folding of said rod member as aforesaid, said other end of said support member also being channel shaped for receipt of said one end of said rod member, the side walls of said other channel shaped end being crimped inwardly to provide a spring force for retaining said rod member in its extended position.

7. The device of claim **6**, wherein the bight portions of both of said channel shaped ends are also crimped inwardly adjacent their respective ends axially spaced from their respective pivotal connections to insure straight alignment of said support member, pin, and rod member

when said support member and rod member are in the extended positions.

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