United States Patent [19]

Foley et al.

[11] **3,832,679**

[45] **Aug. 27, 1974**

[54] **HIGHWAY EMERGENCY COMMUNICATIONS-WARNING SYSTEM AND UNITS**

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[73] Assignee: **Design Properties, Inc.,** Wellston, Ohio

[22] Filed: **Aug. 16, 1972**

[21] Appl. No.: **281,143**

[52] **U.S. Cl.** **340/22**

[51] **Int. Cl.** **G08g 1/09**

[58] **Field of Search** ..... 340/22, 74, 75, 90, 114, 340/118, 119, 88, 287, 300; 9/8.3 E; 179/1 DD, 2 R

[56] **References Cited**

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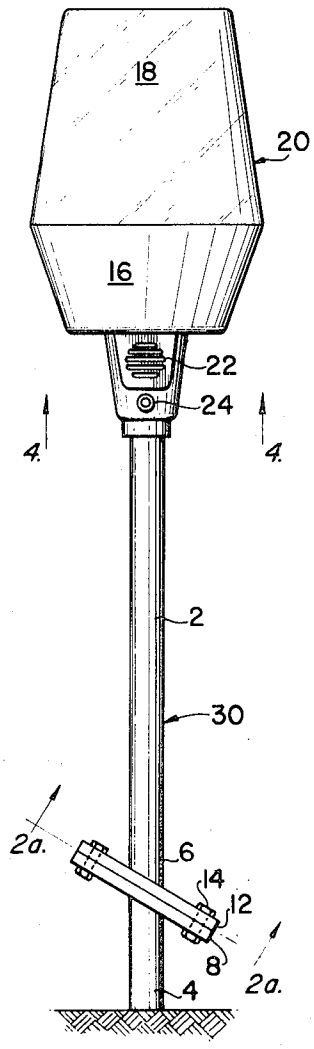
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Primary Examiner—Kathleen H. Claffy
Assistant Examiner—Thomas L. Kundert
Attorney, Agent, or Firm—Gardiner, Sixbey, Bradford and Carlson

[57] **ABSTRACT**

A highway warning system is comprised of a plurality of standards erected at regularly-spaced intervals along the road side and interconnected by conventional telephonic system to a central dispatcher station. The standards are provided with communication elements and a light which is under control of the central station such that the standard at the closest point to a trouble site may be illuminated and as well standards ahead of the trouble point may be illuminated to warn motorists of potential danger ahead.

6 Claims, 10 Drawing Figures



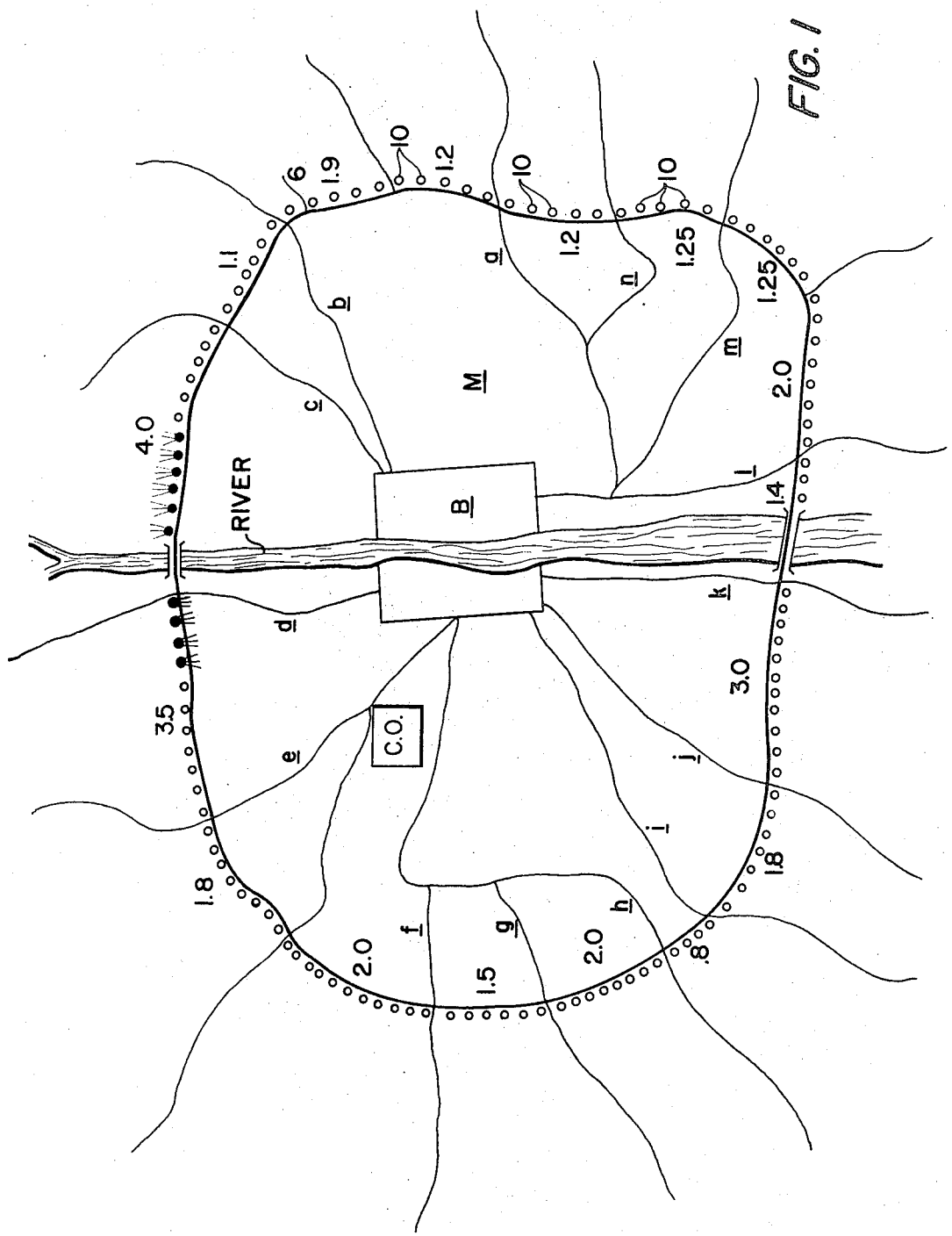

6
1.9
10
1.2
10
10
1.1
1.2
1.25
1.25
2.0
4.0
RIVER
M
B
1.4
3.0
3.5
C.O.
1.8
2.0
1.5
2.0
.8
1.8
a
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c
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e
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FIG. 1

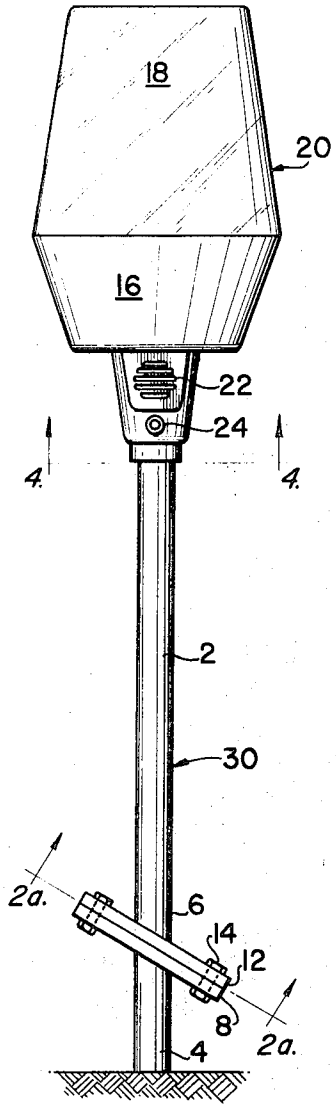


FIG. 2

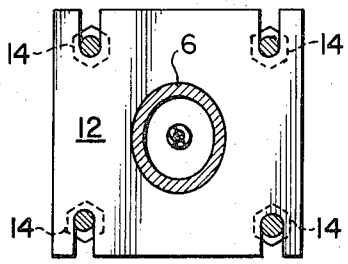


FIG. 2a

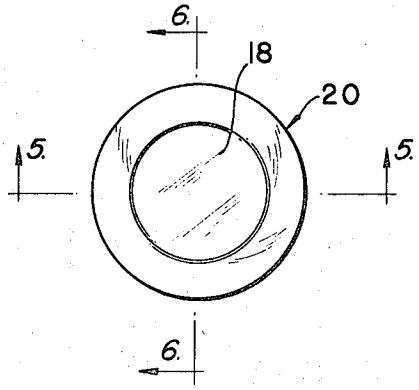


FIG. 3

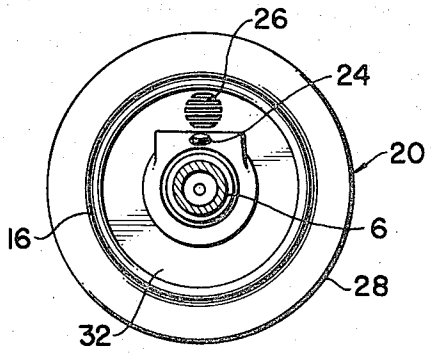


FIG. 4

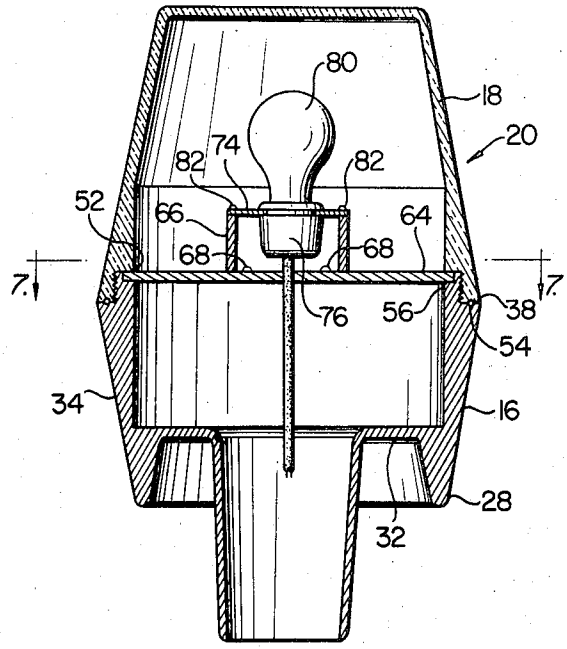

80
18
20
82
74
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64
68
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38
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34
16
28
32

FIG. 5

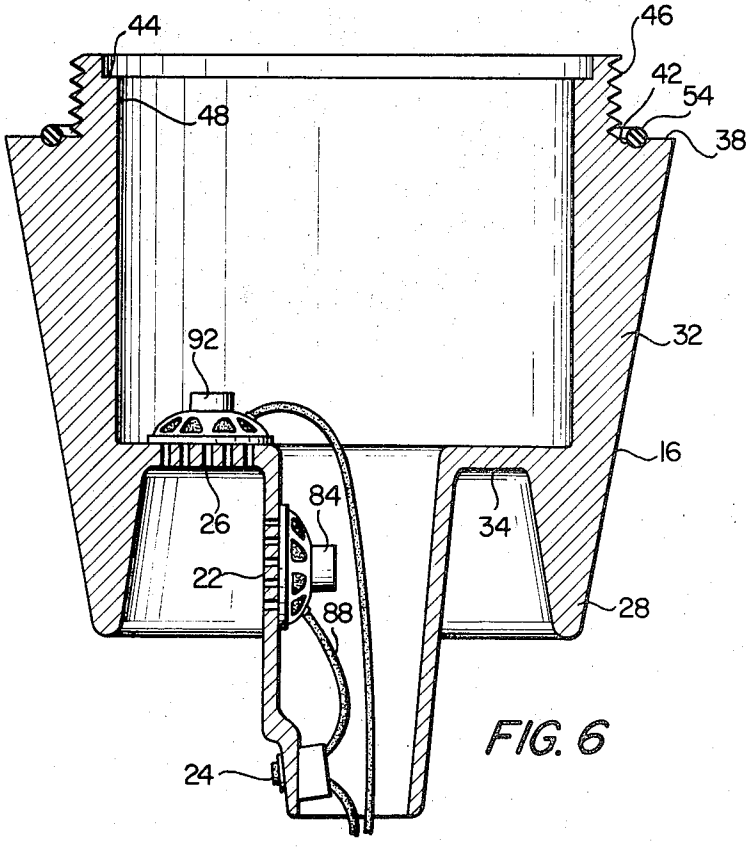

44
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42
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92
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26
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28
88
24

FIG. 6

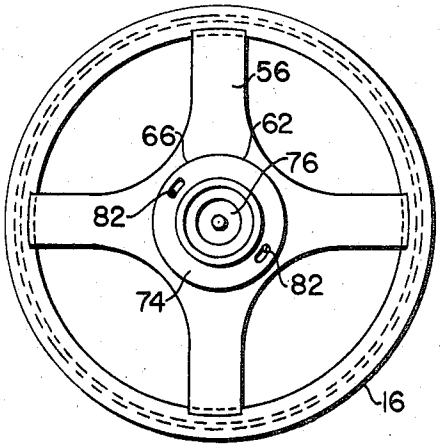


FIG. 7

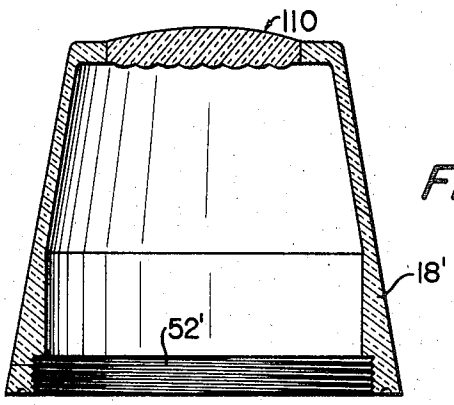


FIG. 8

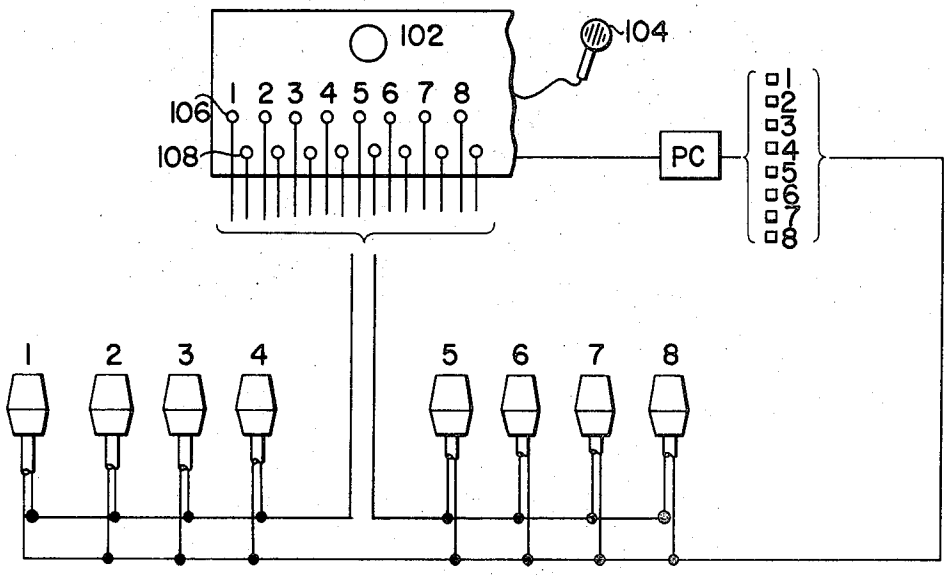


FIG. 9

HIGHWAY EMERGENCY COMMUNICATIONS-WARNING SYSTEM AND UNITS

BACKGROUND

The rapid development of our national highway system into a network of high-speed, limited access dual highways has proved a boon to the American motorist. As with everything man made, however, such highway systems have also created problems for both the motorist and the administrative agency, be it state or Federal, charged with the responsibilities of safety and of providing assistance to motorists in distress either because of breakdown or accident.

By way of example, the so-called Capitol Beltway which encircles the Washington, D. C. Metropolitan Area is a dual highway of not less than two and in places four lanes in both clockwise and counterclockwise direction. Access to and from the Beltway is limited to approximately 37 entrances and exits with the average distance between adjacent exits or entrances being on the order of 1.9 miles. At some points the distance between adjacent exit or entrance roads is as much as 5.8 miles. Additionally, there are no service areas or services available directly on the Beltway proper so that assistance to motorists in trouble must come from the closest available facility via the nearest access road. Thus a stranded motorist must depend for assistance on the charity of passing motorists; the arrival of a cruising police car on the scene or must walk for assistance which may be as much as 2 miles and in so doing a hazard is created by the presence of the disabled vehicle and by the pedestrian himself.

An even more critical situation arises in the case of an accident. Because speed limits on such a road are rarely less than 50 M.P.H. and as much as 70 M.P.H., any accidental contact of a vehicle with an object, moving or stationary, is bound to be serious resulting in a severely damaged vehicle or vehicles and too often in serious bodily injury. The occurrence of the original accident is further complicated by the fact that motorists approaching the scene at high speed have no warning of approaching danger and that emergency personnel as well as other motorists attempting to assist accident victims are continously exposed to the hazard of being struck by oncoming vehicles.

When it is realized that on the example Beltway scarcely a day passes without a breakdown or major accident the enumerated disadvantages of such a high speed facility become a matter of increasing concern to everyone, motorists, police, safety officials, emergency personnel and even mechanics and service station personnel rendering assistance to stranded motorists.

As is the case with any abnormal situation, the immediate problem that must be faced is one of communication whereby the party needing assistance can communicate that fact and all relevant details to the assisting party. Also, since any abnormal situation involves hazard, not only to those directly concerned, but also to approaching motorists, speed of communication is vital so that assistance forces can be mustered immediately to the precise location of the abnormal situation and that oncoming motorists can be alerted to impending danger and take measures to adequately protect themselves and others from compounding the existing situation by their own unfortunate involvement.

Recognition of the situation outlined above is not new. Various solutions have been proposed as for example signs illuminated from a central station, see U.S. Pat. Nos. 2,902,669 and 2,849,701. Also proposed are warning devices such as in U.S. Pat. No. 3,060,406 which may be placed by persons ahead of a trouble scene to warn oncoming motorists of danger. Still, the main problem remains that of communication, i.e. getting the information as to the existing condition to the proper parties for remedial action and transmitting warnings to innocent parties of impending danger.

One system in use on the aforementioned Beltway provides solar-powered radio transmitters spaced along the road side at regular intervals. Each transmitter is a self-contained unit provided with buttons which are operated by the stranded motorist or a passing party to indicate that assistance is needed and what type of assistance should be dispatched. For example, six buttons are provided which are designated "OUT OF FUEL", "FLAT TIRE," "ACCIDENT," "FIRE," "INJURY," and "BREAKDOWN."

Thus, the party presses the appropriate button or buttons to indicate as closely as possible the factual situation that exists and for which assistance and relief are requested. A code signal is than transmitted via a solar battery powered radio transmitter to a central receiver monitored by a dispatcher. The dispatcher then communicates with the proper agency to provide assistance in accordance with the relief requested. It might be mentioned that the coded transmission also identifies the location of the transmitter.

This system has not, contrary to expectations, proved to be a complete success for three reasons. First, the equipment itself has not been totally reliable. Second, the distressed party is not directly in communication with the dispatcher and thus has no evidence that in fact his or her distress message is received. Finally, if the call is received there is no way this fact can be acknowledged and, even more important, there is no way that the existence of an emergency can be communicated to other motorists in such a way as to provide advance warning of a potentially dangerous situation.

BRIEF DESCRIPTION OF INVENTION

The purpose of the present invention is to provide a system and means whereby assistance can be requested by a distressed motorist, the exact factual situation can be conveyed to a central dispatcher; the dispatcher can acknowledge receipt of the communication thus relieving the anxiety of the distressed party and finally, not only can appropriate relief be initiated, but motorists not involved in the particular situation can be warned well in advance that a potentially dangerous situation exists ahead of them and they should modify their driving conditions accordingly.

To effect these desired results a communications system is provided wherein a plurality of communication-warning standards are provided at regularly spaced intervals along the road side, the standards being interconnected by a telephonic system to a central dispatching point to enable voice communication between user and dispatching personnel; said standards including further warning and locator means providing visual stimuli under control of the dispatcher whereby the scene of the incident can be readily located while advance warning of an unusual condition can be served on oncoming motorists.

Each standard includes a break-away connection to its ground anchor and a weatherproof top assembly comprising a bowl-shaped housing having a peripheral bottom skirt and mounting means for a manually operated switch and individual voice transmitting instruments securely protected from the elements, a socket means for a light source is also mounted in the bowl-shaped housing which is closed by a generally frusto-conical shaped light transmitting top or cover, said cover being of amber shade as viewed from the roadway. Possibly the base of the frusto-conical cover, which is the top of the standard is clear whereby a beam of light may be projected upward for a considerable distance to provide a homing beacon for conveyances such as helicopters.

The broad purposes and components of the invention are set forth above so that it is apparent that an object of the invention is to provide a reliable highway control and warning system.

Another object of the invention is to produce a highway assistance system which is effective to solicit aid and is reassuring to the party seeking aid in that vocal communications are effected.

Still an additional object of the invention is to provide a highway assistance and warning system which is universal in its application and which is readily installed, easy to maintain and completely reliable in its operation.

Additional objects of the invention are to provide a standard for use in a highway warning and assistance system which is readily recognizable, simple to use and provides for prompt identification of its use by visual indicator means.

These and other objects not specifically enumerated but readily apparent to those skilled in the art can be discerned from the following detailed description coupled with the drawings forming a part thereof, and wherein:

FIG. 1 is a graphic representation of a typical metropolitan area surrounded by a circular highway of the limited access, high speed type.

FIG. 2 is an elevational view of a standard used in the warning and communication system associated with FIG. 1.

FIG. 2A is a sectional view taken along line 2A—2A of FIG. 2.

FIG. 3 is a top view of the standard shown in FIG. 1,

FIG. 4 is a bottom view taken along the line 4—4 of FIG. 2,

FIG. 5 is a sectional elevational view of the top assembly of the standard taken along the line 5—5 of FIG. 3,

FIG. 6 is a sectional view similar to FIG. 5 but taken along the line 6—6 of FIG. 3 with parts removed for clarity,

FIG. 7 is a top sectional view of the top assembly of the standard taken along the line 7—7 of FIG. 5,

FIG. 8 is a sectional view of a modified form of cover used in the top assembly, and

FIG. 9 is a simple block-type diagram showing a communication-control system for use in the invention.

Considering FIG. 1 by way of entry into the detailed descriptive matter, it will be seen that a typical metropolitan area M is comprised of a central high density core or business area B transcended by a river R and from which radiate a plurality of typical arterial roads, *a*, *b*, *c* and so forth. Arterial roads *a*, *b*, *d*, *g*, *j*, and *i* are also major highways leading North, South, etc., which may blossom into dual lane expressways in the outskirts of the metropolitan area or in some cases leading directly into the business or core area B.

In order to enable travelers or even local residents to reach any one of the major arterial roads or expressways, the entire metropolitan area is girded by a circular dual-lane, high-speed road C which enables this feat without the necessity of traveling through the highly congested area B. Thus the expressway C is burdened with a constant flow of traffic and the traffic will all be traveling at speeds approximately 50–60 M.P.H. Also, it will be apparent from a further inspection of FIG. 1 that the average distance between any two entry or exit ramps is about 1.75 miles which means that in case of an accident or breakdown the maximum distance a motorist would have to walk for assistance would be 2 miles. Even if a breakdown or accident occurred at an entrance or exit point the involved motorist would still be forced to walk some distance to reach facilities for aid or communication which are normally located at some distance along the respective arterial highways.

When it is considered that the time involved in obtaining assistance could vary from at least 5 minutes as to as much as and hour and the further fact that the stranded motorist himself becomes a potential hazard to himself and others by crossing or walking along the roadway, it becomes apparent that some means of obtaining immediate assistance is a vital necessity. Not only must this means serve to make assistance available; it must also assure the motorist that his message has been understood. It must also warn other motorists of a potential hazard and it must meet these vital requirements while minimizing exposure of the user to an absolute minimum.

As illustrated then in FIG. **1**, a plurality of such means are provided at regularly spaced intervals along the entire circular expressway. Preferably, if the economics so justify the spacing should be no more than 1 mile between any two adjacent means, but should be spaced more frequently in situations that warrant, i.e., congested areas, high accident areas. It should be further understood that while such means are shown just on one side of the road, the same facilities at the same intervals would be located on the opposite side of the highway to avert the necessity for any party to cross the highway with all of this hazard.

Turning, now, to FIG. **2**, the means **10** which serves the assigned function is shown in elevation as comprising a vertical column **2** and a top assembly **30.**

As shown, column **2** is formed in two parts, a base **4** and a tubular post **6.** The base **4** is anchored in the ground, preferably in a cement slab, now shown, which is consistent with the non-graphic operational design, and on which a person can stand. Seated on the upper end of base **4** is a slanted plate **8** which mates with a second slanted plate **12** which is affixed as by welding or the like to the bottom end of tubular post **6.**

The two plates which are rectangular in plan view are bolted together by bolts **14** at each corner. The plates **12** and **8** are slotted such that the parts will separate on impact and also force the upper part of the unit into the air and over the vehicle. This type of break-away connection for light poles, signs, etc., adjacent highways is

mandatory for compliance with Federal and state safety laws.

Mounted on the top of tubular post **6** is the communications head or assembly **20.** This assembly is comprised of a generally inverted, frusto-conical base or bowl **16** and a frusto-conical cover **18** of a suitable high impact, light-transmitting plastic. Just below the bottom of the base **16** is a switch **24** of the push buttom type, preferably illuminated, and a series of elongated slit-like openings forming a grill area **22** the function of which is to permit voice communication to the interior of the assembly **20.**

The overall height of the entire device is approximately 84 inches from ground level with the height of the column **30** being about 62.5 inches to position the push button switch **18** and the grill area **22** are positioned at a vertical elevation convenient for use by most prople.

As stated the cover **18** is formed of a light-transmitting plastic or equivalent material. Preferably the cover is tinted to emit a yellow light of high intensity. This color is almost universally recognized as denoting caution and at the same time will not be confused with red lights, such as stop lights or the danger lights customarily used on emergency vehicles and the like by approaching motorists.

In FIGS. **3** and **4,** the top and bottom of the head or communications assembly **20** are clearly shown. Little comment is necessary with respect to FIG. **3,** however, FIG. **4** does warrant more than passing consideration for again it should be noted that the bottom of the bowl **14** is also provided with slit-like openings defining a grill area **26** for voice transmission within the interior of the bowl **16.**

As stated, FIG. **5** is a sectional view taken along the line **5—5** of FIG. **2.** As clearly shown, the base of bowl **16** is made of a metal which may preferably be cast in the desired shape and which exhibits good anti-corrosive properties. Aluminum is an ideal metal because it possesses good weather-resistant properties and it can be die cast with good precision.

It should be understood, however, that the specified materials are not the only materials of which the communication heads **20** can be fabricated. Plastics could be used as well as combinations of other metals or glass. As a matter of fact, it is within the realm of feasibility to mold the heads of two plastic parts which are fitted internally as will be described and thereafter permanently joined together to form inexpensive replaceable units. As is usual where is agreat number of units are to be manufactured the method manufacture and materials used will be dictated by a balance of various factors.

As further disclosed in FIG. **5,** the bowl **16** is so formed that a peripheral skirt **28** of some depth is provided at the juncture between the bottom **32** and the conical side wall **34.** This skirt acts as an awning or shield to prevent rail or snow from entering the grill area **26** and also to, at least partially, shield the grill area **26** and the push button **24** from inclement weather.

The upper rim of the bowl is provided with an annular shoulder having a groove **42** and merges into a threaded cylindrical mouth **44** which is externally threaded at **46.** The cover **18** is also provided with a threaded peripheral area **52** which engages the exterior threads **46** on base **16.** Seated in the groove **42** is a diametric O ring sealing member **54** which forms a weathertight seal when the transparent cover **18** is threaded into place on base **16** via the threads **46** and **52** on each respective part.

Wedged between transparent cover **18** and base **16** is an X-unit **56** having a central hub **62** from which the four arms radiate outward.

The X-shaped unit has affixed thereto, at the central hub **62,** a typical electrical junction box **66** by means of any type of conventional fasteners **68.** The cover plate **74** of the junction box **66** carries a lamp socket **76** of the conventional weatherproof type manufactured by such parties as General Electric Co., Sprague Electric Co., among others. The cover **74** is held in place also by conventional screw fasteners **82.** A lamp bulb **80** of suitable wattage to illuminate the light-transmitting cover **18** with sufficient brilliance to catch the eyes of motorists is screwed in the socket **76.**

Additional details of the assembly **20** are apparent from an inspection of FIG. **6** which is a view of 90° displacement from that of FIG. **5** but with the light assembly removed. As shown, a miniature microphone **84** is positioned within the tubular downwardly projecting cylinder which extends from the bottom of the bowl and is joined to the top of column **2** as by a set screw or the like. The microphone is located immediately behind the grill area **26,** previously described, and is electrically connected to the push buttom switch **24** via electrical conductors **88.** Preferably, the button operator of switch **24** is illuminated, such switches being readily available, whereby it can be readily located during nightfall. Also fixed within the bowl is a miniature speaker **92** mounted in the area of the grill **26** whereby its sounds are transmitted exteriorly of the assembly **20.** This speaker is electrically connected via a conductor **94** to the central dispatcher station as will be apparent.

SYSTEM OPERATION

As stated, the individual standards with the light, speaker and microphone are positioned at regular intervals along the road side. Each of the units is connected via buried cable to a central dispatcher's desk as schematically illustrated in FIG. **9.**

The dispatcher's desk contains a speaker **102,** a microphone **104** and a plurality of indicator lights **106** and switches **108,** one set of each being assigned to each standard along the road side. Preferably, any single dispatcher's desk would service **50** standards which, if spaced 1 mile apart means that each dispatcher monitors about 25 miles of highway.

In case of an accident or emergency for example, at point X in FIG. **1,** the involved motorist would go the nearest standard and press the button **24.** This places the standard in communication with the dispatcher via voice transmission through speaker **102.** Immediately a tape recording will answer, explaining that the motorist is connected to the communication station and that the dispatcher will answer immediately. As soon as possible the dispatcher replies via microphone **104** and at the same time flips the switch paired with a given indicator light **106** which is illuminated simultaneously with operation of button **24.** The switch **108** causes bulb **80** to be energized so that other motorists are warned by light of the standard that a hazard exists. Uper ascertaining the nature of the motorist's difficult, the dispatcher provides appropriate advice and then

may, if the situation so warrants, flip additional switches **108** as he deems necessary to cause illumination of any number of standards ahead of, i.e., in the direction opposite to traffic flow, the particularly standard from which the call for assistance originated.

In the situation of FIG. **1**, let it be assumed that an accident involving several vehicles has ocdurred at point X. As is evident, this is a critical location because traffic is approaching the bridge from both directions and the traffic moving in a counterclockwise direction would be at full speed since there is a distance of approximately 3.0 miles from the last arterial entrance road *c*. An involved or witnessing motorist would proceed to the nearest standard and by operating the push button **24** would be place in communication with the dispatcher, the appropriate indicator light pin pointing the scene. The dispatcher would, upon being appraised of the gravity of the situation, operate the number of switches **108** to cause illumination of the number of standards in either direction such as he feels advisable. In the illustrated situation he has selected a mile and one quarter as being a safe warning margin, accordingly, six standards are illuminated in either direction from the accident scene X.

It should be stated that the specific details of the telephonic communication system are conventional and need not be discussed in detail. The control of the lights may be via the same type of system used in a dial telephone, i.e., each switch sends out a pulsed code via coder P.C. to operate relays to turn on the lights. Similarly the voice communications system, per se, is conventional and would in all probability be handled by the most convenient telephone company, emergency alarm systems company or similar organization. By way of example, systems which can be readily considered and/or adapted for the intended purpose by persons skilled in the art are shown in U.S. Pat. No. 2,151,272 to T. A. Haytes issued Mar. 21, 1939; U.S. Pat. No. 786,894 issued to O. W. Hart on Apr. 11, 1905, among others.

MODIFICATION OF STANDARD

In recent years, considerable interest has been generated in the use of helicopters as emergency vehicles particularly where an accident occurs resulting in serious bodily injury. States such as Maryland, Texas and others have already instituted such procedures.

Obviously, it is vital that such airborne vehicles "home in" on the scene as soon as possible. In daylight hours this is a relatively simple process of visual navigation. However, at night or in periods where visibility is hampered, other means of guiding the airborne vehicle are desirable.

In FIG. **8**, there is shown a modified cover for the standard which is virtually the same as the previously discussed cover, like numerals (primed) indicating like characteristics. However, as shown in this sectional view, the top of the cover **18'** is modified to include a lens **110** which has the property of focusing light rays vertically skyward. Preferably, the lens **110** would be of clear rather than amber color and it may be in the form of an insert suitably fixed in cover **18** or it may be an integrally molded part of the cover, a manufacturing operation which may be readily effected by known techniques.

In any event, the cover not only, as modified, serves as a warning for motorists, when illuminated from within, but also it serves as a homing beacon for airborne craft dispatched to render assistance to the particular emergency scene, and suitable lighting and switches may be used to send verticle signals only.

Having described the invention in detail it will be apparent that modifications thereof will occur to those skilled in the art and which fall within the scope of the claims, wherein what is claimed is:

1. A highway emergency traffic advisory and warning system comprising a plurality of communications stations positioned at regularly spaced intervals along the roadside in either direction; a central dispatch station in direct telephonic communication with at least a selected station, each station comprising

a vertical column anchored in the ground at its lower end and having impact releasable connector means adjacent its lower end,

an audio-visual communications head surmounting and permanently affixed to the upper end of each column, said audiovisual communications head comprising,

an inverted, open topped, frusto-conical shaped bowl having a bottom recessed upwardly toward the interior thereof whereby a pronounced depending peripheral skirt is defined around the lower circumferential edge of the said bowl;

a central, tubular column depending from the bottom of said bowl and connected to said vertical column

the bottom of said bowl between said skirt and said tubular column and also said tubular column having a plurality of vertically aligned grid-like openings therein, each opening being disposed above the lowermost peripheral edge of said depending skirt;

voice communicating means including a telephonic transmitter device and a telephonic receiving device positioned within said bowl and said tubular column respectively behind each of said grid-like openings,

manually actuated means for actuating said voice communicating means to connect said station with the central dispatch station for telephonic two-way communication therewith;

a light source mounted in the open top of said inverted, frusto-conical shaped bowl and operable only from said central dispatch station; and

a complimentary light transmitting cover encompassing said light source and in sealing engagement with the upper peripheral edge of said inverted frusto-conical shaped bowl to define therewith an integral weatherproof housing for said voice communicating means and said light source.

2. A communications system as defined in claim **1** wherein said lower peripheral outside edge of said bowl defines a protective skirt and audio trap and said manually actuated means is a switch mounted on said tubular extension depending from the center of the bottom of said bowl and aligned beneath said grid-like openings.

3. A communications system as defined in claim **1** wherein said cover is frusto-conical in shape and has its lower peripheral edge threadedly engaged with the top of said bowl and a seal means is positioned between said cover and said bowl to prevent moisture from entering said bowl at its juncture with said cover.

4. A communications system as defined in claim **3** wherein the top of said cover comprises a lens focusing

rays from said light source into a vertical column defining a visual beacon.

5. A communications system as defined in claim 2 wherein said bowl includes a grill area located in the bottom surface between said peripheral skirt and said central tubular extension and wherein a speaker is disposed directly above said grill area and wherein said central tubular extension of said bowl is provided with a grill area in communication with the interior of said bowl and a microphone is mounted directly behind said grill area.

6. A communications system as defined in claim 1 wherein said impact releasable connector is comprised of a pair of abutting plates bolted to each other and said plates are inclined relative to the horizontal to impart a definite one-directional movement of said standard from the base upon impact created by a moving object such as a vehicle.

* * * * *