United States Patent [19]

Finch

[11] **3,836,275**

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[54] **ROADWAY MARKER DEVICE**

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[21] Appl. No.: **240,155**

[52] **U.S. Cl.** **404/13**

[51] **Int. Cl.** **E01f 9/06**

[58] **Field of Search** ..... 404/9, 10, 11, 12, 13, 404/14; 52/586, 595, 312, 716, 717, 718; 161/38, 138, 145; 156/293, 298; 116/63 R; 24/205.12

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Assistant Examiner—Thomas J. Holko
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[57] **ABSTRACT**

A roadway marker system for improved wet-night visibility where snow plowing is prevalent in which a preformed strip is provided with recesses into which inserts can be placed, the inserts being provided with reflector elements, electrically activated light emitting devices, electrical heating elements, electrically activated infra-red radiation emitting devices, or radioactive light emitting elements. Electrical conductors are also embedded in the strip to supply power to the inserts.

2 Claims, 10 Drawing Figures

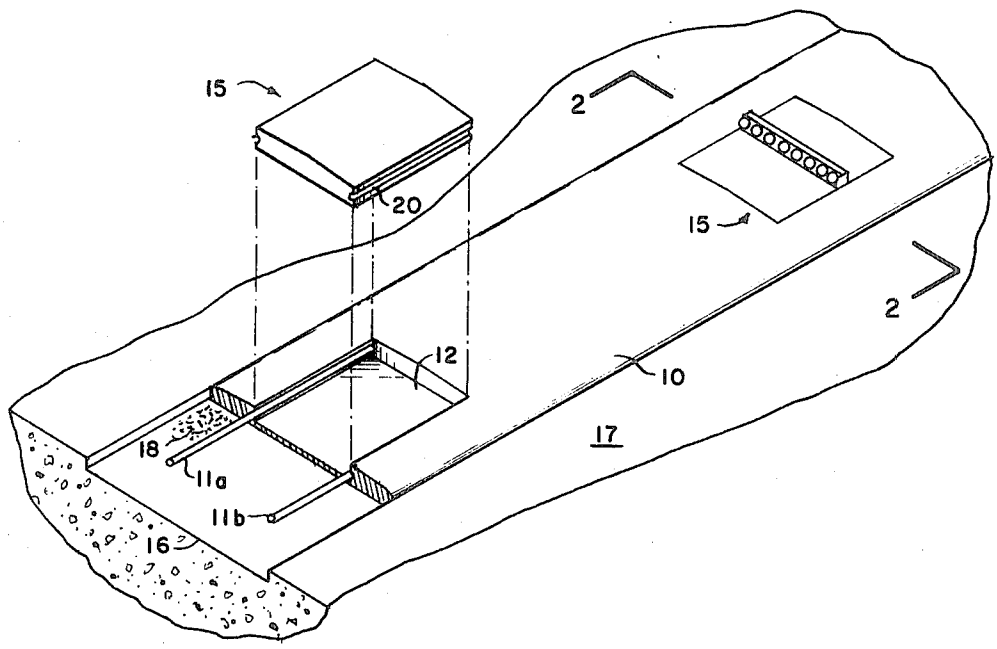


FIG. 1

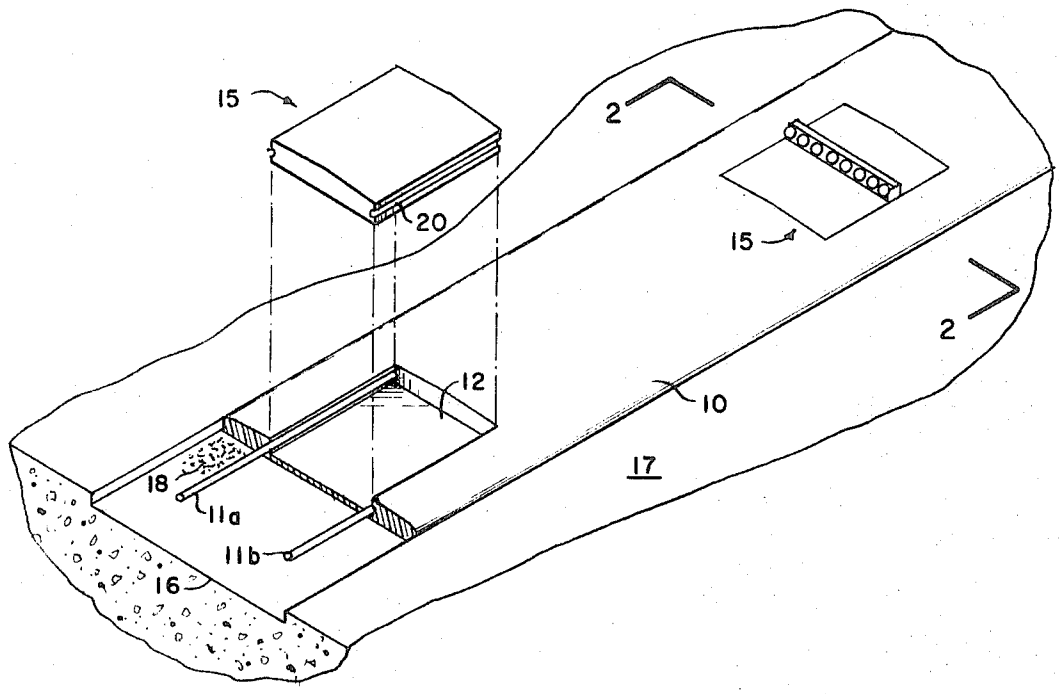


FIG. 2

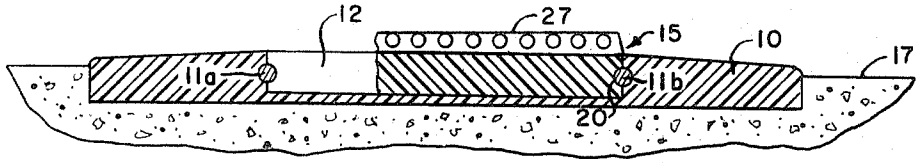


FIG. 4

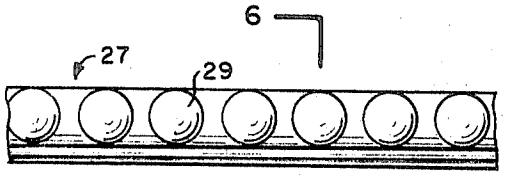


FIG. 5

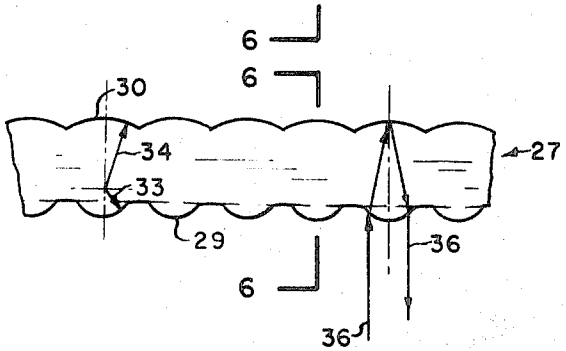


FIG. 6

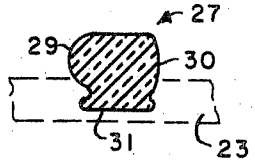


FIG. 3

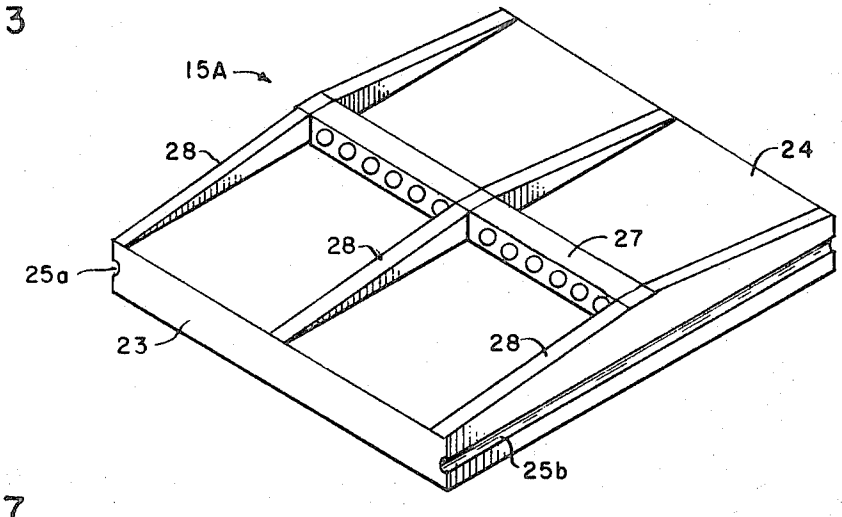


FIG. 7

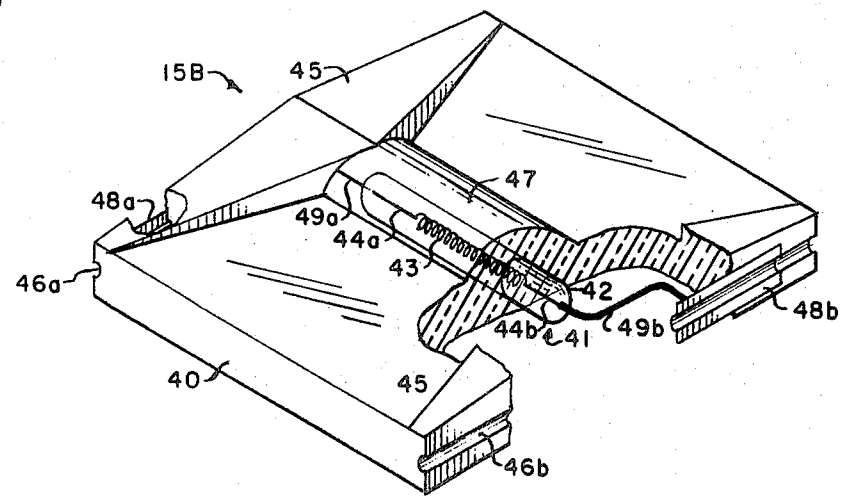


FIG. 8

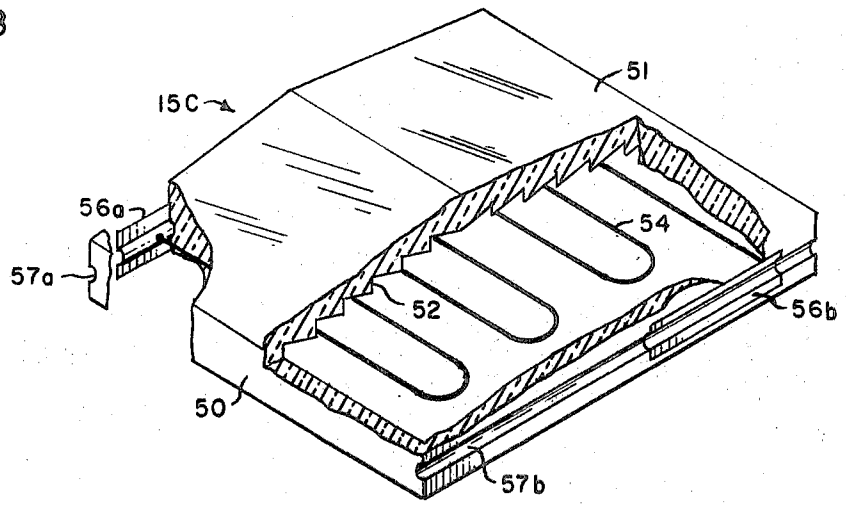


FIG. 9

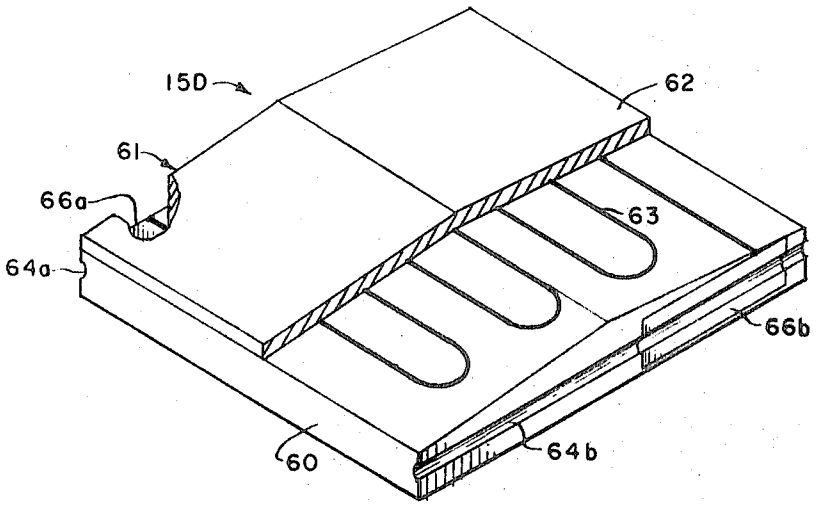
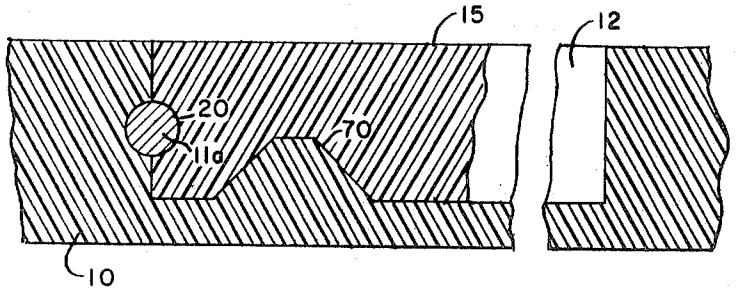


FIG. 10



ROADWAY MARKER DEVICE

BACKGROUND OF THE INVENTION

This invention relates to marking devices and in particular, to devices for marking roadways and paved areas.

The present method of marking roadways and other paved areas includes either applying a painted line directly on the pavement in which fine glass beads are mixed with the paint, the glass beads acting as reflector elements, or, applying an adhesive material to the pavement and affixing thereto individual cap-like reflector elements, or, embedding in the pavement individual lighting units.

The painted strip with intermixed glass beads has proved to be the poorest means for providing a luminous marker strip under wet-night conditions because the water and snow blocks out the light and prevents the glass beads from performing their reflecting function.

The cap-like reflectors offer somewhat better visibility since they project above the pavement surface and protrude above the thin layer of snow and water, however, because they do project above the pavement an appreciable amount in order to perform their reflecting function and because they are fastened to the pavement surface with an adhesive, they are easily removed from the pavement by the relatively large shear forces exerted by the action of a snow plow blade scraping at or near the pavement surface.

The embedded lighting units, because of their relatively high initial cost and their high cost of installation, although used extensively for airport runway and taxiway lighting, have not been used extensively in roadways and highways.

SUMMARY OF THE INVENTION

The roadway marking system of the present invention comprises a flexible molded strip of resilient material in which are disposed electrical conductors and recesses adapted to receive inserts.

The inserts can include reflector elements, radioactive light emitters, electrically activated light sources, heating elements or infra-red radiation emitters or the electrical conductors may act to heat the entire marker strip.

The inserts are of a low profile and are designed to withstand the shear forces encountered during snow removal.

The electrical conductors may also be used as the means for holding inserts in the recess.

It is, therefore, an object of the present invention to provide a wet-night visible roadway marker system.

It is another object of the present invention to provide a roadway marker device and system in which the marking devices are easily replaceable.

It is another object of the present invention to provide a raodway marker device and system having a low profile.

It is a further object of the present invention to provide a roadway marker device and system in which the marking device is self-illuminating.

It is another object of the present invention to provide a roadway marker device and system in which the marking devices are heated.

These and other objects of the present invention will be manifest upon study of the following detailed description when taken together with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view of a typical marking strip of the present invention with an exploded view of a typical insert.

FIG. 2 is a section through a typical marker strip of the present invention taken at line 2—2 in FIG. 1.

FIG. 3 is an isometric view of a typical reflector insert.

FIG. 4 is a typical parital front elevational view of a typical reflector element.

FIG. 5 is a partial plan view of a typical reflector element.

FIG. 6 is a cross-section of a typical reflector element taken at line 6—6 in FIGS. 4 and 5.

FIG. 7 is an isometric view of a typical self-illuminated insert.

FIG. 8 is an isometric view of a typical heated insert.

FIG. 9 is an isometric view of a typical infra-red radiation emitting insert.

FIG. 10 ia a partial elevational section of a method of securing an insert in the recess of the marking strip.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to FIG. 1, there is shown an isometric exploded view of the basic roadway marker system of the present invention comprising a flexible strip 10 having disposed longitudinally therein a pair of cylindrical reinforcing wires 11*a* and 11*b* which can also be electrically conductive, and means defining a recess 12 into which a typical insert 15 (shown both in exploded view and in place) will fit and be flush with the surface of strip 10 or protruding only enough to function visually and mechanically.

As shown in FIG. 1, strip 10 is installed in a trough 16 in pavement 17 and held in place by an adhesive material 18.

FIG. 2, being a cross-sectional elevation of strip 10 taken at lines 2—2 of FIG. 1, illustrates, in greater detail, the relationship of the various elements.

Wires 11*a* and 11*b* are disposed on each side of recess 12 so that one longitudinal half of wires 11*a* and 11*b* protrudes into recess 12 while the other half is embedded in and held in place by the material of strip 10.

By providing a groove 20, adapted to receive the one half of wire 11*a* and 11*b* on each side of insert 15, wires 11*a* and 11*b* thus act as a means or detent for retaining or holding insert 15 in place in recess 12.

Insert 15 may be arranged in many configurations. For example, insert 15A, FIG. 3, is a simple reflector unit utilizing a transparent reflex reflector device.

Insert 15B, FIG. 7, includes a self-illuminating light source insert utilizing a small inacandescent or gaseous discharge lamp or solid state light emitting device.

Insert 15C, FIG. 8, includes a reflex reflector unit and an electrical heating element for melting snow and ice in the immediate area of the insert.

Insert 15D, FIG. 9, includes an infra-red radiation source for use in a system which includes vehicle

mounted infrared guidance equipment during low visibility fog conditions.

Both strip **10** and insert **15** are preferably fabricated of a tough but resilient thermoplastic material having self-lubricating properties such as found in the polyamide and tetrafluoroethylene group of thermoplastics.

With reference to FIG. **3**, insert **15A** comprises a generally rectangular base **23** adapted to fit into recess **12** (FIG. **1**) with its top plane **24** generally flush with the top surface of strip **10**.

Grooves **25***a* and **25***b* are provided on each side of base **23** and are adapted to receive the longitudinal half of wires **11***a* and **11***b*, respectively, which protrude into recess **12**.

A reflex reflector unit **27** is fixed to base **23** proximate the middle of insert **15A** and is arranged to protrude above plane **24**, the roadway surface, approximately, but generally not to exceed, one-quarter of an inch.

Under normal snow plowing conditions, the snow plow blade does not rest fully on the pavement surface but is allowed to be about one-quarter inch above the pavement surface to prevent excessive wear of the snow plow blade and also to prevent damage to the roadway surface. However, because the road surface is generally uneven, the blade may come in contact with the pavement at one or more points including the top of strip **10** and insert **15**.

For this reason, insert **15A** is provided with a plurality of tapered ridge protectors **28** longitudinally disposed on insert **15A** to cause a snowplow blade to ride up and over reflector **27**.

A typical reflex reflector unit **27** is shown in FIGS. **4**, **5** and **6**. FIG. **4** shows a front elevational view of reflex reflector unit **27**. FIG. **5** shows a plan view of reflector unit **27** and FIG. **6** is a section taken through reflector unit **27** in FIGS. **4** and **5** taken at line **6—6**.

Reflector unit **27** comprises basically a front refracting lens **29**, a back reflecting surface **20** and a lockform base **31** adapted to be molded into base **23** (shown by dashed lines) of insert **15A**.

Back reflector **30** is coated with aluminum or other material that will act to provide a reflecting surface.

Both front lens **29** and back reflector **30** are shperical in shape having radii **33** and **34**, respectively.

Light rays **36** from a vehicle headlamp (not shown) are shown entering front lens **29** where they are refracted to back reflector **30** which reflects ray **36** back through front lens **29** and back to the driver of the vehicle.

Reflector **27** should be capable of reflecting light received at angles of from 0°–5° above base strip **10** and 0°–30° from the longitudinal axis of base strip **10** back within the same angular range. Such reflectors can include the corner-cube type of reflector as well as the type illustrated.

With reference to FIG. **7**, light source insert **15B** is shown in isometric and partial cut-away view and comprises a base **40** in which is embedded an incandescent light source **41** having a glass envelope **42**, a filament **43** which is connected to electrodes **44***a* and **44***b*.

Light source **41** can be any type of light source other than incandescent such as a gaseous discharge type, solid state or semi-conductor type or be a radioactive energized type, the last type would not, of course, require an outside source of power from conductors **11***a* and **11***b*.

Base **40** is also provided with grooves **46***a* and **46***b* along its sides which are adapted to receive the exposed longitudinal half of wires **11***a* and **11***b*, respectively, in recess **12** (FIG. **1**).

Also disposed along the sides of base **40** with grooves **46***a*and **46***b* are electrodes **48***a* and **48***b* which are formed to be flush with the sides of base **40** and match grooves **46***a* and **46***b*, respectively.

Electrodes **48***a* and **48***b* are electrically connected to electrodes **44***a* and **44***b*, respectively, by means of conductors **49***a* and **49***b*, respectively. Thus when insert **15B** is placed in recess **12** (FIG. **1**) electrodes **48***a* and **48***b* are in contact, respectively, with wires **11***a* and **11***b* permitting an electrical current to flow through conductors **49***a* and **49***b* through light source **41**.

The material of base **40** may, therefore, be fabricated from a transparent material to afford minimum absorption of light from source **41**. So that insert **15B** will be visible at small angles, 0°–10°, above the pavement, its surface could be etched or provided with a surface of a light diffusing material.

For the embodiment illustrated in FIG. **7**, the top of base **40** comprises a pair of tapered ridges **45** at each side of base **40** which serve to protect cylindrical refracting lens **47** from snow plow blade damage. Lens **47** can be of several configurations to either direct the light from source **41** in one direction or both directions as shown.

For the configuration shown, filament **43** can be at or above the top surface of base **40** for better visibility. The curvature of lens **47** can be varied to focus the light toward the oncoming vehicle for better utilization of emitted light.

With reference to FIG. **8**, heated reflector insert **15C** is shown in isometric and partial cut-away view and comprises a base **50** on which is mounted a reflex reflector **51** having internal reflecting surfaces **52** and electrical heating element **54** which is connected to electrodes **56***a* and **56***b*.

Although reflector **51** is shown with flat reflecting surfaces, the corner-cube type of reflector common in the art may also be used.

It will be noted, similar to insert **15B**, that base **50** is also provided with grooves **57***a* and **57***b* along its sides which are adapted to receive the exposed longitudinal half of wires **11***a* and **11***b*, respectively, in recess **12** (FIG. **1**).

It will also be noted, similar to insert **15B**, that electrodes **56***a* and **56***b* are formed to be flush with the sides of base **50** of insert **15C** and match grooves **57***a* and **57***b*, respectively.

Thus, when insert **15C** is placed in recess **12** (FIG. **1**) electrodes **56***a* and **56***b* are in contact, respectively, with wires **11***a* and **11***b* permitting an electrical current to flow through heating element **54** to melt any ice or snow which might be covering reflector **51**.

It will be noted further that reflector **51** is formed to achieve a low profile having its front and rear surfaces ramped so that front and rear edges are level with the surface of strip **10** when insert **15C** is installed in recess **12**, so that the horizontal shear forces from the action of a snow plow blade are minimized.

With reference to FIG. **9**, infra-red radiation source insert **15D** is shown in isometric and partial cut-away view and comprises a base **60** on which is mounted infra-red radiation source **61**.

Infra-red radiation source **61** comprises a radiating surface **62** and heating elements **63** in thermal contact with surface **62.**

Insert **15D**, similar to inserts **15B** and **15C**, also comprises grooves **64***a* and **64***b* along the sides of base **60** which are adapted to receive the exposed longitudinal half of wires **11***a* and **11***b*, respectively, in recess **12** (FIG. 1).

It will also be noted, similar to inserts **15B** and **15C**, that electrodes **66***a* and **66***b* are formed to be flush with the sides of base **60** and formed to match grooves **64***a* and **64***b*, respectively. Electrodes **66***a* and **66***b* are connected, respectively, to each end of heating element **63.**

Thus, when insert **15D** is place in recess **12** (FIG. **1**), electrodes **66***a* and **66***b* are in contact, respectively, with wires **11***a* and **11***b*, permitting an electrical current to flow through heating element **63** raising the temperature of radiating surface **62** to a level desired for use as an infra-red radiation source.

As shown in FIG. **9,** source **61** is slightly raised or ramped for better visibility, however, it may remain flat and flush with the surface of strip **10.**

With reference to FIG. **10,** there is shown a partial elevational section through strip **10** and insert **15** in which a ridge **70** is provided in the bottom of recess **12** and a matching groove is provided in the bottom of insert **15** running parallel to wire **11***a* (wire **11***b*, not shown).

The sides of ridge **70** make an angle of about **45°** with the bottom of recess **12,** which angle can be varied as desired, so that the underside of groove **20** is biased against wire **11***a* and acts to further lock insert **15** into recess **12.**

Strip **10** is installed in a roadway by first cutting a flat groove **16** in the pavement to a depth slightly less than the thickness of strip **10.** In practice this would be about 0.095 inches. The maximum thickness of strip **10** would be about 0.125 inches.

Strip **10** is attached to the bottom of groove **16** with suitable adhesive which is common in the art.

Recesses for inserts will normally be spaced about every 5–7 feet.

For areas not encountering snow removal conditions, strip **10** could be fastened to the roadway without cutting a groove.

As an additional feature, the current flowing in wires **11***a* and **11***b* could be adjusted as can the material of the wires so that they can function as heating elements to melt ice and snow from the entire strip, thus permitting all inserts and the strip itself to be free of ice and snow for greater visibility.

I claim:

1. A roadway marker strip comprising

a resilient base strip having a generally planar top surface,

means defining a resilient insert,

means defining a recess in said base strip along the top surface thereof for receiving said insert,

a pair of reinforcing members disposed parallel to each other and longitudinally affixed in said base strip and passing through said recess, and

means defining a groove in said resilient insert adapted to receive said reinforcing member.

2. A roadway marker strip comprising

a resilient base strip,

means defining an insert,

means defining a recess in said base strip for receiving said insert,

a pair of reinforcing members disposed parallel to each other and longitudinally in said base strip and passing through said recess,

said insert including means defining a groove adapted to engage said reinforcing member, and

means protruding from the bottom of said recess for biasing said groove against said reinforcing member.

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