(12) UK Patent Application (19) GB (11) 2 365 048 (13) A

(43) Date of A Publication 13.02.2002

(21) Application No 0017193.4

(22) Date of Filing 14.07.2000

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(51) INT CL$^7$
**E01F 9/012**

(52) UK CL (Edition T )
**E1G** GLJ G705

(56) Documents Cited

| | |
|---|---|
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(58) Field of Search
UK CL (Edition S ) **E1G GLJ GLR , G5C CEA CEN CFF**
INT CL$^7$ **E01F 9/012 9/015 9/019 , G09F 7/18 17/00 21/04**

(54) Abstract Title
**Hazard warning device**

(57) A hazard warning device comprises an elongate flexible substrate 18, at least a portion of which comprises an air-permeable material, and a high visibility material 20. The substrate 18 may itself be brightly coloured, and the high visibility material 20 may be a retroreflective material. The flexible substrate 18 allows the device to by folded or rolled-up for transport / storage. The device may be mounted on or in the vicinity of a hazard such as a stationary car 19 or wide vehicle.

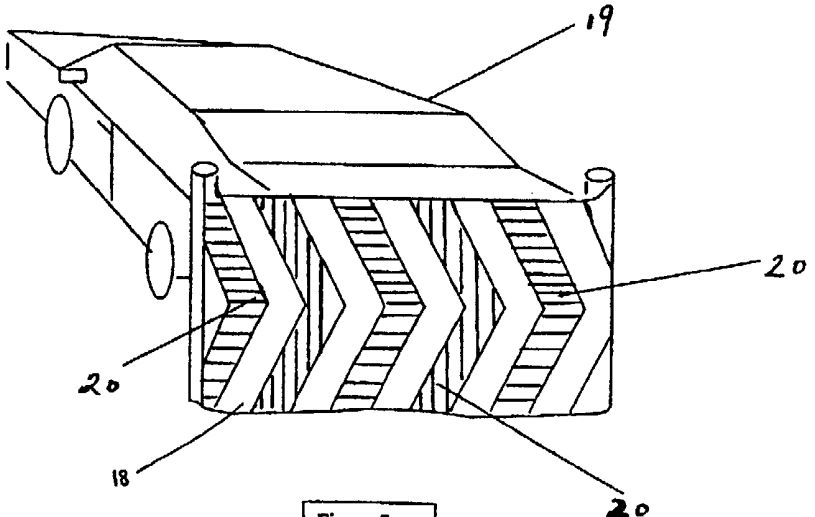


Figure 7

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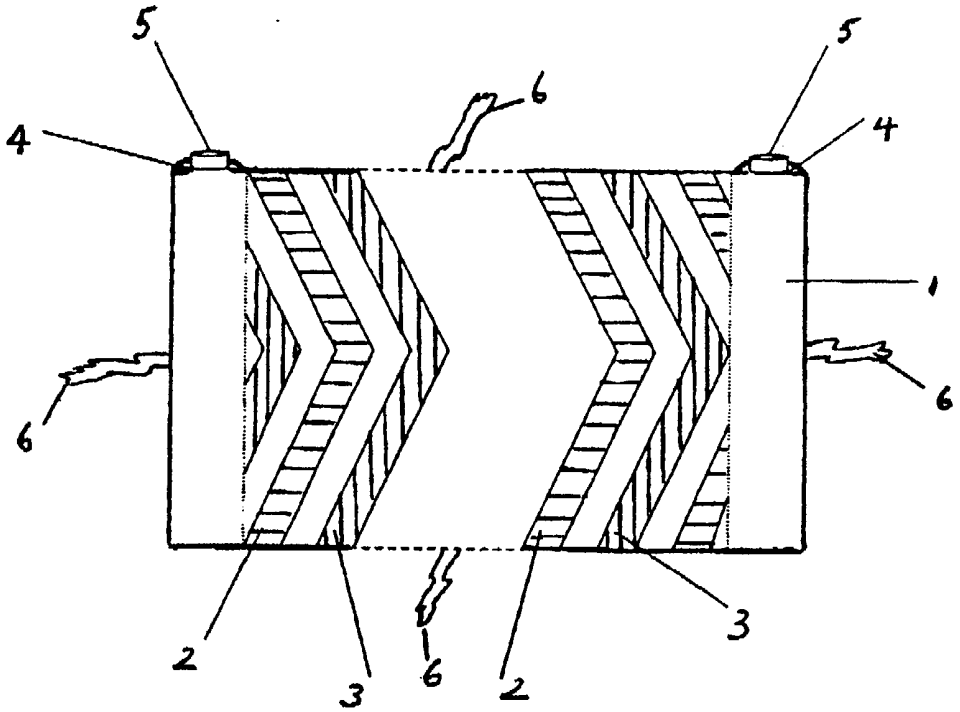


Figure 1

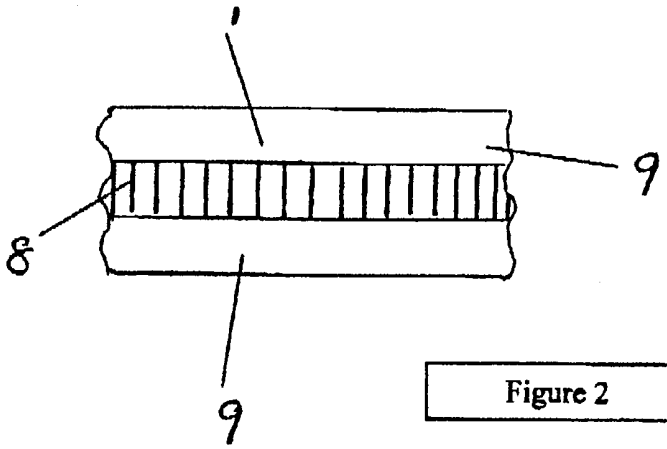


Figure 2

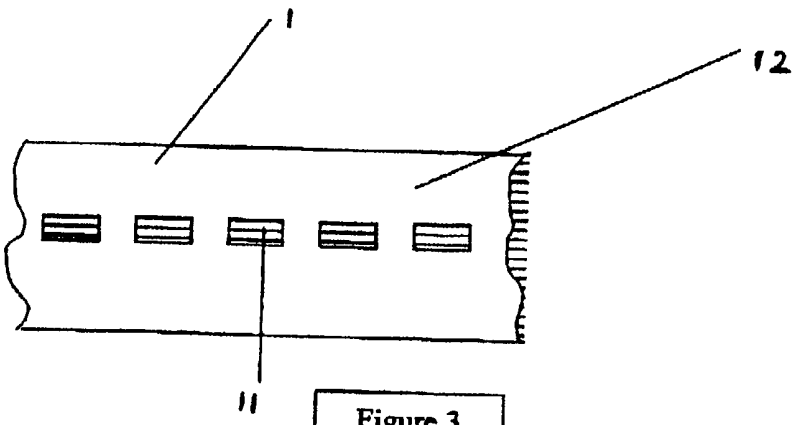


Figure 3

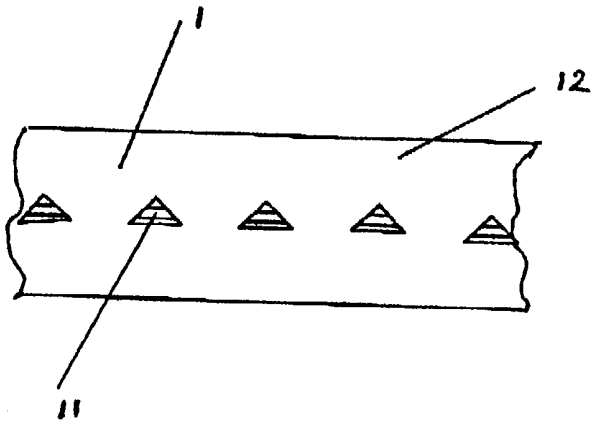


Figure 4

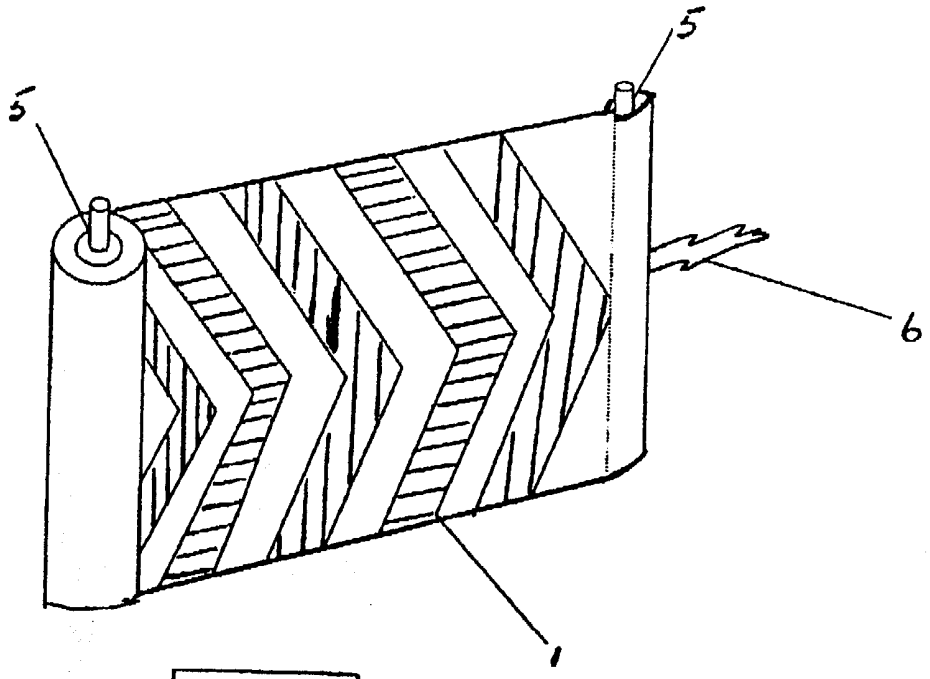


Figure 5

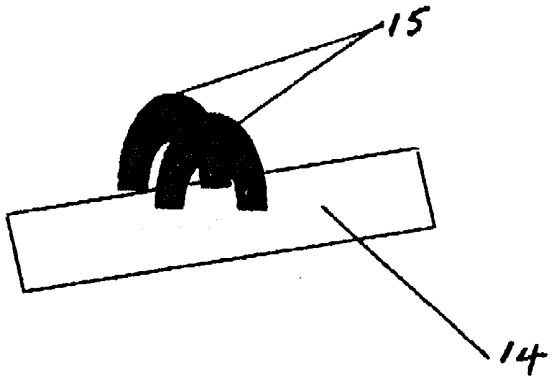


Figure 6

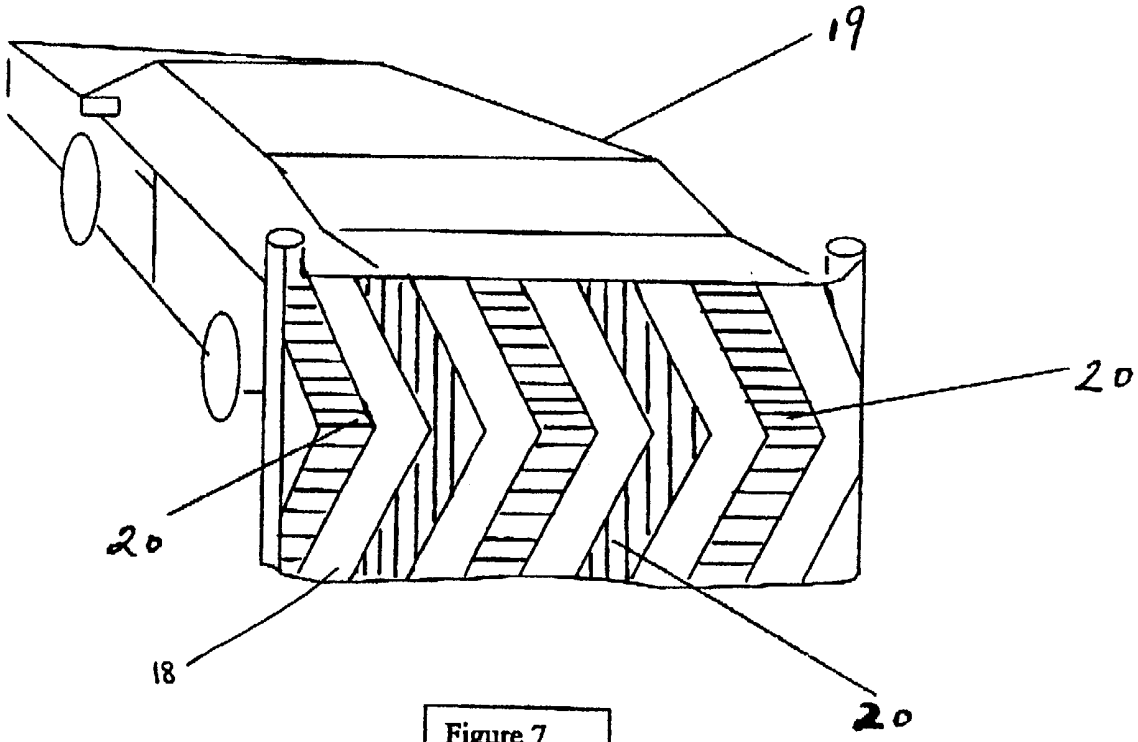


Figure 7

# Hazard warning device

## Field of the invention

The present invention relates to a hazard warning device and its use.

## Background to the invention

Motorists and other road users need to be adequately warned of hazards along their route, in particular temporary hazards such as broken down or slow moving vehicles, fallen trees, abnormal loads or other obstructions. The need for hazard warning is especially great under low visibility conditions, such as during the hours of darkness or in poor weather.

There are several known hazard warning methods. A stationary, slow moving or heavily laden vehicle may for instance be indicated by illuminating its flashing hazard lights. A "warning triangle", carrying light reflectors, may be erected before a vehicle hazard (common in particular in continental Europe). Flexible tapes, which are either made of or carry light reflecting materials, may be positioned at or near to the scene of a hazard; they are usually wound around suitable available supports such as tree trunks, lamp posts or vehicles.

Vehicle hazard lights are often, on their own, insufficient to warn other road users of a hazard, partly because they are only visible when the vehicle itself comes into view and cannot therefore be used to give advance warning. They can also be mistaken for the vehicle's direction indicators, especially if part of the vehicle is obscured from view.

A warning triangle suffers from the disadvantages of bulk and weight and a relatively high cost. The user needs to keep the triangle permanently in his vehicle, and it can be difficult to erect.

Flexible tapes, whilst more versatile in use, can be disadvantaged by their flimsy nature. In windy conditions they tend to flap about, making them unreliable indicators of the location and nature of a hazard boundary. At worst they can come away from their supports altogether.

It would be desirable if an alternative form of hazard indicator could be provided, which overcame or at least mitigated the above described problems. In particular, it would be desirable to provide a hazard indicator which was versatile in use, simple to erect, easily stored and relatively inexpensive.

Statements of the invention

According to a first aspect of the present invention, there is provided a hazard warning device comprising an elongate, flexible substrate, at least a portion of which comprises an air permeable material, and a high visibility material. The high visibility material is preferably provided on the substrate. The substrate itself preferably also is or comprises a high visibility material.

Such a device is ideal for indicating the presence of all manner of hazards, and is as versatile in use as conventional hazard warning tapes. However, the presence of the air permeable material reduces the amount of movement in windy conditions; air can pass through the device rather than blowing around it. It can thus be more securely and reliably secured in the vicinity of a hazard.

The device is particularly suited for warning of hazards on roads and paths, in particular of stationary vehicles for instance at accident or breakdown sites (especially on a motorway hard shoulder), or of slow moving vehicles or vehicles of an unusual size or carrying an abnormal load. One of the advantages of the device is that it can be secured to either a stationary or a moving vehicle, thus warning of the vehicle's presence no matter what its location.

Other advantages of a device according to the invention can include ease of storage (the flexible substrate can easily be stowed in a vehicle luggage compartment, for instance rolled or folded) and ease of installation and removal (it may for example be tied around part of a vehicle to warn other road users of its presence). It could conveniently be carried by the emergency and rescue services for roadside use whenever needed, or for example by airport traffic to warn of temporary obstructions in the taxi-ing area.

The device is elongate to allow its use in a variety of situations, in a similar manner to known hazard warning tapes. It can be of any desired length depending on its likely use and storage conditions. Preferably it is long enough to be used around the front or rear of a range of common vehicles, in particular cars, vans and trucks; typical lengths for this might be between 2 and 3 metres. Longer forms may be provided for use on larger vehicles such as lorries, agricultural or construction vehicles and the like. Longer forms (carried for instance on a roll) are also useful when the nature of the hazard is variable, for instance for a device carried by the police, which may have to be erected at all manner of different hazards en route and may even be required to indicate the boundaries of an entire accident site.

The device is preferably wider than conventional hazard warning tapes, which (a) makes it more visible and (b) allows a significant amount of air permeable material and hence reduces its tendency to flap in the wind. Suitable widths might be between 0.5 and 1.5 metres, preferably between 0.8 and 1.2 metres.

The flexible substrate of the device must be permeable to air over at least a portion of its surface area. It is preferably made entirely of an air permeable material.

The degree of air permeability is preferably such that air may pass through the material, and ideally through the device as a whole, at reasonably high speeds such as those encountered during gale force winds. The presence of any non-air permeable portions of the substrate should not unduly restrict air movement through the device.

Suitable air permeable materials include loosely woven or knitted fabrics and mesh fabrics, either natural or synthetic (for example, polyester). Suitable fabric weights are between 50 and 250 g/m$^2$, preferably between 100 and 150 g/m$^2$.

Particularly preferred substrate materials are those which are both high visibility and air permeable. The device may then, if desired, be made of a single material. Suitable such fabrics are available in a variety of high visibility colours (eg, fluorescent yellow or orange) and are in common use for safety clothing. Examples include those sold by John Heathcoat & Company Ltd of Tiverton, UK, which include the following:

| QUALITY CODE | COMPOSITION | WEIGHT (G/M$^2$) | FABRIC TYPE |
|---|---|---|---|
| N1489X | 100% polyester | 115-135 | Knitted |
| N1286M | 100% polyester | 200 | Knitted |
| N1582R | 100% textured polyester | 65 | Mesh |
| N1249R | 100% polyester | 100 | Mesh |

The high visibility material is preferably separate to the substrate of the device, in the form of one or more panels mounted on the substrate for instance by sewing or gluing. Some available high visibility materials can be bonded to a substrate by the application of heat and/or pressure; these too may be used in the device of the invention.

The substrate may carry any number of high visibility panels, each of which may be of any suitable size, shape and position. Possibilities include a continuous strip of a high visibility material along the length of the substrate, and/or a series of appropriately shaped and spaced panels of a high visibility material, preferably on a substrate of a contrasting colour. Particularly preferred is a series of chevrons formed from high visibility panels. These can be used to indicate the direction in which traffic must pass

around a hazard, the device then being usable at either side of a road, in the UK or abroad, depending on its orientation.

Most preferred is a high visibility (for example a fluorescent yellow or orange) air permeable substrate, carrying one or more panels of a high visibility (for instance fluorescent coloured, or light reflecting, in particular silver or white) material which may or may not itself be air permeable. More than one type and/or colour of high visibility material may be present on the device. However, if one or more of the high visibility panels is formed from a non-air permeable material, their size and position should not be such as unduly to restrict air movement through the device as a whole.

Suitable high visibility materials include the air permeable ones supplied by John Heathcoat & Company Ltd, mentioned above (in appropriate colours such as fluorescent yellow or orange), and fluorescent/reflective fabrics available from 3M United Kingdom PLC, under the trade mark SCOTCHLITE.

By "high visibility" material is meant a material having light reflecting and/or refracting properties such that it stands out even under low visibility conditions, making optimum use of the available ambient light. The term includes materials in so-called "fluorescent" colours such as those commonly used in safety clothing, and materials carrying light reflecting/refracting beads or prisms. Preferably, the high visibility material has a chromaticity (x, y co-ordinates and luminance factor) meeting the requirements of British Standard EN-471:1994 for high visibility warning clothing, preferably at the highest brightness category level.

The device as a whole ideally has sufficient strength and durability to be suitable for outdoor use, even in adverse weather conditions. It may be coated with waterproof, flame resistant and/or other protective materials.

The device may be provided with one or more attachment means, for attaching it to a support at the scene of a hazard. Suitable attachment means include tapes (such as sewn-on fabric tapes), magnets (by which the device may be attached to the bodywork of a vehicle), loops, hooks and the like. They are preferably provided at intervals along the

length of the device, to enable it to be mounted on a range of different sizes and shapes of support (for example, vehicles).

The device preferably includes one or more support means, such as rigid posts or poles, to give it additional stability in use and to help to keep the substrate taut. A convenient arrangement is two poles, located in hems at the ends of the substrate material. The poles are preferably made of a lightweight material such as aluminium or a plastics material, preferably hollow. They may be arranged to fold away, for instance telescopically, when the device is not in use.

The device of the first aspect of the invention may be stored in a rolled or folded form (including a "stacking fan" arrangement). It may be supplied as a roll on a suitable support such as one or more poles or a reel. A second aspect of the invention therefore provides a device according to the first aspect, in combination with a support around which the device is rolled for storage.

The rolled or folded device may be provided in a storage container such as a tube or a fabric bag, and a third aspect of the invention provides such a device and storage container in combination.

According to a fourth aspect of the invention, there is provided a method for warning of a hazard, the method comprising mounting a device according to the first aspect either at or close to the hazard, preferably by wrapping it around and attaching it to a suitable support such as a vehicle.

As described above, such a method would be of particular use in warning road users of a vehicle hazard, for instance a stationary vehicle at the scene of an accident or break down, a slow moving or abnormally loaded vehicle or one of an unusual size.

The present invention will now be described, by way of example only, with reference to the accompanying illustrative drawings.

## Brief description of the drawings

Figure 1 is a plan view of a hazard warning device in accordance with the invention;

Figures 2 to 4 are plan views of parts of alternative devices in accordance with the invention;

Figure 5 is a perspective view of the device of Figure 1, shown partly rolled;

Figure 6 shows a storage and carrying case for the device of Figure 1; and

Figure 7 illustrates how a device similar to that of Figure 1 might be used around a broken down vehicle.

Detailed description

The device of Figure 1 comprises a strip of a flexible substrate material 1, which is air permeable. The substrate is made of Heathcoat ™ fabric no. N1489X (see above), which itself provides a high visibility, in this case fluorescent yellow, background. Its length and width are approximately 2.35 metres and 1 metre respectively, these dimensions being suitable for use around most commonly driven cars.

Sewn onto the substrate 1, in a chevron pattern, are strips of high visibility material; in this case the strips 2 are of reflective silver SCOTCHLITE ™ and the alternating strips 3 of fluorescent orange Heathcoat ™ fabric no. N1489X, itself air permeable. The strips 2 and 3 are each approximately 50 mm wide, and spaced approximately 50 mm apart.

At each end of the device, a hem 4 in the substrate material 1 houses a rigid hollow plastics pole 5, which can act as a support when the device is in use (see Figure 7). Although the poles are shown protruding from the hems in the Figure 1 device, in practice they are better trapped inside and the hems fastened at both ends, as in Figure 7.

Attachment tapes 6, made from conventional 40 mm wide bias binding, are sewn onto the device at appropriate points. These may be used to fasten the device in position around for instance a vehicle, and also to fasten the rolled device for storage.

The devices of Figures 2 to 4 comprise air permeable substrates 1 analogous to that of the Figure 1 device. In the Figure 2 device, a continuous strip 8 of a high visibility material is provided along the length of the device and is either sewn between two continuous strips 9 of an air permeable substrate or mounted on a single, wider, air permeable substrate.

In the Figure 3 device, high visibility portions are provided as a series of spaced rectangular panels 11 of for instance SCOTCHLITE ™ reflective silver fabric, on an air permeable substrate 12. Analogous panels on the Figure 4 device are triangular; in general, any desired size and shape is possible. The rectangles in the Figure 3 device could conveniently be formed from 50 mm wide strips of a commercially available high visibility material.

Suitable spacings between the panels 11 might be between 40 and 70 mm, preferably approximately 50 mm.

In Figure 5, the device of Figure 1 is shown partly rolled around one of the support poles 5. The fully rolled device can be stowed in the approximately cylindrical carrying bag 14 shown in Figure 6, for easy carrying and storage. The bag 14 may be made of any suitable material, a lightweight fluorescent coloured knitted polyester, as used for the substrate 1, being suitable. Carryings handle 15 are provided on the bag, which may be fastenable by conventional means (not shown) such as a zip, ties or a Velcro™-type fastening.

A device according to the invention may alternatively be provided in the form of a roll held on a support such as a reel.

Figure 7 shows a device 18, similar to that of Figure 1, in use. The device is wrapped around the rear of a broken down vehicle 19 and secured there by means of fabric ties (not shown). It is supported partly by the vehicle and partly by support poles sewn into its hems at either end. The chevrons 20 indicate the direction in which traffic should pass around the vehicle 19.

The device 18 could equally be wrapped around the front of the vehicle 19. The ends of the device could additionally or alternatively be shut in the car doors or windows for extra security.

It has been found that, when such a device is in use around a vehicle as in Figure 7, the vehicle lights (when illuminated) are visible through the fabric substrate, and indeed tend to create a "starburst" effect through the substrate mesh. This gives an eye-catching warning of the vehicle's presence.

A device in accordance with the invention may alternatively be secured to supports such as fencing, lamp posts, trees and buildings.

## Claims

1. A hazard warning device comprising an elongate, flexible substrate, at least a portion of which comprises an air permeable material, and a high visibility material.

2. A hazard warning device according to claim 1 wherein the high visibility material is provided on the substrate.

3. A hazard warning device according to claim 1 or claim 2 wherein the substrate itself comprises a high visibility material.

4. A hazard warning device according to any one of the preceding claims wherein vehicle lights (when illuminated) are visible through the fabric substrate.

5. A hazard warning device according to any one of the preceding claims which further comprises one or more attachment means, for attaching it to a support at the scene of a hazard.

6. A hazard warning device according to claim 5 wherein the attachment means are tapes, magnets, loops or hooks.

7. A hazard warning device according to claim 6 wherein the attachment means are sewn on tapes.

8. A hazard warning device according to claim 6 or claim 7 wherein the attachment means are provided at intervals along the length of the device, to enable it to be mounted on a range of different sizes and shapes of support.

9. A hazard warning device according to any one of the preceding claims wherein the device is long enough to be placed around the front or rear of a range of common vehicles.

10. A hazard warning device according to claim 9 which is between 2 and 3 metres in length.

11. A hazard warning device according to any one of the preceding claims is between 0.5 and 1.5 metres wide.

12. A hazard warning device according to claim 11 which is between 0.8 and 1.2 metres wide.

13. A hazard warning device according to any one of the preceding claims which is made entirely of an air permeable material.

14. A hazard warning device according to any one of the preceding claims wherein the air permeable material is a loosely woven or knitted fabric, or a mesh fabric which is either natural or synthetic.

15. A hazard warning device according to claim 14 wherein the air permeable material is a polyester.

16. A hazard warning device according to claim 14 or claim 15 wherein the air permeable material has a fabric weight of from 50 and 250 $g/m^2$.

17. A hazard warning material according to claim 16 wherein the air permeable material has a fabric weight of between 100 and 150 $g/m^2$.

18. A hazard warning device according to any one of the preceding claims wherein the high visibility material is separate to the substrate of the device, and is in the form of one or more panels mounted on the substrate.

19. A hazard warning device according to claim 18 wherein the substrate is of a contrasting colour to the panel(s) of high visibility material.

20. A hazard warning device according to claim 18 or claim 19 wherein panels of high visibility material are formed into a series of chevrons arranged such that they can indicate the direction in which traffic must pass around a hazard.

21. A hazard warning device according to any one of the preceding claims which is coated with waterproof, flame resistant and/or other protective materials.

22. A hazard warning device according to any one of the preceding claims which includes one or more support means, arranged to keep the substrate taut.

23. A hazard warning device according to claim 22 wherein the support means comprises rigid posts or poles.

24. A hazard warning device according to claim 23 wherein the posts or poles are made of aluminium or a plastics material.

25. A hazard warning device according to claim 23 or claim 24 wherein the posts or poles are hollow.

26. A hazard warning device according to any one of claims 23 to 25 wherein the posts or poles are arranged to fold away when the device is not in use.

27. A hazard warning device according to claim 26 wherein the posts or poles are arranged to fold away telescopically.

28. A hazard warning device according to any one of the preceding claims in combination with a support around which the device is rolled for storage.

29. A combination or a hazard warning device according to any one of the preceding claims and a storage container therefor.

30. A combination according to claim 29 or claim 30 wherein the storage container comprises a tube or a fabric bag.

31. A method for warning of a hazard, the method comprising mounting a device according to any one of claims 1 to 27 either at or close to the hazard.

32. A method according to claim 31 wherein the device is wrapped around and attached to a suitable support.

33. A method according to claim 32 wherein the support is a vehicle.

34. A hazard warning device substantially as hereinbefore described with reference to the accompanying drawings.

35. A method for warning of a hazard substantially as hereinbefore described.

14

**Application No:** GB 0017193.4
**Claims searched:** All

**Examiner:** Philip Osman
**Date of search:** 22 May 2001

# Patents Act 1977
# Search Report under Section 17

## Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): E1G (GLJ), (GLR)
G5C (CEA), (CEN), (CFF)

Int Cl (Ed.7): E01F 9/012, 9/015, 9/019
G09F 7/18, 17/00, 21/04

Other: Online: WPI, EPODOC, PAJ

## Documents considered to be relevant:

| Category | Identity of document and relevant passage | | Relevant to claims |
|---|---|---|---|
| X,Y | GB 2,343,210 | (Evans) Esp. Abstract. | All |
| X,Y | GB 2,297,574 | (Dugdale) Esp. Abstract. | All |
| Y | GB 2,275,125 | (Ward) Whole Doc. | All |
| X,Y | GB 1,408,816 | (Tildawn Electronics) Whole Doc. | All |
| X,Y | US 5,438,780 | (Winner) Whole Doc. | All |
| X,Y | US 4,105,190 | (Curtis) Whole Doc, esp. column 2, line 41. | All |

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|---|---|---|---|
| X | Document indicating lack of novelty or inventive step | A | Document indicating technological background and/or state of the art. |
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