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(54) Overhead cable protection system

(57) An overhead cable protection system comprises a detector and signalling unit (5) adapted to be temporarily mounted on a first pole (1) and comprising a detector switch (22) having a detachable member (10), separation of which from the switch causes the switch to operate. Control means (16) are provided responsive to operation of the switch to trigger operation of audible and/or visible warning signals. The detachable member (10) has a cord (8) secured thereto, a free end of the cord being securable to a second post (2) spaced from the first so that the cord stretches between the first and second posts at a desired safety height limit. Snagging of the cord (8) by a vehicle passing underneath pulls the detachable member from the switch, causing actuation of a warning, preferably remotely from the unit by radio.

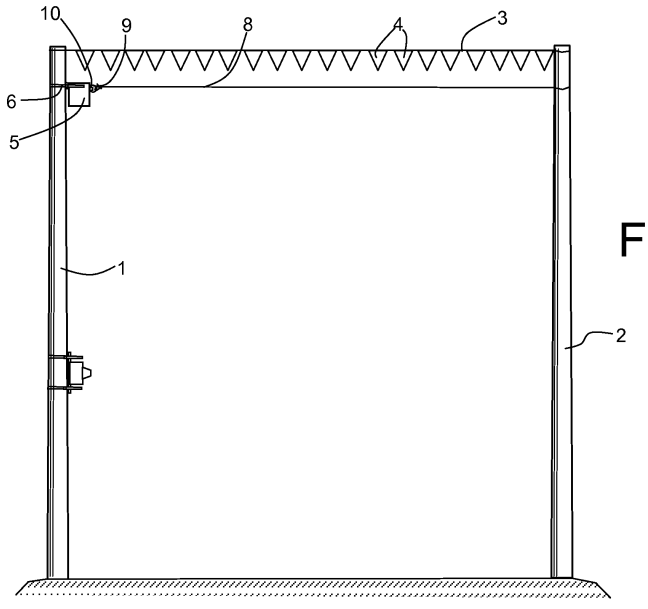

Fig 1

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Description

Field of the Invention

[0001] This invention relates to a overhead cable protection system for use in worksites where vehicles are required to pass under cables.

Background to the Invention

[0002] Conventional protection for overhead cables at a worksite where vehicles, for example excavators having elevatable arms, are required to pass underneath the cables, is afforded by hanging some form of alerting line or chain between a pair of posts at either side of the track by which vehicles pass under the cables. The line or chain is set at a height from the ground less than that of the cables to provide a safety margin. This is particularly important where the cables carry high voltages, to avoid the risk of flashover from the cable to the vehicle. Flags or bells may assist in alerting the driver of a vehicle to check that the highest point of the vehicle passes freely beneath the line or chain, and will thus not risk fouling the cables or a dangerous passage of current through the vehicle.

[0003] Even with these aids, there is a risk that the driver of a vehicle of excess height might still not notice that he is at risk of striking the cables, with the result that cables could become damaged and an electrical discharge could cause injury or death. Contractors working on a site with overhead cables therefore need to be able to eliminate even the small risk that the conventional warning systems might prove insufficient.

[0004] Systems have been proposed for detecting the passage of vehicles which are in excess of a safe height for, say, a bridge or tunnel. For example, GB2137005 discloses a system in which a light beam is sent across the road at the height limit to a detector on the other side. A vehicle breaking the beam triggers audible and visible warnings. Because this is to be applied to a permanent construction, the light source and detector can be mounted and precisely aligned to ensure continued accurate detection. A problem with worksites is that they are temporary, and so the mounting of stable structures to carry a light source and a detector, and the accurate alignment of these, would be unreasonably costly. The mounting of such a system on the temporary structures normally used (for example wooden poles set directly in the earth), and by untrained personnel, could well result in unreliability of detection, rendering the system unfit for purpose.

Summary of the Invention

[0005] The present invention provides an overhead cable protection system comprising a detector and signalling unit adapted to be temporarily mounted on a first pole and comprising a detector switch having a detachable member, separation of which from the switch causes the switch to operate, control means being provided responsive to operation of the switch to trigger operation of audible and/or visible warning signals, the detachable member having a cord secured thereto, a free end of the cord being securable to a second post spaced from the first so that the cord stretches between the first and second posts at a desired safety height limit.

[0006] Preferably, the control means comprises a radio transmitter arranged to transmit a signal, in response to operation of the switch, to a remote receiver, the remote receiver, the remote receiver comprising audible and/or visible warning signal means to provide a warning in response to receipt of the signal. There may be more than one remote receiver, for example one such receiver being mounted on the pole at a height readily visible by the driver of the vehicle, while another receiver may be suitable for mounting in the cab of a vehicle to be operated on the worksite, so that the driver of the vehicle is given immediate warning of his vehicle being at risk of fouling the cables before any such fouling can occur.

[0007] The control means can also be configured to transmit a predetermined SMS message by means of the cellular telephone network to a designated mobile telephone.

[0008] The detector switch is suitably a reed switch, the detachable member being magnetic so as to change the state of the reed switch when in proximity with it, or during the action of detaching the detachable member from the switch.

[0009] Alternatively, the detector switch may be a mechanical switch in which the contacts are held apart by a detachable member in the form of a pin inserted into the switch, and are allowed to close when the pin is pulled out of the switch. Alternatively, the contacts may be held closed by the pin, being allowed to separate when the pin is removed. Yet another alternative is the use of an electrically-conductive pin to complete the circuit when inserted in the switch and breaking the circuit when it is pulled out by the vehicle snagging the cord. Other forms of switch may be possible, for example relying on a change of inductance in a switching circuit when the detachable member is removed from the switch. Another possibility would be to arrange for the detachable member to operate as a shutter between a light source and a light detector within the switch. When the detachable member is removed as a result of snagging of the cord, the light path is restored, and this constitutes operation of the switch.

[0010] The detector and signalling unit may be attachable to the pole in the desired position by simply providing the casing of the unit with an external loop through which a fixing strap may be passed. The fixing strap may, for example, be a plastics cable tie of the type including a ratchet fixing to hold the strap firmly in place and prevent unauthorised or accidental removal.

[0011] By providing a visible and/or audible warning as soon as a vehicle snags the cord stretched across poles at the maximum safe height for vehicles passing

under cables, the system of the invention provides a simple and reliable addition to safety provisions, substantially reducing the risk of damage to cables or dangerous electrical discharge.

Brief Description of the Drawings

[0012] In the drawings, which illustrate an exemplary embodiment of the system:

Figure 1 is a diagrammatic view of the system installed on a pair of poles marking the access to the path under cables on a worksite;
Figure 2 is a diagrammatic view of the detector and signalling unit;
Figure 3 is a diagrammatic view of the pole-mounted receiver; and
Figure 4 is a diagrammatic view of a remote vehicle cab-mounted receiver.

Detailed Description of the Illustrated Embodiment

[0013] Referring first to Figure 1, the system is installed on the pair of temporary poles 1, 2 conventionally set up at either side of the access path beneath overhead cables on a worksite, for example beneath overhead electricity power lines forming part of the national grid, or overhead line equipment on an electrified railway. Such poles are usually provided with a cord 3 stretched between them at a height equal to the maximum working height beneath the cables, the cord typically carrying warning bunting 4. Engagement of the vehicle with the cord 3 breaks the cord and is intended to alert the vehicle's driver by the falling bunting. In accordance with the invention, the detector and signalling unit 5 is attached to the first pole 1, at a position just beneath the bunting cord 3, using a plastics cable tie 6 passed through a mounting ring 7 on the casing of the unit 5. A cord 8 is tied to a ring 9 extending from a pin 10, described hereinafter in more detail with reference to Figure 2, and is stretched across the gap between the poles to be tied to the second pole 2 so that the cord 8 is substantially horizontal. The tension in the cord 8 is sufficient to hold the cord straight, but not such as to place significant tension on the pin 10. A receiver unit 11 is attached to the first pole 1 below the unit 5 and at a position such that it is in the eyeline of the vehicle driver in use. The receiver unit 11 has a pair of mounting arms 12 extending from it, by which it may be attached to the pole by, for example, plastics cable ties passed round the pole and the respective arm. The receiver unit, described hereinafter with reference to Figure 3, has a light 13 mounted thereon which is caused to flash on and off to warn the driver of a vehicle that the cord 8 has been snagged and therefore that his vehicle is too tall to pass under the overhead cables, for example because an excavator arm has not been lowered sufficiently. Snagging of the cord 8 causes the pin 10 to be pulled from the unit 5, activating the alarm transmitter.

[0014] Referring now to Figure 2, the detector and signalling unit is shown with one side of the casing 14 removed for the sake of clarity. The casing contains a battery 15, a controller 16, and a radio transmitter 17. It may also contain a cellular telephone transmitter device 18. A plastics block 19 is mounted on the casing 14, and has a tubular bore 20 therethrough provided with a short section 21 of slightly larger diameter bore adjacent to one end thereof. A transverse bore 22 extends through the block 19 and intersects with the wider section 21, and the mounting ring 7 is passed through the transverse bore 22 and the wider section 21. The mounting ring 7 is suitably of the split type typically used as a key ring. The pin 10 has adjacent to the end thereof remote from the ring 9 a spring-loaded ball 23 which projects outwardly of the cylindrical wall of the pin and which engages the shoulder at the intersection between the bore 20 and the wider section 21 to resist removal of the pin from the bore under normal conditions, but allows the pin to be released if tension on the cord 8 increases above a predetermined value as a result of snagging by a vehicle, for example.

[0015] The upper part of the casing 14 contains a resin-encapsulated reed switch 24 connected to the controller 16 and operable by the withdrawal of the pin from the bore, the pin being magnetised and so causing a change of state of the reed switch 24 as it is withdrawn. This in turn changes the state of a detector circuit in the controller 16 to which the reed switch is electrically connected. This causes the controller to go to an alarm state, causing transmission of an alerting radio signal by the radio transmitter 17. It can also trigger the transmission of an alerting text or voice message by the cellular telephone transmitter to a predetermined remote telephone, for example to alert the site manager of an incident. The alerting radio signal is received by the receiver unit 11, which comprises, referring to Figure 3, a radio receiver and controller 25, powered by a battery 26 within the unit, and triggering, in response to receipt of the signal, operation of the flashing warning beacon 13 and an audible alarm device 28, for example an electronic sounder.

[0016] In addition, a secondary receiver unit 29, illustrated in Figure 4, can be mounted in the vehicle's cab to provide the driver with a more immediate warning. The secondary unit 29 similarly has a radio receiver 30 activating a warning lamp 32 on the exterior of the unit when an alerting signal is received. The secondary unit may be powered from the vehicle's electrical supply through a suitable electrical lead 31 and plug (not shown). The unit may also include an audible sounder 33 to reinforce the alerting signal and ensure that the driver stops his vehicle well clear of the overhead cables. This unit is mountable within the vehicle and could be provided with temporary attachment means such as a sucker pad for attachment to the vehicle's window or other smooth surface.

Claims

1. An overhead cable protection system comprising a detector and signalling unit adapted to be temporarily mounted on a first pole and comprising a detector switch having a detachable member, separation of which from the switch causes the switch to operate, control means being provided responsive to operation of the switch to trigger operation of audible and/or visible warning signals, the detachable member having a cord secured thereto, a free end of the cord being securable to a second post spaced from the first so that the cord stretches between the first and second posts at a desired safety height limit.

2. An overhead cable protection system according to Claim 1, wherein the control means comprises a radio transmitter arranged to transmit a signal, in response to operation of the switch, to a remote receiver, the remote receiver comprising audible and/or visible warning signal means to provide a warning in response to receipt of the signal.

3. An overhead cable protection system according to Claim 1 or 2, wherein additional remote receivers are provided to provide additional warnings in other locations.

4. An overhead cable protection system according to Claim 1, 2 or 3, wherein the control means also comprises a cellular telephone transmitter arranged to send an audible message or SMS text message to a predetermined cellular telephone number in response to operation of the switch.

5. An overhead cable protection system according to any preceding claim, wherein the detector switch is a mechanical switch in which the contacts are held apart when a detachable member in the form of a pin is inserted into the switch and allowed to close when the pin is pulled out of the switch.

6. An overhead cable protection system according to any of Claims 1 to 4, wherein the detector switch is a mechanical switch in which the contacts are held closed when a detachable member in the form of a pin is inserted into the switch and allowed to separate when the pin is pulled out of the switch.

7. An overhead cable protection system according to any of Claims 1 to 4, wherein the detector switch is a mechanical switch in which the contacts are electrically connected by a detachable member in the form of an electrically-conductive pin inserted into the switch, the connection being broken when the pin is pulled out of the switch.

8. An overhead cable protection system according to any of Claims 1 to 4, wherein the detector switch is a reed switch and the detachable member comprises a magnet, whereby separation of the detachable member from the unit influences the reed switch to change the state thereof.

9. An overhead cable protection system according to any preceding claim, wherein the detachable member is held in the switch by a latching arrangement which releases the member when the force exerted on the member by the cord exceeds a predetermined value.

10. An overhead cable protection system according to any preceding claim, wherein the detector and signalling unit is provided with an external loop through which a fixing strap may be passed to secure the unit to the pole.

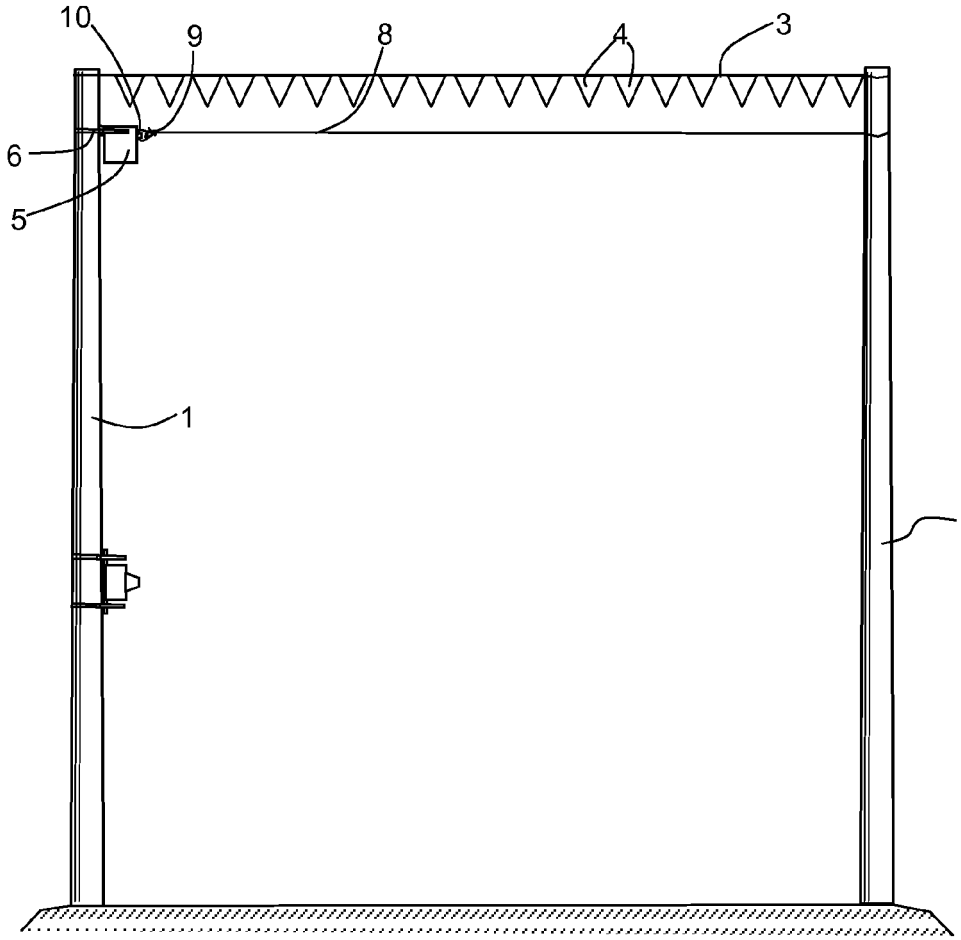


Fig 1

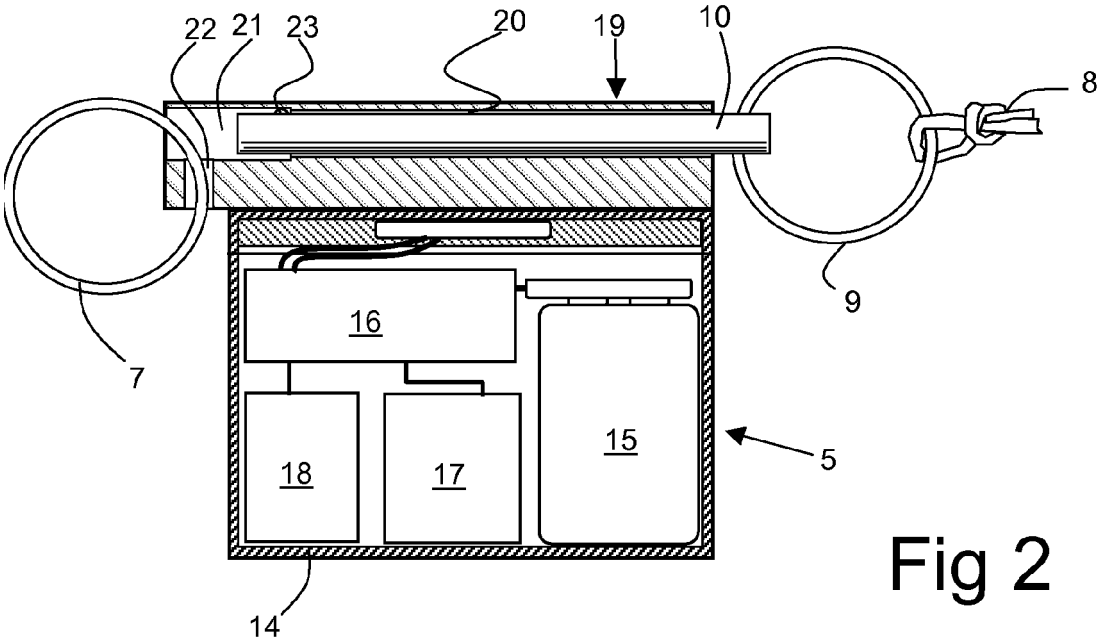


Fig 2

Fig 3

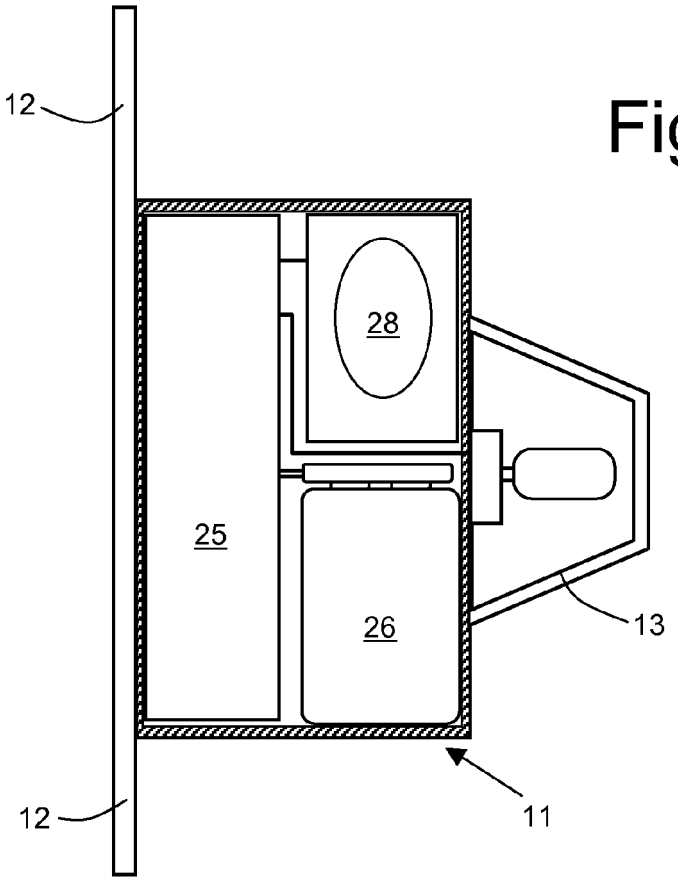
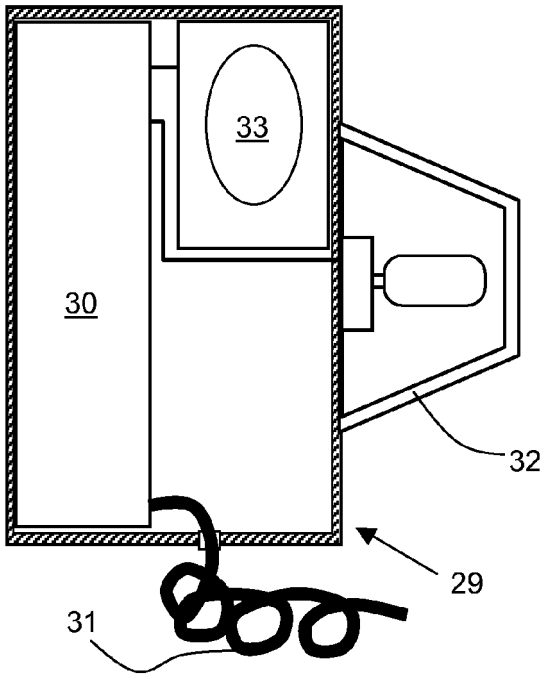


Fig 4



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EUROPEAN SEARCH REPORT

Application Number
EP 09 27 5011

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 5 900 815 A (STORY BENNY C [US]) 4 May 1999 (1999-05-04) * figures 1-5 * * abstract * * column 1, lines 25-30 * * column 2, lines 20-30,50-67 * * column 3, lines 1-5 * -----	1,5-10 2-4	INV. G08G1/01
Y	US 2005/179539 A1 (HILL PHILIP A [US] ET AL) 18 August 2005 (2005-08-18) * figure 4 * * abstract * * column 4, paragraph 39 * * column 5, paragraph 49 * -----	2-4	

TECHNICAL FIELDS SEARCHED (IPC)

G08G
G08B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 August 2009	Coffa, Andrew

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5900815 A	04-05-1999	CA 2238573 A1	06-12-1998
US 2005179539 A1	18-08-2005	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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