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(54) Signalling device.

(57) An impact detonated signalling device for use in railway track signalling. The signalling device is suitable for attachment to ferrous railway track and adapted to be detonated upon impact.

The signalling device includes an active material (14) adapted for detonation upon being impacted, at least one magnetic element (15) for attachment to the track and means (10) for securing the magnetic element (15) to the active material (14).

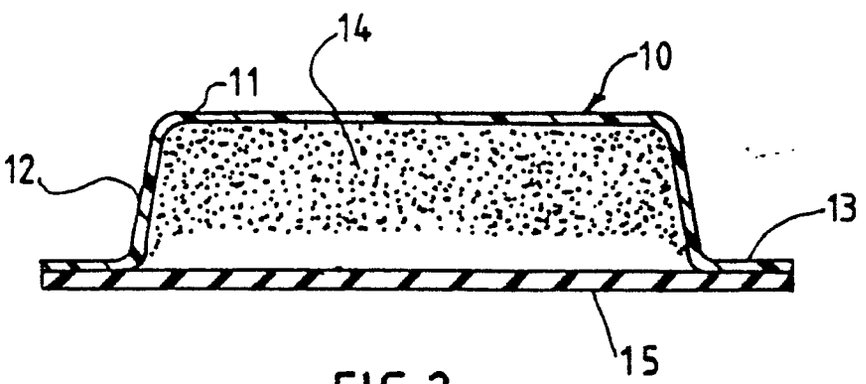

FIG 2

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SIGNALLING DEVICE

The present invention relates to signalling devices and in particular to impact detonated devices for use in railway track signalling.

Railway track signalling devices are adapted to be placed upon a rail where advancing wheels of a rail vehicle such as a train will produce impact detonation of the devices resulting in an audible and/or visible signal. Such signals are employed in warning train crews of approaching trains.

It is known to fasten explosive and similar warning devices to railway tracks by mechanical means. A spring clip or metal wire or strap is generally affixed to the device to retain it in position on a rail. Such mechanical fastners have not proved entirely reliable in securely attaching warning devices to the wide range of track cross-sections currently in use. Operating conditions such as worn or curved tracks or tracks contaminated with oil, grease, sand or brake dust significantly affect reliability of prior art warning devices.

In addition activation of prior art warning devices creates a hazard due to flying debris which can cause serious injury to persons in the vicinity of a detonated device.

Prior art signalling devices cannot be readily installed by unskilled personnel and are generally not reusable or at best have only limited reusability.

According to the present invention there is provided a signalling device suitable for attachment to a ferrous railway track and adapted to be detonated upon impact, said device comprising:

an active material adapted for detonation upon being impacted;

at least one magnetic element for attachment to said track; and

means securing the magnetic element to said active material.

The means of securing the magnetic element to the active material may comprise a housing. The housing may enclose at least a portion of the active material adapted for detonation. The housing may be formed from any suitable material such as plastics. The housing preferably is substantially combustible upon detonation of the active material housed therein. The housing may be bright coloured to improve its visibility.

The housing may comprise a blister package. The blister package may be of any convenient shape or size. The blister package may include a cavity for retaining the active material. The package preferably is substantially symmetrical in shape. In one form the blister package may be substantially cup-shaped. The blister package may include a substantially circular major surface. The major surface may have diameter approx. 38 mm. The blister package may include a substantially cylindrical or truncated conical side wall. The side wall may be approximately 38 mm in diameter and may have a height approximately 10 mm. The blister package may include a flange portion. The flange portion may be substantially annular. The flange portion may depend outwardly from the side wall of the package. The flange portion may have an outer diameter approximately 48 mm.

The active material may comprise a low grade explosive. In one form the active material may comprise a friction sensitive composition. The composition may be adapted for detonation upon being subjected to a predetermined force or mechanical pressure. For reasons of safety the composition preferably is arranged such that it will not detonate when attached to a steel rail and impacted by a steel weight approximately 11.3 kg. and having a hemispherical striking surface approximately 75 mm radius of curvature when the weight is dropped from a height less than 200 mm. The composition preferably is arranged such that it will detonate when the steel weight is dropped from a height 400 mm or greater.

The active material preferably is arranged such that it will detonate by passage of a rail vehicle of 5 tonne minimum axle load.

The active material preferably is such that upon detonation it will register no less than 150 db peak sound level measured 6 metres from the source at a distance 1.2 to 1.5 metres above source level with the microphone pointed in direction of the source.

The active material may additionally or alternatively be arranged to produce a flash and/or smoke signal upon detonation. This may be useful to warn train crews in fog and/or storm conditions.

The magnetic element may be attached to the housing in any suitable manner. Preferably the magnetic element is bonded to the flange portion of the blister package. The magnetic element may be adapted to seal the active material within the cavity of the blister package or housing.

The magnetic element preferably is resilient. A resilient magnetic element improves adhesion qualities of the signalling device because it conforms more easily to a track surface. A resilient magnetic element also enhances the capacity of the signalling device to pass safety tests associated with bulk storage of the warning devices. The magnetic element may comprise magnetic sheet material. The sheet material may comprise rare earth cobalt. The sheet material may additionally comprise rubber.

One problem associated with prior art warning devices is their tendency to skid under wedge action applied when the wheel of a rail vehicle makes contact with the device. The signalling device of the present invention resists skidding because movement of the magnetic element over a conducting surface induces eddy currents in the surface which in turn set up a magnetic force opposing movement of the magnetic element. The magnetic element of the signalling device of the present invention thus produces dynamic braking action which acts to resist movement of the device when attached to a rail or similar surface.

A preferred embodiment of the present invention will now be described with reference to the accompanying drawings wherein:-

Fig. 1 shows in plan view a signalling device made according to the principles of the present invention; and

Fig. 2 shows the signalling device of Fig. 1 in cross-sectional view.

The signalling device shown in Figs. 1-2 includes a housing 10 comprising a moulded plastics blister cup including a major surface portion 11, a truncated conical side wall portion 12 and an annular flange portion 13 depending from side wall portion 12. The housing 10 comprises thermal plastics material such as polyethylene or polypropelene. Major surface portion 11 is approximately 38 mm in diameter and side wall portion 12 is approximately 10 mm high and 38 mm in diameter. Flange portion 13 has an outer diameter approximately 48 mm and an inner diameter approximately 38 mm.

The housing 10 of the signalling device contains an active material 14. The active material 14 comprises a friction sensitive composition which will detonate at least upon passage of a rail vehicle of 5 tonne minimum axle load. The active material 14 when detonated is adapted to produce a sound level no less than 150 db linear peak measured in accordance with the procedure disclosed herein.

The active material 14 is sealed within housing 10 via a base member 15. Base member 15 is bonded to flange portion 13 of housing 10 via any suitable bonding agent such as pressure sensitive adhesive. The adhesive is such that it prevents ingress of water into the cavity of the housing containing the friction sensitive composition 14.

Base member 15 comprises a sheet of magnetic rubber such as rare earth cobalt. The sheet of rubber is approximately 48 mm in diameter and approximately 1 mm thick.

The signalling device of the present invention has been successfully tested under passenger and freight trains travelling at high (100-115 kph), low (10-30 kph) and very low (< 5 kph) speeds on straight and curved tracks. The device has also been successfully tested under a variety of rail conditions including dry and wet rail, rail contaminated with oil, water or detergent and sanded and worn rail.

Tests for signal track adherence during rail vibration have also been accomplished by use of 'super series' locomotive running at maximum power and at slow speed.

The rail signalling device of the present invention has been found to operate successfully at temperatures at least as low as -20°C and as high as +60°C.

Upon detonation it has been found that debris is minimal and is not ejected beyond 1 metre. Debris consists principally of plastic fragments and inert composition elements. Residue is also minimal and usually consists of a small piece of burnt rubber sheet which will eventually be removed by passage of successive rail vehicles.

The rail signal device of the present invention may be relocated indefinitely prior to use since it includes no consumable or deteriorating elements prior to use.

The housing 10 may carry information such as date and place of manufacture together with a warning concerning the explosive nature of the device. The latter information may be conveniently applied to the housing by embossing the major surface portion 11 of the blister cup.

It will be appreciated that various alterations, modifications and/or additions may be introduced into the constructions and arrangements of parts previously described without departing from the spirit or ambit of the invention.

Claims

1. A signalling device suitable for attachment to a ferrous railway track and adapted to be detonated upon impact, said device comprising:

an active material adapted for detonation upon being impacted;

at least one magnetic element for attachment to said track; and

means securing the magnetic element to said active material.

2. A signalling device according to claim 1 wherein said securing means comprises a housing, said housing enclosing at least a portion of said active material.

3. A signalling device according to claim 1 wherein said housing comprises a blister package, said package including a cavity for retaining said active material.

4. A signalling device according to claim 3 wherein said blister package is substantially cup-shaped.

5. A signalling device according to claim 3 wherein said package includes a side wall and a flange depending from said side wall.

6. A signalling device according to claim 1 wherein said magnetic element comprises a sheet of magnetic rubber.

7. A signalling device according to claim 5 wherein said magnetic element comprises a sheet of magnetic rubber, said sheet being bonded to said flange such that it provides a closure for said cavity.

8. A signalling device according to claim 2 wherein said housing is substantially symmetrical such that said device has no preferred direction of orientation in use.

9. A signalling device according to claim 1 wherein said active material comprises a friction sensitive composition.

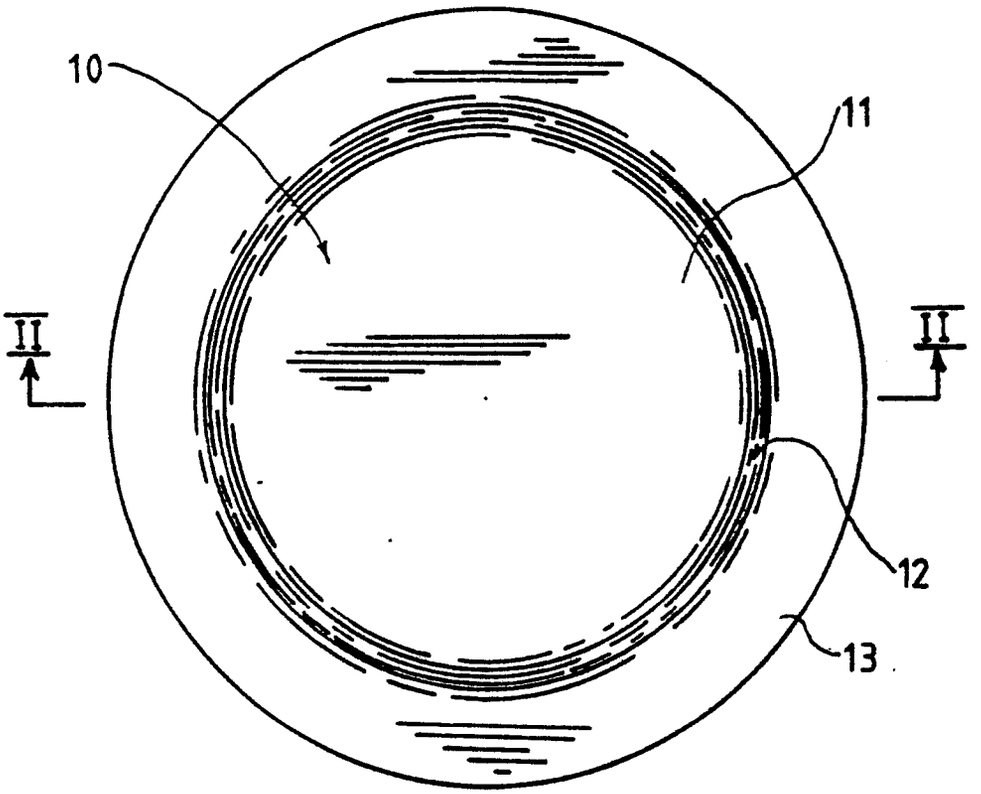

FIG 1

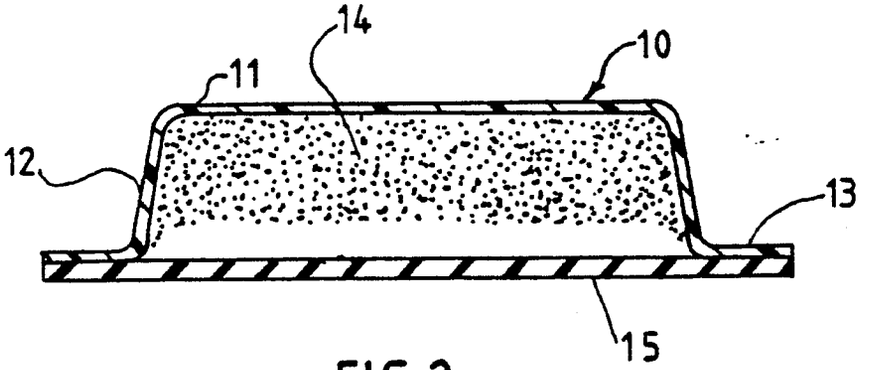

FIG 2