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(54) IMPROVED SAFETY SYSTEM FOR RAILROAD PERSONNEL

(57) A personnel warning system producing a signal when sensing the presence of a train for use by railroad workers including the steps of providing a train detection device having at least one magnet thereon, attaching such train detection device quickly and easily to the train track in the work area where maintenance is to be performed, providing each of the workers with a personal alert receiver for receiving such signals for warning to the workers of an oncoming train, quickly detaching such train detection device when desired and repeating the steps of attaching, and detaching such train detection device when moving the train detection device to subsequent work areas. Also disclosed is a train detection device having at least one magnet disposed on a side thereof.

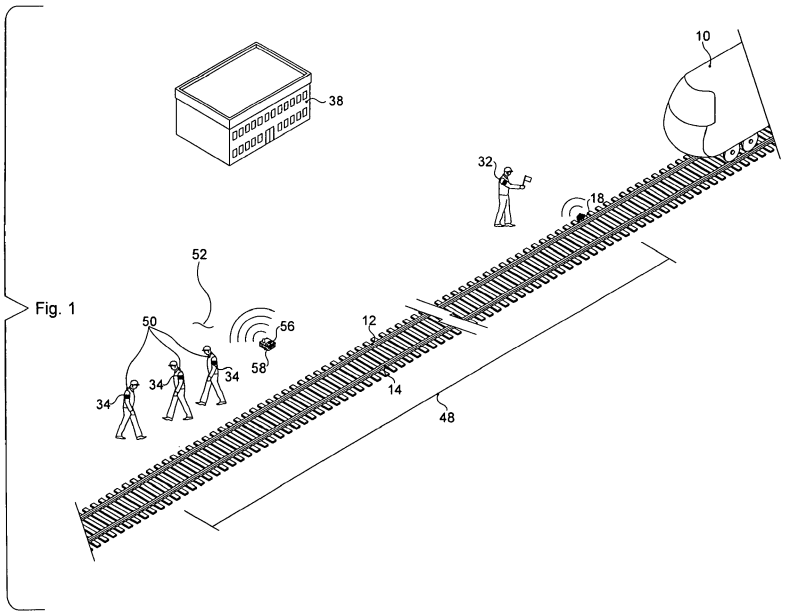

Fig. 1

EP 2 946 982 A1

Description

[0001] This application claims priority and benefit of provisional patent application entitled Magnetically Rail Mounted Portable Train Detector Device, application no. 61/855,834 filed 05/24/2013, now pending.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The system of this invention resides in the field of railroad warning systems and more particularly relates to a warning system for railroad personnel and others working in the vicinity of railroad tracks to give such railroad personnel and others warning of oncoming trains.

DESCRIPTION OF THE PRIOR ART

[0003] In the field of railroads with trains, light rail vehicles, trolleys, third rail powered vehicles and tramways it is very important to alert any work crews or railroad personnel on or near the tracks of an oncoming train as many accidents occur because railroad workers fail to hear such oncoming train and can be struck and injured or killed by such trains. It is to avoid such accidents that the system of this invention has been developed. In the prior art my U.S. Patent 7,624,952 teaches a safety system for railroad personnel wherein a train is sensed as it moves down the tracks and a signal is sent to workers further ahead on the tracks. Such prior art systems when installed and utilized correctly work very well to give the workers notice of approaching trains. A further improvement on such system is taught in my U. S. Patent 8,109,474 being a dual ultrasonic train detector which is bolted very securely to the rails with a complex system of clamps. Such prior art train detection systems are mounted on the running rails of the train tracks and are in most cases clamped under the rail flange which mounting is accomplished by significant drilling into the rail itself or by digging out the ballast under the rail so that the train detection unit's support plate can be passed under the rail and then clamped to the lower rail support. The problem with such prior art involves mounting the train detection device which is clamped to the rail or flange or secured to the rail by using holes drilled in the rail. This mounting process is a very difficult and time consuming and moving the train detection device from one location to another is also cumbersome. Currently in order to move such prior art train detector, it has to be unclamped from the rail flange or rail, or the nuts and bolts have to be removed, and the clamps released. Then in order to install the train detector in a new location, several steps are required, such as cleaning out the ballast under the rail, sliding the train detector's base under the rail or drilling holes in the rail, and then reclamping the detector with nuts and bolts to hold it securely in place. To move a detector under the current system, these nuts and bolts have to be removed each time the train detector is to be moved and the entire installation process done over and over again in order to reinstall the system in another location so as to effectively allow the system to work as the work area moves down the tracks. Due to the size and heavy weight of the train detector, its support plate and brackets, it is a cumbersome and slow process that requires a great deal of effort and labor to move the detector from one location to another. It is the normal process for workers working in the vicinity of tracks to do their work in a first location, complete that work, and then move down the tracks to a new second and then to subsequent locations where additional work is done. Thus, the normal process of working on train tracks continually moves the workers away from the train detector until they are at a distance that is beyond the detector's effective warning range. It is therefore desirable to provide a system that enables the train detector to be moved easily from one place to another on the tracks which system is the subject of this invention.

SUMMARY OF THE INVENTION

[0004] It is an object of this invention to provide a system that allows the installation of a train detector also referred to as a train detection device to be accomplished more easily and faster than the prior art so that it can be quickly and easily moved from a first location to a second location and even to further subsequent locations as the work proceeds along the track in its normal course. In providing this system it has been found that attachment of the train detector can be made by a designated railroad worker which attachment does not utilize a cumbersome system of clamps and accompanied digging and drilling but uses a new system where the train detector has on it a magnet(s) which is of sufficient strength to retain the train detector at a first desired location against the web of the track and allows the train detector to perform its function to give notice to the workers further down the track and then for the detector to be moved by the designated worker who is in charge of the safety system from the first location as the work is completed in that location to a second location further down the track where the workers are then performing their work. This process can be repeated as the workers move down the track because the attachment of the train detector by magnets to the rail requires no further connection and allows the device to be attached and detached from the rail with just a few seconds work and easily secured at a new location with just a few seconds of work. This system has significant advantages in providing a safety system which involves substantially less work and is much faster to install than previous systems of the prior art.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005]

Figure 1 illustrates a perspective view of a train track with an oncoming train thereon being detected and workers further down the track receiving a signal of such train's presence.

Figure 2 illustrates a close-up view of a train detector having magnets disposed thereon having been attached to the web of a train track.

Figure 3 illustrates a rear view of the train detector showing the magnets disposed on the rear side thereof.

Figure 4 illustrates an enlarged view of a personal alert device that is attached to each worker in the vicinity of the track to receive warning signals from the train detector.

DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

[0006] Figure 1 illustrates a perspective view of the system of this invention wherein train 10 is traveling along the tracks, being first rail 12 and second rail 14 and having web 44 and rail flange 16 shown in Figure 2. Train 10 is shown traveling in the vicinity of train detector 18 which is attached to the track by at least one magnet 36 which is located on rear side 60 of train detector 18, as seen in Figure 3. Once train detector 18 senses the presence of the oncoming train, it sends a signal to a plurality of personal alert devices 34, each having alarm 40 and LED warning light 120, as seen in Figure 4, one of which is positioned on each of the workers 50 in the vicinity of the track, thus warning them of the presence of the oncoming train which the workers might not otherwise notice due to their concentration on their work and the high volume of noise that may be occurring in the workers' vicinity. Train detector 18, as seen in Figures 1 and 3, can be positioned a warning system distance 48, such as 1,000 - 2,000 feet, in advance of the work area 52 where the workers are performing their work and the train detector senses the train as it comes into proximity of the train detector and the workers, thereby giving both an audible alarm 20 and a visible alarm 22. Each personal alert device 34, as shown in Figure 4, can include both audible and visual alarm systems because sometimes audible alert sounds do not have sufficient volume to be perceived due to the ambient high levels of noise in the work area. Train detector 18, as seen in Figure 2, can be of many types such as taught in the prior art which can include an on/off switch 24 and a battery level indicator 26. Some detectors can have a speed detector 28 that detects the speed of the oncoming train and can utilize many methods of detecting the mass of the train as it comes down the track. Some trains can have a signaling means that is picked up by the train detector to indicate their presence.

[0007] During the process of working, the workers 50 may finish their work at a first location, and the designated worker 32 who is in charge of the train warning system can retrieve the train detector from its original location, remove it from the track by pulling it away from web 44 of first rail 12 and breaking the magnetic contact of the magnet(s) 36 with rail 12, and then can carry train detector 18 down the track to a new second location where it is installed by positioning train detector 18 adjacent to the track rail web where it instantly adheres thereto by magnetic attraction of its magnet(s) 36. Thus the warning system can be quickly and easily moved from one location to another by an individual designated worker 32 who is tasked with maintaining the warning system of an oncoming train's presence as related to the workers who are working in advance of trains coming down the track.

[0008] Each personal alert device 34, such as seen in Figure 4, can have an audible alarm 20 such as a horn, an LED light 120, and an ear piece attachment not shown to plug into head phones worn by the workers so that the battery-operated device will give sufficient notice to the worker even if the worker is wearing a hard hat by means of a speaker within the hard hat to warn the worker of oncoming trains.

[0009] The safety procedures used are very important for workers to follow which procedures call for a designated worker to be in charge of such system. The system would likely be unsuccessful if used by random workers who may or may not take it upon themselves to move the train detector from one place to another, each worker assuming that someone else may have accomplished such task. Thus the system of this invention requires a particular designated worker 32 to be in charge of the warning system. The procedure is to first select a qualified person of the work crew to be the designated worker 32 and to coordinate the work crew's activity with the operation control center (OCC) 38 and to provide on track safety for all members of work crew 50. In this way only a designated, qualified person, referred to as the designated worker, will request and initiate a track work area and will be sufficiently knowledgeable of the safety procedures to assure the optimum safety of the other personnel in work crew 50. Designated worker 32 will then confirm the number of personnel that are on-site and provide and supervise the on-track safety system for work crew 50 in the work area. Such designated worker 32 will also be in communication with OCC 38 and work crew 50 throughout the maintenance operation. By obtaining clearance from OCC 38 before entering the work area, the designated worker first requires that each member of the work crew has his personal alert receiver 34 installed and functioning on his person so that when the magnetically mounted portable train detector is installed on the track in a first location, the system can be tested to determine whether it is operating and that every worker has his personal alert receiver 34 in active mode. When the work is completed in that first work area, the designated worker 32 in charge of the safety system has to verify that all personnel and equipment are clear of the first work area and accounted for and that the area is then safe for train movement. The designated worker 32 in charge of the safety system, when work is completed

in a first work area, either removes the train detector himself or has someone else remove it from a first location to a second location down the tracks where it is installed in the work area where the workers will then be working. The system should then be tested to be sure that all the warning devices including the personal alert receivers 34 on each worker are functioning properly. Upon completion of work at the second location the designated worker 32 in charge should confirm that each personal alert receiver 34 on each worker has been shut off in order to conserve battery power. When the workers resume work, such as after a break, designated worker 32 in charge of the system must check that all personal alert receivers 34 are then turned on and perform a test in order to confirm that such devices are operating. Designated worker 32 can then contact the OCC 38 and inform them of the work being done on a particular area of the track and, if necessary, request speed restrictions from the OCC be sent to trains approaching the work area. Also the designated worker 32 in charge of the system must confirm to the OCC 38 that the magnetically mounted train detector and personal alert receivers 34 are turned on and properly functioning. Once everything has been confirmed that the safety devices are working and all crew members 50 are within voice communication range, then work can recommence either at the current location or in an area further down the track to where train detector 18 has been moved. This system allows the equipment of the train detector and its magnet(s) and personal alert receivers 34 for the workers to be used for both a moving or fixed rail work zone. In some embodiments of the system of this invention when designated worker 32 in charge moves too far away from the work area, the system can cause train detector 18 to go into alarm mode, or if communications are lost, the train detector will also go into an alarm mode.

[0010] Thus to provide an improved system for track access in order to perform track maintenance or repair in fixed or moving work zones, the follow steps of the present invention are performed:

Authorizing and assembling a maintenance work crew 50 to perform track work;
Selecting a designated worker 32 of the work crew to be designated for coordinating the work crew activities with the Operations Control Center (OCC) 38 and to provide on-track safety for all members of the work crew. In one embodiment only a designated worker 32 will request and initiate a track work area and shall always comply with safety procedures, policies, and standards in order to ensure optimum safety to all personnel;
Confirming by said designated worker 32 that appropriate personnel are on site;
Confirming the type of maintenance/repair to be performed with the shift supervisor and work crew;
Providing and supervising on-track safety guidelines for all crew members in and around the work area;
Possessing, establishing and maintaining adequate means of communications with OCC 38 and the work crew 50 throughout the maintenance operation;
Ensuring proper clearance is obtained from OCC 38 before entering the intended work area;
Providing a portable train detector 18 having magnet(s) 36 on at least one side of the train detector; and
Mounting the portable train detector on a selected portion of the track when the work crew 50 enters the work area.

[0011] In some embodiments the system of this invention can further include the following steps:

Positioning a flagger alert device and portable warning horn/lights in the work area;
Coordinating all work crew activities with OCC 38 within work area 52; and
Verifying after completion of work that all personnel and equipment are clear of the work area and accounted for and that the work area is safe for train movement.

[0012] The safety system of this invention requires that each individual of work crew 50 is responsible for following all on-track safety rules and that all crew members will adhere to all agency safety guidelines and personal alert receiver requirements. This system further requires:

Establishing and maintaining adequate means of communications with work crew 50 through designated worker 32 throughout the work or maintenance operation;
Ensuring proper clearance is given to work crew through the designated worker before the work crew enters the intended work area;
Ensuring that all required personal alert receivers and magnetically rail-mounted portable train detector 18, flagger alert device and portable warning horn 56/lights 58, as seen in Figure 1, are turned on and in position when the work crew members enter the work area;
Coordinating all activities of work crew 50 via designated worker 32; and
Verifying after completion of work that all personnel and equipment are clear of the work area and accounted for by the designated worker and that the work area is safe for train movement.

[0013] Further steps in the system of this invention that are required in some embodiments can include:

Confirming work is done with the shift supervisor;
Obtaining the required work area protection safety technology equipment using the magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights warning devices;
Performing an initial test of all equipment and warn-

ing devices; and

Ensuring that all equipment and warning devices (magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights) are properly signed-out according to approved procedures; and

[0014] Upon completion of initial function tests, turning off all early warning devices such as magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights in order to conserve power charge and prevent false warning while moving them to the designated work area.

[0015] It is the best practice to provide a job briefing to the work crew including the steps of:

Confirming attendance and duties of all assigned crew members;

Specifying location and nature of work/repair to be done;

Specifying safety guidelines and ensure proper personnel protective equipment;

Designating and assigning duties to safety personnel, i.e. flagger, watch person and lookout;

Providing a magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights to personnel and instructing where the devices will be needed;

Asking the designated worker and all crew members, "Are all personnel warning devices (magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights) turned on?";

Performing a supervisory function test by the designated worker to confirm that all warning devices (magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights) are turned on and functioning properly to provide a secondary means of work area protection;

Performing a test of all safety and warning devices (magnetically rail mounted portable train detection device, flagger alert device and portable warning horn/lights);

Establishing contact with OCC by the designated worker and requesting track access by the following procedure:

Giving the radio number;

Reporting the number of workers in the work crew;

Stating the location of the work area;

Stating nature of work and/or repairs

Requesting a speed restriction of the trains, if necessary;

Confirming with the OCC that the magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights devices are turned on and functioning properly. The OCC should ask the designated worker, "Are all warning devices (magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights) turned on?" in order to confirm that all safety warning devices are turned on and functioning properly.

[0016] Upon requesting and confirming proper clearance from OCC, the designated worker will ensure that the work crew possesses adequate communications and will position flagger(s) and magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights warning device(s) in the work area, as per approved guidelines, as a secondary means of track area protection. Once the magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights area positioned in the work area, the designated worker will confirm with all crew members that the assigned magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights are turned on.

[0017] Further the designated worker will take the following steps:

Ensuring that all crew members are within voice communication range with the flagger(s)/watchperson(s)/lookout(s);

Commencing work only after the designated worker has verified all information with OCC and has confirmed that all safety equipment and early warning devices, magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights have been turned on and are functioning properly;

Notifying the OCC if any work site is not equipped with a flagger alert device or portable horn/light warning device;

Notifying the designated worker when any magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights is placed out of service or too far away;

Maintaining crew members in a position that will enable them to receive a train approach warning communicated by the flagger/watchperson/lookout at any time while on-track safety is provided by train approach warning with flagger/watchperson/lookout communicating train approach warnings by a means that does not require a warned employee to be looking in any particular direction at the time of warning and the warning can be detected by the warned employee regardless of noise or distraction of work;

Maintaining communications with OCC and the work crew throughout the operation;

Updating the OCC periodically, such as after fifteen (15) minutes and updating the OCC if additional time is anticipated;

Verifying, by the designated worker upon completion of track maintenance and/or repair, that all personnel and equipment are clear of tracks and accounted for

and that the area is safe for train movement;
Confirming upon verification that the work area is clear of all tools, equipment, vehicles, and personnel, the designated worker shall confirm with crew members that all assigned (magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights) early warning devices are turned off in order to prevent false warnings and to preserve battery life of the devices;
Calling the OCC by the designated worker to indicate work area is clear of personnel and equipment; and
Collecting by the designated worker of all safety equipment (magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights devices) including accountability and proper return according to sign off procedures.

[0018] In best practice the system of this invention includes the following:

A maintenance crew to consist of a minimum of two employees;
All crew members will adhere to all agency safety guidelines and personal protection equipment requirements;
A crew member shall not be permitted in the work area until given permission by the designated worker;
All crew members will establish and maintain voice communication with the designated worker, flagger(s)/watchperson(s)/lookout(s); and
All crew members shall leave the work area when required.

[0019] The OCC will not allow reverse train traffic for any reason until the following steps have been taken:

Notifying the work crew;
Verifying that all safety and warning equipment are in place as per railroad procedures and guidelines;
Asking the designated worker, "Are (magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights) warning devices turned on?" in order to confirm that all warning devices are turned on and functioning properly; and
Positioning the magnetically rail-mounted portable train detector, flagger alert device and portable warning horn/lights warning devices as a secondary means of protection to cover both sides of the work area, where applicable.

[0020] More specifically the system of this invention can include the following steps:

Adding a magnetically rail-mounted portable train detector where the designated worker or flagger is posted and providing to the work crew warning devices, such as personal alert receivers and/or portable warning horn and lights;
Providing a safety briefing prior to work commencing to determine the site conditions, such as being a fixed site or a moving site;
Providing at each work site a designated worker(s) with a line of sight in the direction that a train will approach a work site in order to provide an advance warning using a flag, whistle to the work zone personnel and train detection devices to provide enough notice of at least 15 seconds to such workers of an oncoming train;
Providing the designated worker a magnetically rail-mounted portable train detector;.
Providing each worker a personal alert receiver to be worn on his vest or arm;
Installing on any work equipment a vehicle alert device similar to a personal alert receiver;
Positioning a portable warning horn and lights at the work zone in view of the workers and in line of sight of the designated worker;
Turning on the advance warning equipment prior to start of work and during the safety briefing and pretesting such equipment to make sure that all warning equipment is fully operational;
Upon confirming that the warning equipment is functioning, the designated worker takes the magnetically rail-mounted portable train detector and walks to its setup location line of sight of typically 1,000 feet up the track; and
Magnetically attaching the portable train detector to the web of the rail at the work area.

[0021] After work has been completed in the work area, the following steps should be taken:

Detaching the magnetically-mounted train detector from the web of the rail by the designated worker at the work zone and moving it to a new appropriate location down the tracks and then reattaching it to the web of the rail which step is repeated as the work area moves down the tracks.

[0022] Thus the system of this invention provides a system that can be used for both fixed and/or mobile railway work sites. The system can include a "hand shake" so that should the designated worker go too far away from the work area, the unit will go into alarm mode. Should communication with the designated worker be lost, the train detector will go into alarm mode. If for whatever reason the designated worker gets distracted, the train detector will automatically detect the train and send a secure signal to the work site turning on the portable warning horn and lights which are located at the fixed or moving work zone as well as the personal alert receivers on each work crew member.

[0023] Although the present invention has been described with reference to particular embodiments, it will be apparent to those skilled in the art that variations and

modifications can be substituted therefor without departing from the principles and spirit of the invention.

Claims

1. A method for warning railroad workers at a work area to warn such workers of oncoming trains traveling on metal tracks that pass through said work area, each of said tracks having first and second rails, each with a running surface, a web and a flange, comprising the steps of:

   providing a battery-operated train detection device having at least one side, the train detection device having at least one magnet on said side;
   attaching said train detection device to said rail by the magnetic attraction of said magnet(s) to said web of said rail;
   providing a plurality of battery-operated personal alert receivers having an alarm and being adapted to be worn by said workers in said work area;
   transmitting a signal from said train detection device to said personal alert receivers worn by said workers when said device senses an oncoming train on said track; and
   activating said alarm on said personal alert receivers when receiving a signal from said train detection device to warn said workers of said oncoming train.

2. A method for warning railroad workers at a first work area of oncoming trains traveling on metal tracks that pass through said work area, each of said tracks having first and second rails, each with a running surface, a web and a flange, comprising the steps of:

   selecting a designated worker to be in charge of operating said warning system;
   providing a battery-operated train detection device having at least one side, the train detection device having at least one magnet on said side;
   attaching said train detection device to said rail by the magnetic attraction of said magnet(s) to said web of said rail;
   providing a plurality of battery-operated personal alert receivers having an alarm and being adapted to be worn by said workers in said work area;
   transmitting a signal from said train detection device to said personal alert receivers worn by said workers when said device senses an oncoming train on said track;
   receiving said signal by said plurality of personal alert devices;
   activating said alarm on said plurality of personal alert receivers by said signal to warn said workers of said oncoming train;
   moving said workers away from said train tracks until said train(s) passes;
   moving said workers back into said first work area upon the passage of said train(s);
   completing work in said first work area;
   detaching said train detection device from said web of said rail of said train track in said first work area by manually pulling on said train detection device to separate said magnetic side of said train detection device from said web of said rail;
   moving said train detection device by direction of said designated worker to a second work area where further work is to be performed on said track;
   attaching said side of said train detection device to said web of said rail by said magnetic attraction of said magnet(s) to said web of said rail at said second work area; and
   repeating said steps of attaching and detaching said train detection device to and from the web of said tracks when moving said train detection device to each subsequent work area.

3. A method according to claim 1 or claim 2 further including before the step of attaching said train detection device to said web of said rail of said track, the steps of:

   contacting a control center to advise that work will be commencing in said first work area; and advising said control center of the number of workers and work status of said work to be completed at said first work area.

4. A method according to claim 1 or claim 2 or claim 3 further including upon completion of the work at said first work area, the steps of:

   removing said train detection device from said web of said rail; and
   turning off power to said train detection device and said plurality of personal alert receivers to conserve battery life of said devices.

5. A method according to claim 2, or claim 3 or claim 4 as dependent upon claim 2 further including when work is to commence at said second work area the step of:

   checking by said designated worker that said plurality of personal alert receivers and said train detection device have been powered "on".

6. A method according to any of claims 3 to 5, as dependent upon claim 2 further including the step of:

obtaining clearance by said designated worker from said control center before said workers enter said work area.

7. A method according to any preceding claim further including the step of:

providing a flagger alert device and portable warning horn in said work area that is activated when said train detection device senses an oncoming train.

8. A method according to any of claims 3 to 7 further including when contacting said control center the steps of:

confirming the attendance and duties of all workers; and
specifying the location and nature of work to be done at said work area.

9. A method according to claim 2, or any of claims 3 to 8 as dependent upon claim 2 further including after work has been completed the step of:

verifying by said designated worker that all workers have left said work area so that it is safe for train movement over said tracks in said work area.

10. A method according to any preceding claim further including the step of:

using said magnetically attachable and detachable train detector device in both fixed work sites and mobile work sites.

11. A method according to any preceding claim, further including the step of:

providing an alarm should communication with said workers be interrupted or lost.

12. A method according to claim 2, or any preceding claim dependent upon claim 2, further including the step of providing an alarm should communication with said designated worker and/or communication with said workers be interrupted or lost, such situation(s) causing said train detector device to enter an alarm mode so that said personnel warning system can be promptly reactivated by said designated worker.

13. A method according to any of claims 1 to 12, further comprising detaching said train detection device from said web of said rail by manually pulling on said train detection device to separate said magnetic side of said train detection device from said web of said rail.

14. A personnel warning device for use on metal train tracks having rails, comprising:

a battery-operated train detection device having at least one side; and
at least one magnet positioned on said side of said train detection device for attachment of said train detection device to said train track without the need for clamps or digging, said train detection device being removable from said train track by manually pulling thereon.

15. A personnel warning device according to claim 12, further comprising an audible alarm and/or a visual alarm disposed on the train detection device.

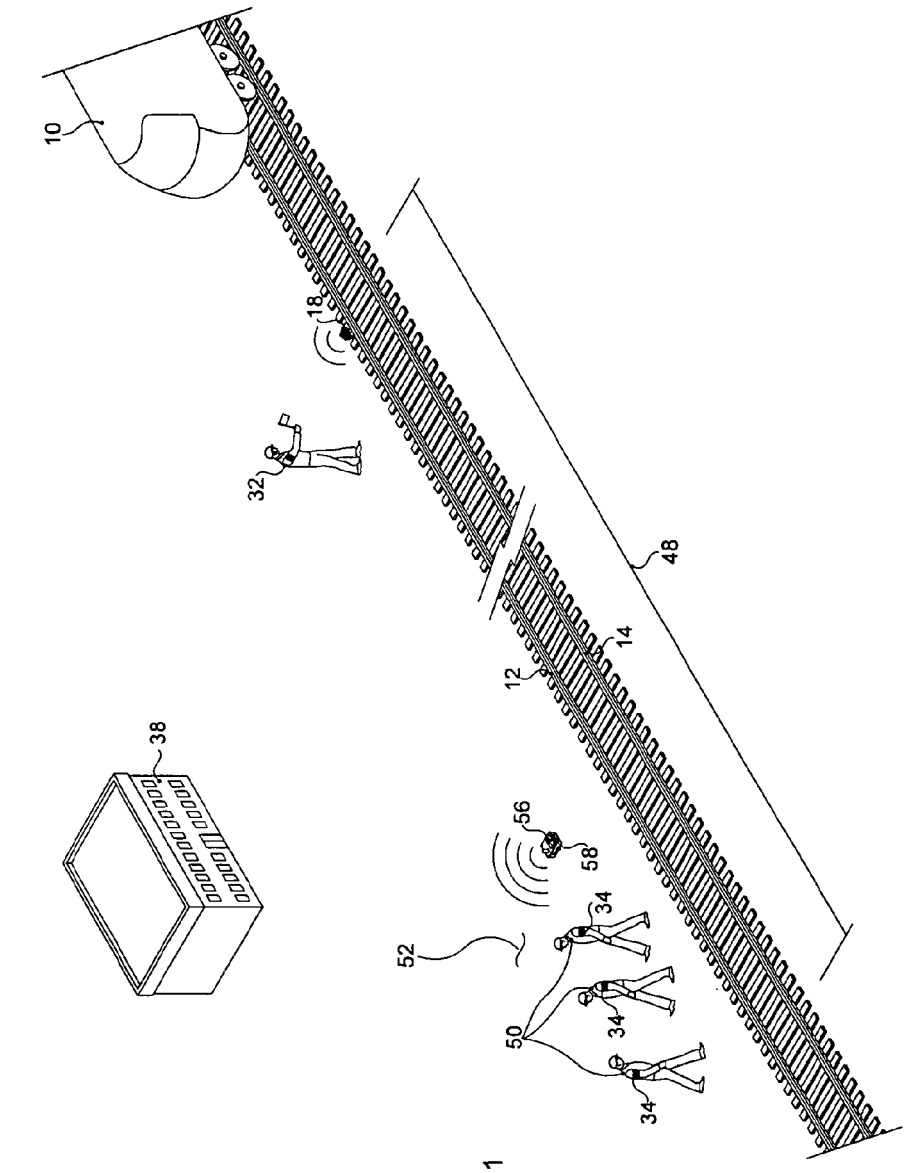

Fig. 1

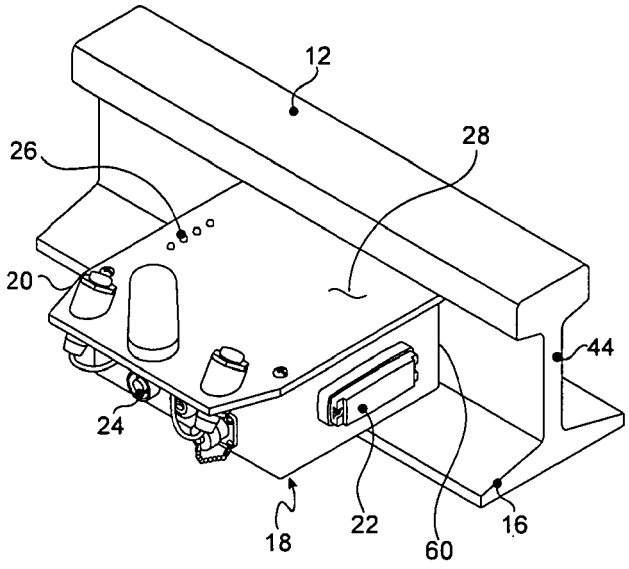

Fig. 2

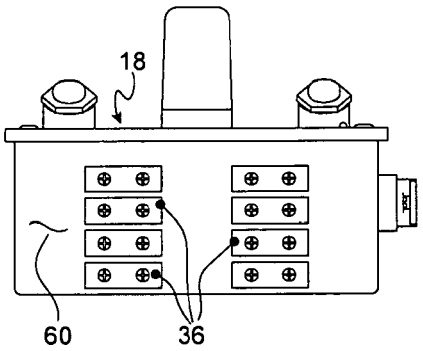

Fig. 3

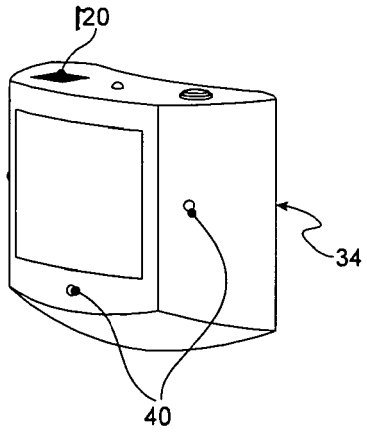

Fig. 4

Europäisches Patentamt
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EUROPEAN SEARCH REPORT

Application Number
EP 15 16 8910

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 September 2015	Mäki-Mantila, M

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X : particularly relevant if taken alone
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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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