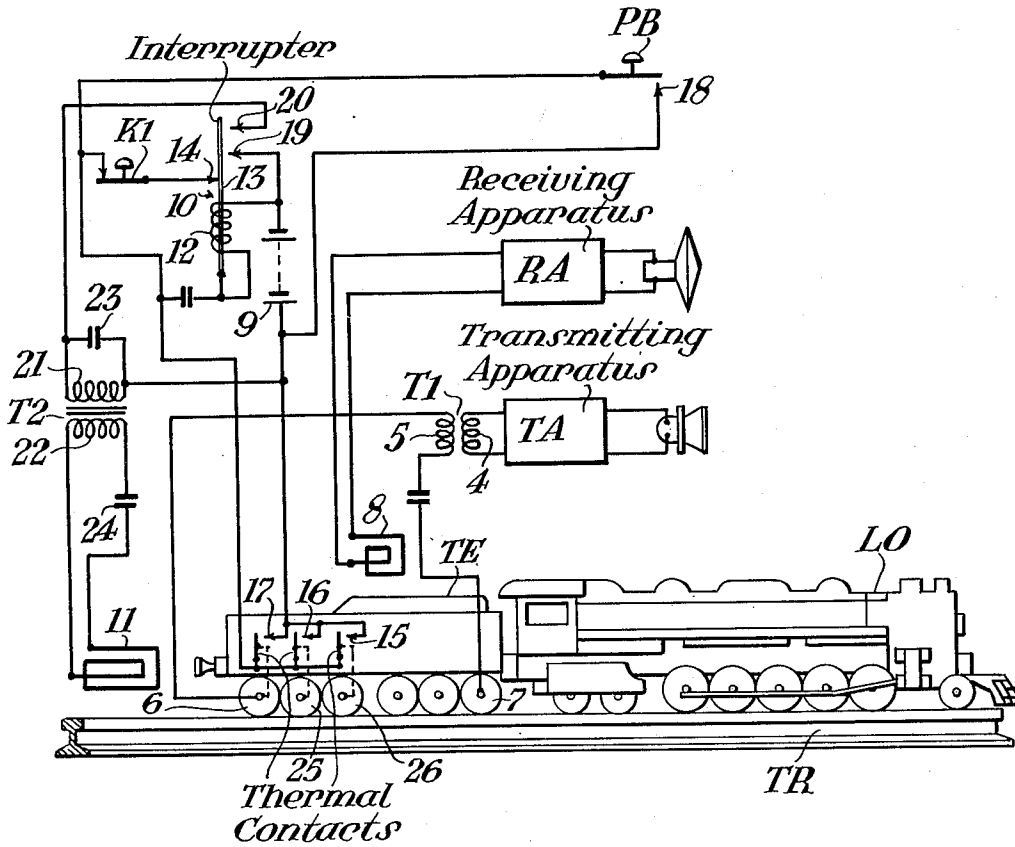


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ALARM APPARATUS FOR HOT JOURNAL
BEARINGS AND LIKE HAZARDS
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ALARM APPARATUS FOR HOT JOURNAL
BEARINGS AND LIKE HAZARDS

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My invention relates to railway train emergency alarm apparatus, and more particularly to apparatus for sending out an emergency alarm through railway train communication equipment.

In the operation of railway trains, derailed cars, dragging equipment, hot journal bearings and many other circumstances create hazards which may involve all trains in the vicinity of the hazard. Many times these accidental hazards are first observed by railway employees at a wayside station or by a crew member of a train other than of the train to which the accident has occurred. Furthermore, a hazard, such as a rock slide, may be observed by a watchman who is to warn all trains in the vicinity.

It would be a step toward safety if all trains and various wayside stations along the railway could send out an emergency alarm when a hazard occurs, and which alarm would be immediately received by all trains in that vicinity but which would not extend much beyond a predetermined limit each side of the hazard. In this way all trains near the hazard would be put on the alert, and each crew could take whatever action is necessary to bring their train under full control. In other words, it is desirable in train operation to have means whereby an emergency alarm is set into operation without delay when given hazards occur, and which alarm would not extend beyond a given range. This alarm to be set into action either automatically through devices actuated by the occurrence of a hazard, or manually by railway employees observing a hazard.

Accordingly, a feature of my invention is the provision of novel emergency alarm apparatus for use in the operation of railway trains.

Another feature of my invention is the provision of novel emergency alarm apparatus for use with railway train communication equipment.

Other features, objects and advantages of my invention will appear as the specification progresses.

To attain the foregoing features, objects and advantages of my invention, I provide novel apparatus through which an emergency alarm current is created when a given hazard occurs, this apparatus being capable of being set into operation either automatically or manually. This alarm current is of a predetermined characteristic and is of a nature that it is effectively transmitted along the railway through a transmitting medium common to all trains, but which medium limits the transmission in each direction from the hazard. This alarm current is picked up on each

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train and at associated wayside stations through receiving apparatus influenced thereby and is utilized to give a special alarm signal. Preferably, the transmitting medium used for train communication, that is, train telephone communication, would be used for transmission of the alarm current, the alarm current being of a character that it is effectively transmitted by such a medium. Also, the alarm current is preferably of a characteristic that it will be picked up by the receiving apparatus of the train communication system and will influence this receiving apparatus to give a special alarm. Furthermore, the alarm current is of a characteristic that it will break in when the receiving apparatus is being used for telephone purposes.

I shall describe one form of apparatus embodying my invention, and shall then point out the novel features thereof in claims.

The accompanying drawing is a diagrammatic view showing one form of apparatus embodying my invention when used with a train telephone communication system of the carrier inductive type. It is to be understood, however, that my invention is not limited to this one application but this application of the apparatus discloses the principle of the invention and illustrates the many places where the apparatus is useful.

Referring to the drawing, the reference character LO designates a locomotive adapted to travel on a railway track, the rails of which are indicated at TR. Locomotive LO is shown as a steam locomotive, having a tender TE, but other types of motive power may be used. In fact it is to be understood that apparatus embodying the invention is not limited to use on locomotives and it can be applied to other railway vehicles. Also, as will be more fully explained hereinafter, the apparatus can be located at wayside stations.

The locomotive LO is provided with train telephone communication equipment which may be, for example, of the carrier inductive type, such as is covered by Letters Patent of the United States No. 2,064,639, granted December 15, 1936, to L. D. Whitelock et al., for Communicating Systems, or by an application for Letters Patent of the United States, Serial No. 575,311, filed January 30, 1945, by P. N. Bossart, for Railway Train Communication Systems, now Patent No. 2,484,680, granted October 11, 1949, and to which patents reference is made for a full understanding of such train telephone communication equipment.

It is sufficient for the present application to point out that the communication equipment

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comprises transmitting apparatus and receiving apparatus which are shown in the drawing conventionally at TA and RA, respectively. The transmitting apparatus TA includes a microphone, an electron tube oscillator, a modulator and an amplifier, and is capable of supplying to a primary winding 4 of an output transformer T1 a carrier telephone current, the carrier being of a preselected frequency which is modulated by a preselected band of voice frequencies. For example, in the aforementioned Whitelock et al. patent, it is assumed for illustration that a carrier of 7000 cycles per second is amplitude modulated by a band of voice frequencies extending, say, from 400 to 2400 cycles. In the aforementioned Bos-sart application, it is assumed for illustration that a carrier of either of the frequencies of $f/1$ or $f/2$ is frequency modulated by a preselected band of voice frequencies. The output transformer T1 is electrically coupled to a transmitting circuit which serves as a medium for transmitting the current along the railway track, and which circuit includes in the well known manner, the track rails and paralleling conductors, such as line wires strung on a pole line. As shown in the drawing, secondary winding 5 of output transformer T1 is connected to a sending loop circuit coupled to the transmitting circuit by being connected to the track rails, the connection including two spaced pairs of wheels of the locomotive LO. These spaced pairs of wheels may be any of the wheels of the locomotive, and the rear pair of wheels 6 and the forward pair of wheels 7 of the tender TE are used. It is clear, therefore, that the transmitting apparatus TA when energized is operable to supply to the transmitting circuit a carrier telephone current, which is available at any point along the railway within a given range for reception by proper receiving apparatus such as the receiving apparatus RA when such receiving apparatus is coupled to the transmitting circuit.

The receiving apparatus RA of locomotive LO includes amplifying and demodulating means and a loud-speaker, arranged to demodulate the carrier telephone current and cause the voice frequencies to be sounded in the loud-speaker. The receiving apparatus RA is coupled to the transmitting circuit through a pick-up coil 8 mounted preferably on the top of the rear of the tender TE in a position to be in inductive relation to the rails and conductors paralleling the rails. Preferably the receiving apparatus RA is normally conditioned for reception, and the transmitting apparatus TA is normally deenergized and is energized and made active only during periods of sending. It follows that the crew of the locomotive LO can telephone to other vehicles of the same train, to other trains and to wayside stations when such remote stations are equipped with apparatus similar to transmitting apparatus TA and receiving apparatus RA, the transmitting circuit which includes the track rails and paralleling conductor serving as a transmitting medium common to call such trains and stations. The range of effective transmission is limited by the proportion of the parts and the parts can be proportioned for effective communication for a range of one to five miles.

In addition to this telephone communication equipment, I provide the locomotive LO with novel means for creating an emergency alarm current and for supplying such alarm current to the transmitting circuit. The supply means for this emergency alarm current includes a battery 9, a converter and a transmitting coil. The converter

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comprises an interrupter 10 and a transformer T2 with tuned circuits. The interrupter 10 may be of any one of several types, and preferably it is of the tuned alternator of coder relay type having an energizing winding 12 and a vibrating member 13. An energizing circuit for the interrupter can be traced from battery 9 through winding 12, vibrating contact member 13, a contact 14, a push button key K1 and normally open contacts 15, 16, 17 and 18 in multiple to the other terminal of the battery 9. The normally open contacts 15, 16 and 17 are controlled in a manner to be explained hereinafter, and the normally open contact 18 is preferably that of the spring return type push button. It is clear that the contact member 13 is normally inactive, but is set into vibration by the energizing of the operating winding 12 due to the closing of any one of the contacts 15, 16, 17 or 18 and when thus put into operation the contact member 13 is vibrated at a frequency predetermined by the proportioning of the parts. Also, operation of the interrupter can be discontinued through key K1 when one or the other contacts 15, 16, 17 or 18 is closed.

Contact member 13 when vibrated periodically closes contacts 19 and 20 to complete a circuit through which current is supplied from battery 9 to primary winding 21 of transformer T2, as will be readily understood by an inspection of the drawing. Such impulses of current supplied to primary winding 21 induce a corresponding electromotive force in secondary winding 22, which is connected to a transmitting coil 11. Preferably a capacitor 23 is connected in multiple with winding 21 and a capacitor 24 is interposed in series in the connection of winding 22 and coil 11 for the purpose of tuning these circuits. This converter has the characteristic of a spark gap and the electromotive force thus created in secondary winding 22 of the transformer T2 has a complex wave containing a relatively wide band of frequencies extending from the low frequency at which the circuit is being interrupted up to one megacycle per second and even higher. This emergency alarm current will contain frequency components of the order to which the receiving apparatus RA responds and will cause a noise to appear in the loud-speaker every time the contacts of the interrupter are operated.

The transmitting coil 11 is mounted on the locomotive to be relatively close to the track rails and in inductive relation thereto. Thus an electromotive force corresponding to the emergency alarm current is transferred from coil 11 to the transmitting circuit of the telephone system and becomes available for influencing the receiving coil 8 and all the receiving apparatuses within the range of the equipment.

The electromotive force picked up by receiving coil 8 will have frequencies corresponding to those of the emergency alarm current with the result a corresponding noise will be sounded in the associated loud-speaker and which noise will be of a distinctive characteristic and will be understood as an alarm signal. Furthermore, this alarm current with its band of frequencies will constitute noise energy during telephone communication and the noise will be sounded during each pause in the conversation and in this manner it will be an effective break in on the telephone conversation to inform the train crew that an emergency condition exists.

Although the above description refers to amplitude modulated signals only, the equipment can without any major modification be adapted

for use with frequency modulation equipment as well. It is well known that signals generated as described above will appear in frequency modulation receiving apparatus as spaced noise impulses which are easy to distinguish from the communication energy, and it will therefore be easy for the operator to detect such emergency signals when transmitted due to an emergency condition.

The contacts 15, 16 and 17 are thermal contacts such as are mounted adjacent the journal bearings of train wheels to detect hot journal bearings. The contacts 15, 16 and 17 are shown mounted adjacent the journal bearings of the pairs of wheels 26, 25 and 6, respectively, of the tender TE. The arrangement is such that each thermal contact is normally open and becomes closed when the respective journal bearing becomes abnormally hot indicating what is normally called a "hot box." The closing of any one of the thermal contacts 15, 16 or 17 automatically causes the converter means to be set into operation to send out the emergency alarm current which will be picked up by the receiving apparatus of the locomotive and by other vehicles of the same train and by vehicles of nearby trains and wayside stations. This alarm calls each crew's attention that a hazard exists, the hazard in this case being a hot box on the locomotive LO. Such emergency alarm would call for each crew to be on the alert and find out the nature of the hazard. The locomotive crew can check if the hazard is on their train by operating key KI. If the alarm ceases when key KI is operated the hazard is on their train, but if the alarm continues with the key KI open the hazard is elsewhere. Each crew should remain alert in either case because a hot box may cause a broken axle and the train thus wrecked may foul other tracks.

It is obvious that thermal contacts similar to contacts 15, 16 and 17 can be mounted on each of the other wheels of the locomotive and such additional contacts connected in multiple with the contacts 15, 16 and 17 for controlling the emergency alarm current supply means. Furthermore, such thermal contact can be mounted on each wheel of the train and used to control the emergency current supply means on the locomotive through wires extending throughout the train. Such an arrangement would probably be the preferred form for the modern type of streamline trains. Also, each car on the train can be equipped with thermal contacts and provided with a converter means similar to that shown for the locomotive LO and connected to an inductor mounted on the car in inductive relation with the rails. With such an arrangement each car is a unit and the occurrence of a hot box on any car of the train would cause the emergency alarm current to be supplied to the transmitting circuit to be picked up by the receiving apparatus of the locomotive and any other equipped vehicle of the train, and by other nearby trains.

It is obvious that normally open contacts of the pressure actuating type can be mounted on the locomotive and connected to the train brake pipe to be actuated in response to a heavy brake pipe reduction, such as is caused by an emergency brake application and these contacts can be used to control the sending of the emergency alarm current so that an emergency alarm current is sent out whenever an emergency application is made and can serve as a warning to other trains in the vicinity of the train on which a condition

has arisen that calls for an emergency brake application. Again, wayside stations can be equipped with emergency current supply means and a contact similar to contact 15, 16 or 17 arranged to be actuated by a rock slide, high water, burning bridge and similar detectors, and when thus used an emergency alarm current can be sent out warning all trains within the vicinity of such a hazard.

Through the use of the push button PB the crew of the locomotive LO can immediately cause the sending of the emergency alarm current in the event they observe a hazardous condition either of their own train or of any nearby train. Similarly, wayside stations equipped with such emergency alarm current supply means can be supplied with a manually operable push button through which any operator may cause the sending of the emergency current when a hazard is observed.

It is to be seen therefore that in the drawing there is disclosed means through which an emergency alarm current can be sent out from any vehicle of a train or from any wayside station, and such current transmitted along the railway through a transmitting medium common to all trains and preselected stations for actuating receiving apparatus on the different trains and at the different wayside stations for sounding a special emergency alarm in the event a hazardous condition arises.

Although I have herein shown and described but one form of railway train emergency alarm apparatus embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. In combination, a railway train having receiving apparatus responsive to a carrier telephone current, said receiving apparatus normally active and including a pick-up element mounted for receiving current from the track rails, a train carried source of current, a train carried converter means including a tuned circuit and an interrupter, said converter means operable when energized to create an emergency alarm current having a frequency band overlapping the frequency band of said carrier telephone current for sounding in the loud-speaker of said receiving apparatus an emergency alarm, an energizing circuit including a normally open contact mounted on a given vehicle of said train to connect said interrupter to said current source, said contact thermally associated with a given journal bearing of said vehicle to close the contact when the journal bearing becomes abnormally hot, and an inductor to couple said tuned circuit to the track rails.

2. In an emergency alarm means for use with railway train telephone communication equipment including transmitting apparatus and receiving apparatus which use a carrier telephone current for two-way communication between a station on a vehicle of a train and remote stations through a transmitting circuit common to all points along the railway and each of which receiving apparatuses is in a normally active condition, the combination comprising, a current source, converter means including a contact interrupter on said vehicle, said converter means operable when energized to create an emergency

alarm current having a frequency band that includes the band of said telephone current, a coupling element to electrically couple said converter means to said transmitting circuit to influence the receiving apparatus of said vehicle and said remote stations to sound an alarm corresponding to said emergency alarm current, a contact on said vehicle operatively associated with an element of the vehicle, said contact normally open and operated to a closed position in response to a given operating condition of said vehicle element, circuit means including said contact to connect said converter means to said current source to energize the converter means, and manually operable means interposed in said circuit means to deenergize the converter means to check if the emergency alarm sounded on the vehicle is due to said condition of the vehicle

element or is due to a condition at some remote station.

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