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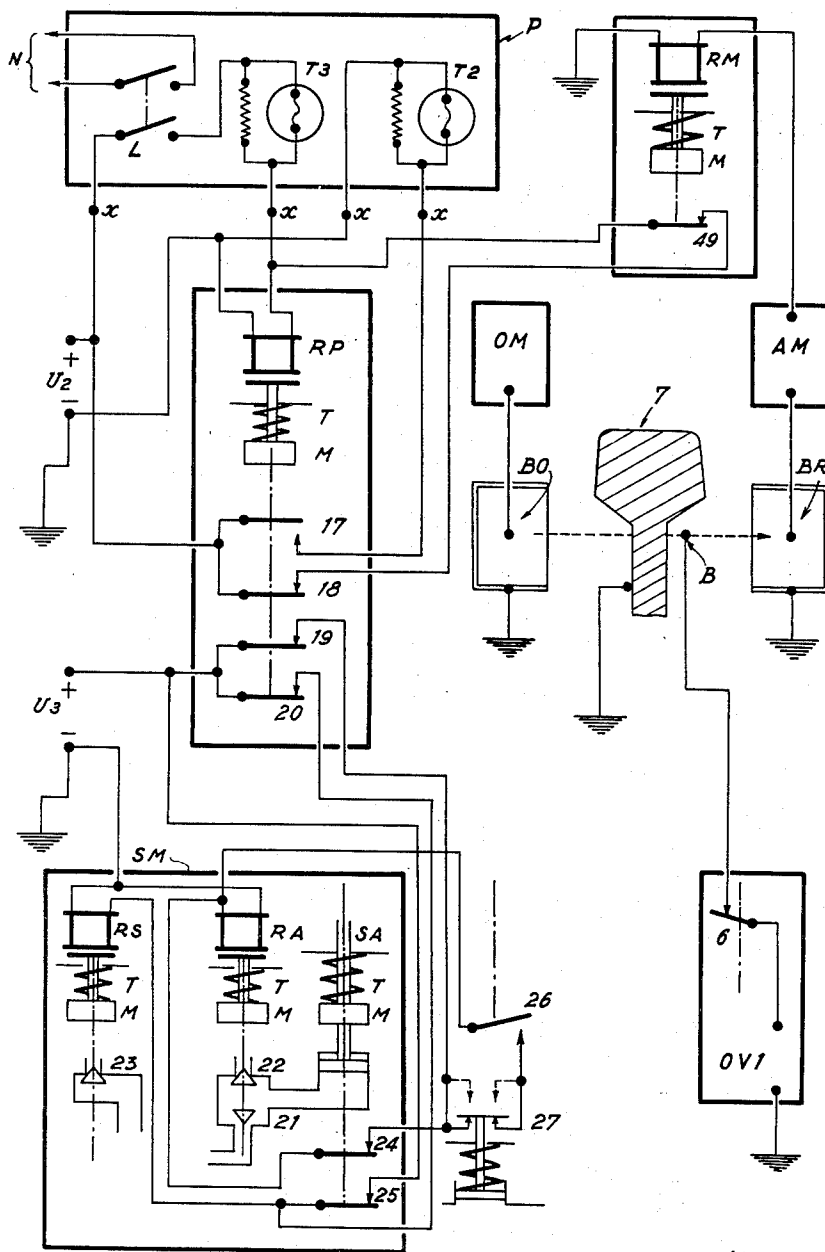
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AUTOMATIC STOPPING DEVICE FOR RAILWAY TRAFFIC

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2 Sheets-Sheet 1

Fig. 1



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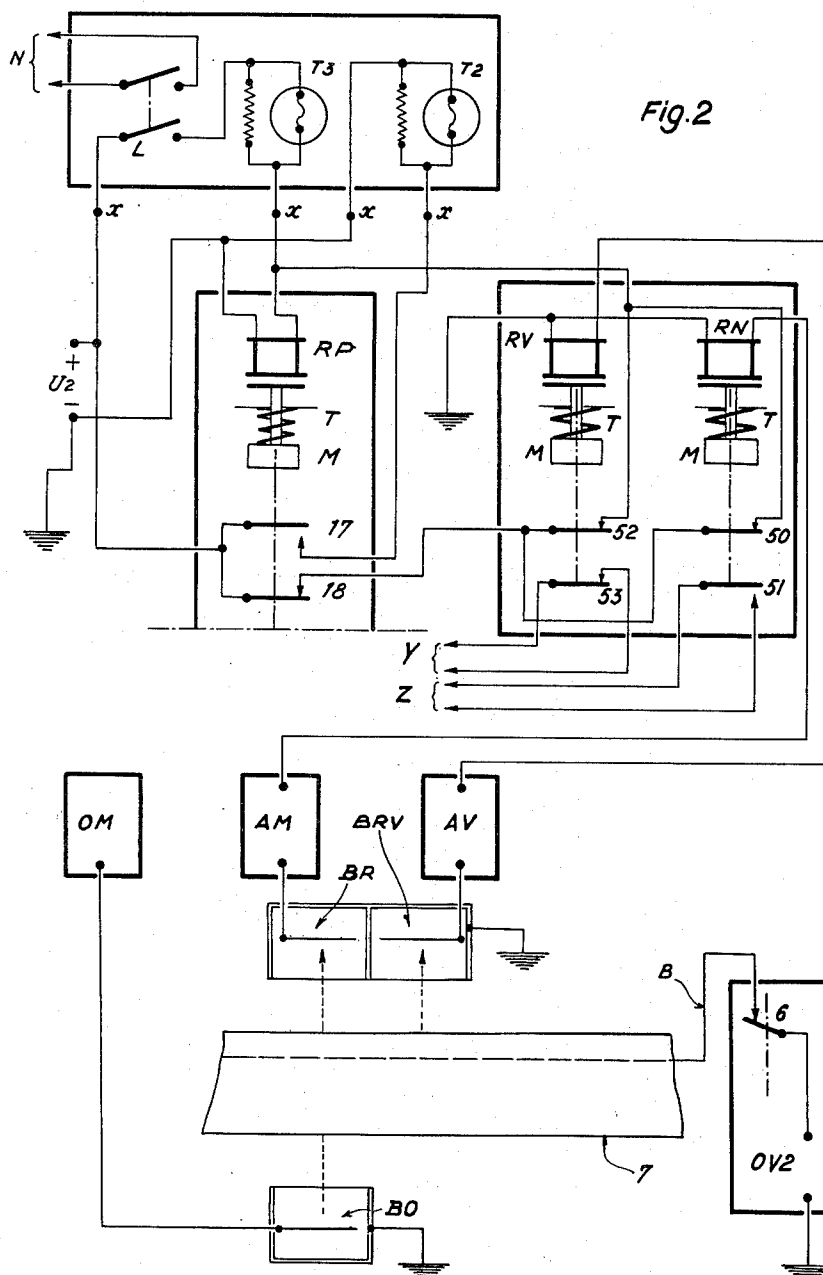
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2 Sheets-Sheet 2



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AUTOMATIC STOPPING DEVICE FOR RAILWAY TRAFFIC

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9 Claims. (Cl. 246-63)

The present invention relates to traffic controlling apparatus for effecting the automatic stopping of a vehicle on a railway track if the vehicle attempts to pass a signal at danger.

The present invention employs a radio electric method which has completely fulfilled its expectations. With this system the length of the track element is in no way limited and any desired length can be given to it. It does not require any maintenance or attendance and its cost is not high. The coupling device placed at the lower part of the vehicle in order to be subjected to the influence of the track element is as simple as possible; it is not at all fragile and moreover, it is completely protected from any materials thrown up from the track. If any disturbance affecting the vehicle equipment or the track equipment should occur there can be no other consequence than operation of the stopping servo-mechanism, and thus everything combines to ensure safety.

Everything tends also to prevent such operation of the stopping mechanism when it is unnecessary, as is the case when the vehicle approaches a clear signal. This is one of the important characteristics of the present invention.

It is planned in order that the equipment on board the vehicle may also receive all sorts of useful information coming from the fixed installations of the track.

The equipment on board the vehicle according to the present invention, consists of an oscillator, an amplifier suitably disposed and normally coupled to this oscillator by coupling members, and in the output circuit of the amplifier, a contactor (electro-mechanical or electronic for instance) which maintains an automatic stop servo-mechanism in a non-operative condition as long as the oscillator is suitably coupled to the amplifier.

A suitable spacing some 20 cm. for example, is left clear between two coupling members (which have a linear development or are coiled, as will be hereinafter described with reference to the drawing) said coupling members being inserted respectively in the output circuit of the oscillator and in the input circuit of the amplifier. The frequency of the oscillator current is chosen in order to be sufficient for a suitable feeding of the amplifier.

In order that the stopping servo-mechanism carried by the vehicle may automatically ensure that the signals are respected, the invention provides, on approaching these, a very simple track installation consisting of a suitable screen interposed between the coupling elements of the oscillator and of the amplifier, in order to ensure its complete uncoupling, such uncoupling causing a cessation of the feeding of the contactor controlling the stopping servo-mechanism, or a signal repeating device.

This is the general operation of the system if the signal in question is not in the "line clear" position. In this latter position it would of course be unnecessary to release the stopping devices and the invention has to avoid this. To this end the invention provides for the installation, at a suitable distance from the coupling element connected to the amplifier, a feeder inserted in the circuit of an oscillator fed by a track current.

The amplifier on board the vehicle is then fed by the track oscillator by means of the feeder conductor extending alongside the screen. The latter may be constituted by a simple rail situated at a level which is suit-

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able for fulfilling its function as a screen and is preferably earthed. The feeder is disposed between the screen and the coupling member of the amplifier; it is connected to the fixed oscillator by a track contact under the control of the indication of the signal, and which naturally is only closed when this signal is in the "line clear" position. The feeder may be exposed or under a strong rot proof insulation which enables it to be directly fixed on the screen rail.

The favourable frequencies employed permit the use of a non-tuned feeder extending along a relatively great length and utilising an earthed support without any risk of interference. On the other hand the screenings which constitute the supports of the coupling elements carried by the vehicle enable to orient and also to limit the propagation and the reception without any possibility of disturbances coming from the outside. Yet again, the amplifier may be equipped with a device such as a tube which has a time constant during the releasing in order that the length of the track element may be reduced.

It is understood that any modification which does not go beyond the scope of the invention may be carried out, with respect to the construction itself, to its means of operation and to its application. Other characteristics will appear from the following description and the accompanying drawing given by way of non-limiting example.

In the drawing:

FIGURE 1 shows schematically the elements of the invention with the addition, by way of example, of a servo-mechanism for effecting automatic stopping by removing the driving action and by applying the brakes of the train.

FIGURE 2 shows a modification, including a schematic recording device. The elements of the device of FIGURE 2, which are strictly identical to those of the device of FIGURE 1 are not shown, whereas the corresponding elements which are included in the two figures are shown by corresponding references.

Referring to FIGURE 1, OV1 indicates the track oscillator and 6 is a movable contact operated with the control for actuating the signal. This contact is in the upper position when the signal indicates the "line clear," it is moved to the lower position for any other indication of the signal. 7 is the fixed screen intercepting the action of the oscillator on the vehicle on the amplifier of the servo-mechanism. B is the feeder mentioned above as a possible intermediary between the track oscillator and the vehicle amplifier. OM is the oscillator carried by the vehicle, BO is its coupling element; AM is the amplifier and BR its receiving coupling element; RM is the relay fed by the output circuit of the amplifier which controls the contact 49; RP is the main release relay controlling the contacts 17, 18, 19 and 20; P is the control desk placed in the field of vision and within reach of the driver whilst T2 indicates the operation of the main relay RP, that is to say the release of the stopping device, which may or may not be delayed. The coupling elements BO and BR may be linear or coiled conductors which are contained within screening metal casings only open on their adjacent sides to permit coupling between the coupling elements.

L is the lever for resetting the relay RP after its release. By means of its second contact (connections N), its operation is recorded on the tape of the chronotachometer during the whole period of this operation. T3 is the indicator of the contact position of the lever L. The points marked "x" are those to which a second control desk can be connected (exactly the same as the first), if the equipment includes two driving positions.

U2 is the current source feeding the relay RP; SM is a complete servo-mechanism, given by way of example,

where RA is an electrically operated valve for effecting the interruption of the drive means, which acts on the pneumatic servo motor SA.

By means of its armature the relay RA drives a distributor which enables the piston of the servo-motor SA to communicate either with the main compressed air tank of the locomotive by the aperture 21, or with the atmosphere by means of the calibrated aperture 22. The relay RS drives an element which connects the general piping or tubing of the automatic brake with the atmosphere by means of the aperture 23 (when the relay is not excited), the said aperture is closed (when the relay is under voltage). 26 is a contact associated with the driving action control under the supervision of the driver. This contact is only closed for the zero position of the control. The latter may be of any type and may control for instance, contactors, injection pumps, vapourised fuel, or a steam regulator valve, according to whether the locomotive is electric, diesel or other oil, or steam driven.

The pneumatic servo-motor SA may move members which are similar to those which have just been mentioned and are mounted in series with those which are under the supervision of the driver, in order to be able effectively to cause the automatic stopping of the train. 24 and 25 are contacts controlled by the servo-motor SA. 27 is a contact mounted either on a brake cylinder or on the general tubing of the automatic brake. In the first case (connections shown in full lines) it only makes contact in the lower position. In the second case it only makes contact in the upper position (connections shown by dotted line). U3 is the source of current feeding the servo mechanism SM. U2 and U3 may of course constitute one and the same source.

All the elements of the servo mechanism that is to say: the relays RM and RP, the electro-valves RA and RS as well as the servo motor SA and the relays RN and RV which will be described further on, are arranged according to the principle of a constant tendency to an operation of the stopping mechanism resulting from the permanent action of the mass M and of the spring T, an action which is only cancelled by the attraction exerted through the relay coil when it is under voltage and by the pressure of the compressed air with respect to the pneumatic servo-motor.

In order to explain the functioning of the arrangement shown on FIGURE 1, it will first be supposed that the elements RP, RA, RS and SA are at rest, that is to say that their movable armatures are in the lower position under the action of the masses M and of the springs T. In order that they come into the working position, the driver operates the lever L which, by means of the indicator T3, directly connects RP to the source U2, the relay then occupies the upper position, breaking the contact 17 and making the contacts 18, 19 and 20. The operation effected on the lever L is inscribed on the tape of the chronotachometer by means of the connections N. The contact 20 connects the source U3 to feed RS. RS in its upper position closes the aperture 23 and the general brake tubing is not connected with the atmosphere.

When the driver releases the brakes and the driving control is in the "zero" position of i.e. position in which the motor or engine of the vehicle is not operative to drive the vehicle, the contacts 26 and 27 are closed. This being so, the circuit of RA is connected to U3 by the contacts 19, 26 and 27; RA occupies the upper position; 22 is closed, 21 permits the connection of the main compressed air tank of the vehicle with the servo-motor SA. The latter occupies the upper position, permitting the driving action controlled by the driver and closing the contacts 24 and 25. The main relay RP is fed by U2; on the one hand through L and T3; on the other hand by the contacts 18 and 49. The oscillator OM acts on the amplifier AM by means of the coupling elements BO and BR. The amplifier AM feeds the relay RM which is then in the upper position closing the contact 49. The

driver opens the contact L; RP remains fed by the contacts 18 and 49. The assembly is then in the normal working position. When a "line clear" signal is passed, the feeder B connected to OV1 by the contact 6 acts on BR and the amplifier AM and consequently on the relay RM. The action of the oscillator OV1 makes up for that of the oscillator OM, suppressed as a result of the interception of the coupling between BO and BR, by the screen element 7.

When passing a track element whose corresponding signal is not at "line clear" the contact 6 is in the lower position and interrupts the connection between the feeder B and the oscillator OV1 and the latter cannot act on the amplifier AM. The insertion of the screen 7 between BO and BR breaks the effective coupling between these units and the influence of OM on AM is suppressed, AM is affected and no longer feeds RM. The latter drops, interrupting the contact 49, and therefore the feeding of the main relay RP which then immediately occupies the lower position; the contact 17 is closed and switches on indicator T2; the contact 18 is opened and prevents the refeeding of RP when 49 will be re-established after the screen 7 is passed. The contact 19 is opened and interrupts the feeding of RA by U3. RA then occupies the lower position, 21 is closed breaking the connection between the main compressed air tank of the vehicle and the piston of SA, 22 is opened connecting the piston SA with atmospheric and the pressure on the piston of SA drops. However, as has been indicated, the aperture 22 is calibrated in such a manner that the drop in pressure which causes the fall of SA is only produced in a manner controlled at will.

It has been seen that the fall of RP has interrupted the contact 20, therefore, the feeding of RS by U3 is then only effected by the holding contact 25, controlled by the piston of SA and connecting directly RS to U3. As soon as the pressure reduction caused by 22 has become sufficient, SA occupies the lower position and interrupts the driving action; 25 is opened. RS is no longer fed, 23 is opened, the general piping of the brake system is in connection with the atmosphere and causes the braking. The automatic stopping device has functioned in a complete manner.

In order to bring the device of FIGURE 1 back into the working state, the driver operates the lever L which, by its contact, causes RP to rise again under the action of the current of U2; the contact 17 is broken, the contacts 18, 19 and 20 are re-established again. The contacts 24 and 25 of SA are still open but the contact 20 of RP ensures the refeeding of RS which closes the aperture 23. Thus the general brake piping is no longer in connection with the atmosphere; the brakes may be released by means of the valve controlled by the driver. When the brakes are released and when the driving control is put back to zero by the driver, the contacts 26 and 27 are re-established, the contact 19 of RP also being re-established, the relay RA is once again excited, 22 is closed and 21 cleared. This ensures the passing of the compressed air from the main tank up to the piston of the servo motor SA. The latter reaches the upper position; the contacts 24 and 25 are re-established; the driving action is under the control of the driver.

A slightly delayed release is in no way obligatory but it has the advantage of giving the driver the necessary time required for cancelling the automatic intervention by operating the warning lever L which, as it directly feeds RP, prevents the release and enables the person responsible to stop the train by using the means which are normally at his disposal. This control may hold the contact position without it being kept by the driver, in order to enable the latter to operate the controls which are normally under his supervision. The indicator light T3 may be supplemented by an audible warning.

It is understood that the elements RS, RA and SA may be mechanically locked into an upper position, dur-

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ing trials or in cases when the device is damaged. This locking is obtained by means of a special key whose employment may be subject to conditions prohibiting its use without the knowledge of the driver responsible or its thoughtless use by the latter.

On the other hand it should be stated that the connections N of FIGURE 1 and NYZ of FIGURE 2 not shown in detail, are effected according to a conventional wiring diagram of a source of current in series with the recording relays of the chronotachometer. The source considered may be U2, U3 or any other source.

If in the schematic drawing of FIGURE 1 the track oscillator and its feeder are not operative, then, the fact of passing the entry of each approach section (for example) which is provided with an interception screen rail systematically causes the release of the automatic stopping except when the driver is watchful.

FIGURE 2 shows how to adapt the invention in order to ensure a recording of the passing of open as well as closed signals, and thus a complete system is achieved which can be substituted for any other fulfilling these two functions. The servo mechanism, the contacts 19 and 20 of RP and the terminals of U3 are not shown. The track screen 7, the movable contact 6, the oscillator OV2 as well as the elements OM, AM, BO, and BR have the same functions as above.

A relay RN controlling the contacts 50 and 51 and another relay RV controlling the contacts 52 and 53 replace the relay RM of FIGURE 1. A collecting element BRV is connected to an amplifier AV whose output circuit is connected to control the relay RV. The relay RN is connected in the output circuit of the amplifier AM. The operation of the device of FIGURE 2 is as follows:

In normal working, the oscillator OM acts on the amplifier AM by means of the coupling BO—BR. The relay RN, fed by AM, is in the upper position and maintains the contact 50 which ensures the feeding of the main relay RP. When a stop signal is passed, the interception of the coupling BO—BR by the screen 7 suppresses the action of OM on AM, the latter no longer feeds RN, which occupies the lower position; the contact 50 is broken and interrupts the feeding of the main relay RP, thus releasing the automatic train stopping mechanism already described. On the other hand the lower position of the relay RN establishes the contact 51, which, by the connections 2, effects the recording of the passing of the signal on the tape of the chronotachometer. If the signal is at stop, the movable contact 6 is in the lower position and does not permit the connection between OV2 and B.

When a clear signal is passed, the same situation affects the elements OM, BO, BR, AM and RN but as the movable contact 6 is in the upper position, the oscillator OV2 acts on the amplifier AV, by means of the feeder B and the collecting element BRV. The amplifier AV then feeds the relay RV which occupies the upper position; the contact 52 ensures the feeding of the main relay RP, and this neutralises the opening of the contact 50 by the lower position of the relay RN since the contacts 50 and 52 are in parallel. On the other hand the upper position of the relay RV makes a contact 53 which through the connections Y, enables it to be recorded, on the tape of the chronotachometer that the signal has been passed "open."

The indicators T2 and T3 give the indications which have already been stated. The lever L and the connections N ensure the warning functions. These elements enable the operation of the automatic stopping to be prevented and enable it to work in such a manner that the operation is recorded on the tape of the chronotachometer. It should in fact be noted that the recording of the passing of signals either by establishing the contact 50 or by establishing the contact 52 can in no way be influenced by the operation of L.

It is obvious that for this embodiment different frequencies can be chosen for OM and OV2. It should be

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understood on the other hand that the amplifiers and oscillators described may be equipped with any elements such as electronic tubes, transistors or the like in so far as concerns the operations which they carry out.

It will also be understood that various modifications may be made without departing from the scope of the invention.

I claim:

1. Traffic controlling apparatus for effecting the automatic stopping of a vehicle on a railway track if the vehicle overruns a signal indicating that the vehicle should stop comprising a vehicle, a mechanism for interrupting the driving action and controlling the application of the brakes on said vehicle, radio-electric control means for controlling said mechanism including an oscillator, first coupling means connected to the output of said oscillator, an amplifier, second coupling means coupled to said first coupling means and to the input of said amplifier, a relay connected to the output of the amplifier, means controlling the relay by the energy supplied by the oscillator through said first and second coupling means and said amplifier, and means for supporting said first and second coupling means in the lower part of the vehicle, adjacent the track spaced apart by a small distance transverse to the longitudinal direction of the vehicle but in coupling relationship with each other, whereby the energy of said oscillator is applied through said first and second coupling means and said amplifier to control said relay so long as the coupling between said first and second coupling means is not eliminated.

2. Apparatus as claimed in claim 1, in which the track is provided with a screening element which passes between the first and second coupling means to eliminate the coupling between them if the vehicle attempts to pass a signal at danger, said elimination of the coupling causing operation of said relay to actuate the mechanism applying said brakes.

3. Apparatus as claimed in claim 2, including a track oscillator, an output feeder therefor which can supply energy from said track oscillator to said amplifier through said second coupling means, a contact connecting said track oscillator to energise said feeder only if the signal indicates that the track is clear whereby energy is supplied to said amplifier through said second coupling means when the line is clear, during the period that said second coupling means is screened from said first coupling means by said screening elements, thereby preventing the operation of the relay and application of the brakes.

4. Traffic controlling apparatus for effecting the automatic stopping of a vehicle on a railway track if the vehicle attempts to overrun a signal at danger, said vehicle including a mechanism for controlling the application of the brakes, a relay controlling the operation of said mechanism, a high frequency oscillator, first coupling means connected to the output of said oscillator, an amplifier, second coupling means in inductive coupling relationship with said first coupling means and connected to the input of said amplifier, means for feeding the output of said amplifier to control said relay, means supporting said first and second coupling means on said vehicle adjacent the track and spaced apart by a small distance transverse to the direction of travel of said vehicle but in inductive coupling relationship with each other so that the energy from said oscillator can be coupled from said first coupling means to said amplifier through said second coupling means to control said relay as long as the coupling between said first and second coupling means is not eliminated and a screening member positioned on said track adjacent a signal to pass between the first and second coupling means to eliminate the inductive coupling between them and thereby cutting off the output from said amplifier which in turn causes the operation of said relay to actuate the mechanism applying said brakes on the vehicle.

5. Traffic controlling apparatus for effecting the automatic stopping of a vehicle on a railway track if the ve-

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hicle attempts to overrun a signal at danger, said vehicle including a mechanism for controlling the application of the brakes, a relay controlling the operation of said mechanism, an oscillator, first coupling means connected to the output of said oscillator, an amplifier, second coupling means in coupling relationship with said first coupling means and connected to the input of said amplifier, means for feeding the output of said amplifier to control said relay, means supporting said first and second coupling means on said vehicle adjacent the track and spaced apart by a small distance transverse to the direction of travel of said vehicle but in coupling relationship with each other so that the energy from said oscillator can be coupled from said first coupling means through said second coupling means to said amplifier to control said relay as long as the coupling between said first and second coupling means is not eliminated and a screening member positioned on said track adjacent a signal to pass between the first and second coupling means to eliminate the coupling between them and thereby cut off the output from said amplifier which in turn causes the operation of said relay to actuate the mechanism applying said brakes on the vehicle.

6. Apparatus as claimed in claim 5, in which the said mechanism for applying the brakes operates with time delay.

7. Apparatus as claimed in claim 5, including indicating means whereby the driver is given an indication prior to the application of the brakes.

8. Traffic controlling apparatus for effecting the automatic stopping of a vehicle on a railway track, if the vehicle overruns a signal at danger, said vehicle including a mechanism for controlling the application of the brakes, a relay controlling the operation of said mechanism, an oscillator, first coupling means connected to the output of said oscillator, an amplifier, second coupling means in coupling relationship with said first coupling means and connected to the input of said amplifier, means for connecting the output of said amplifier to the coil of said relay, means supporting said first and second coupling means on said vehicle adjacent the track and spaced apart by a small distance transverse to the direction of travel of said vehicle but in coupling relationship with each other so that the energy from said oscillator can be coupled from said first coupling means through said second coupling means to said amplifier to energise said relay as long as the coupling between said first and second coupling means is not eliminated, a screening member positioned on said track adjacent a signal to pass between the first and second coupling means to eliminate the coupling between them and thereby cut off the output from said amplifier which in turn causes de-energising of said relay to actuate the mechanism applying said brakes and a second oscillator feeding a third coupling member positioned adjacent said screening member to apply energy to said

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amplifier through said second coupling means during the period that it is screened from said first coupling means if the signal indicates that the track is clear, thereby preventing de-energisation of the relay and application of the brakes and means controlling the energisation of said second oscillator in dependence upon whether said signal indicates danger or that the track is clear.

9. Traffic controlling apparatus for effecting the automatic stopping of a vehicle on a railway track if the vehicle overruns a signal at danger, said vehicle including a mechanism for controlling the application of the brakes, a relay controlling the operation of said mechanism, a high frequency oscillator, first coupling means connected to the output of said oscillator, an amplifier, second coupling means in inductive coupling relationship with said first coupling means and connected to the input of said amplifier, means for connecting the output of said amplifier to the coil of said relay, means supporting said first and second coupling means on said vehicle adjacent the track and spaced apart by a small distance transverse to the direction of travel of said vehicle but in inductive coupling relationship with each other so that the energy from said oscillator can be coupled from said first coupling means through said second coupling means to said amplifier to energise said relay as long as the coupling between said first and second coupling means is not eliminated, a screening member positioned on said track adjacent a signal to pass between the first and second coupling means to eliminate the coupling between them, said screening member extending along said track for a sufficient distance to ensure elimination of the coupling between said coupling members for a time to cut off the output from said amplifier and thereby de-energise said relay at the highest speed of travel of the vehicle, said de-energising of said relay actuating the mechanism applying said brakes, a second oscillator adjacent said track feeding a third coupling member positioned adjacent said screening member to apply energy to said amplifier through said second coupling means during the period that it is screened from said first coupling means if the signal indicates that the track is clear, thereby preventing de-energisation of the relay and application of the brakes and means controlling the energisation of said second oscillator in dependence upon whether said signal indicates danger or that the track is clear.

References Cited in the file of this patent

UNITED STATES PATENTS

50	1,377,137	Lewis	May 3, 1921
	2,110,166	Nicolas	Mar. 8, 1938
	2,753,550	Treharne	July 3, 1950
	2,761,962	Hughson	Sept. 4, 1956

FOREIGN PATENTS

55	213,921	Great Britain	Apr. 9, 1925
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