United States Patent

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[54] METHOD OF AND MEANS FOR CONTROLLING TRAFFIC

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[52] **U.S. Cl.** .....**340/62,** 180/106, 340/52 R

[51] **Int. Cl.**.....**B60q 1/00**

[58] **Field of Search** 340/62, 54, 52, 32; 180/106, 180/98

[56] **References Cited**

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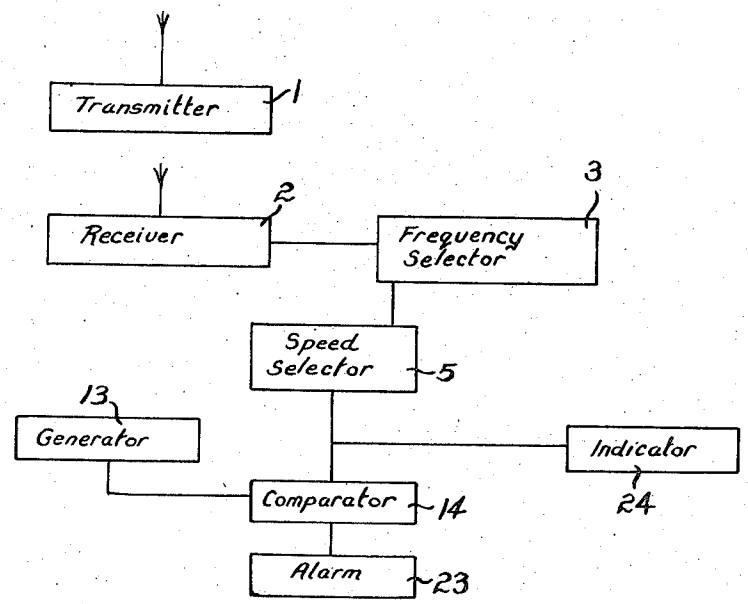
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[57] **ABSTRACT**

Method of indicating to the driver of a vehicle whether he is exceeding a speed limit as he passes through various areas, the vehicle containing a generator which produces a frequency of voltage in proportion to the vehicle speed and including means which can either be set by the operator or which are set by a radio signal or the like at the area concerned, the device including a comparator which actuates an alarm if the actual speed is outside of the limit set, whether the speed is below or above the set limit.

7 Claims, 4 Drawing Figures



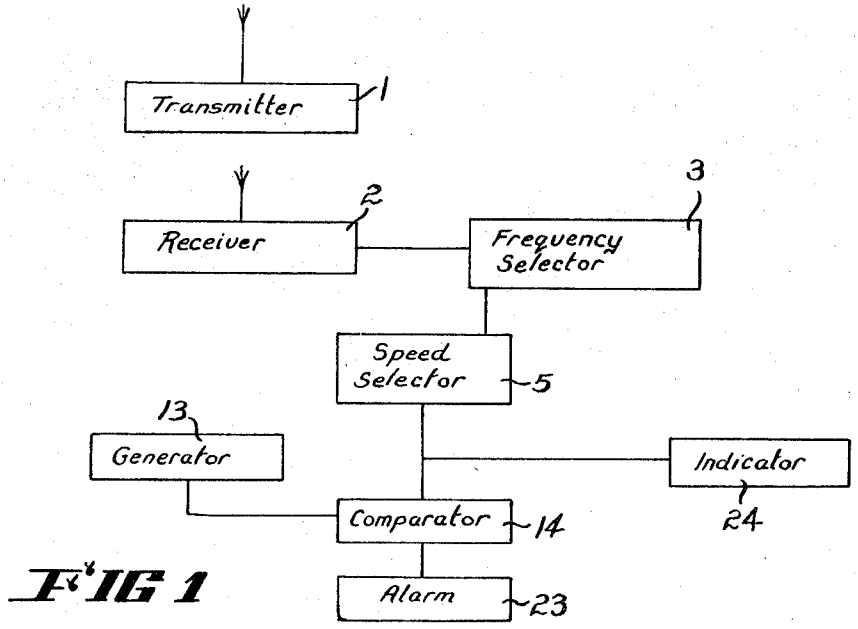


FIG 1

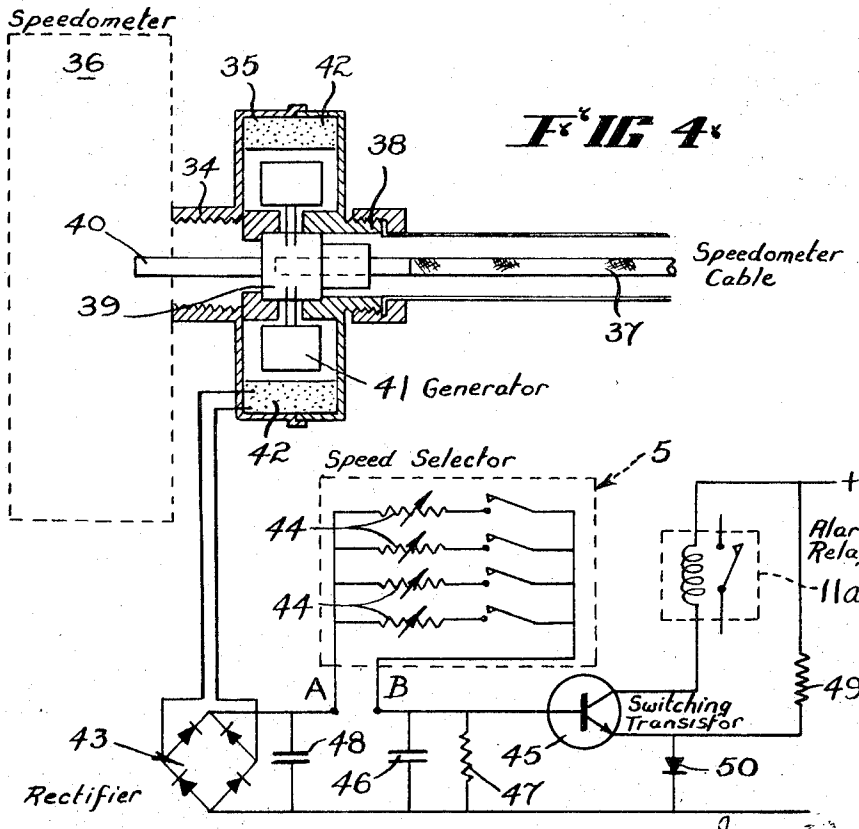


FIG 4

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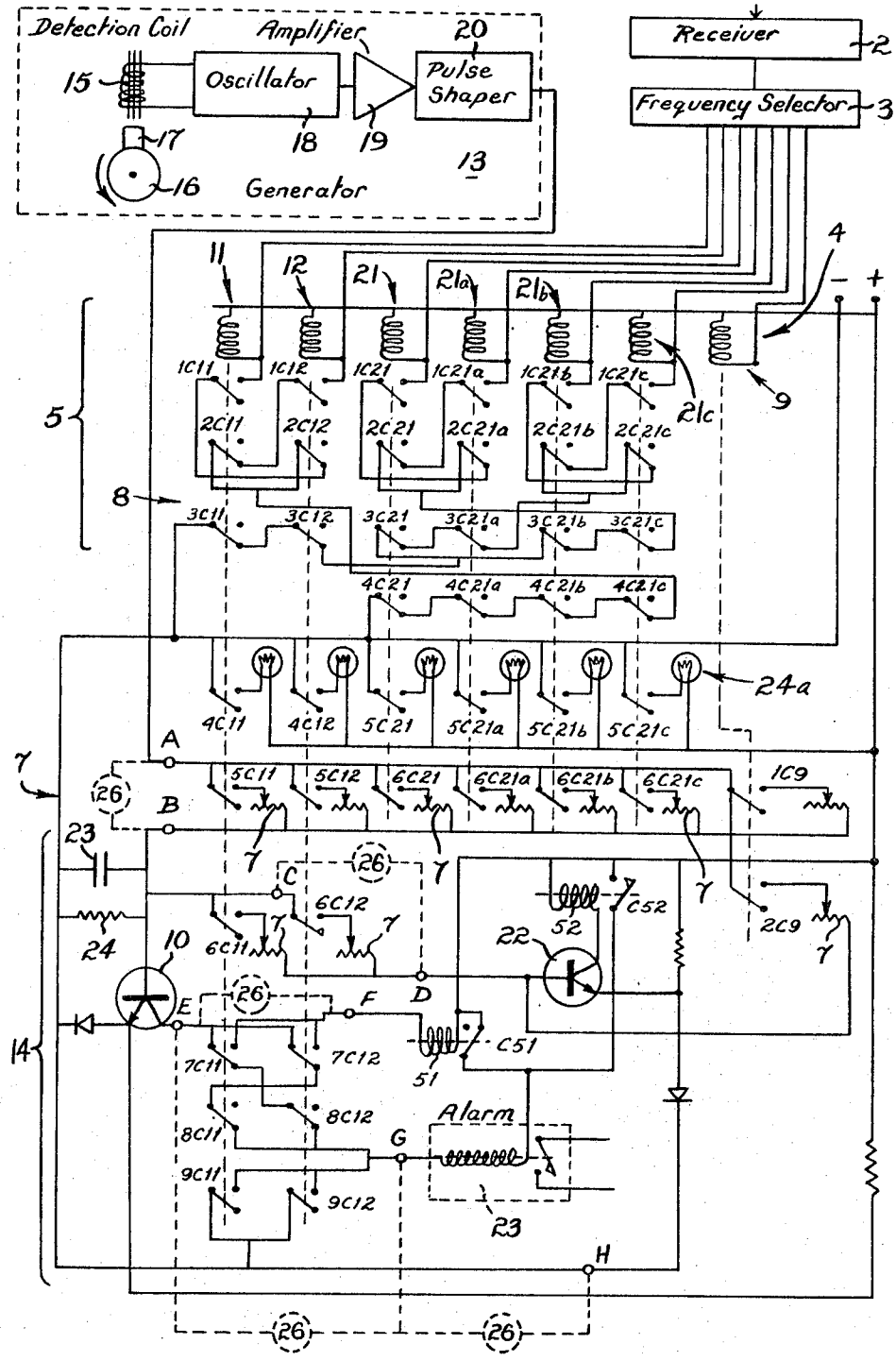


FIG 2

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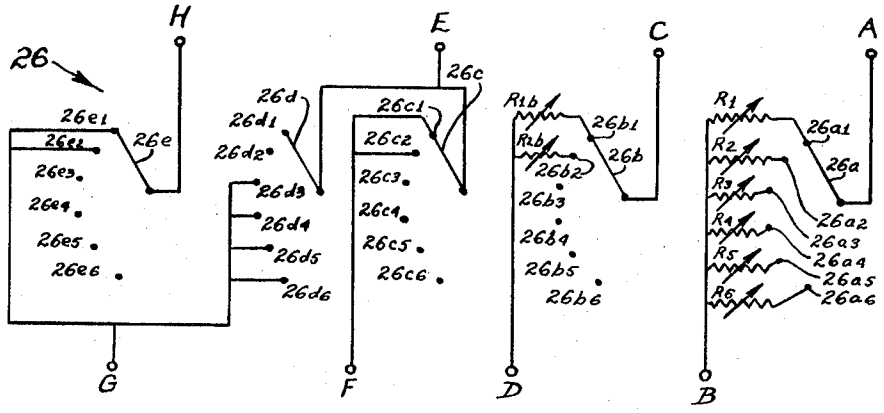


FIG 3

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METHOD OF AND MEANS FOR CONTROLLING TRAFFIC

BACKGROUND OF THE INVENTION

This invention relates to a method of and means for controlling traffic.

One of the problems with traffic control at the present time is that there are many areas where signs require to be observed by motorists but it is not always certain that the motorist is aware of these signs.

Thus for instance there are pedestrian crossings, school crossings, areas where restricted speeds are necessary, and zoned areas where speeds vary on highways and should be observed by motorists for smooth traffic flow and safety of pedestrians.

There are also areas where speed limits must be observed but no special crossings are involved, such as on open roads.

The object of the present invention is to provide apparatus which will allow control of the traffic flow by having warning devices which generate a signal at the particular localities, apparatus being provided in the vehicle which indicates when there is a departure from the set speed at that particular area.

Thus for instance for general road use a warning can be sounded in the vehicle if a selected speed is exceeded, or at a school crossing it is envisaged that there would be transmitters adjacent to the crossing so that when a motorist approaches a school crossing, should his speed be in excess of what is required or allowed, a warning will be indicated or sounded which will let him know that he has exceeded the limit for that zone and, if desired, will also let traffic control authorities know that the speed has been exceeded either after allowing a few miles per hour grace or not.

In other areas where speed variation over different sections of a roadway are to be observed transmitters can again be placed at the entry and exit parts of the area so that while in the area, should a transgression of the regulations take place, the motorist will be aware that this is so and will be able to rectify his speed.

SUMMARY OF THE INVENTION

The device can take various forms and includes a simple warning device in a vehicle operative at a selected speed, but according to a convenient arrangement transmitters operating on particular frequencies are disposed at the roadway to define the entry and exit points of the area, such as a school crossing or country town, and the motorist approaching this will, provided he does not reduce his speed to the required limit, be given an indication of his excessive speed by a suitable warning device should the vehicle's speed be in excess of that limit selected by the transmitter, this arrangement then being held until such time as the exit to the area is reached where the signal will be cancelled by being out of the area of the generated trigger signal or by an exit control transmitter which cancels a hold circuit.

Thus for instance the vehicle could be equipped with a receiver which is tuned to the frequency of the transmitter and this receiver will then be actuated to indicate the received signal, but if the speedometer of the vehicle is at a value where the speed limit is not exceeded, no signal will be given to the driver, or to anyone else, but should the speed of the vehicle be exceeding the limit set by the particular transmitter, then the difference in speed of the vehicle and that selected and/or indicated by the transmitter will actuate a light or horn or other device which will indicate both to the driver, and if required to the public also, that the speed limit is being exceeded by that particular vehicle.

The system could of course be used to only indicate the condition to the driver if that is preferred, or alternatively the arrangement could be such that whenever the driver is in an area where restrictions are current there will be some indication in his vehicle to warn him of this so that he will then have his attention called to road signs or the like which will give him the correct driving speed.

Different areas where different speed zoning is necessary could be taken care of by having various transmitter frequencies which when received will be channelled in the receiver to actuate corresponding frequency selector devices or the like, so that for instance the transmitter at a 15 miles per hour zoning area will cause energization only of that particular relay device and when a different speed zone area is reached the transmitter at that area will control the relay device in the vehicle, thus allowing a selection of the warnings in accordance with the transmitter frequency.

In this way it will be realised that whenever a motorist crosses from one zone to another, his attention can be drawn to his driving conditions and particularly he can be warned should he be exceeding the limit set for that particular area.

The device in the vehicle can conveniently comprise a receiver which can be tuned to the various signals which it is necessary to receive and these signals can be discriminated according to the frequency of the transmitter and can then be co-related as said to the actual speed of the vehicle so that if the driver is within the set limits no signal will be given but should he exceed the limit then a signal will be given either to him alone or the public, as well as to enable law enforcement.

It will be realised that the small signal generators or transmitters could be conveniently installed in a manner similar to traffic lights and could if required form part of a traffic light system, and it will also be realised that the transmitters can be used merely to trigger a relay which will then hold until the other end of the area which is under control is reached whereupon the relay can be released by the transmitter at that locality, for which purpose the transmitter can be simply directed across the road at the required area so that the vehicle must pass through the beam.

Obviously where this system is used there will be an initiating beam at the entry part to the area and a cancelling beam at the exit part of the area, in which event, to take care of traffic in both directions, it would for instance be possible to have beams signifying 35 miles per hour at the entry and exit localities and beams signifying 15 m.p.h. just inside of the area so that as a vehicle moved from the 35 to the 15 m.p.h. beam actuation of the mechanism will take place and this will be cancelled when the area indicating 35 m.p.h. is again reached.

It is also possible to use only one transmitter at say a school crossing so that while the particular transmitter frequency is being received the frequency selector relay bank still remains holding the previously held relay, but also activates another relay which cannot lock itself in but which would enable the alarm to sound if its selected speed value is exceeded. Upon passing out of the transmitter range of influence this relay would of itself be released because of the absence of the necessary transmitter frequency so that the system would then revert to the relay previously selected and still held locked in.

It will be realised also that the actual type of apparatus can be widely varied within the spirit of the invention, the principle of which consists in the use of signal generators at the appropriate areas where speed control is necessary and responsive means within the vehicle which indicates the information generated and preferably co-relates it to the speed of the vehicle at the time and therefore indicates whether the conditions are being observed or not observed. The transmitter signal naturally will be more or less controlled and directive so as not to interfere with other speed zones or areas.

In the accompanying drawings is shown how such a system could be applied, and while these will be described in some detail it should be clear that modifications within the appended claims are readily possible. BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings,

FIG. 1 is a schematic diagram of a remote controlled system,

FIG. 2 is a circuit diagram showing how the system of FIG. 1 can be applied, the circuitry being arranged for automatic actuation of the comparator system through transmitted frequencies which reach the frequency selector, but showing a

series of points A to H where connections can be made if a manual system is required to be added and/or used,

FIG. 3 shows the wiring of the manual switch for use in the circuit shown in FIG. 2, and

FIG. 4 shows a somewhat simplified system having only a manual speed selection switch at which an alarm audible or visible is actuated, but which can have an automatic selection system added by replacing the manual switches with a circuit similar to that shown in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIGS. 1 and 2, a transmitter 1 disposed at a suitable road locality such as a school crossing, speed restriction area, speed increase area or the like, generates a signal of selected frequency which is received by the receiver 2 of a passing vehicle.

The receiver 2 feeds the frequency to a frequency discriminator circuit in the frequency selector unit 3 which actuates the coil 4 of one of the relays in the speed selector 5. One set of each of these relays contacts forms the speed selector network by being connected to a preset variable resistor of a bank 7 according to its desired speed limit setting. The other relay contacts 8 form a self-locking circuit through the holding sections of the relays as shown.

This is achieved by maintaining current flow through the coils of the relays until one of the other relays is actuated, whereupon the circuit to all other relays, excepting the relay 9, will be broken thus allowing the new relay to lock and thus control the feed to the switching transistor 10.

Thus only one relay may be locked in at any time and actuation of another relay immediately and automatically cancels the previous relay by permitting it to drop out and thus at the same time ensure that it, the newly selected relay, is then locked in.

This allows a single impulse signal to be held until a cancelling or changing signal is actuated, such as at the start or finish of a school crossing or other zoned area.

Relay 9, because it cannot lock itself into a hold position could be used for example at a school crossing where because of the short distance between the entry and exits points only one transmitter could be used so that when this transmitter frequency is received the frequency selector relay bank 3 still remains holding the previously held relay but also causes relay 9 to operate but only when in the transmitter's range of influence so as to enable the alarm to operate if its selected speed value is exceeded.

An emergency warning relay can be incorporated in the frequency selector bank 3 similar to that just described so that without altering the selected speed relay setting and by using the vehicle power supply and a suitable current limiting resistor the switching transistor can be caused to activate the alarm. In this case the transmitter frequency would cause the particular relay to hold in whilst the signal is being received only and therefore if desired the transmitter could be pulsed on and off to achieve a pulsing of the alarm.

Such a system could be used by various authorities such as police, fire, ambulance etc., and would also prove an asset to safety when used to indicate that a green traffic light would change to red by the time the intersection was reached or if used at a railway crossing to indicate the approach of a train. In the foregoing cases it may be required that the speed limit be 0 m.p.h. or close thereto. Other uses could include men at work, accident scene, etc.

A minimum speed relay 11 and 12 could be included which would be actuated by further radio controlled signals which would actuate the warning device when the vehicle speed fell below minimum requirements so that a device could then be provided which defined, by warning the operator, and the authorities or public if required, when either the upper or lower speed limit or both, of the area concerned are being observed, exceeded or maintained.

To achieve this a generator 13 is actuated by the vehicle in relation to the road speed of the vehicle and this produces a signal at the point marked A in FIG. 2 which signal is transmitted through a particular variable resistance of the bank 7 shown to the point B from whence by reason of the circuit of the comparator 14 the unit is actuated to give an alarm if the speed is out of the selected limit but does not operate if the vehicle is within the speed limit of the area.

The generator 13 shown in FIG. 2 comprises a detection coil 15 adjacent to a rotating member 16 of the vehicle which operates in direct proportion to road speed, the rotating member 16 having a section 17 which impulses the coil 15 during each revolution of the member 16.

The coil 15 if fed by an oscillator 18 of any required type and the resultant impulse signal passes through the amplifier 19 to a pulse shaper 20 from which the signal is transmitted to the point A as a voltage and/or frequency dependent on the vehicle speed.

This generated signal is then passed to B via the selected preset resistance which was chosen to trigger the switching transistor at a selected speed by the transmitter when it selected and caused to be locked in the particular relay whose contacts complete a circuit by making contact with the resistance.

In the case of any relays 21 operating it will be noted both relays 11 and 12 will always be non-operative because they also have similarly been locked in to the other relay pattern so that only one relay can operate. This therefore means the signal passes from B to the switching transistor 10 via the condenser 23 and bleed resistor 24 with the result that when the transistor is switched on current passes through the contacts of relays 11 and 12 as shown thus permitting the alarm to sound.

When either relay 11 or 12 operates the transistor 22 connected to D provides an upper limit whilst the other transistor 10 provides a minimum limit such that should the vehicle speed not be maintained between these limits then the alarm relay 23 can be actuated because of the circuit arrangement now connected because of the activation and holding in of either relay 11 or 12.

The addition of a monostable flip-flop or other device could also be used to cause the alarm to sound intermittently if required.

Indicator lights 24*a* show which relays are actuated.

By connecting a ganged five wafer switch 26 shown in FIG. 3 into the connections A, B, C, D, E, F, G and H, as shown in FIG. 2, the unit of FIG. 2 can be actuated manually as the frequency selector 3 will be over-ridden and/or replaced.

In that case the actuation will be somewhat similar to that shown in FIG. 4 which will be later described.

As stated earlier, the circuit of FIG. 2 is a self-holding circuit through the holding sections 8 of the relays.

Considering the operation of the system in more detail and referring to FIG. 2, assume that the signal from the transmitter is an upper limit speed signal and further that this signal actuates the frequency selector 3 so as to energize the relay 21. The contact 2C21 of this relay now opens, breaking the circuit of the relay 21*a* to de-energize relay 21*a* if it was previously energized. Likewise, contact 3C21 also opens assuring that relays 21*b* and 21*c* are de-energized while contact 4C21 opens to assure that relays 11 and 12 are de-energized. Thus, all the speed limit determining relays 11, 12, 21–21*c* are de-energized except the particular relay selected by the frequency selector circuit 3. A holding circuit for the relay 21 is completed at the same time by the closing of the contact 1C21. This circuit includes also the normally closed contacts 2C21*a*, 3C21*c*, 3C21*b*, 3C12, and 3C11. Contact 5C21 also closes to light the corresponding one of the indicator lamps 24*a* and contact 6C21 closes to bring the corresponding one of the resistors 7 into the circuit. The signal from the generator 13 which is proportional to vehicle speed is thus supplied to the base of the switching transistor 10 across the one of the resistors 7 associated with the contact 6C21. No signal is sup-

plied to the base of the switching transistor 22 since the contacts 6C11 and 6C12 are open. The switching transistor 10 is of the type which is normally nonconductive and becomes conductive when its base voltage rises above a predetermined level. When the vehicle speed exceeds that of the selected speed the signal from the generator 13 supplied across the resistor 7 associated with the contact 6C21 becomes sufficient to energize transistor 10. A circuit is then completed across the emitter and cathode of transistor 10 and the contacts 7C11 and 8C12 to the alarm 23.

If the vehicle moves into a zone having a different, higher speed limit the frequency selector 3 will select another of the relays 21, for example the relay 21*a*. This will result in the relay 21 being de-energized by the opening of the contact 2C21*a* and latching circuit being completed for the relay 21*a*, as described above. The corresponding one of the lights 24*a* will again be selected and the resistor 7 associated with the contact 6C21*a* will now be brought into the circuit in place of the resistor 7 associated with the contact 6C21. If the relay 21*a* corresponds to a higher speed limit than does the relay 21 the newly selected resistor will be of a higher value than the previously selected one so that a higher output signal from the generator 13 must be supplied before the switching transistor 10 becomes conductive.

When the vehicle moves into a zone which has a lower as well as an upper speed limit the frequency selector 3 will energize one of the two relays 11 or 12. Assuming that the relay 11 has been selected, the contact 5C11 will be closed so that the resistor associated with this contact now forms a part of the circuit between the generator 13 and the base of the transistor 10. At the same time the contact 6C11 has closed so that the one of the resistors 7 associated with this contact forms a part of the circuit between the generator 13 and the base of the switching transistor 22. The closing of contact 7C11 switches the emittor cathode circuit of the transistor 10 from the alarm 23 to a relay 51. A contact 9C11 also closes completing a circuit for the alarm 23. As long as the signal from the generator 13 is insufficient to cause the transistor 10 to conduct the alarm will be operated through the contact 9C11. When the generator output reaches a sufficient level the transistor 10 conducts energizing the relay 51 to open the contact C51 thereby deenergizing the alarm. This indicates that the vehicle is preceding at above the minimum speed limit. If the signal from the generator 13 continues to increase the transistor 22 will also be caused to conduct causing the relay 52 to be energized and closing the contact C52 which again energizes the alarm 23 to indicate that the upper speed limit is being exceeded. The operation of the relay 12 is identical but brings different ones of the resistors 7 into the circuit to determine different speed limit values.

It will be noted that the relay 9 does not have any contacts associated with the latching circuits of the other relays 11, 12, 21–21*c* and thus does not effect and is not effected by the operation of these relays. The contacts 1C9 and 2C9 of relay 9 serve, when the relay is energized by the frequency selector 3, to connect the generator output to the bases of the transistors 10 and 22, respectively, through corresponding ones of the variable resistors 7. This relay thus provides for the operation of the alarm regardless of the speed selected by the manual control or by the other relays of the bank 4 and provides for an emergency warning. As discussed above, the variable resistances selected by the relay 9 preferably are of such value that the alarm will be energized even a low vehicle speed near 0 m.p.h. Since the generator signal is supplied to both transistors 10 and 22 the alarm will operate even if a lower speed limit has been selected by the relay 11 or 12.

If the manual control or selection switch 26 is provided the first arm 26*a* of this switch will select one of the resistors R1–R6 which will be in parallel with the particular resistor selected by the relays of the bank 4. Thus, a signal from the generator 13 will cause the switching transistor 10 to conduct whenever this signal passing through either the resistor selected by the switch 26 or that selected by the relays of the bank 4 is sufficient to energize the transistor. The alarm will thus be operated when the speed exceeds the lower of the two selected limits. The second arm 26*b* of the switch 26 selects either the resistor R1*b* or R2*b* to determine the lower speed limit value in its first two positions and in its remaining position does not provide any connection for the transistor 22 and thus does not provide a lower speed limit. The contact arms 26*c* and 26*d* serve in the same manner as the relay contacts 7C11–9C11 and 7C12 9C12 to provide for the operation of the alarm 23 whenever the lower selected speed is not reached.

In the simplified form shown in FIG. 4 which requires no external signal, but which can be made automatic as previously described, the generator can have a socket 34 to join the case 35 to a speedometer 36, and the speedometer cable 37 can have its outside casing held in position by a threaded stem 38 so that the cable 37 can drive the rotor 39 which has an extension 40 which in turn engages the mechanism of the normal speedometer 36 to also drive this. Magnets 41 and coils 42 generate the required voltage or frequency, whichever is to control the triggering of the warning mechanism or actuate the comparator.

While in FIG. 4 a generator is shown, it will be realized that this could be replaced by a contact system, or the generator system of FIG. 2, so that when using a magnetic generator or a contact or similar device a condenser can be charged in the manner of the well known electrical tachometers which operate from the distributor of the vehicle and generate a voltage in proportion to the frequency of the impulses.

The voltage from the coils 42 passes to the rectifier 43 and through a selected resistor 44 to the switching transistor 45, passing condenser 46 and bleed resistor 47 which are connected to the negative rail

A smoothing capacitor 48 is suggested while the resistor 49 and silicon diode 50 determine the firing voltage of the switching transistor 45.

What I claim is:

1. A method of indicating the deviation of vehicle speed from the set speed of a speed zone, comprising the steps of

generating an electrical signal proportional in frequency to vehicle speed;

generating and transmitting from a point external to the vehicle a signal the frequency of which indicates the set speed; and

comparing the vehicle speed indicating signal frequency and the set speed indicating signal to initiate a warning signal when the vehicle speed is outside of the limits of the set speed.

2. The method of claim 1 which includes the additional steps of

generating and transmitting an additional signal from a point external to the vehicle; and

initiating the warning signal upon reception of the additional signal.

3. Apparatus for indicating deviation of vehicle speed from the set speed of a speed zone, comprising:

vehicle mounted means for generating an electrical signal proportional in frequency to vehicle speed;

a plurality of resistors;

a switching transistor;

alarm means controlled by the transistor;

a plurality of stationary transmitters, one transmitter being provided for each speed zone, each transmitter having a fixed frequency and different frequencies being provided for different set speeds;

a plurality of relay means, one relay means being associated with each resistor, the relay means being operative so that only one relay is energized at any time, the energized relay placing the corresponding resistor in series connection with the generating means and the transistor;

a vehicle mounted receiver for receiving the signal from the transmitter of the zone in which the vehicle is located; and

a frequency selector circuit responsive to the receiver output for energizing the one of the relay means corresponding to the set speed of the zone.

4. Apparatus according to claim 3 further including a second plurality of resistors and a manually controlled switch for placing any one of the second plurality of resistors in parallel connection with the one of the resistors which is in series connection with the generating means and the transistor.

5. Apparatus according to claim 3 further including a second switching transistor, and an additional relay having a normally closed contact in series connection with the alarm means, at least one of the relay means being operative when energized to disconnect the first transistor from the alarm means and connect the first transistor in series with the additional relay, to connect the alarm means to a power supply whereby the alarm means is operative so long as the first transistor is not conductive, and to place one of the resistors in series connection between the generating means and the second transistor whereby the second transistor is biased to a conducting state energizing the alarm means whenever vehicle speed exceeds a set speed.

6. Apparatus according to claim 3 further including an additional relay means energized by the selector circuit, the additional relay operating independently of the plurality of relay means and being operative to place an additional variable resistance parallel connection with the one of the variable resistances selected by the plurality of relay means.

7. Apparatus according to claim 3 further including a plurality of indicator lamps, the means for selecting including means to energize the one of the lamps corresponding to the selected set speed.

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