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SYSTEM FOR VEHICLE CONTROL.
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Fig. 1.

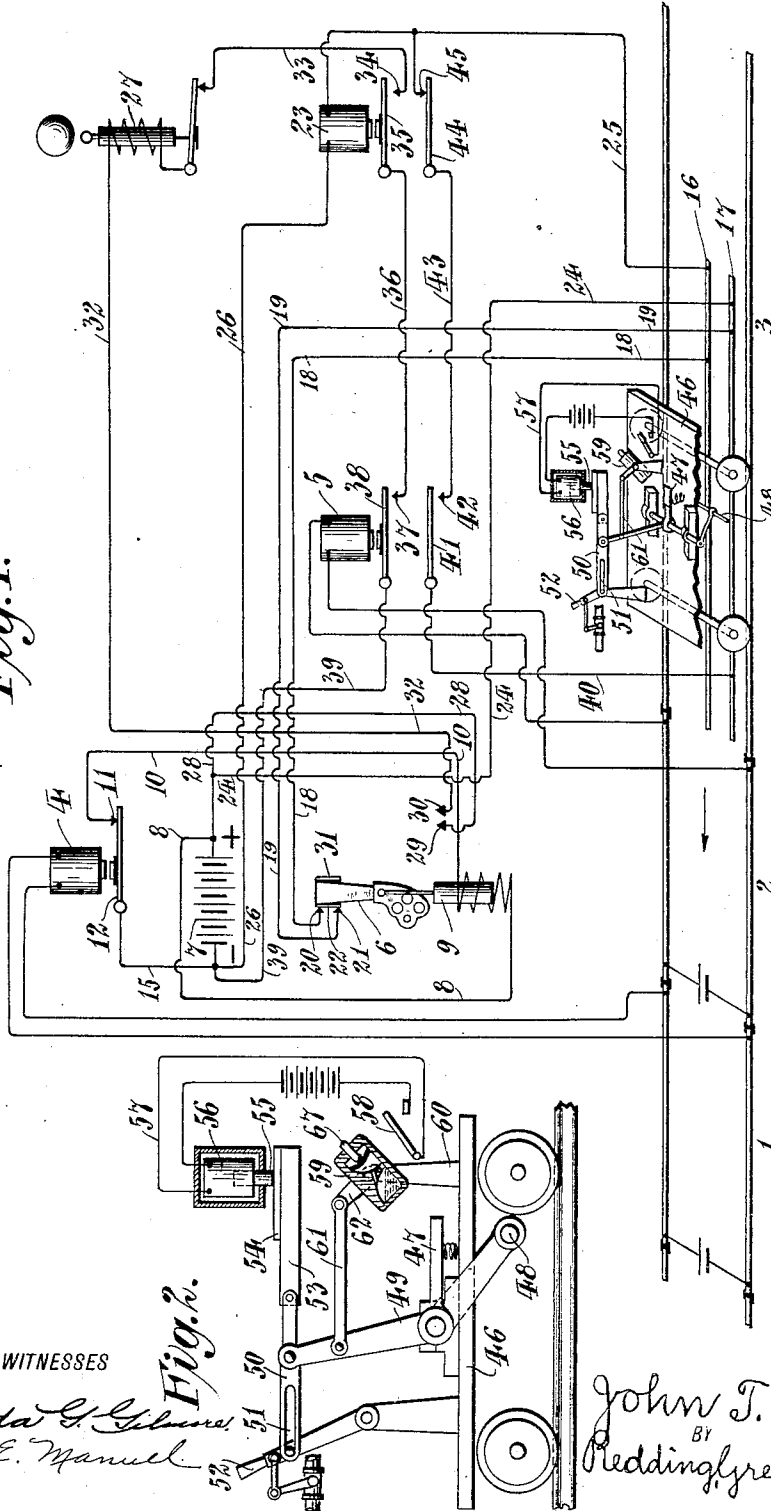
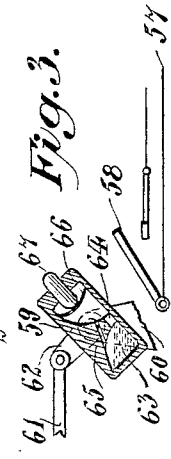


Fig. 2.



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SYSTEM FOR VEHICLE CONTROL.

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To all whom it may concern:

Be it known that I, JOHN T. CADE, a citizen of the United States, and a resident of Arcola, county of Bergen, and State of New Jersey, have invented certain new and useful
5 Improvements in Systems for Vehicle Control, of which the following is a specification, reference being had to the accompanying drawings, which form a part hereof.

10 This invention relates to vehicle or train control systems and has for its object to eliminate certain dangers to railway traffic which have lately impressed themselves upon the minds of the public and those
15 actively interested in the installation of systems and apparatus of this character.

Recently it has been especially realized that many accidents upon railways are due to the fact that engine drivers, for one reason and another, pass the ordinary semaphore signal while in its danger position in
20 disregard of traffic regulations. It is found that such action of engine drivers is frequently due less to a voluntary disregard of the signal than to a failure to note or
25 realize its danger indication. Heretofore, it has been proposed to meet this condition by providing train stops to positively and automatically stop the train when the engine
30 driver passes or attempts to pass the signal in the danger or stop position. But a train stop is objectionable for reasons peculiar to itself. In the first place it takes from the engine driver his own control of his train
35 under certain conditions and makes him liable to rely upon the automatic stop instead of himself to avoid accidents. This tends to lessen that feeling of responsibility, watchfulness and care which it is essential
40 to preserve in the engine driver. Furthermore, the automatic stop is not well adapted to efficient conduct of traffic where such traffic is carried on under the usual widely
45 varying conditions of ordinary railway operation. A signal sometimes stands at danger when it is desirable for traffic reasons that it be passed if this is done with full realization by the engine driver of his act. A stoppage of the train under such conditions
50 by an automatic stop would serve no useful purpose but would be a hindrance to traffic.

In the present invention the control of the train is not taken from the engine driver
55 but provision is made to make him exercise

increased care against proceeding when travel is dangerous without full knowledge and realization of his act. It will be understood that travel is dangerous when conditions are such as these now usually indicated
60 by the warning condition of a signal. In accordance with this invention, therefore, the automatic stop is eliminated and in its place there is provided a special alarm device designed to be automatically operated
65 whenever the engine driver proceeds when travel is dangerous or when he enters a danger zone of the track, unless, having noted the danger condition of the track, he performs some act that will forestall the
70 operation of the alarm device after having retarded or brought his car or train under control. If he has noted the danger to travel, on the track ahead, and finds it advisable to proceed, notwithstanding, he is
75 at liberty to do so provided he performs some act that will cut out the alarm device from operation after he has retarded or brought his car or train under control. But
80 if, with inattention and lack of watchfulness, he proceeds when travel is dangerous or into the danger zone, he will fail to attend to the cutting out of the alarm device and it will operate and thereby compel him, and preferably others, to realize what is taking
85 place. The forestalling of the operation of the alarm device is effected through preventive means under the control of other provisions which, when operated, serve to retard the vehicle or train. This alarm device is
90 designed to be of such a distinctive character that it positively attracts the attention of the engine driver and also the train crew and passengers. Thus, the control of the train is left with the engine driver but he is induced
95 to exercise increased watchfulness and is made to realize the consequences of his act when entering or about to enter a danger zone of the track. Means are also provided to prevent power being applied by the engine driver to the vehicle for a predetermined
100 time interval after said preventive means have been operated. Thus, after the engine driver has retarded his vehicle and cut out the alarm device in response to a
105 suggestion or indication of danger ahead he must wait for a certain interval of time before he is at liberty to apply power to speed up his vehicle again. This arrangement provides an additional feature of
110

safety. In the preferred arrangement a signal is employed to indicate to the engine driver when travel is dangerous and it is arranged to give its warning at the entering end of a track zone when travel in such zone is dangerous. It is obvious that the signal with which the alarm device is associated may be a full stop or a cautionary signal. In either case, when the signal gives its warning indication, it is to be understood that the track zone guarded by the signal is "dangerous" or is a "danger zone" as these terms are herein used.

The invention may be embodied in various forms. It is not restricted to any special type of alarm device nor any special type of signal. This alarm device may be stationed on the trackway or it may be located on the engine or at other points on the train. Nor is the invention to be restricted to any special means for controlling or operating the signal or alarm device.

The invention is shown in one of its various embodiments in the accompanying drawings.

Figure 1 is a diagrammatic representation of the system. Fig. 2 is an enlarged view showing a vehicle on which certain devices of the system are carried. Fig. 3 is an enlarged sectional view of a circuit closing device.

Referring now to this particular embodiment of the invention, as shown in the drawings, 1, 2 and 3 are track sections insulated from each other, track sections 1 and 2 being provided with the usual track circuits in the former of which is the track magnet 4, and in the latter of which is the track magnet 5.

6 is a signal of the semaphore type located on the trackway at the entering end of track section 1 and arranged to stand normally at safety. The signal is shown as operated by a solenoid 9 or other type of motor, the circuit of which is normally closed and extends from generator 7, through wire 8, solenoid 9, wire 10, contact point 11, contact finger 12 of magnet 14, and wire 15 back to generator 7.

16 and 17 are two contact rails on the trackway connected, respectively, by wires 18 and 19 with contact points 20 and 21 which are normally in electrical connection by means of the contact 22 carried on the blade of the semaphore 6. Magnet 23 is normally energized by a circuit which includes generator 7, wire 24, contact rail 17, to which it is connected, wire 19, contacts 21, 22 and 20, wire 18, contact rail 16, wire 25, connected with contact rail 16, magnet 23, wire 26 back to generator 7. It will be seen that this circuit is closed when the semaphore is in safety position and broken when the semaphore is in danger position.

27 is an alarm device preferably located

on the trackway in proximity to the semaphore 6. It may be embodied in various forms and it may address itself to the intelligence in any suitable manner, audible or otherwise. It is here shown in the form of an electrically operated gong, the circuit for which extends from generator 7, through wire 28, contacts 29, 30, which are arranged to be connected by the contact 31 on the semaphore blade when the latter is in danger position, thence through wire 32, gong 27, wire 33, contact point 34, contact finger 35 of magnet 23, wire 36, contact point 37, contact finger 38 of track magnet 5 and wire 39 back to generator 7. This circuit is normally open at three points, namely, at contacts 29, 30, at contact finger 35 and at contact finger 38. Contact rail 17 is connected with wire 25 through wire 40, contact finger 41 of magnet 5, contact 42, wire 43, contact finger 44 of magnet 23, and contact point 45.

46 is a car traveling on the track in the direction of the arrow. Mounted on the car 46 is a treadle 47 arranged to operate a shoe 48 capable of bridging the contact rails 16 and 17 and thereby connect them electrically together. Connected with the treadle is an arm 49 which operates a link 50 having a slot 51 through which passes a pin on the lever 52. This lever controls the motive power or brakes, or both, of the vehicle or train and must be first pulled back to retard the vehicle or train before the shoe may be depressed. The shoe 44 is normally elevated above the contact rails and is designed to be depressed into contact therewith by the engine driver on the car 46 but he is unable to perform this act until the lever 52 has been pulled back to retard the car. It will be seen that the lever 52 may be operated independently of or without depressing the shoe 47.

Associated with the lever 52 are means to prevent power being applied by the engine driver to the vehicle for a predetermined time interval after the treadle 47 has been depressed to cut out the alarm device. This means may be embodied in various forms and variously arranged. In the present instance, the link 50 has an extension 53 carrying a shoulder piece 54 arranged to be engaged by the core 55 of the solenoid 56. This solenoid is energized by a circuit 57 having a switch 58. This switch is arranged to be closed by a mercury flask 59 pivotally mounted on a bracket 60. This flask is arranged to be tilted to and fro on its pivot by means of the link 61 connected at one end to the arm 49 and at its other end with the lever 62 connected with the flask. Within the flask is a body of mercury 63 adapted to flow from one end of the flask to the other through an orifice 64 in a partition 65 which divides the flask into two chambers. At one

end of the flask is a resilient diaphragm 66 carrying a stud 67. In the normal position of the parts, as shown in the drawings, the flask is tilted up so that the mercury rests at the bottom of the flask. When the treadle is pressed down the flask turns on its axis so as to bring the stud into contact with the switch 58. The mercury then runs through the orifice 64 to bear against the diaphragm 66 and thereby thrust outward the stud 67 so as to close the switch 58. The arrangement is such that the switch does not close until substantially all of the mercury has passed through the orifice 64 to bear against the diaphragm. Thus, a substantial and predetermined interval of time must elapse after the treadle has been depressed before the switch 58 is closed. This time interval may be varied by changing the size of the orifice 64 or in other ways. By the arrangement described, it will, therefore, be seen that after the lever 52 has been pulled back to retard the vehicle and the treadle 47 has been depressed to forestall the operation of the alarm device, lever 52 cannot be immediately pushed over to apply power to the vehicle because solenoid core 55 has engaged shoulder piece 54 thereby locking lever 52 in its backward position. Solenoid 56 must first be energized to release link 50 before the lever 52 can be pushed over and this cannot take place until sufficient time has elapsed for the mercury in the flask 59 to pass through the orifice 64 and effect the closing of the switch 58. When this operation of the mercury flask has taken place, lever 52 is unlocked and may then be pushed over to apply power to the vehicle.

The operation of the system is as follows: When the train approaches and passes the semaphore 6 while the semaphore is in safety position, the alarm device does not operate because when the train reaches track section 2, it merely deenergizes magnet 5 and closes at contact finger 38 only one of the three breaks normally in the circuit of the alarm device 27 heretofore pointed out, and because when the train passes on to track section 1, it merely deenergizes track magnet 4, thereby breaking the signal circuit and permitting the semaphore to drop to danger position. When the train has passed beyond track section 1 and the track portion guarded by the signal, the signal returns to safety position with the circuits and devices in normal condition. If the signal is in danger position and the engine driver, having noted this fact, desires to pass the signal notwithstanding its danger indication, he must first pull back his lever 52 to bring his train under control and thereby release his treadle. When the treadle has been thus released, the engine driver then depresses the shoe 48 into connection with contact

rails 16 and 17. This closes the circuit of the magnet 23, which was broken at contacts 20, 21 and 22 when the signal moved from safety position, and thereby keeps the circuit of the alarm device open at contact finger 35. When the train proceeds on to track section 2, it deenergizes track magnet 5 and drops contact fingers 38 and 41. Magnet 23 is so constructed as to have a slow release so that, when the train passes off of section 3 and on to track section 2 and beyond contact rails 16 and 17, contact finger 41 will have dropped before contact fingers 35 and 44 are able to drop. By this arrangement, magnet 23 remains energized when the train is on track section 2 and the alarm device is cut out by the break in its circuit at contact finger 35 and remains cut out. When the train is on track section 2, the circuit of magnet 23 may be traced from generator 7, through wire 24, contact rail 17, wire 40, contact finger 41, contact point 42, wire 43, contact finger 44, contact point 45, wire 46, magnet 23, wire 26 back to generator 7. Thus, the operation of the alarm device may be prevented by the action of the engine driver after he has retarded his train. If, however, the signal is at danger and the engine driver fails to note its indication, he will fail to see that the alarm device is cut out and without having depressed the shoe 48, will pass on to track section 2. Under this situation, the magnet 23 will be deenergized because the semaphore 6 has broken the circuit of this magnet at contacts 20, 21 and 22 by its movement to danger position. This causes two of the breaks in the circuit of the alarm device, namely, the break at contact finger 35 and the break at contacts 29, 30. When, therefore, the train having passed on to track section 2 deenergizes track magnet 5, and drops contact finger 38, it closes the remaining break in the circuit of the alarm device and the latter is set in operation.

The warning produced by the operation of the alarm device is of so distinctive a character that it is designed to attract the attention of the engine driver and also the attention of other members of the train crew and the passengers so that the negligent act of the engine driver is known to other persons on the train who may operate the engine whistle or apply the emergency brake. It is this possibility of thus setting the alarm device in operation that is calculated to make the engine driver attentive and watchful of his signals so that he may not unknowingly pass a signal at danger position or enter a danger zone.

After the vehicle has been retarded by pulling back lever 52 and the treadle has been depressed to forestall the operation of the alarm device, lever 52 cannot be pushed forward to apply power to the vehicle until a predetermined time interval has elapsed

due to the retarded energization of solenoid 56, as has been described in the foregoing. This requires the engine driver not only to retard his train before cutting out the alarm device, but requires him thereafter to wait a suitable interval before again acquiring speed.

The invention may be associated with a signal standing normally at danger as well as to one standing at safety. Also to a signal located on the vehicle as well as on the trackway and also to a signal whose indication is given otherwise than by changes in position.

The term "danger condition" of a signal or semaphore, as herein shown, means a cautionary or any condition other than safety, and may indicate that the train or vehicle should stop immediately or slow down or be prepared to stop.

What I claim is:—

1. In a vehicle control system, the combination of an alarm device; vehicle controlled means for operating the alarm device; preventive means to forestall the operation of the alarm device; retarding means for the vehicle controlling said preventive means; and means to prevent power being applied to the vehicle for a predetermined time interval after said preventive means have been operated.

2. In a vehicle control system, the combination of an alarm device located on the trackway; vehicle controlled means for operating the alarm device; preventive means to forestall the operation of the alarm device; retarding means for the vehicle controlling said preventive means; and means to prevent power being applied to the vehicle for a predetermined time interval after said preventive means have been operated.

3. In a vehicle control system, the combination of an alarm device; vehicle controlled means for operating the alarm device; preventive means on the vehicle to forestall the operation of the alarm device; retarding means for the vehicle controlling said preventive means; and means to prevent power being applied to the vehicle for a predetermined time interval after said preventive means have been operated.

4. In a vehicle control system, the combination of an alarm device located on the trackway; vehicle controlled means for operating the alarm device; preventive means on the vehicle to forestall the operation of the alarm device; retarding means for the vehicle controlling said preventive means; and means to prevent power being applied to the vehicle for a predetermined time interval after said preventive means have been operated.

5. In a vehicle control system, the combination of a signal; an alarm device operable

when the signal is in a predetermined condition of indication; vehicle controlled means for operating the alarm device when the signal is in said condition of indication; preventive means to forestall the operation of the alarm device; retarding means for the vehicle controlling said preventive means; and means to prevent power being applied to the vehicle for a predetermined time interval after said preventive means have been operated.

6. In a vehicle control system, the combination of a signal; an alarm device located on the trackway and operable when the signal is in a predetermined condition of indication; vehicle controlled means for operating the alarm device when the signal is in said condition of indication; preventive means to forestall the operation of the alarm device; retarding means for the vehicle controlling said preventive means; and means to prevent power being applied to the vehicle for a predetermined time interval after said preventive means have been operated.

7. In a vehicle control system, the combination of a signal; an alarm device operable when the signal is in a predetermined condition of indication; vehicle controlled means for operating the alarm device when the signal is in said condition of indication; preventive means on the vehicle to forestall the operation of the alarm device; retarding means for the vehicle controlling said preventive means; and means to prevent power being applied to the vehicle for a predetermined time interval after said preventive means have been operated.

8. In a vehicle control system, the combination of a signal; an alarm device located on the trackway and operable when the signal is in a predetermined condition of indication; vehicle controlled means for operating the alarm device when the signal is in said condition of indication; preventive means on the vehicle to forestall the operation of the alarm device; retarding means for the vehicle controlling said preventive means; and means to prevent power being applied to the vehicle for a predetermined time interval after said preventive means have been operated.

9. In a vehicle control system, the combination of an alarm device; vehicle controlled means, including a track circuit, for operating the alarm device; preventive means to forestall the operation of the alarm device; retarding means for the vehicle controlling said preventive means; and means to prevent power being applied to the vehicle for a predetermined time interval after said preventive means have been operated.

10. In a vehicle control system, the combination of a signal; a track circuit controlling said signal; an alarm device operable

when the signal is in a predetermined condition of indication; vehicle controlled means, including a track circuit, for operating the alarm device when the signal is in said condition of indication; preventive means to forestall the operation of the alarm device; retarding means for the vehicle controlling said preventive means; and means to prevent power being applied to the vehicle for a predetermined time interval after said preventive means have been operated.

11. In a vehicle control system, the combination of an alarm device; vehicle controlled means for operating the alarm device; preventive means to forestall the operation of the alarm device; retarding means for the vehicle controlling said preventive means and operable independently thereof; and means to prevent power being applied to the vehicle for a predetermined time interval after said preventive means have been operated.

12. In a vehicle control system, the combination of an alarm device located on the trackway; vehicle controlled means for operating the alarm device; preventive means to forestall the operation of the alarm device; retarding means for the vehicle controlling said preventive means and operable independently thereof; and means to prevent power being applied to the vehicle for a predetermined time interval after said preventive means have been operated.

13. In a vehicle control system, the combination of a signal; an alarm device operable

when the signal is in a predetermined condition of indication; vehicle controlled means for operating the alarm device when the signal is in said condition of indication; preventive means to forestall the operation of the alarm device; retarding means for the vehicle controlling said preventive means and operable independently thereof; and means to prevent power being applied to the vehicle for a predetermined time interval after said preventive means have been operated.

14. In a vehicle control system, the combination of a signal; an alarm device located on the trackway and operable when the signal is in a predetermined condition of indication; vehicle controlled means for operating the alarm device when the signal is in said condition of indication; preventive means to forestall the operation of the alarm device; retarding means for the vehicle controlling said preventive means and operable independently thereof; and means to prevent power being applied to the vehicle for a predetermined time interval after said preventive means have been operated.

This specification signed and witnessed this 16th day of January, A. D., 1913.

JOHN T. CADE.

Signed in the presence of—

IDA G. GILMORE,
WORTHINGTON CAMPBELL.