F. E. BUTTON.

SYSTEM FOR CONTROLLING THE MOVEMENTS OF VEHICLES.

APPLICATION FILED MAR. 28, 1912.

1,167,333.

Patented Jan. 4, 1916.

2 SHEETS—SHEET 1.

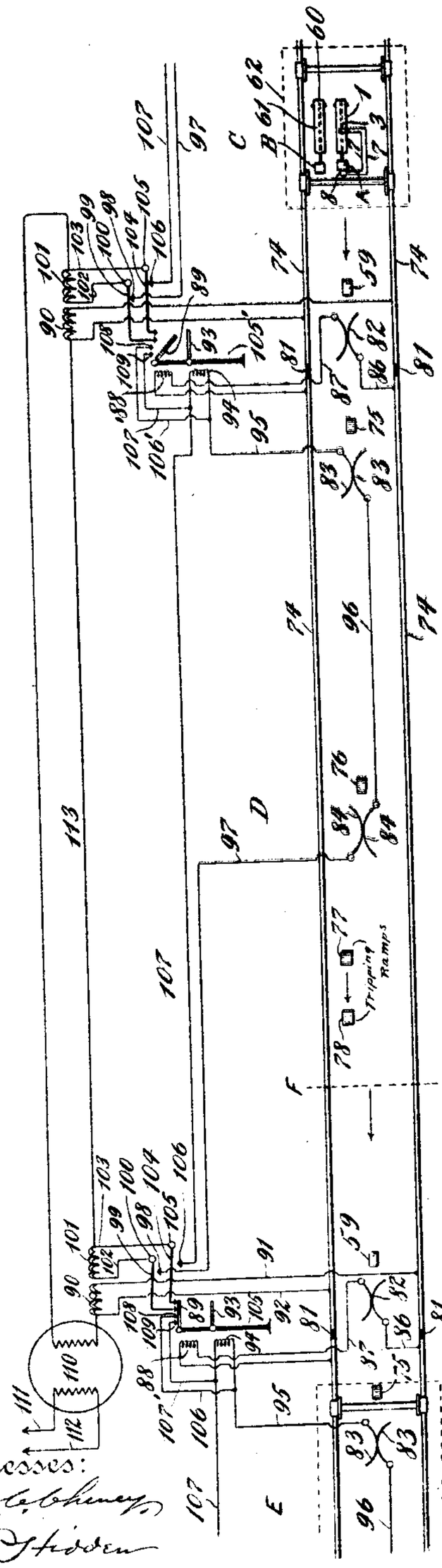

Fig. 1.

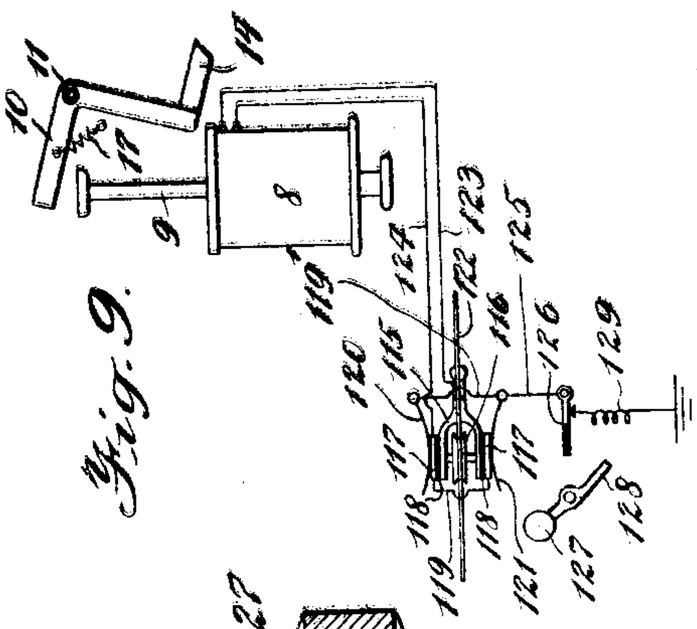

Fig. 9.

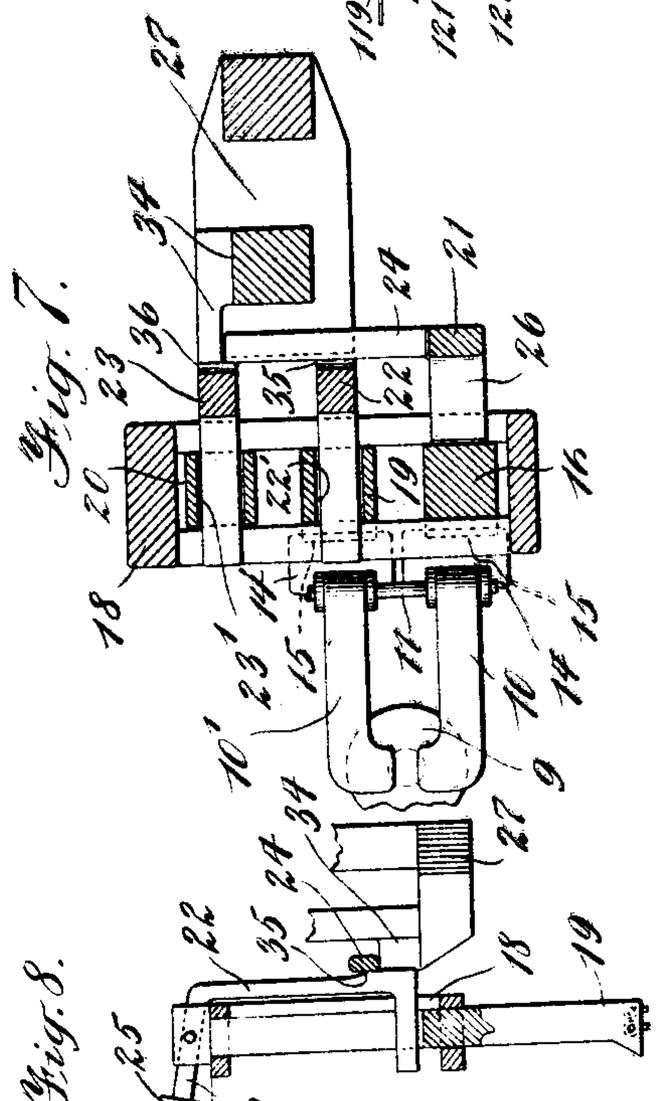

Fig. 7.

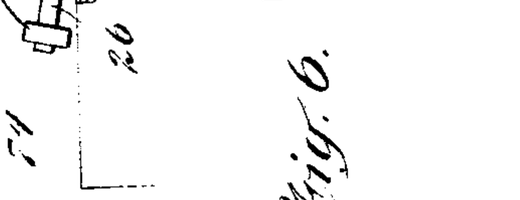

Fig. 8.



Fig. 6.

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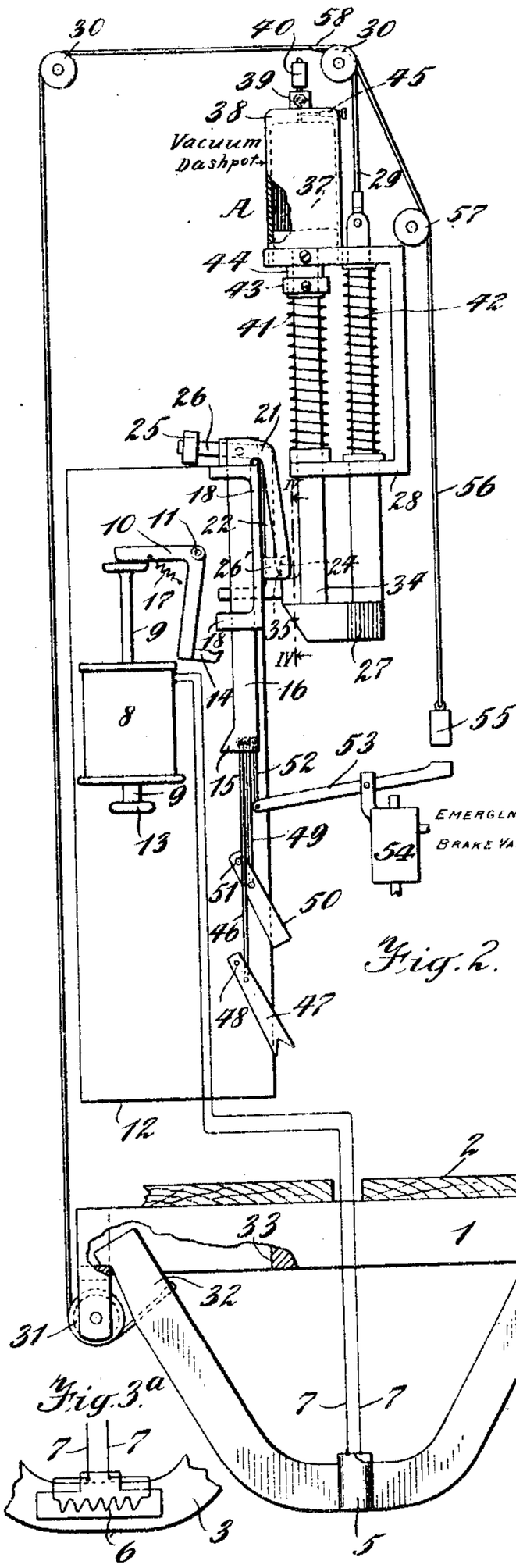


Fig. 2.

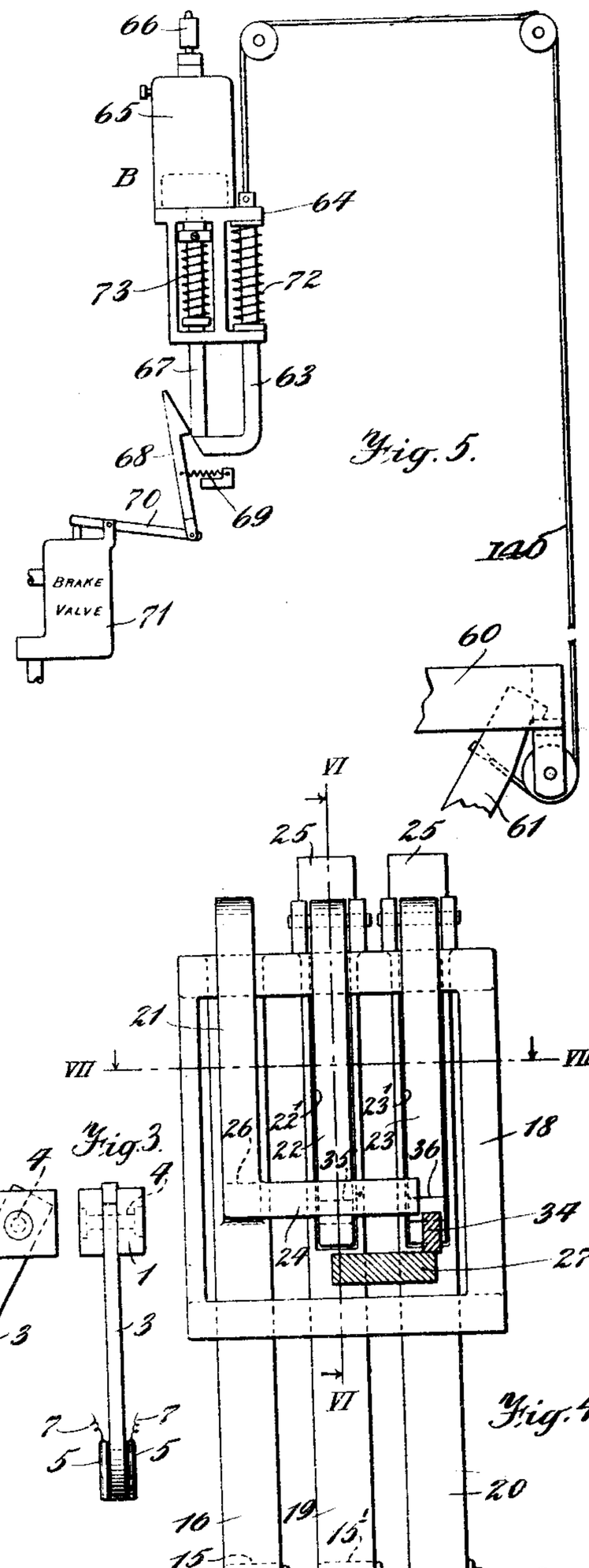


Fig. 5.

Fig. 3.

Fig. 3a.

Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## SYSTEM FOR CONTROLLING THE MOVEMENTS OF VEHICLES.

1,167,333. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed March 28, 1912. Serial No. 686,752.

*To all whom it may concern:*

Be it known that I, FRANK E. BUTTON, a citizen of the United States, residing at the city of New York, in the borough of Brooklyn and State of New York, have invented certain new and useful Improvements in Systems for Controlling the Movements of Vehicles, of which the following is a full, clear, and exact description.

This invention relates to a system for controlling the movements of vehicles such as trains, trolley cars and the like, and has for one of its objects the provision of novel means for automatically controlling the movements of such vehicles when the speed thereof is in excess of a determined amount while traversing the space interval defined by two points along the trackway.

Another object of the invention is to provide a block system for automatically controlling the movements of a train or car entering, or traversing a block already occupied by another vehicle.

Still another object is to provide the system with such a degree of flexibility that the allowed rate of speed of the vehicle when approaching one danger point may be different from that allowed for the approach toward another danger point.

These and other objects will be hereinafter referred to, and the novel elements and combinations of elements whereby they may be attained will be more particularly set forth in the claims appended hereto.

I am aware of various changes and modifications which may be made within the purview of my invention and without departing from the spirit thereof, and I hence desire to be limited only by the scope of the said claims.

In the accompanying drawings which form a part hereof and in which like reference characters designate like parts throughout the several views, I have shown certain preferred embodiments of my system, but these are to be taken merely by way of exemplification and are not to be construed as limiting the scope of my invention in any way.

Referring to said drawings: Figure 1 is a diagrammatic representation of a section or block of a system of the character in question. Fig. 2 is a somewhat diagrammatic representation of the apparatus carried by, for example, an engine or car. Fig. 3 is an end view of an operating shoe and attached parts which form a part of said apparatus. Fig. 3ª is a detail of a modification of an electrical element carried by said shoe. Fig. 4 is a detail section of another portion of said apparatus, the section being taken on line IV—IV of Fig. 2. Fig. 5 is a fragmentary view of certain auxiliary apparatus adapted for use in connection with the block system. Fig. 6 is a vertical section of the apparatus shown in Fig. 4, the section being taken on line VI—VI of said figure. Fig. 7 is a horizontal detail section of the same, taken on line VII—VII of Fig. 4. Fig. 8 is a fragmentary view of a modified portion of the system shown in Fig. 1. Fig. 9 illustrates the application of the system to trolley cars and the like.

Considering first the elements shown in Fig. 2, a supporting frame or hanger 1 is secured in any suitable manner to a portion 2 of a car or other vehicle, and has pivoted thereto an operating member or shoe 3, the pivotal connection being shown at 4. The shoe carries means for completing or influencing an electric circuit, such for example as the contact plates 5, or the induction coil or appliance 6 (shown in Fig. 3ª). The car or cab portion of this circuit, which will be hereinafter referred to as the cab circuit, comprises the wires 7 and an electro-magnetic releasing device 8, which latter may be for example a solenoid, provided with a core 9. The upper extremity of this core is adapted for engagement with one arm of a Z shaped detent or latch 10, which is pivotally mounted upon a fixed support 11. These latter parts, if desired may be mounted upon a board 12; a stop 13, also secured to said board, serving to limit the downward movement of the core 9. The detent has a laterally directed finger or portion 14 adapted for engagement with a lug or extension 15, upon a reciprocally mounted rod 16. This lug and the finger 14 are so shaped that an upward movement of the rod 16, forces the detent aside, after which the finger is swung, by means of a spring 17, for example, back into the path of the lug, to engage the latter when it again starts to descend. The rod or plunger 16 is one of three such elements similarly mounted in a frame 18, secured to the board 12,

the others respectively being designated 19 and 20. Fig. 4 shows an elevation of this frame with the rods in position therein; and it will be observed that rods 19 and 20 are bifurcated at their upper extermities for the reception of pivoted dogs, while rod 16 carries a fixed dog, said dogs being respectively designated 21, 22 and 23. The fixed dog 21 carries a cross bar or shield 24 which laterally projects therefrom and is adapted to hold the longer or depending legs of the pivoted dogs 22, 23 back in substantial parallelism with the rods to which they are attached. The pivoted dogs are arranged to have a bias toward an outer position, the means employed to this end in the present instance being the weights 25, one of which is mounted upon a laterally directed arm 26 of each of said pivoted dogs. The lower extremity of the obliquely extending fixed dog may be offset as at 26′ and directly secured to the middle of the rod or plunger 16. In front of the dogs is the apparatus for displacing the same, which has been broadly designated A, and comprises, in the present instance, a primary lifting or displacing element or hook 27, preferably mounted for reciprocation in a frame or support 28. A flexible connection *e. g.* a wire rope 29 extends from this hook upwardly around idlers 30, and downwardly around an idler 31, into engagement with the free end 32 of the shoe 3. The corresponding extremity of the beam or frame 1 may be slotted as at 33 to serve as a guide for this end; and when the shoe is raised, by its engagement with one or the ramps hereinafter referred to, the upward movement of the end 32 will pull the hook 27 upwardly through the intermediacy of said flexible connection. The laterally extending or hooked end of the member 27, normally supports the somewhat similarly shaped lower extremity of a secondary lifting or displaceable element or hook 34. The extremity of hook 34 extends in beyond the end of shield 24, so that when the element 27 is elevated in the manner above described, the element 34, normally carried upwardly thereby, will pass the extremity of the shield and hook 27 will then co-act with the dog 21 and lift rod 16. At the bottom of the pivoted dog 22 is a projection or boss 35 which normally engages this shield when the rod 16 is in substantially its lowermost position. Correspondingly a projection 36 upon the lower extremity of the dog 23 in like manner is adapted for engagement with said shield. Boss 36 however also is adapted for engagement with the laterally bent end of the hook 34, which projection or boss 35 can never engage, owing to the fact that the said hook is relatively narrow as compared to hook 27, as shown in Fig. 4. When the shield is lifted therefore, in manner aforesaid, it clears the projections 35 and 36 and enables the weight attached to dog 22 to swing the latter out into the path of the hook 27. On the other hand while the corresponding weight attached to the pivoted dog 23 tends in like manner to drive this dog outwardly, since the lateral face of hook 34 extends out at least as far as hook 27 at this point, the latter can never engage dog 23 as long as hook 34 is substantially in contact with hook 27. The dogs 22 and 23 are each provided with rearwardly bent ends which move in slots 22′—23′ in the rods 19 and 20, the walls of said slots serving as guides for these dogs.

The stem of the secondary hook or element 34, like that of the primary hook 27, extends through portions of the frame 28 and carries at its upper extremity a piston head 37. This latter rides in a dash pot cylinder 38 of any suitable construction, the dash pot being preferably, but obviously not necessarily, of the so called vacuum type. The piston fits snugly within cylinder 38 and an upward movement of the secondary hook displaces air from said cylinder through, for example, a ball check valve 39. Above this valve is a signal whistle 40 which sounds when the air is expelled therethrough, and serves to notify the engineer or driver of the vehicle every time that the secondary hook 34 is forcibly upwardly displaced. This secondary hook or element is normally urged downwardly by a spring 41, or the like, while the primary hook may correspondingly be given a bias toward its lowermost position by means of a spring 42. The force of the spring 41 is preferably made adjustable as by means of an adjustable collar, 43, upon a downwardly projecting part or nipple 44 of the cylinder 38, against which the upper end of spring 41 bears. Downward movement of the element 34 is resisted by atmospheric pressure, and a valve 45 in the dash pot cylinder permits of regulation of the readmission of air thereinto; so that the speed of descent of the piston may be determined or regulated to a nicety. The rod 19, it may be here stated, is also provided with a lug 15′ which corresponds to the lug 15 previously referred to in connection with rod 16, and the hooked lower extremity 14′ of a second detent 10′ is adapted to latch the rod 19 in its upper position in the same way that the rod 16 is held when moved upwardly past the latching point. The upper extremity of the core 9 is adapted for engagement with both of these latches so that when the coil 8 is energized both the rods 16 and 19 are released simultaneously, although each can be latched separately. Secured to the lower extremity of rod 16 is a wire 46 the lower end of which is connected to a caution signal 47, pivoted

at 48 to the board 12. Similarly a wire 49 connects rod 19 with a danger signal 50, pivoted at 51 to said board; while a third wire 52 connects the rod 20 to the operating lever 53 of the emergency brake valve 54 of the vehicle; any suitable known air-brake system, for example, being provided in connection with this valve. Finally an emergency drop weight 55 is secured to a wire rope 56, or the like, which extends upwardly over an idler 57 and is spliced into or secured to the flexible connection 29, as at 58.

*Operation of device A and connected parts.*—The operation of the above described mechanism is as follows: When the shoe 3 is drawn over one of the ramps, hereinafter referred to, the hook 27 will be drawn upwardly through the instrumentality of the rope 29, elevating hook 34, and compressing springs 41 and 42. Hook 27 lifts the rod 16 by reason of its engagement with the shield 24 attached to dog 21, and the latter in turn actuates the caution signal 47. During the lifting operation the whistle 40 is blown directing the attention of the engineer to the apparatus. The rod 16 when substantially fully raised is latched by the detent 10, and the signal 47 hence remains set at caution. If the cab circuit is thereafter energized the detent will be tripped and the signal 47 will be lowered. Now if on the other hand the cab circuit be not energized and the shoe be caused to encounter a second ramp, hook 27 having, of course, descended, then dog 22 will no longer be shielded and hence will be engaged by the reascending hook 27, so that the danger signal 50 will be set through the intermediation of the rod 19 and wire 49; rod 19 in turn being latched by detent 10′. If a third ramp be encountered before the coil 8 is energized, the third rod 20 will not be lifted so long as hook 34 has had time to descend substantially into engagement with hook 27; but if the speed of the vehicle be such that the third ramp forces shoe 3 upwardly while hook 34 is still descending (and a number of seconds may be consumed during its descent) then the third dog 23 will not be shielded by hook 34 and hook 27 will engage its lower extremity and thereby elevate the rod 20 to which the emergency brake valve operating lever is attached, setting the brakes and stopping the train or vehicle. Assuming now that the flexible element or rope 29 breaks, the weight 55 will fall and in engaging the rearwardly directed arm of the lever 53, immediately therebeneath, will at once set the brake.

*Speed limit device B.*—In Fig. 5 I have shown diagramatically the details of a second mechanism similar in many respects to that just discussed. A frame 60 and shoe 61 similar in all respects to those designated 1 and 3, are provided, being preferably disposed to one side thereof as shown upon the car 62 indicated in dotted lines in Fig. 1. A flexible connection 140, leads from the shoe 61 to a primary element or hook 63. This is mounted in a frame 64 which carries a dash pot 65, similar in all respects to that previously described. The whistle 66 above the dash pot 65 may, however, have a different tone from whistle 40; but it is sounded in the same fashion by the ascent of a secondary element 67, which latter in the present case is not hooked. A detent 68 is adapted for engagement with the extremity of hook 63 being urged thereagainst by a spring 69. The lower end of detent 68 is connected to the operating lever 70 of the brake valve 71. The detent, however, is normally prevented from operatively engaging the hook 63 by the element 67, the lower end of which acts as a shield. If now the shoe ramp 61 be raised, the primary and secondary elements will be elevated, the former to again descend together with the shoe by reason of the spring 72 disposed thereabout, while the secondary element descends comparatively slowly owing to the restraining action of its dash pot, it nevertheless being urged downwardly by its spring 73. If the shoe encounters a second ramp before the secondary or shielding element has had an opportunity to descend, then the operating lever 70 will be tripped by the again ascending hook 63, and the brakes will be set. This obviously affords a means for limiting the speed of a vehicle between given points, the distance between the ramps being the normally variable factor while the speed of descent of the secondary or shielding element will normally be constant.

*General arrangement of the system.*—Referring now to Fig. 1, wherein are shown diagrammatically the circuit and track devices used in connection with the automatic speed limit, train-stop and cab signal system, the car 62, above referred to, is shown upon the rails 74, and is assumed to be moving in the direction of the arrow in front thereof. This car is equipped with devices A and B previously described, shoes 3 and 61, cab circuit leads 7, the releasing solenoid 8, etc., the frame 1 of the shoe 3 being substantially in the middle of the car, with the shoe 61 to one side of the same, shoe 3 being adapted for engagement with the track ramps 59, 75 and 76, while shoe 61 correspondingly may engage the ramps 77 and 78, when the car is traveling in the indicated direction. The rails are provided with the usual block insulators 81 and preferably midway between said rails are contact devices 82, 83 and 84, or their equivalents, *e. g.* the inductors 85; the generic term "circuit influencing means" being hereinafter ap-

plied in the claims to said contact devices or their equivalents, to avoid undue limitation in said claims. Connections 86 are provided between each of the said circuit influencing means or contacts 82, (of which there is at least one at the entrance to each block) and a section of one of the track rails, preferably, in each case, at a point adjacent the respective insulator 81. Connections 87 are also provided from the other side of said means to the operating coil 88 of a block danger signal 89, and from thence back to the opposite track rail section. Coil 88 is normally energized, current being derived from a series transformer 90 or the like, connection 91—92 extending from said transformer to the distant end of the respective rail sections above referred to; or in other words at the exit end of the block.

The signals 89 may be of the common gravity actuated type that shown at the entrance to block D, assuming that the car 61 be moving from block C into block D, being held out of its danger indicating position by the energized coil 88, while that at the entrance to block E, is at danger, by reason of the deënergization of its coil 88, for reasons hereinafter noted. Below the danger signals 89 are the usual caution signals 93, which are controlled in like manner by operating coils 94. The latter are each connected by wire 95 to one of the contacts 83, the other side of each of which latter is in turn connected via wire or lead 96 with one of the third set of contacts 84; a connection 97 extending thence to a contact 98 which is adapted for engagement with a contact arm 99, the latter being pivotally mounted at 100. The arm 99, in each case, is electrically conductive and is in turn connected to a series transformer 101 or the like via a wire 102; the circuit being completed, when operative, through a lead 103, second conductive contact arm 104 which is pivoted at 105, contact 106, and lead 107 which extends back to the coil 94. When danger signal 89 is at danger, *i. e.* horizontally disposed, this circuit through a given coil 94 is interrupted, the signal arm at the other end of the block lifting contact arms 99 and 104 and thus interrupting the circuit at both 98 and 106. At the same time, owing to the fact that each signal arm 89 is made electrically conductive at the inner end thereof, the coil 94, which controls the caution signal 93, mounted upon the same post 105′, is short circuited since a wire 106′ taps into wire 95 while a wire 107′ is similarly connected to lead 107, wires 106′ and 107′ respectively terminating in contacts 108—109 which are adapted for engagement with the conductive portion of said signal arm 89. the primaries of the series transformers 90 and 101 are each in circuit with the secondary of a constant current transformer 110, the primary leads of which latter are indicated at 111—112; the secondary circuit being broadly designated 113.

*Operation of the system as a whole.*—The operation of the system when operating cab signals and as a train stop for over-run danger signals, is as follows: Let us assume that a car or train 62′ has entered block E. The circuit which includes the transformer 90 of this circuit (not shown) and the contacts 82 at the entrance to said circuit will be shorted by the car wheels and axles of said car, so that the coil 88 in said circuit will be substantially deënergized. Danger signal 89 will be raised, short circuiting the caution signal coil 94 immediately therebelow. The elevation of the danger signal interrupts the circuit which includes coil 94 at the entrance of block D, and the driver of car or train 62 will be visually notified of the presence of a train ahead in the usual manner. As the car or train is about to enter block D, shoe 3 depending therefrom encounters ramp 59 in block C. This operates the cab mechanism A, blowing whistle 40, and setting the caution signal 47 in the manner above described. The shoe 3 and hook 27 immediately return to normal position, caution signal 47 remaining set through the action of detent 10, and the secondary element or hook 34 moving downwardly at a determined rate, being retarded a number of seconds behind hook 27 by the dash pot. As the contact plates 5, attached to shoe 3 pass the contactor or contacts 82 which are energized by transformer 90, at the distant end of the block D, the solenoid 8 operates to trip the detent 10 and release the signal to clear. Track ramp 75 is next encountered and re-sets the caution signal in the cab; this signal being carried until mid block provided the circuit including contacts 83 and 84 deënergized where track ramp 76 sets the danger signal 50, and if contactor 84 is still deënergized as shown, owing to the block ahead being occupied, or for any other reason, then both signals are carried until substantially the end of block D is reached, when the train should be under control or running, let us say, less than 5 or 6 miles per hour. If running in excess of this speed, the track ramp 59 at the end of block D operates the cab device A to lift the member 34, and the second ramp 75 will lift the air brake valve lever 53, as the space between ramps 59 and 75 in advance thereof is such that the shield for the dog 23, *i. e.*, the hooked end of the element 34, is retarded by the dash pot and allows the hook 27 to engage said dog, as previously described. If however the block ahead has cleared during the time elapsed since the danger signal was received at mid-block ramp 76, then contactor 82 becomes energized and the solenoid 8 operates to clear both signals, while the

cross-bar or shield 24, attached to dog 21, shields the hinged dogs 22 and 23 so that the ramp 75 merely resets the caution signal, which may or may not be carried to the middle of the next block, depending on whether or not the contactor 83 at the beginning of block E is energized.

Speed control for curves, draw-bridges and cross-overs or for any definite space interval defined by two points along the trackway is exercised by the apparatus B and associated parts, this apparatus being much the same in its mode of operation as the apparatus or device A, except for the parts used in connection with the cab signals.

Assuming that the dotted line F marks a danger point and that the train is moving toward the left, as before. Shoe 61 will first ride up on the ramp 77, spaced some distance back of F and will elevate the hook 63 and plunger shield 67 of apparatus B. Hook 63 will fall immediately together with its governing shoe, while the shield will fall more slowly under the restraining action of its dash pot. If the train be under control and running less than the speed determined upon as the speed limit for this point along the track, the shield will have time within which to reach its shielding position, otherwise the brake valve 71 will be operated when shoe 61 passes ramp 78. The spacing apart of these ramps hence determines the speed limit at the point in question, without necessitating any re-adjustment of the elements carried by the cab, and this limit may be any where from one to 60 miles per hour, according to the exigencies of the case.

The above description applying to the cab signals and train stop for over run danger signals, covers a permissive system in as much as the train stop is non-operative if the train is under control or running less than 5 or 6 miles per hour; but the system may be made absolute if desired, and I hence do not desire to be limited to a permissive system, although the latter is usually to be preferred. If inductors 85 and induction coils 6 be used in lieu of the contact devices, electrical contact to the moving train of course becomes unnecessary; the passage of a coil 6 past an inductor energizing said coil, the current through the inductor being controlled by the presence or absence of a train in advance in precisely the same manner as when contacts are employed.

While in the exemplification discussed the signal controlling shoe 3 and the ramps 59, etc., which co-act therewith have been placed centrally of the vehicle, it will be understood that this arrangement will usually only be resorted to when the traffic over the rails is normally undirectional.

I particularly desire to emphasize the importance of the novel time element mechanism herein described, wherein the time limit is fixed and may be made the same for all engines carrying the device, the spacing of the ramps at different points along the road being variable and alone determining the allowed speed of the train at such points.

*System as applied to trolley cars and the like.*—In Fig. 9 I have diagrammatically illustrated the harp 115 of a trolley pole carrying the usual wheel 116, but being further provided with contacts 117, preferably one upon either side of the harp, and insulatedly spaced therefrom as at 118. These contacts may be electrically connected as by a wire 119, and are adapted for engagement with the spring contacts 120—121, which latter correspond in certain respects to the contacts 83—84, etc., previously described. Contacts 120—121 are normally deënergized, but when, providing the track is clear, the trolley harp passes between these contacts, current passes from the trolley wire 122, through the lead 123, latch tripping solenoid 8 of apparatus A, lead 124, to one of the contacts 117; thence via wire 119, the second contact 117 and contact 121, or via wire 119′ direct, to lead 125. As long as the signal 127 is clear, the arm 128 thereof is out of engagement with the switch arm, and the switch is closed. Hence the current through lead 125 passes through switch 126 and resistance 129 to ground. When however the signal is at caution or danger, switch 126 will be opened by arm 128 and the solenoid 8 will remain deënergized.

The car will of course be provided with the various parts of the apparatus A as in the case previously described and the sets of contacts 120—121 and connections thereto will in effect merely replace the contacts 82, etc., along the track; track ramps being provided as in the preceding construction.

In the claims the term "governing" member has been used, for want of a better generic term, to cover either a train stop governing member such as the brake valve lever 53, or a member which governs the movements of a vehicle through the instrumentality of the engineer or driver. In other words the "governing" member may govern the train or vehicle direct, or it may be a signal, such as that designated 47 (or 50), and govern or guide the engineer of said train or vehicle.

Having described my invention, I claim:—

1. In combination, a car or train, train controlling means thereon, operating means for said train controlling means located on the car or train, time controlled means on said car or train for controlling the effectiveness of said operating means and means located along the trackway controlling the time controlled means and the operating means.

2. In combination, a car or train, train controlling means thereon, operating means for said train controlling means located on

the car or train, time controlled means on said car or train for controlling the effectiveness of said operating means and means located along the trackway defining a definite space interval controlling the time controlled means and the operating means.

3. In combination, a car or train, a train controlling means, means for operating the same comprising a device along the trackway, time controlled means on the car for controlling the effectiveness of said operating means, and means along the trackway for setting said time controlled means in operation before the train reaches said device.

4. In combination, a car or train, a train controlling device thereon including a movable arm, operating means for said device located on said car or train and including an arm co-acting with said first-mentioned arm, and time controlled means also located on the car or train for controlling the co-action of the arms with each other.

5. In combination, a car or train, train controlling means thereon comprising operating means and time controlled means for controlling the effectiveness of said operating means, means spaced along the trackway co-acting with said train controlling means for effecting the operation of said time controlled means, and for later causing said operating means to act.

6. In combination, train controlling means including operating means, time controlled means for controlling the effectiveness of said operating means, and means electrically controlled operatively associated with said operating means for preventing the operation thereof, and means along the trackway for controlling said operating means and time controlled means, and electrical devices for controlling said electrically controlled means.

7. In combination, a car or train, train controlling means thereon including operating means, and time controlled means for controlling the effectiveness of the operating means, two devices spaced along the trackway with which said train controlling means is adapted to co-act, the co-action of said train controlling means with the first of said devices setting said time controlled means into operation, said time controlled means when operated permitting the actuation of the operating means on passing the second of said devices only when the train reaches the second of said devices in less than a predetermined time interval.

8. In combination, a car, train controlling means thereon comprising operating means and means for controlling the effectiveness of said operating means, said last named means comprising a time controlled means and electro-magnetically controlled means, and means spaced along the trackway controlling said time-controlled means.

9. In combination, a car or train, train controlling means therefor, including means spaced along the track way and time controlled means carried by the car controlled by said means along the track way for preventing the operation of said train controlling means when said train or car passes from one to another of said means along the track way in a greater than a pre-determined time interval.

10. In a railway vehicle control system, brake controlling means, mechanism carried by the vehicle for actuating said means, and means disposed at determined points along the track for actuating said mechanism, said mechanism including two parts having a bias for engagement with each other, means for normally holding said parts out of operative engagement with each other, and time element means for retarding the movement of said holding means toward its normal position when displaced therefrom.

11. In a railway vehicle control system, brake controlling means, and mechanism for actuating said means when the speed of the vehicle at determined points in its path of travel exceeds determined amounts respectively corresponding to each of said points, said mechanism including two parts having a bias for engagement with each other, means for normally holding said parts out of engagement, time element means for retarding the movement of said holding means toward its normal position when displaced therefrom, a series of devices disposed at determined points along the track, and means adapted to successively co-act with said devices to displace said holding means, said devices being spaced apart varying distances, the distance between one of said devices and a succeeding device determining the speed limit of the vehicle at said succeeding device.

12. In a railway vehicle control system, a "governing" member carried by the vehicle, mechanism carried by the vehicle for actuating said member, and means disposed at determined points along the track for actuating said mechanism, said mechanism including two parts having a bias for engagement with each other, means for normally holding said parts out of operative engagement with each other, and time element means for retarding the movement of said holding means toward its normal position when displaced therefrom.

13. In a railway vehicle control system, a "governing" member carried by the vehicle, mechanism carried by the vehicle for actuating said member, and means disposed at determined points along the track for actuating said mechanism as the vehicle passes

such points, said mechanism including two parts having a bias for hooking engagement with each other, shielding means having a bias for a shielding position for normally holding said parts out of said hooking engagement, and time element means for retarding the movement of said holding means toward its normal position when displaced therefrom.

14. In a railway vehicle control system, a "governing" member carried by the vehicle, mechanism carried by the vehicle for actuating said member, and ramps disposed at determined points along the track for actuating said mechanism, said mechanism including two parts having a bias for engagement with each other, movable means, having a bias for a determined position, for normally holding said parts out of operative engagement with each other and means including a dash pot for retarding the movement of said holding means toward said determined position when displaced therefrom.

15. In a railway vehicle control system, a "governing" member carried by the vehicle, mechanism carried by the vehicle for actuating said member, and ramps disposed at determined points along the track for actuating said mechanism, said mechanism including two parts having a bias for engagement with each other, movable means, having a bias for a determined position, for normally holding said parts out of operative engagement with each other, means for retarding the movement of said holding means toward said position when displaced therefrom, and means adapted to co-act with said ramps, as the vehicle passes the latter, for displacing said holding means from said determined position.

16. In a railway vehicle control system, a "governing" device, carried by a vehicle, and means whereby the movement of said vehicle past a determined point at a speed in excess of a determined amount will actuate said "governing" device, said means including two actuating members one of which is located at said point and the other of which is spaced back a determined distance from said point, in the direction from which the vehicle is coming, time element mechanism carried by said vehicle including a part having a bias, when displaced, for returning to a determined position at a determined rate, vehicle carried means, adapted to co-act with the last mentioned actuating member, for displacing said part, said last mentioned means adapted to similarly co-act with said first mentioned actuating member to merely again displace said part if the latter has had time to return to the said determined position, and means, adapted to co-act with the vehicle carried means aforesaid, for actuating said governing device if said part has not returned to said determined position when said point is reached.

17. In a railway vehicle control system, a "governing" member carried by the vehicle, mechanism carried by the vehicle for actuating said member, means disposed at determined points along the track for actuating said mechanism, said mechanism including two parts, one of which has a bias for movement into the path of the other, means for normally holding said part which has a bias for movement into the path of the other, out of said path, time element means for retarding the movement of a part at least of said holding means toward its normal position when displaced therefrom, auxiliary means for holding one of said two parts in a position where it cannot be engaged by the other, means for rendering inoperative said auxiliary holding means, and auxiliary means, portions of which are disposed at determined points along the track, for releasing said auxiliary holding means from the action of said means for rendering it inoperative.

18. In a railway vehicle control system, a "governing" member carried by the vehicle, a device carried by the vehicle for actuating said member, actuating means, portions at least of which are disposed at determined points along the track, for actuating said device, said device including a part normally operable by said actuating means, an element normally inoperable by said means, and means, including a time element mechanism, adapted to co-act with said normally operable part to effect the actuation of said normally inoperable element when said device is successively actuated a plurality of times by said actuating means within less than a determined time interval between such successive actuations.

19. In a railway vehicle control system, a "governing" member carried by the vehicle, a device carried by the vehicle for actuating said member, actuating means, portions at least of which are disposed at determined points along the track, for actuating said device, said device including a part normally operated by said actuating means, an element normally inoperable by said means, means, including a time element mechanism, adapted to co-act with said normally operable part to effect the actuation of said normally inoperable element when said device is successively actuated a plurality of times by said actuating means within less than a determined time interval between such successive actuations, and auxiliary actuating means, comprising a normally effective part located between two of said determined points along the track and a coöperating part carried by said vehicle for rendering nugatory the action of

said means which co-act with said normally operable part.

20. In a railway vehicle control system, a "governing" member carried by the vehicle, a device carried by the vehicle for actuating said member, actuating means, portions at least of which are disposed at determined points along the track, for actuating said device, said device including a part normally inoperable by said actuating means, an element normally operable by said means, means, including a time element mechanism, adapted to co-act with said normally operable part to effect the actuation of said normally inoperable element when said device is successively actuated a plurality of times by said actuating means within less than a determined time interval between such successive actuations, and auxiliary actuating means for rendering nugatory the action of said means which co-act with said normally operable part, said auxiliary means comprising a cab circuit, including an electro-magnetic device carried by said vehicle, and normally energized circuit influencing means disposed between two of said determined points, for energizing said cab circuit as the vehicle passes said last mentioned means.

21. In a railway block system, a vehicle provided with a train-stop governing member, an indicating member, and controlling mechanism for said members, means, including devices disposed at determined points along the track, for recurrently actuating said controlling mechanism, said mechanism including latching means, and a part, displacable by said recurrent actuating devices, adapted for engagement with said latching means, means, including normally effective parts disposed along the track in alternation with the devices first mentioned, for normally interrupting the engagement between said latching means and said part when said latching means and part are in engagement, and means controlled by a vehicle in advance of that aforesaid, for rendering said normally effective parts ineffective when said second vehicle is spaced less than a determined distance from a determined one of said normally effective parts.

22. In a railway block system, a vehicle provided with a caution signal and a danger signal, and controlling mechanism for said signals, means including devices disposed at determined points along the track for recurrently actuating said controlling mechanism, said mechanism including a first part normally actuated by said actuating means each time that the vehicle passes one of the said devices, a second part adapted for latching engagement with said first part, a third part normally displacable by said actuating means only when said second part is in latching engagement with said first part, and connections between said first and third parts and said signals.

23. In a railway vehicle control system, the combination of a brake valve and a valve tripping device, both carried by the vehicle, ramps disposed at determined intervals along the track, said tripping device including shielding parts each having a bias for its shielding position, means, including a hook and a member adapted to engage said ramps, for moving said shielding parts out of their shielding position, and a dog operatively connected to said brake valve, said hook and dog normally adapted for engagement with each other when said shielding parts are both out of shielding position, and time element means for retarding the movement of one of said shielding parts with respect to a movement of said hook.

24. In a railway vehicle control system, the combination of a brake controlling mechanism carried by the vehicle, with ramps for initially actuating said mechanism, said ramps disposed at determined intervals along the track, said mechanism including a valve, a valve controlling element and means for operatively displacing said valve controlling element, in any event, only when said mechanism is actuated a determined plurality of times within less than a determined interval of time, and means, adapted to be rendered ineffective by the presence of a vehicle within less than a determined distance ahead of the vehicle aforesaid, for normally rendering said first mentioned means inoperative.

25. In combination, a car or train, train controlling means therefor comprising means spaced along the track way and time controlled means on the car or train controlled by said means along the track way for controlling the operation of said train controlling means.

26. The combination with a pair of spaced ramps along the track way and an electrically controlled device interposed between said ramps, and means controlled by traffic conditions for controlling said device, of a car or train having a train stop mechanism thereon and means on the car coöperating with said train stop mechanism and with said ramps and device along the track way for actuating said train stop mechanism to stop the car or train when said car or train successively co-acts with the said ramps and device along the track way in less than a determined time interval and under dangerous traffic conditions.

27. In combination, a car or train, train controlling means thereon, a plurality of devices spaced along the track way one at least of which is controlled by traffic conditions, and means on the car including a

time controlled device adapted to co-act with said devices along the trackway and with said train controlling means for stopping the car or train when it passes over said devices in less than a predetermined time interval and under dangerous traffic conditions.

28. In combination, a car or train, train controlling means thereon, a plurality of devices along the track way, means for controlling at least one of said devices by traffic conditions and means on the car including a time controlled device coöperating with said train controlling means and with each of said devices along the track way for stopping the train only when said means successively passes all of said devices in less than a pre-determined time interval and under dangerous traffic conditions.

29. In combination, a railway vehicle, vehicle-controlling means thereon, a device in the trackway for causing operation of said vehicle-controlling means, time-measuring means on the vehicle for determining whether or not said vehicle-controlling means shall be operated by said device, and a second device located in the trackway for setting said time-measuring means into operation at a predetermined distance in the rear of said first-mentioned trackway device.

30. In combination, means spaced along the track way, a car or train, train controlling means thereon and means on the car including a time controlled device for actuating the said train controlling means only when said car passes from one to another of said means in less than a determined time interval.

31. In combination, means spaced along the track way, means for controlling part of said means by traffic conditions, a car or train, train controlling means thereon, and means on the car including a time controlled device, said means being adapted to co-act with said means along the trackway for actuating said train controlling means only when said car passes over said means in less than a determined time interval and under dangerous traffic conditions.

32. In combination, a trip along the trackway, a car or train, train controlling means thereon, means on said car or train including a movable arm adapted to co-act with said trip for controlling the operation of said train controlling means as the train passes over said trip, and time controlled means on the car for rendering said arm ineffective to control said train controlling means on passing said trip.

33. In combination, a trip along the trackway, a car or train, train controlling means on said car or train including a movable arm adapted to co-act with said trip for controlling the operation of said train controlling means as the train passes over said trip, and time controlled means on the car for rendering said arm ineffective to control the train controlling means on passing said trip, and means along the trackway spaced from said trip for controlling said time controlled means.

34. In combination, two devices along the trackway defining a definite space interval, a car or train, train controlling means thereon adapted to co-act with the second of said devices to control the speed of the train, and time controlled means on the car or train controlled by the first of said devices along the trackway to render said train controlling means ineffective to control the speed of the car as it passes over the second of said devices under determined traffic conditions.

35. In combination, a car or train, train controlling means thereon, operating means for said train controlling means, and time controlled means on the car for controlling the effectiveness of said operating means, separate devices along the trackway defining a definite space interval for controlling said time controlling means and said operating means, respectively.

36. In combination, a car or train, train controlling means thereon, operating means for said train controlling means comprising mechanism carried by the car and a device along the trackway coacting therewith, and means for controlling the effectiveness of said operating means to render it ineffective to operate said train controlling means when said mechanism on said train coacts with said device along the trackway, said last named means comprising a device along the trackway and a time controlled part carried by the car, said devices along the trackway being spaced from each other a distance sufficient to permit the car or train to be slowed down in passing thereover.

37. In combination, a railway vehicle, vehicle-controlling means thereon, means spaced along the trackway, and time-controlled means on the vehicle controlled by said trackway means for controlling the operation of said vehicle-controlling means.

38. In combination, a railway vehicle, vehicle-governing means thereon, controlling means for said vehicle-governing means, time-measuring means on said vehicle for determining the effectiveness of said controlling means, said time-measuring means when set into operation being capable of a complete cycle of operation in a predetermined time from a normal condition in which it prevents the effectiveness of the controlling means through a condition in which it does not prevent such effectiveness to the said normal condition, and two devices spaced along the trackway for causing

operation of said controlling means and said time-measuring means, the first of said devices setting said time-measuring means into operation and the second of said devices causing operation of the controlling means to affect the vehicle-governing means if the cycle of operation of the time-measuring means has not been completed.

39. In combination, a railway vehicle, vehicle-controlling means thereon, means spaced along the trackway defining a definite space interval and controlled in part by traffic conditions, and means on the vehicle coöperating with said trackway means and with said vehicle-controlling means for preventing operation of the vehicle-controlling means when the vehicle consumes more than a predetermined time interval in passing over said space interval under dangerous traffic conditions.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

FRANK E. BUTTON.

Witnesses:

WALDO M. CHAPIN,

WILLIAM C. LANG.