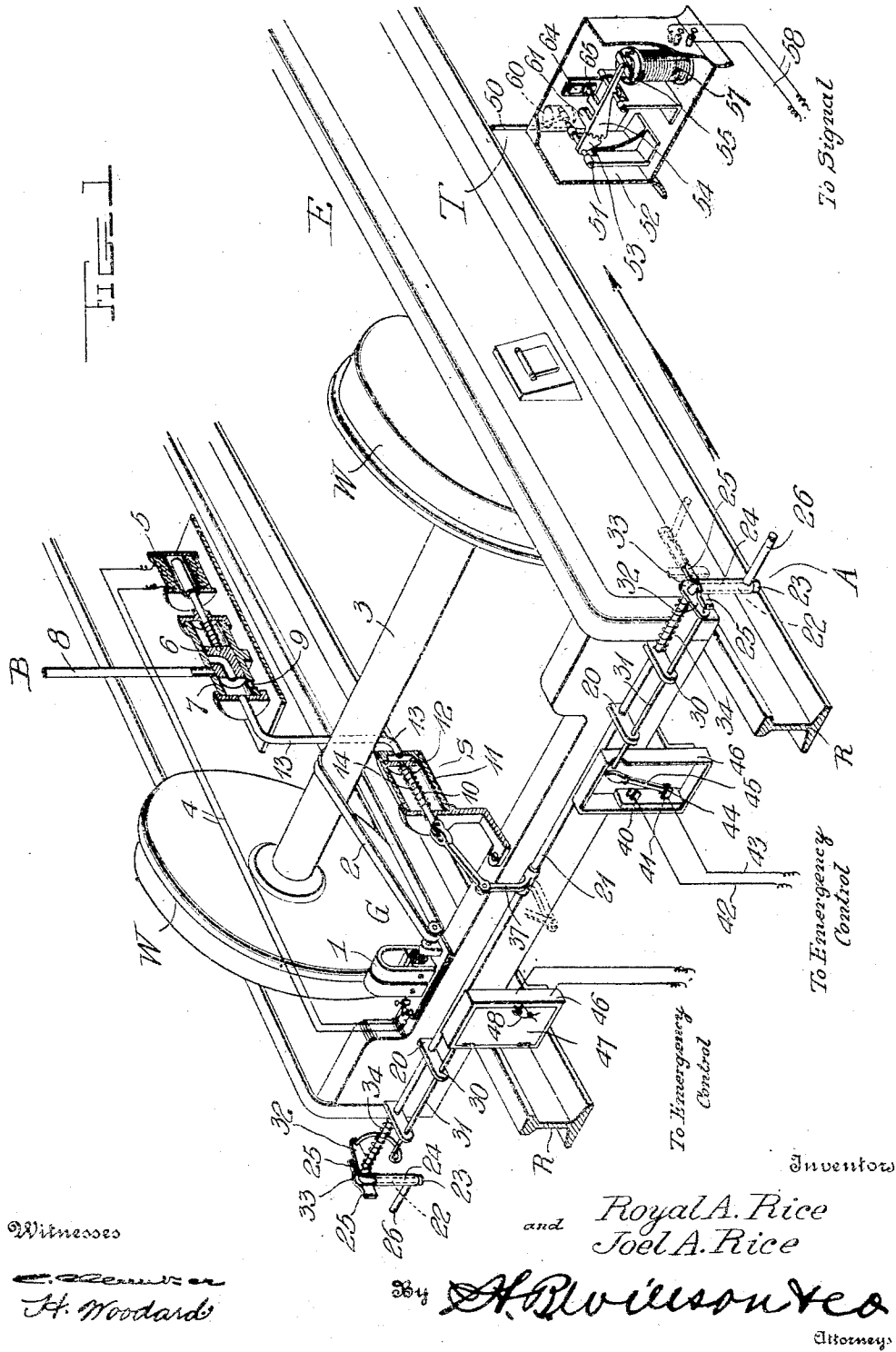


R. A. & J. A. RICE.
 AUTOMATIC CONTROL FOR THE SPEED OF TRAINS.
 APPLICATION FILED JAN. 2, 1914.

1,122,643.

Patented Dec. 29, 1914.

3 SHEETS-SHEET 1.



Witnesses

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3 SHEETS-SHEET 2.

FIG. 4

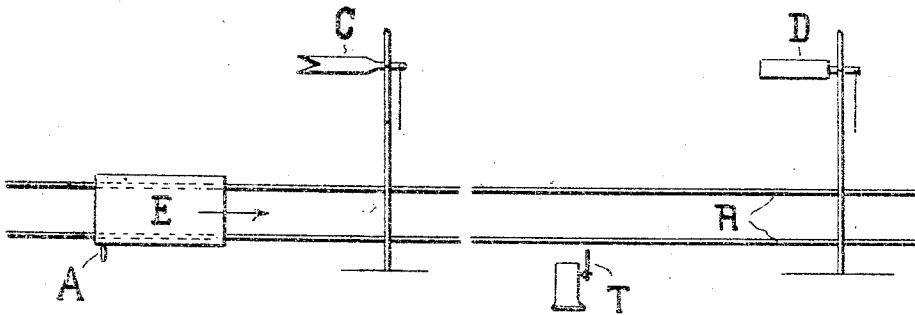


FIG. 2

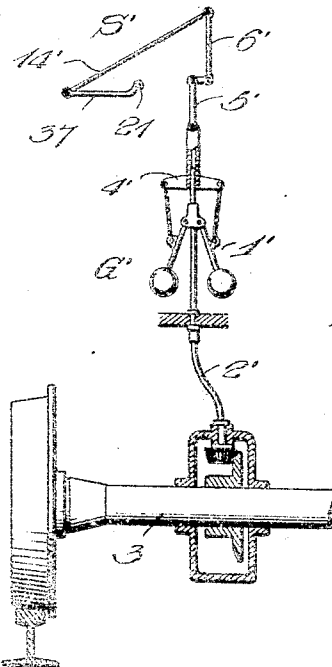
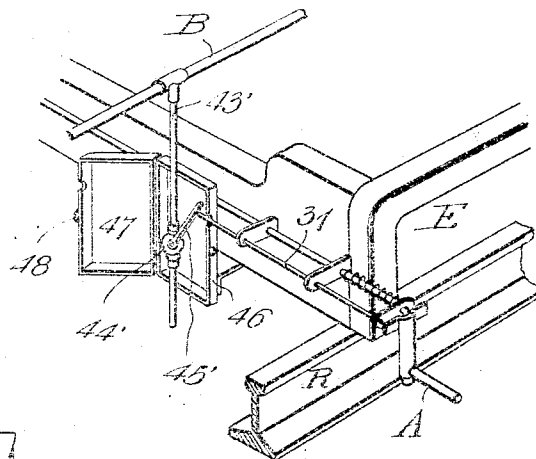


FIG. 3



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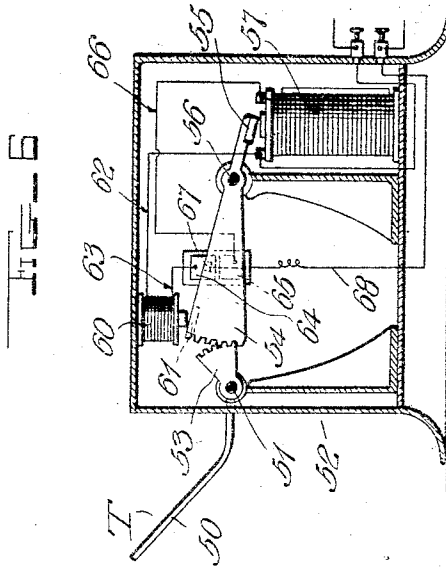
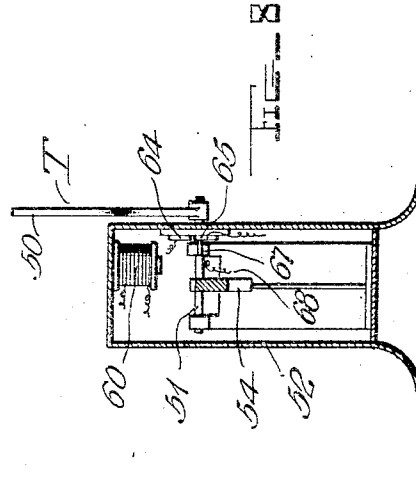
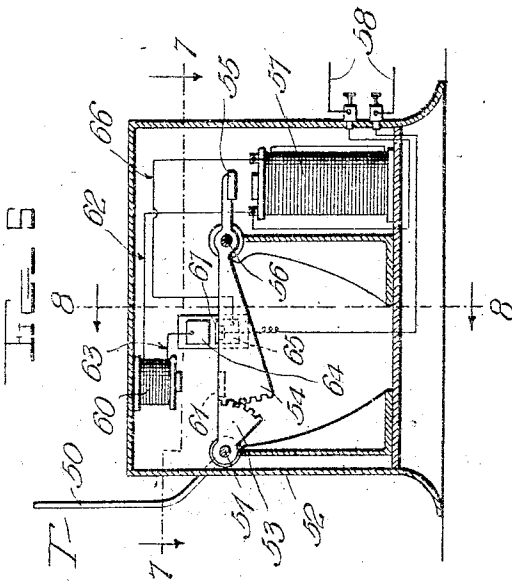
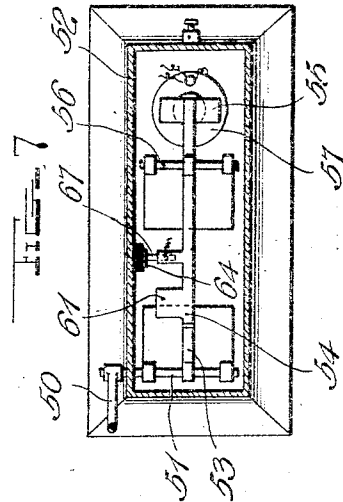
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3 SHEETS-SHEET 3.



Witnesses

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AUTOMATIC CONTROL FOR THE SPEED OF TRAINS.

1,122,645.

Specification of Letters Patent.

Patented Dec. 29, 1914.

Application filed January 2, 1914. Serial No. 809,954.

To all whom it may concern:

Be it known that we, ROYAL A. RICE and JOEL A. RICE, citizens of the United States, residing at New York, in the county of Bronx and State of New York, have invented certain new and useful Improvements in Automatic Control for the Speed of Trains; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to railway brakes, and more especially to automatic controlling mechanisms used in connection therewith whereby a train or a locomotive is unfailingly brought to a stop if the engineer fails to recognize a danger signal by reducing speed to a predetermined rate.

The object of the invention is to simplify and yet to improve the mechanism for carrying out this broad idea, as hereinafter more fully described and claimed, and as shown in the drawings wherein—

Figure 1 is a perspective diagram with parts broken away, showing the controlling mechanism as applied to the truck of an engine. Fig. 2 is an elevation partly in section, showing the use of a slightly different form of governor and illustrating diagrammatically one means by which it could be connected with the rock shaft. Fig. 3 is a perspective detail showing a slight modification whereby the movement of the push rod opens the valve which directly releases air from the train pipe. Fig. 4 is a diagrammatic plan view illustrating the position of the track device adjacent the signal herein shown as set at danger and remote from the preceding signal which is herein shown as set at caution. Figs. 5 and 6 are vertical sections of the track trip, and Figs. 7 and 8 are sectional views on the lines 7—7 and 8—8 respectively of Fig. 5.

In the drawings we have illustrated only so much of the train or more particularly the engine E as is necessary to coact with this invention, having shown a pair of wheels W traveling on the rails R and connected by an axle. The latter drives a speed governor G which may be of any suitable type, but is intended to operate at a certain predetermined speed (say ten miles an hour) to open an escape valve in the train pipe or air brake system which is herein designated as a whole by the letter B. This permits the

action of a setting device S which sets the trip arm A in position to strike a track trip T, the latter by preference having the detailed construction best seen on Sheet 3 of the drawings. This trip is intended to be set alongside the track some distance in advance of an ordinary block signal and connected with the latter in such manner that when the signal is set at danger the trip is raised into position to be struck by the trip arm A on the engine. It follows that if the engineer passes and observes and obeys a cautionary signal he will reduce his speed to the predetermined limit—otherwise the setting device automatically sets the arm A in position to strike the trip T before the engine has reached the second or danger signal. If the engineer does not obey the cautionary signal and the trip arm A is struck, it closes a switch and energizes the emergency control of or opens an escape valve within the air-brake system so as to bring the train to a stop. As we propose to locate this switch within a box and close and seal the latter, the engineer will then have to dismount and break the seal in order to again open this emergency switch. If, however, the engineer should approach the danger signal and observe it by proceeding at a low rate of speed, the device will not be actuated and there will be no extra delay, as all danger signals should be acknowledged by stopping and then proceeding as one can see and know the way to be clear.

The governor G is shown on Sheet 1 as an electric generator 1 belted as at 2 to the axle 3, and having its wires 4 led to a magnet 5 which controls a valve 6 slidably mounted within its casing 7, into one side of which latter a pipe 8 from the brake system is led while the opposite side of the casing is provided with an outlet port 9. The setting device, broadly designated by the letter S, is shown on this sheet as consisting of a spring 10 located within a cylinder 11 and tending normally to move a piston 12 therein toward the cylinder head through which opens a pipe 13 from the valve casing 7, the force of said spring being insufficient, however, to overcome the pressure of the air admitted. Therefore when the valve stands with the port 9 closed, pressure in the brake system will compress the spring 10; but when the speed of rotation of the axle 3 increases beyond a certain limit the governor

will energize the magnet and the latter will move the valve 6 so as to close the supply from the brake system and permit the air within the cylinder 11 to escape through port 9. This permits the spring 10 to expand and the piston 12 to be moved. Said piston is connected with a rod 14 passing through the other head of the cylinder, and the movement of this rod by the expansion of the spring sets the trip arm A in a manner which will be described below.

Mounted in suitable bearings 20 on the engine and preferably on one of the trucks thereof, is a rock shaft 21 having each end bent downward into a crank 22 which is provided with a head 23 at its lower extremity. On this crank is rotatably mounted a sleeve 24 having near its upper end two radially projecting wings 25 and at its lower end an outwardly projecting finger 26. The finger stands at right angles to the sleeve, and the sleeve is mounted on the crank 22 which stands at right angles to the rock shaft 21—hence the finger stands on a line parallel with said shaft, and by preference the position of the finger is such that it projects away from the track and in position to strike the track trip T when the latter stands upright as seen in Fig. 1 on Sheet 1. Slidably mounted in eyes 30 which may well be formed on one of the bearings 20 is a push rod 31 standing parallel with the crank shaft 21 and having at its outer end a head 32 which is disposed mainly to one side of the rock shaft 21, although it may have an eye 33 which passes around said shaft. Disposed on the latter between the eye and the nearest bearing 20 is an expansive spring 34 moving the entire push rod normally outward. When now the parts stand in their normal position with the sleeves 24 pendent, and the finger 26 is moved in one direction, one of its wings 25 strikes said head and moves the latter inward against the tension of the spring 34, so that the entire push rod is moved inward alongside the rock shaft 21; but if the finger 26 should be moved in the other direction its opposite wing 25 would not strike said head and the push rod would not be actuated. When, however, the entire rock shaft is rotated within its bearings 20 so that the crank 22 is moved from a pendent position to a horizontal position, it will be obvious that the sleeve and the finger are carried upward to the position shown in dotted lines in Fig. 1 and the trip T will not now be struck by the finger 26 because the latter is so high that it passes over the tip of said trip when the engine moves past the latter in either direction. The rock shaft 21 is connected with the setting device by means of an arm 37 rising rigidly from said shaft and connected with the outer end of the rod 14, and therefore the rock shaft

is turned to set the trip arm in active or inactive position by the movements of the setting device S, which latter is actuated by the governor G in a manner above described.

While the spring 10 is described and shown as exerting its tension to hold the arm A in set or lowered position, it is obvious that by simply turning the shaft 21 a quarter turn in the arm 37, the position of the finger 26 would be reversed and would be held in raised inoperative position by the spring 10 and lowered into operative position when the port 9 of the valve 6 is closed and the pressure in the brake system compresses said spring 10.

In Fig. 1 is typically illustrated one form of switch which we might employ in order to apply the brakes when the push rod is moved inward in the manner just set forth. This switch has terminals 40 and 41 from which wires 42 and 43 lead to the emergency control valve in a manner not necessary to illustrate, and pivoted at 44 is an arm or blade 45 adapted to be moved between said terminals when the push rod is driven inward. The whole device is incased within a box or casing 46 whose door 47 is held closed by means of a seal 48, and after the push rod has been moved to force the blade 45 between the terminals and close the circuit it is impossible for anyone to retract the blade and open the switch, unless he breaks the seal and opens the door of the casing. As this cannot be done without the engineer dismounting from his cab and getting at the device which we would preferably locate on one of the locomotive trucks, it follows of necessity that his engine is at a stand-still and he is forced to make a record by breaking the seal in order to proceed; as the signal had automatically signaled him that there was danger ahead. So that it will be seen if he slow down his speed after having been signaled, the governor will not set the trip arm to be struck by the track trip T, and he is at liberty to proceed into the new block at low speed and with due caution. But if he does not reduce his speed below a predetermined limit, the trip arm will be moved and the brake automatically applied by the emergency control mechanism, and then he will be forced to come to a stop and record himself by breaking the seal.

The governor G' and the setting mechanism S' of Fig. 2 are of slightly different construction, although the result is the same. Here the governor proper 1' is connected by a flexible shaft 2'' and gearing with the axle 3 and moves a cross head 4' when the speed of the train increases. The cross head through a link 5' and a bell crank lever 6', pushes on a rod 14' which actuates the arm 37 on the rock shaft 21 as above described. This illustration is given

to show that any suitable type of governor might be employed and any suitable type of setting mechanism to connect the governor with the rock shaft so that the action of the former would be to set the trip arm A in position to strike the trip T.

Instead of having the push rod close a circuit through wires 42 and 43 which energize the emergency control in the air brake system, this push rod could directly open a valve in the train pipe B as, for instance, by the means illustrated in Fig. 3. Here said train pipe has a branch 43' closed by a valve 44' having a handle 45'—the entire valve being located within the box 46 whose door 47 is closed and sealed as at 48 as above described. The push rod 31 passes through the side of this box and is directed toward said handle 45' and when the device is actuated and the push rod is projected the valve is thrown open so that air escapes from the train pipe B and the brakes are automatically applied. This is an illustration of other means which might be employed for automatically applying the brakes, even though the air brake system might not be provided with the electrical attachment with which such systems of the latest type are now equipped; but attention is directed to the fact that the valve is located within a box which is closed and sealed, and in order to close the valve after it has been automatically opened the engineer must stop his train and break the seal and make a record.

In Fig. 4 is diagrammatically illustrated how the track trip T (described below) is disposed close to one signal which we will call the danger signal D but quite remote from the signal in advance which we will call the caution signal C. The engine E is approaching from the left as seen, and its trip arm A is set. When the engineer passes a cautionary signal C it is his business to slow down because he has been so directed by the position of this signal, and if he does so the arm A will not be set and the brakes will not be automatically applied. If, however, he fails to slow down before reaching the danger signal D, the arm A will be set and it will strike the track trip T which is located near and preferably in advance of this signal D, and then his train will be brought to a full stop and he will be compelled to make the record as described above.

The track trip T whose details are best seen on Sheet 3 of the drawings, includes an upstanding finger 50 mounted on a rock shaft 51 which is journaled within a casing 52 and carries a toothed segment 53 meshing with a larger segment 54 also journaled in said casing and having an armature 55 on the other side of its pivotal support or journal 56. This armature 55 stands over

a magnet 57, and the wires 58 of the latter include a source of electrical energy and a signal-switch which is closed when the signal is set at safety and broken when the signal is moved to danger. As above suggested, the signal will doubtless be one of the block signal system, and will be located some distance beyond the track trip mechanism—the details of this signal and the means for setting it forming no part of the present invention. When now the signal is set at danger the circuit through the wires 58 is broken and the weight of the two toothed segments causes them to move to the position shown in Fig. 5 so that the rock shaft 51 turns and the finger 50 is set upright in position to be struck by the finger 26 on the trip arm A. When, however, the signal is turned to safety the circuit is closed, the magnet 57 energized, the armature 55 attracted, and the two toothed segments rise while the finger 50 descends out of position to be struck by the trip arm A; and the track trip stands in this position as long as the signal is at safety. Therefore the engineer is at liberty to pass a signal when set at safety, and continue along the track and into the next block at full speed, whereas it has been explained above how the setting of the signal at danger or caution must be heeded by him to the extent that he shall reduce his speed before passing the track trip, for otherwise his engine will be brought to a full stop.

Within the casing 52 is preferably disposed a holding magnet 60 located above a lug or enlargement 61 on one of the segments, which serves in effect as the armature for this magnet. One pole of the latter is connected by a wire 62 with one pole of the main or actuating magnet 57. The other pole of the holding magnet 60 is connected by a wire 63 with a plate 64 mounted within but insulated from the casing. Beneath this is another plate 65 insulated from the casing and from the first plate, and the last-named plate is connected by a wire 66 with the other pole of the main magnet 57. Finally, a brush or contact 67 is carried by one of the segments in position to be moved across said plates, and this brush or this segment is connected by a wire 68 with one of the signal wires 58. When now the parts stand as seen in Fig. 5, the circuit through the wires 58 to the main magnet 57 is completed through the contact 67 and the lower plate 65, and when the signal is moved to safety the magnet 57 is energized and the segment 54 rises. As it does so the brush or contact 67 moves off the plate 65 onto the plate 64 so that the circuit is completed through the holding magnet 60 and broken through the main magnet 57. The holding magnet now attracts the armature 61 and holds the seg-

ment positively elevated and the finger 51 positively depressed as long as the circuit remains unbroken by the switch which is held closed by the signal in a manner already described. Thus it will be seen that the first impulse of the circuit when it is closed by the signal switch is to actuate the main magnet and raise the rather heavy segment, and the next impulse of the circuit when it has ceased to energize the magnet 57 is to energize the holding magnet 60 which requires much less current, and this magnet will hold the segment raised and the finger 50 depressed. But when the circuit is broken as by the movement of the signal or perhaps by the parting of the wires, the weight of said segments will cause them to fall and the finger 50 will be raised so that the trip arm A will be struck in any event. This construction puts as little mechanism as possible between the heavy segments and the actuating or tripping element 50, and therefore if anything should happen to the mechanism or especially to the electrical portions thereof, the track trip T would stand in operative position.

Throughout this specification we have referred to several mechanisms or devices which are well known in the art and therefore do not need further illustration and description. That is to say, the air brake mechanism, broadly designated by the letter B on Sheet 1 of the drawings, is well known to those familiar with railroading—even to that part thereof which includes the emergency control of the brakes through electrical means in addition to the pneumatic application of the brakes. Also the track or block-signals referred to herein, and their manner of setting and tripping automatically from towers, or by the passage of the trains, are well known to those familiar with railroading, and need no further illustration. We may say in closing that this device is applicable to steam as well as to electric locomotives, and although we have spoken of its application to an engine, it could of course be placed beneath a car. We have shown two of the trip arms A on Sheet 1, and it is quite possible to apply one to either end of the rock shaft 21 by reversing the position of the heads on the push rods so that at one end of the rock shaft would stand on one side of it and that at the other end on the other side. Therefore, whichever way the engine is moving that finger 26 which is then on the right hand side will engage the track trip T. It follows that the device is useful on a single-track road, and on an engine or motor car which moves always forward or on one which is double-ended and moves with different ends forward when it is running in different directions along the

line. We have not considered it necessary to illustrate the wiring from the track trip device to the signal, nor the switch within the signal tower referred to in this specification. Nor will it be necessary to illustrate and describe the wiring by which this invention could be applied to a single track road whereon trains were running in both directions, although it will be understood that our improved automatic control may be applied and used in conjunction with block or other signal systems which are applied to a single-track road. The details other than herein described form no essential part of the present invention.

What is claimed as new is:

1. The combination with a rock shaft mounted across a truck and having a crank at one end, setting mechanism for giving said shaft a one-quarter revolution, and means for actuating said setting mechanism; of a trip arm rotatably mounted on said crank and having an outwardly projecting finger adapted to strike a track trip, a push rod slidably mounted alongside said rock shaft and adapted to be moved by the rotation of said trip arm, and a switch adapted to be closed by the inward movement of said push rod.
2. The combination with a rock shaft mounted across a truck and having a crank at one end, setting mechanism for giving said shaft a one-quarter revolution, and means for actuating said setting mechanism; of a trip arm rotatably mounted on said crank and having an outwardly projecting finger adapted to strike a track trip, a push rod slidably mounted alongside said rock shaft and adapted to be moved by the rotation of said trip arm, a switch connected with the emergency control valve of the brake system and actuated by the inward movement of said rod, a casing inclosing said switch and having a door, and a seal holding the door closed.
3. The combination with a rock shaft mounted across a truck and having a crank at one end, setting mechanism for giving said shaft a one-quarter revolution, and means for actuating said setting mechanism; of a trip arm comprising a sleeve rotatably mounted on said crank and having an outwardly projecting finger adapted to strike a track trip and two laterally projecting wings, a push rod slidably mounted along one side of said rock shaft and having a head standing behind one wing when the crank is pendent, and a switch actuated by the inward movement of said push rod.
4. The combination with bearings adapted to be carried on a locomotive truck, said bearings having eyes, a rock shaft journaled in said bearings and having a right-angular crank at one end with a head at the extremity of the crank, means for giving said shaft

5 a one-quarter revolution, and a trip arm comprising a sleeve rotatably mounted on the crank above its head and provided with an outwardly projecting finger adapted to strike a track trip and with a laterally projecting wing at its upper end; of a push rod 10 slidably mounted in said eyes along one side of the rock shaft and having at its outer end a head standing behind said wing when the crank is pendent, the head being provided with an eye loosely embracing the shaft, an expansive spring on the latter between the eye and the nearest bearing, and brake-controlling mechanism actuated by 15 the inward movement of said push rod.

5 5. The combination with a shaft mounted in bearings in and extending across a locomotive truck and having normally pendent cranks at both ends, an arm upstanding from the mid-length of said shaft, setting mechanism connected with the arm for giving the shaft a one-quarter revolution, and a trip arm rotatably mounted on each crank and provided with an outstanding finger 20 and at its upper end with laterally projecting wings; of push rods slidably mounted alongside said shaft at the ends thereof and having heads at their outer ends, one head standing inside the rearmost wing of the adjacent trip arm and the other head standing inside the foremost wing of the other trip arm, means for pushing said trip arms outward with yielding force, and brake-controlling devices actuated by the inward 25 movement of either push rod.

35 6. The combination with a rock shaft hav-

ing a crank at one end, setting mechanism for turning said shaft, and means for actuating said setting mechanism; of a trip arm rotatably mounted on said crank and having 40 an outwardly projecting finger adapted to strike a track trip, a push rod slidably mounted alongside said rock shaft and adapted to be moved by the rotation of said trip arm, brake applying mechanism actuated by the inward movement of said rod, 45 a casing inclosing said mechanism and having a door, and a seal holding the door closed.

7. The combination with a rock shaft 50 mounted across a truck and having a crank, setting mechanism for giving said shaft a partial revolution, and means for actuating said setting mechanism; of a trip arm comprising a sleeve rotatably mounted on said 55 crank and having an outwardly projecting finger adapted to strike a track trip and two laterally projecting wings, a push rod slidably mounted along one side of said rock shaft and having a head standing behind one wing when the crank is pendent, 60 and brake controlling mechanism actuated by the inward movement of said push rod.

In testimony whereof we have hereunto set our hands in presence of two subscribing 65 witnesses.

ROYAL A. RICE.
JOEL A. RICE.

Witnesses:

CHAS. SCHANO,
AGNES SCHANO.