L. V. LEWIS.

RAILWAY TRAFFIC CONTROLLING APPARATUS.

APPLICATION FILED FEB. 13, 1913.

1,167,335.

Patented Jan. 4, 1916.

5 SHEETS—SHEET 1.

FIG. 1

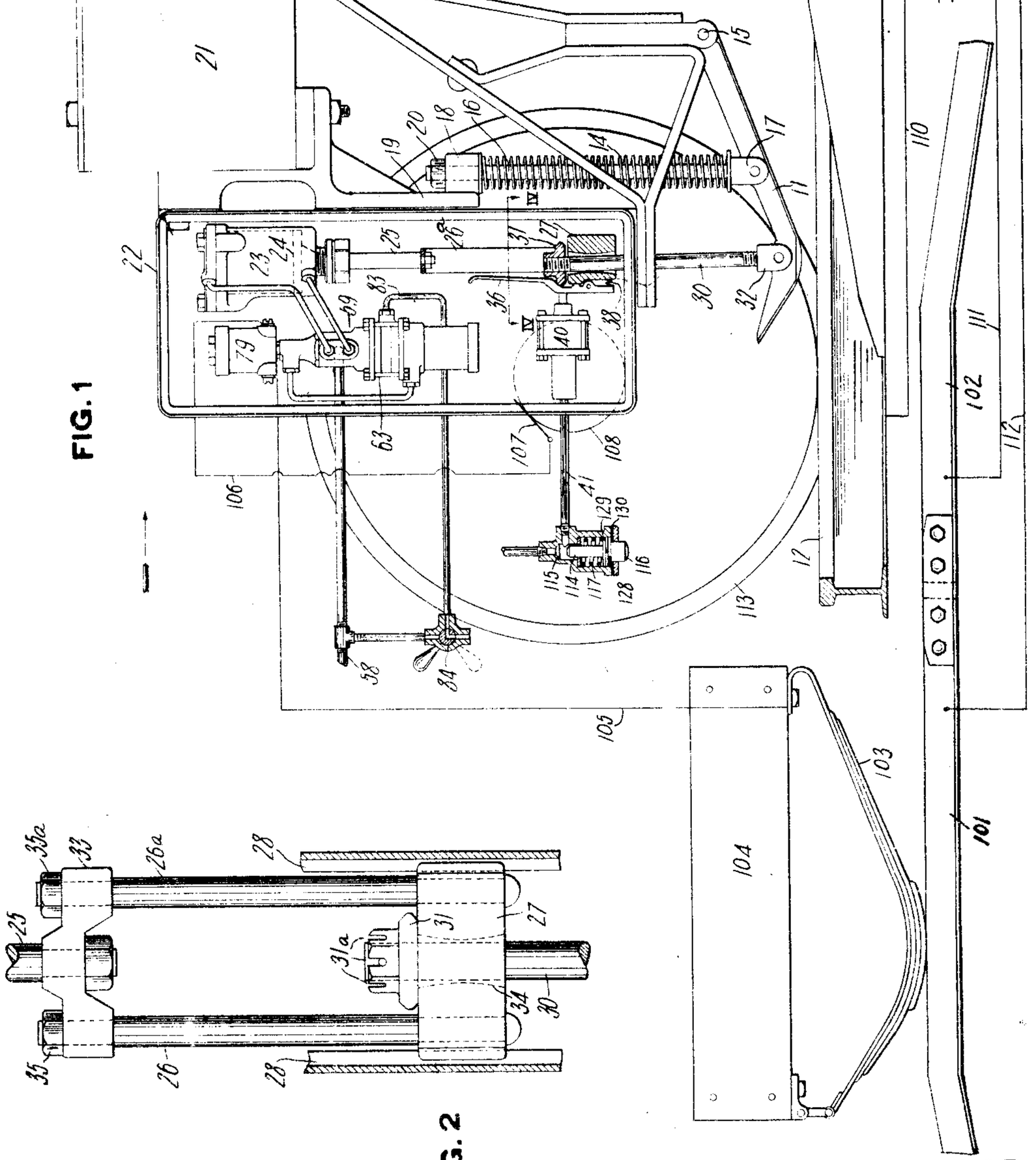


FIG. 2

WITNESSES

W. T. Hohman

A. L. Vencill

INVENTOR

Lloyd V. Lewis

By Geo. E. Corum

his atty.

L. V. LEWIS.

RAILWAY TRAFFIC CONTROLLING APPARATUS.

APPLICATION FILED FEB. 13, 1913.

1,167,335.

Patented Jan. 4, 1916.

5 SHEETS—SHEET 2.

FIG. 5

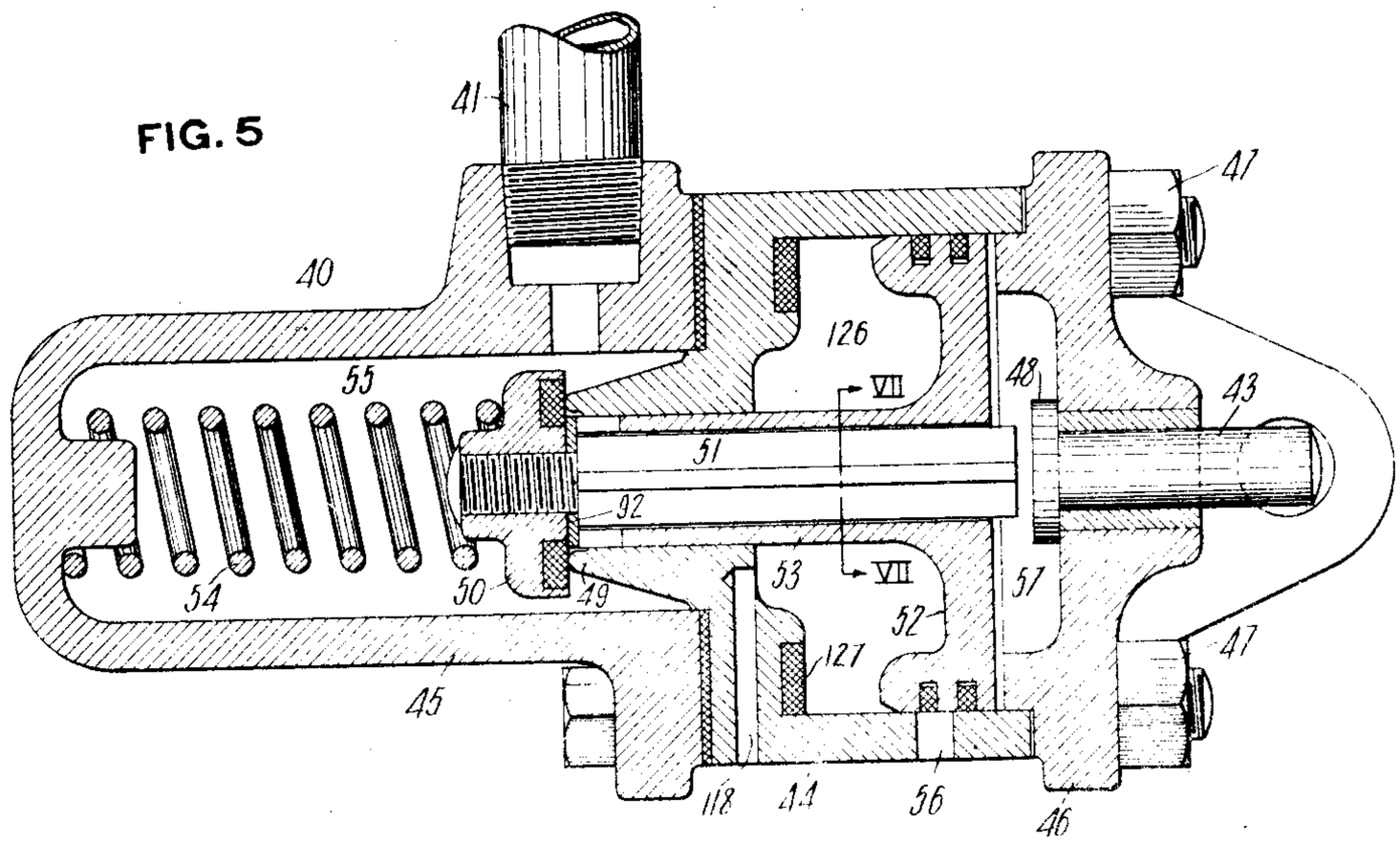
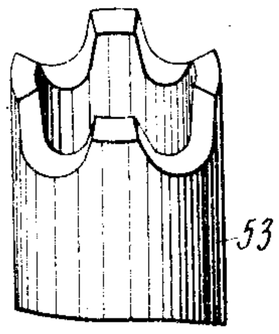


FIG. 6



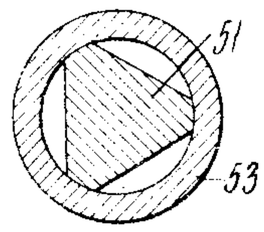


FIG. 7

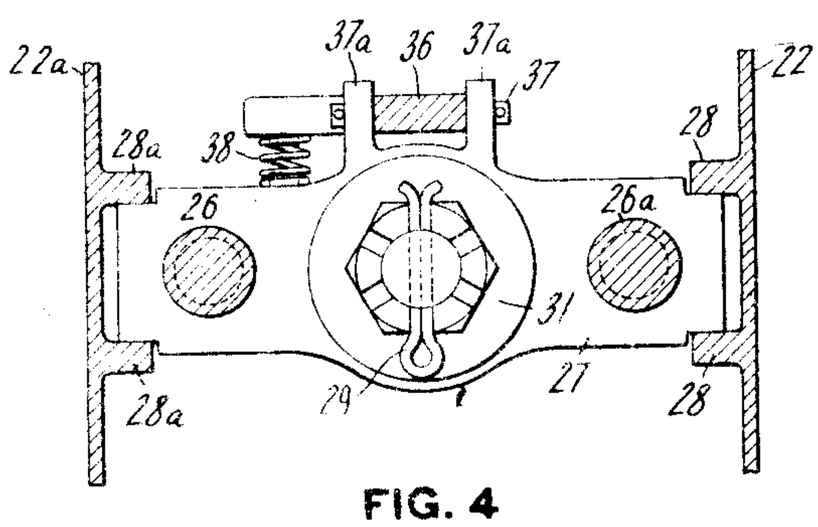


FIG. 4

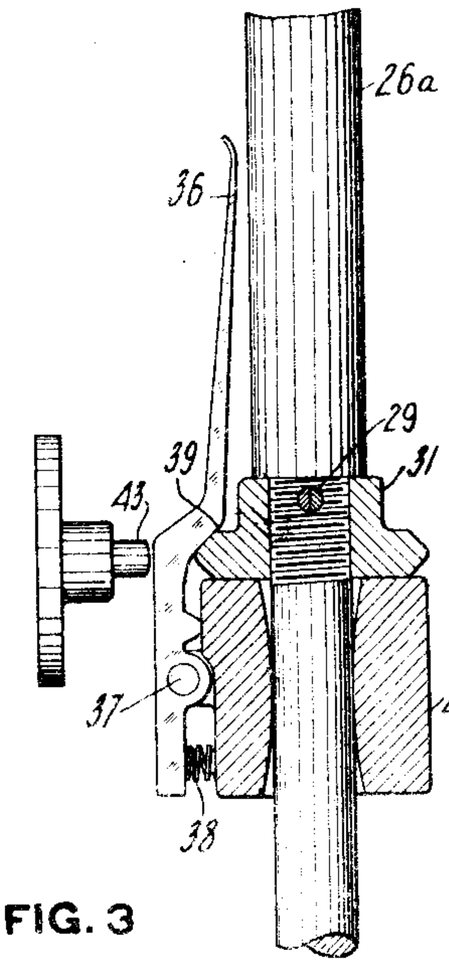


FIG. 3

WITNESSES

W. T. Holman

A. L. Vencill

INVENTOR

Lloyd V. Lewis

By Frank E. Lewis

Atty.

L. V. LEWIS.

RAILWAY TRAFFIC CONTROLLING APPARATUS.

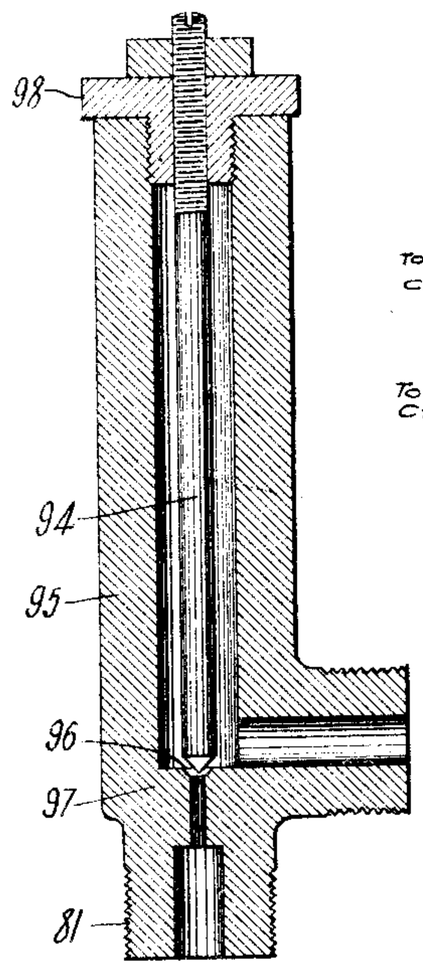
APPLICATION FILED FEB. 13 1913.

1,167,335.

Patented Jan. 4, 1916

5 SHEETS-SHEET 3.

FIG. 9



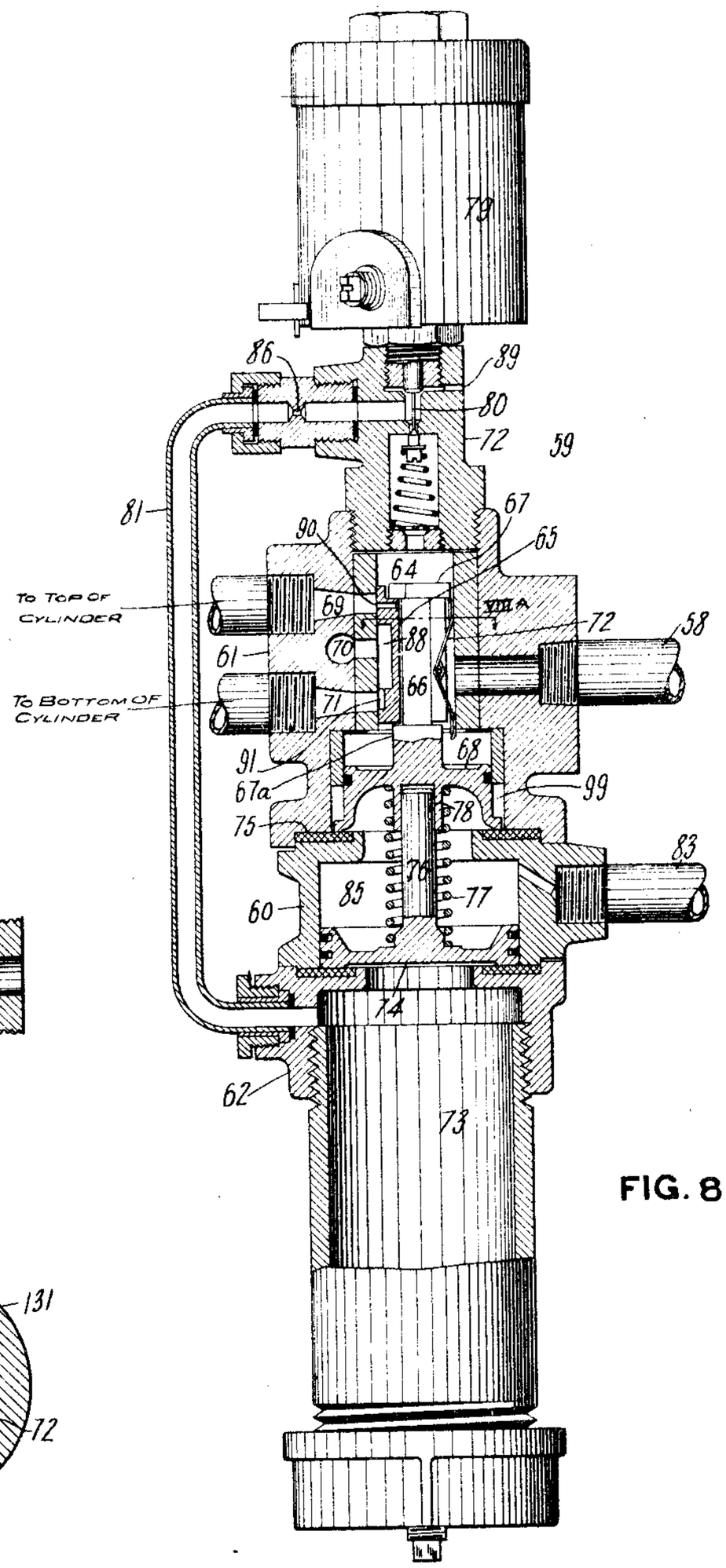


FIG. 8

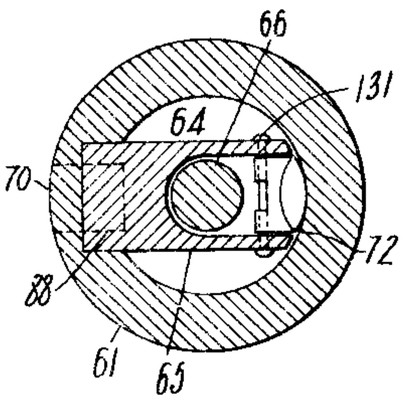


FIG. 8A

WITNESSES

W. T. Hohman

A. L. Kenciell

INVENTOR

Lloyd V. Lewis

By Geo. E. Crume

His Atty.

L. V. LEWIS.

RAILWAY TRAFFIC CONTROLLING APPARATUS.

APPLICATION FILED FEB. 13, 1913.

1,167,335.

Patented Jan. 4, 1916.

5 SHEETS SHEET 4.

FIG. 11

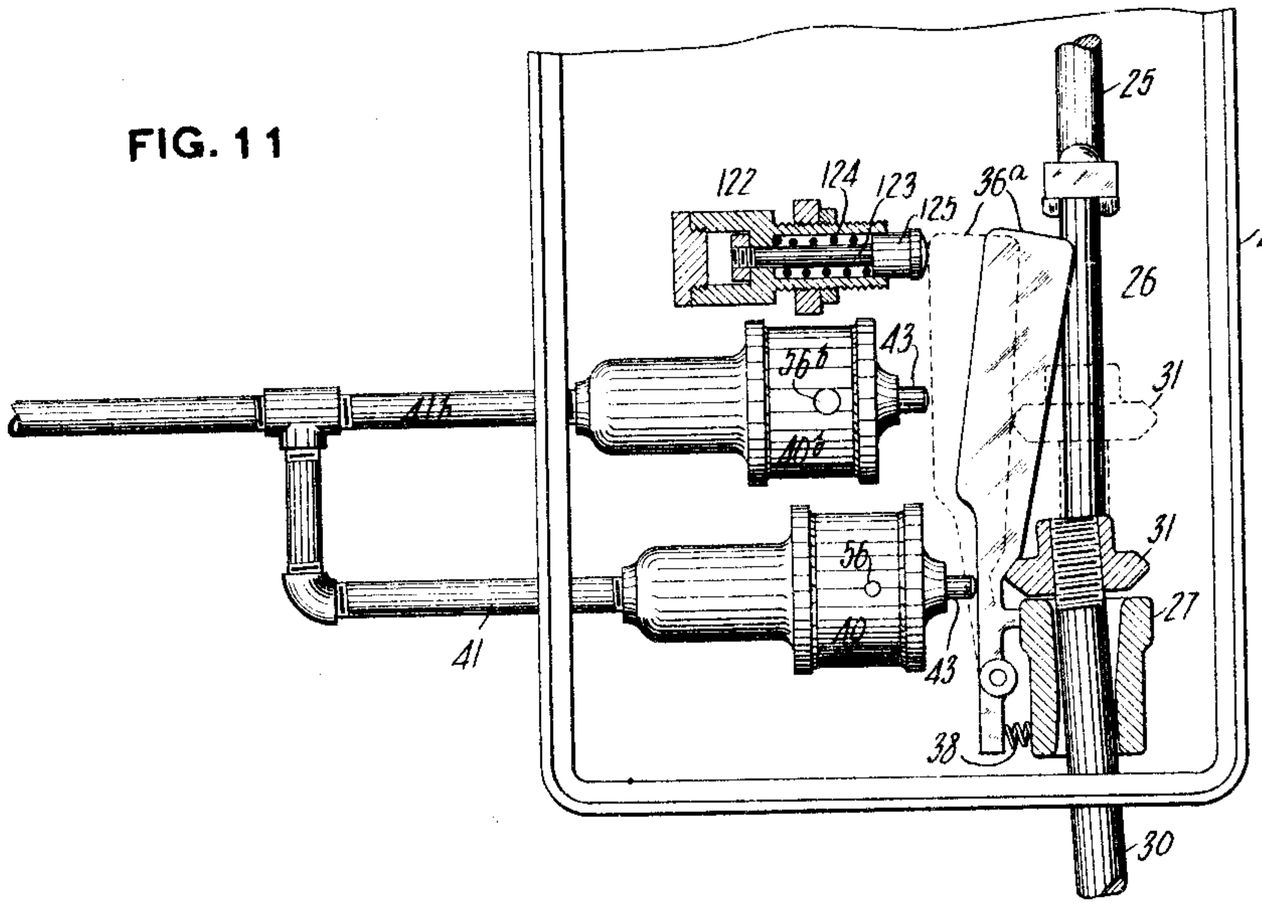
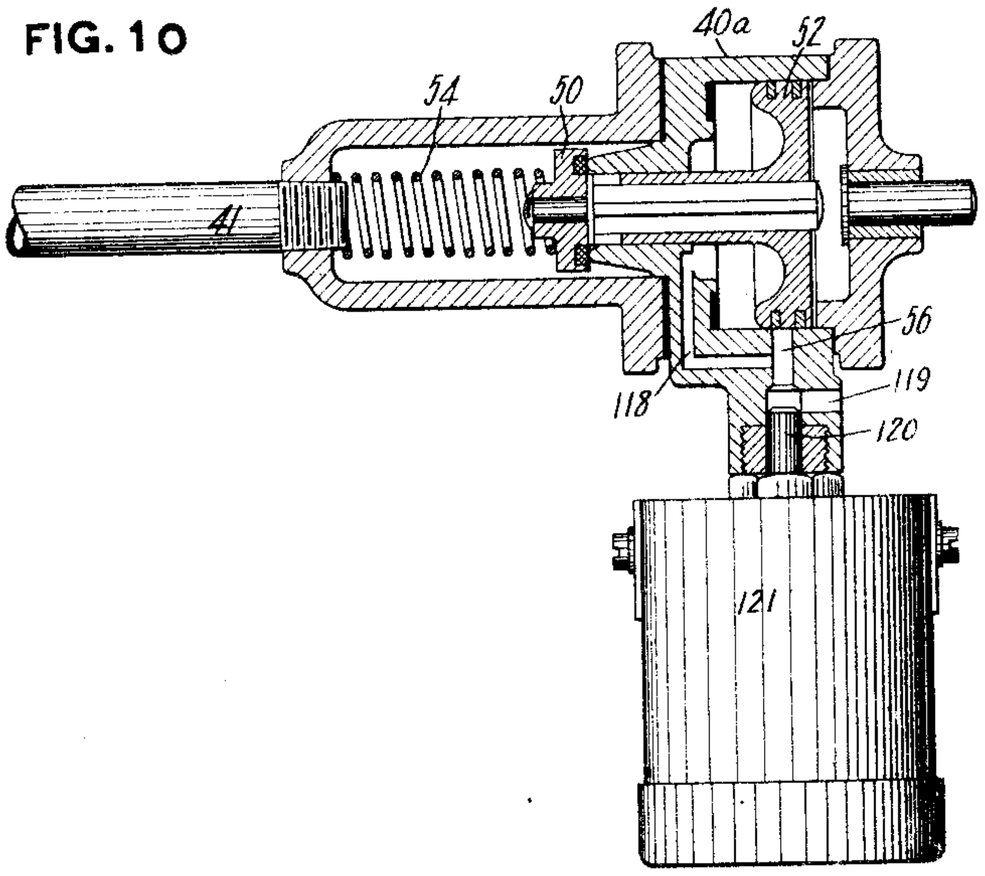


FIG. 10



WITNESSES

W. T. Holman

O. L. Vencill

INVENTOR

Lloyd V. Lewis

by Fred E. Lawrence

Atty.

L. V. LEWIS.

RAILWAY TRAFFIC CONTROLLING APPARATUS.

APPLICATION FILED FEB. 13, 1913.

1,167,335.

Patented Jan. 4, 1916.

5 SHEETS—SHEET 5.

FIG. 12

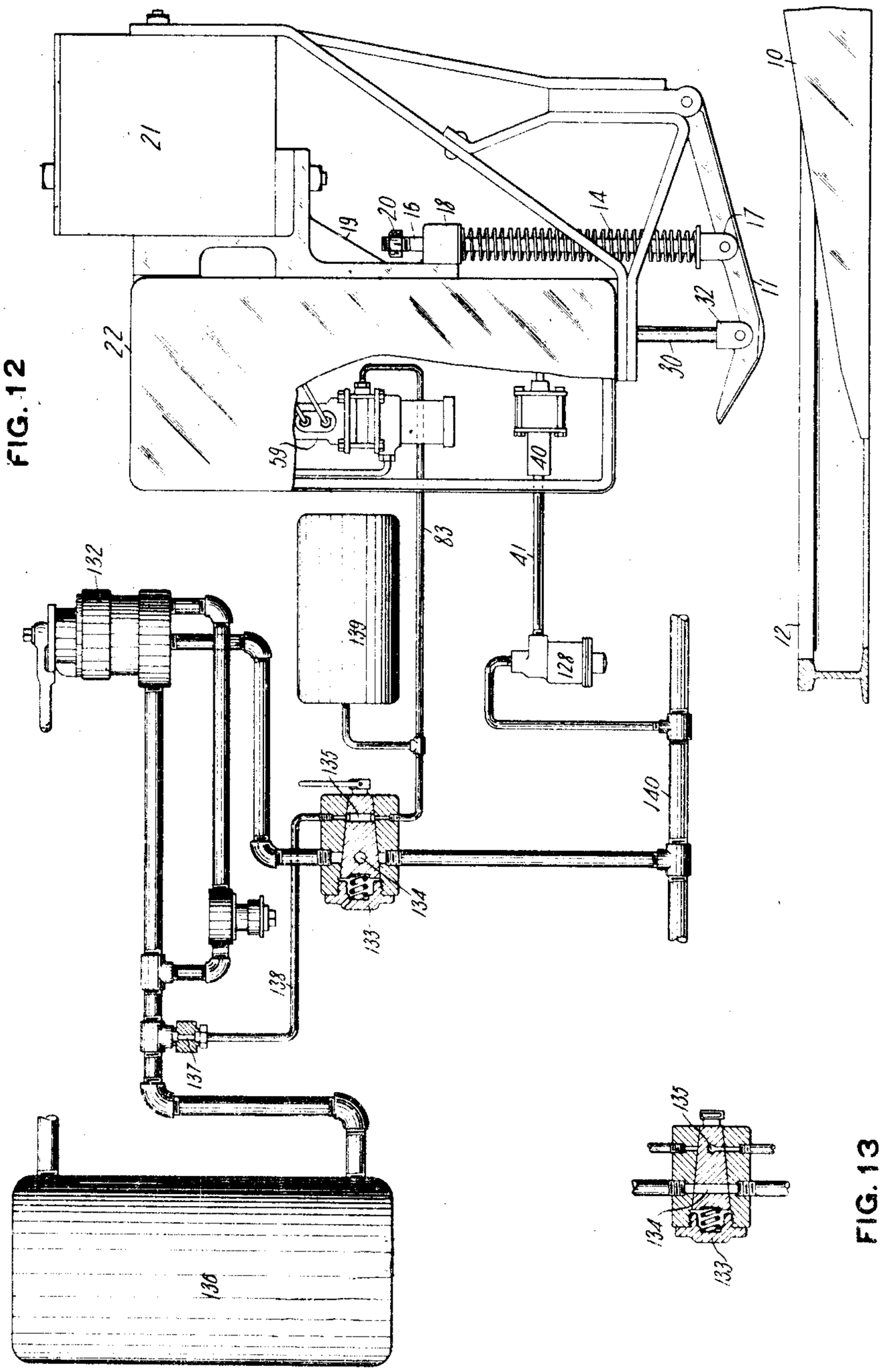


FIG. 13

WITNESSES

W. T. Hohman

A. L. Vencill

INVENTOR

Lloyd V. Lewis

By Fred E. Crane

Attorney

UNITED STATES PATENT OFFICE.

LLOYD V. LEWIS, OF EDGEWOOD BOROUGH, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

RAILWAY-TRAFFIC-CONTROLLING APPARATUS.

1,167,335. Specification of Letters Patent. Patented Jan. 4, 1916.

Continuation of application Serial No. 713,838, filed August 7, 1912. This application filed February 13, 1913. Serial No. 748,092.

To all whom it may concern:

Be it known that I, LLOYD V. LEWIS, a citizen of the United States, residing at Edgewood Borough, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Railway-Traffic-Controlling Apparatus, of which the following is a specification.

My invention relates to railway traffic controlling apparatus.

The present invention is a continuation of the invention shown and described in my copending application filed August 7, 1912, Serial No. 713,838.

I will describe one form and arrangement of apparatus embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawings, Figure 1 is a view showing in side elevation a portion of a locomotive having applied thereto one form and arrangement of apparatus embodying my invention. Fig. 2 is a view showing in front elevation a portion of the apparatus shown in Fig. 1. Fig. 3 is a view showing on a larger scale a portion of the apparatus shown in Fig. 1. Fig. 4 is a sectional view on an enlarged scale on the line IV—IV of Fig. 1 looking in the direction of the arrows at the ends of the section lines. Fig. 5 is a view showing in cross section and on an enlarged scale a valve device 40 shown in Fig. 1. Fig. 6 is a view showing in perspective a part of the valve device shown in Fig. 5. Fig. 7 is a sectional view on the line VII—VII of Fig. 5. Fig. 8 is a view showing in cross section and on an enlarged scale a valve device 59 shown in Fig. 1, Fig. 8^A is a cross-sectional view on the line VIII^a of Fig. 8. Fig. 9 is a view showing a modification of a portion of the valve device shown in Fig. 8. Fig. 10 is a view showing a modification of the valve device 40 shown in Fig. 1. Fig 11 is a view showing a modification of parts of the apparatus shown in Fig. 1 and embodying my invention. Fig. 12 is a view showing a modification of the apparatus shown in Fig. 1 and embodying my invention. Fig. 13 is a view showing in another position one of the parts shown in Fig. 12.

Similar reference character refer to similar parts in each of the several views.

Referring first to Fig. 1, 12 designates one of the track rails of a railway upon which a vehicle 13, here shown as being a locomotive, is adapted to travel. Located in the trackway is a trip 10, and carried on the vehicle 13 is an arm 11 arranged so that it may at times engage the trip 10 to affect certain apparatus on the vehicle. As here shown, the trip 10 is stationary, and is, therefore, always in tripping position, although I do not wish to limit myself to this particular arrangement of the trip 10. This trip, as here shown, is provided with an inclined surface sloping upwardly in the direction of movement of the vehicle 13. The arm 11 is pivotally mounted on the vehicle at a point 15 and is so formed that it may ride upwardly on the inclined surface of the trip 10. The arm 11 is biased by some suitable means so as to be normally in position for engagement with the inclined surface of the trip 10; as here shown this bias is obtained by means of a helical spring 14 which surrounds a rod 16. The lower end of rod 16 is provided with a jaw 17 which is pinned to the arm 11, and the upper end of rod 16 passes through a lug 18 formed on a bracket 19 mounted on a part of the underframe of the vehicle 13, here shown as being the bumper beam 21. The lower end of spring 14 bears against the jaw 17, and the upper end against the lug 18. The pressure of the spring 14 on the jaw 17, and the vertical location of the arm 11, may be adjusted by means of a nut 20, screwed on the upper end of rod 16 and bearing on the top of lug 18.

The arm 11 may at times be moved upwardly out of position for engagement with the trip 10, and against the pressure of the spring 14, by means of a suitable actuating mechanism which I will now explain. This mechanism is inclosed in a box 22, carried by the bracket 19. Mounted in the box 22 is a cylinder 23 in which is a reciprocating piston 24. The piston is fixed to a rod 25, the lower end of which (see Fig. 2) carries a yoke 33. This yoke is provided with two holes into which are fitted the ends of rods 26 and 26^a, these rods being held in place by nuts 35 and 35^a, screwed onto the ends which

are threaded for the purpose. The lower ends of rods 26, 26ª pass through holes in a crosshead 27, and the latter is held firmly in place against the shoulders of the rods by peening the ends of the rods over against the crosshead. As shown more clearly in Fig. 4, the corners of the crosshead 27 are cut away to form flanges which slide in guides 28, 28ª formed respectively in the back of the box 22 and in the cover 22ª of the box. It will be seen that these guides 28, 28ª constrain the crosshead 27 to reciprocation in a straight line. A rod 30 passes through a hole 34 in the crosshead 27. The size of the hole 34 is such that the rod 30 may reciprocate freely therein and the shape of the hole is such that the rod may have a small amount of angular motion without binding. The rod 30 is threaded at both ends; the lower end is screwed into a jaw 32, which is pinned to the arm 11, and the upper end is provided with a head in the form of a nut 31, which rests normally on the upper face of the crosshead 27. The nut 31 is castled, that is, it is provided with several diametrical slots 31ª across its top; and the rod 30 is provided with a hole near its upper end. The nut 31 is adjusted so that the arm 11 has the proper location relative to the trip 10, and the nut is then locked by passing a cotter pin 29 through the hole in the rod 30 and one of the slots 31ª.

Fluid pressure may be admitted to either end of the cylinder 23 by means which I will hereinafter explain. It will be clear that when fluid pressure is admitted to the upper end of the cylinder and the lower end is open to atmosphere, the piston 24 and crosshead 27 will occupy the lowest position of their stroke, which is the position in which they are shown in Fig. 1. The arm 11 is then pressed downwardly by the spring 14 so that the nut 31 rests with considerable pressure on the crosshead 27. Thus fluid pressure and gravity combine to hold the crosshead at the lowest point of its stroke. It will be apparent that, if desired, the action of fluid pressure on the top of the piston may be dispensed with and gravity relied upon to hold the crosshead down. It will be seen that if fluid pressure is now admitted to the lower end of cylinder 23 and the upper end is opened to atmosphere, the crosshead 27 will raise the arm 11 out of the path of the trip 10; and it will also be clear that if the arm is not thus raised before it reaches the trip 10, it will be raised by the inclined face of the trip, and the nut 31 will then be lifted from the crosshead 27. It will, therefore, be seen that when the arm 11 is raised out of operative position by the actuating mechanism on the vehicle, there is no relative movement of the crosshead 27 and the nut 31, but that when the arm is raised by the trip 10 there is relative movement of these two parts. I make use of this relative movement of the two parts in a manner which I will now explain to affect certain apparatus on the vehicle.

A latch 36 is mounted on a shaft 37 which is journaled in lugs 37ª projecting from the crosshead 27. This latch is biased by means of a spring 38 to the position in which it is shown in Figs. 1 and 3. The latch 36 is provided with a shoulder 39 which may be engaged by the nut 31, when the latter moves upwardly from the crosshead 27, to move the latch laterally against the action of the spring 38. It will be seen that while the nut 31 rests on the top of the crosshead 27 the latch 36 occupies its normal position under the action of spring 38, regardless of any simultaneous movement of the crosshead and the nut. Hence, when the arm 11 is raised by piston 24, the latch 36 remains in its normal position with respect to crosshead 27, that is, it is not moved laterally with respect to the direction of movement of the crosshead; but when the arm 11 is raised by trip 10, the nut 31 engages the shoulder 39 of latch 36 and moves the latter laterally against the action of spring 38.

The latch 36 is, as here shown, extended upwardly for a considerable distance above the shoulder 39. The reason for this is, as follows: While the arm 11 is held in the raised position by piston 24, if the spring 14 should break, then the arm 11 might stick in its raised position after the crosshead is driven down by the piston. In such case the nut 31 would engage the upwardly extended portion of the latch 36 and hold the latter in its laterally displaced position, thereby preventing the apparatus which is affected by the latch from being returned to its normal position until the arm 11 is released.

I utilize the lateral movement of the latch 36 to affect certain apparatus on the vehicle, preferably the fluid pressure brakes. As here shown, I provide a valve device 40 which is opened by the lateral movement of the latch 36, which valve device when opened is arranged to cause a reduction of pressure in a pipe 41. The pipe 41 may be connected with the brake pipe of the vehicle, or it may be employed otherwise to control the brakes of the vehicle; in either case an application of the brakes is accomplished by a reduction of pressure in pipe 41.

Referring particularly to Figs. 5, 6 and 7, the valve device 40 comprises a body 44, a cap 45 and a cap 46, all held together by bolts 47. The valve stem 43 passes through a hole in the head 46 and is provided with an integral head 48 which limits the outward movement of the stem by engaging the head 46. The body 44 is provided with an annular valve-seat 49 upon which a valve 50 is adapted to be seated. This valve 50 is

held against its valve seat by a spring 54. The valve 50 is screwed on the end of a triangular stem 51 (see Figs. 5 and 7). A piston 52 is adapted to reciprocate in the cylinder formed by the body portion 44. This piston carries an extended sleeve 53 which surrounds the stem 51 and serves as a guide therefor. The end of the sleeve 53 rests against a washer 92, which in turn rests against the valve 50, the said end of the sleeve 53 being recessed, as indicated in Fig. 6 to permit air to flow from chamber 55 into the sleeve 53 when valve 50 is raised from its seat. Pipe 41 opens into chamber 55; and the body 44 is provided with a port 56 by which chamber 57 is opened to atmosphere when piston 52 moves to the left, the port 56 being so located that a consideable movement of piston 52 is necessary in order to exhaust chamber 57 through port 56 to atmosphere. The body 44 is provided with another port 118 for exhausting to the atmosphere any fluid which may leak past valve 50 into chamber 126 on the left hand side of piston 52.

The operation of the valve device 40 is as follows: Under normal conditions the valve 50 rests against its seat 49, being held there both by spring 54 and by the pressure on the valve of the fluid in chamber 55. When the valve stem 43 is pressed inwardly by the latch 36, the head 48 engages the end of stem 51 and raises valve 50 from its seat. Fluid pressure then flows from chamber 55 through the sleeve 53 into chamber 57; the fluid pressure in chamber 57 acting upon the right hand face of piston 52 will move piston 52 to the left until the prongs on sleeve 53 engage valve 50. If now the pressure in chambers 55 and 57 acting upon piston 52 is sufficient to overcome the pressure of spring 54, the piston will move still farther to the left until it seats upon gasket 127, thereby fully opening the port 56 so that the fluid pressure will be rapidly exhausted to atmosphere. This fluid pressure in chambers 55 and 57 acting against the area of stem 43, moves stem 43 to the right, and leakage past stem 43 is then prevented by the pressure of head 48 against cap 46. The area of piston 52 is comparatively large, hence, only a comparatively small fluid pressure upon piston 52 is required to equal the pressure of spring 54. As soon as the pressure upon piston 52 decreases to a value less than the pressure of spring 54, the piston 52 will tend to return, thereby partially closing orifice 56. This throttling of the orifice 56 has the effect of increasing the pressure in chamber 57 so that a point of equilibrium is soon reached at which the pressure against piston 52 just balances the pressure of spring 54; for example, the spring 54 may be so adjusted that a pressure of five pounds per square inch will be sufficient to hold the piston 52 in such position that the port 56 is partially open. It will be evident, therefore, that the valve 50, after being opened by means of pressure exerted against stem 43 will remain open as long as sufficient fluid is supplied by pipe 41 to maintain a pressure of five pounds per square inch, and that to close the valve it is either necessary to reduce the pressure in chambers 55 and 57 to less than five pounds per square inch, or to provide means for securing an equalization of fluid pressure upon the opposite faces of piston 52.

It is obviously necessary that the brakes should be released after they have been automatically applied, and to accomplish this the valve 50 must be closed and the pressure in pipe 41 must be restored to its normal value. The closure of valve 50 may be accomplished in several ways. For example, it may be accomplished by temporarily disconnecting the pipe 41 from its source of fluid pressure supply, thereby removing the fluid pressure on piston 52 so that this piston moves to the right under the influence of spring 54 and closes both valve 50 and exhaust port 56; the pipe 41 may then be again connected with its source of fluid pressure supply, and the valve 50 being closed will permit the pressure in pipe 41 to build up to its normal value. In Fig. 1 I have shown a valve 128 for thus controlling the pipe 41, this valve comprising a valve seat 115 and a valve stem 114 adapted to coact with the seat to close the pipe 41. The stem 114 is normally held away from the seat 115 by a spring 117, but may be pressed into engagement with the seat by any suitable means such as by a push button 116. I do not wish to limit myself to the use of a push button for the control of valve stem 114. Leakage of fluid pressure from pipe 41 to atmosphere through the valve 128 is prevented by providing the valve stem 115 with a piston 129 which seats against a gasket 130. The valve device 128 is preferably located at a point on the vehicle accessible only from the roadway, so that after an automatic application of the brakes they cannot be released until the vehicle has come nearly to a stop. As this valve interrupts the communication between the air brake system and valve 40 without affecting the pressure in the brake system, it is evident that it may be employed to prevent an application of the brakes when arm 11 is raised by the trip 10; and since the valve 128 is located at a point on the vehicle only accessible from the roadway, this action may only be accomplished when the vehicle is moving at a low rate of speed.

Referring now to Fig. 10, I have here shown another means by which the brakes may be released after an automatic applica-

tion. In this view the valve device 40ª is identical with the valve device 40 shown in Fig. 5, except that the ports 56 and 118 instead of opening separately to atmosphere are brought together and the two are then opened to atmosphere through a port 119. This port 119 is provided with a normally open valve 120 which may be operated in any suitable manner, for example, by means of an electromagnet 121. When, after an automatic application by means of valve device 40ª, it is desired to release the brakes, the electromagnet 121 is energized thereby closing valve 120. The pressures on each side of piston 52 are thereby equalized so that this piston is moved by spring 54 to close valve 50; magnet 121 may then be again deënergized and the valve 50 will, of course, remain closed. The supply of fluid pressure for the cylinder 23 is, as here shown, obtained from a pipe 58, which is connected with a suitable source of fluid pressure (not shown), such, for example, as the main reservoir of the fluid pressure brake system. The supply of fluid pressure from this pipe 58 to the cylinder 23 is controlled by means of a valve device 59, hereinafter referred to as a "timing valve," which I will now explain, referring particularly to Figs. 1, 8, and 8ª. This valve device is inclosed in a casing comprising three sections 60, 61 and 62, which sections are held together by bolts 63. The section 61 contains a chamber 64, into which the pipe 58 opens. Mounted in the chamber 64 is a slide valve 65, which slides over ports 69, 70 and 71 in a wall of the chamber. Ports 69 and 71 are connected respectively with the top and bottom of the cylinder 23, and port 70 is open to atmosphere. The slide valve is reciprocated by shoulders 67 and 67ª on an extension 66 of a piston 68. This piston is adapted to reciprocate in a cylinder formed in section 61 of the casing. The shoulder 67 is shaped to fit the chamber 64 and, therefore, serves as a guide to constrain the piston 68 to movement parallel to its cylinder; this shoulder is triangular in shape or is otherwise recessed to permit the passage of fluid from one side to the other thereof. The slide valve 65 is held against its seat by a spring 72 which slides along the wall of the chamber 64 opposite the slide valve seat and which presses upon a pin 131 mounted in the slide valve. A reservoir 73 adapted to retain fluid pressure is screwed into the section 62 of the device; this reservoir I will hereinafter term a "timing reservoir." This reservoir is open at its top so that it communicates with section 62, and the pressure in the reservoir acts upon the bottom of a piston 74 which is adapted to reciprocate in a cylinder formed in section 60. The area of this piston 74 is greater than the area of piston 68. Piston 74 is fixed to a stem 76, the upper end of which may reciprocate in a suitable socket 78 in piston 68. The function of stem 76 is to raise piston 68 when piston 74 is raised by fluid pressure in reservoir 73. A helical spring 77 extends from piston 74 to piston 68, and tends to separate these two pistons.

A valve body 72 is screwed into the upper section 61 of the device, and into this valve body is screwed an iron clad electromagnet 79 which controls a pin valve 80. This pin valve connects the timing reservoir 73, through a pipe 81, with atmosphere or with the chamber 64, according as the electromagnet is deënergized or energized. The pipe 81 is provided with an orifice 86 of restricted area. A pipe 83 opens into the chamber 85 between pistons 68 and 74. This pipe may be connected with atmosphere or with pipe 58 by means of a cock 84. The purpose of this pipe is to cut the entire apparatus out of service as hereinafter explained.

The operation of the timing valve 59 is as follows: Chamber 64 is constantly filled with fluid pressure from pipe 58. This fluid pressure acts upon the upper face of piston 68 to hold the latter down against its seat 75, thereby holding the slide valve 65 in such position that the lower end of cylinder 23 is connected with atmosphere and the upper end with chamber 64. The chamber 85 under piston 68 is connected with atmosphere through pipe 83 and cock 84. When magnet 79 is deënergized, the timing reservoir 73 is connected with atmosphere by the pin valve 80, as shown in the drawing. When now magnet 79 is energized, it operates pin valve 80 to disconnect the timing reservoir 73 from atmosphere and to connect it with chamber 64. When the pressure in reservoir 73 reaches a certain proportion of the pressure in chamber 64, its action on piston 74 is sufficient to overcome the pressure on piston 68, so that the latter is unseated, thereby exhausting to atmosphere the small annular chamber 99. The pressure of air on the top of piston 68 now acts on a smaller area of this piston, so that a force sufficient to start this piston from its seat will be sufficient to overcome the added friction of the slide valve and to quickly complete the stroke of the pistons and slide valve. Quick action of the slide valve is thereby secured. The period of time required for the pressure in reservoir 73 to reach this proportion of the initial pressure depends upon the capacity of the reservoir 73 and upon the area of orifice 86; hence, this period of time may be varied by varying either one or both of these values.

When the slide valve 65 has been moved, cavity 88 connects ports 69 and 70, and port 71 is opened to chamber 64; this opens the top of cylinder 23 to atmosphere and connects the bottom of this cylinder with

chamber 64 and, therefore, with pipe 58. The fluid pressure thus admitted to the bottom of cylinder 23 raises the piston 24, thereby raising arm 11. This movement of the piston 24 will be comparatively rapid because cavity 88, ports 69, 70 and 71 are comparatively large. When now magnet 79 is deënergized the pin valve 80 disconnects the timing reservoir 73 from the chamber 64 and connects it with the atmosphere through exhaust port 89. The consequent reduction of pressure under piston 74 permits the pressure in chamber 64 to push pistons 68 and 74 and the slide valve 66 downwardly so that port 90 registers with port 69 and cavity 91 registers with port 71. This is the position in which the slide valve is shown in the drawing. The valve then connects the bottom of cylinder 23 with atmosphere and the top of this cylinder with the fluid pressure in chamber 64. Port 90 and cavity 91 are of comparatively small area, hence, the downward movement of piston 24 is accomplished slowly, thereby cushioning the downward movement of arm 11 under the influence of spring 14.

When it is desired to cut the apparatus out of service, that is, to raise the arm 11 out of position for engagement with stop 10 and hold it there, the handle of cock 84 is turned from the position shown in full lines to the position shown in dash lines, thereby connecting chamber 85 with pipe 58. Both faces of piston 68 are then subjected to fluid under the same pressure, and the spring 77 then becomes effective to raise the piston 68 away from stem 76, thereby moving the slide valve 65 to such position as to cause piston 24 to raise the arm 11 out of position for engagement with the stop 10.

As I have stated hereinbefore, a considerable period of time elapses after magnet 79 is energized before the pressure in reservoir 73 becomes sufficient to raise piston 74. This period of time is substantially constant regardless of variations in the pressure in chamber 64. The reason for this is that the flow of air through an orifice is within wide limits directly proportional to the pressure. For example, assume that the pressure in chamber 64 is 100 pounds per square inch, and that 70 pounds per square inch in reservoir 73 is sufficient to overcome the pressure on piston 68, and that the time consumed in charging the reservoir to 70 pounds, is 3 seconds; then if the pressure in chamber 64 is 80 pounds per square inch, then the flow of air through the orifice 86 will be 80% as great as before, and the pressure in reservoir 73 will reach 56 pounds (70% of 80 pounds) in the same period of time, that is, in 3 seconds.

The flow of air through the orifice 86 will, of course, vary to some degree with variations of temperature of the air, so that with an orifice 86 of constant area, as shown in Fig. 8, the time consumed in charging the reservoir 73 will vary with variations of temperature. If desired, this variation of time may be avoided by providing means for varying the area of the orifice inversely as the variations of temperature. One such means is shown in Fig. 9, in which the orifice 96 is formed between a valve seat 97 and the end of a rod 94. The upper end of the rod is screwed into a cap 98, which latter is screwed into a tube 95. The rod 94, and the tube 95, are of different materials, having different coefficients of expansion, the rod 94 having the higher coefficient of the two, so that the area of the orifice 96 varies inversely as the temperature.

As I have stated hereinbefore, the present invention is a continuation of the invention shown and described in my co-pending application filed Aug. 7, 1912, Serial No. 713,838. The means which I employ in the present invention for controlling the electromagnet 79 is preferably similar to the means shown in my said co-pending application for the control of the corresponding electromagnet shown therein. Briefly described, this means as shown in the present case, is as follows: A contact shoe 103 is supported on the vehicle 13 in any suitable manner, as by mounting it on a beam 104 carried by the vehicle. This contact shoe is connected with one terminal of magnet 79 by a wire 105. The other terminal of magnet 79 is connected with a wheel 113 of the vehicle by a wire 106 and a brush 107 bearing on an axle 108. Extending in the rear of the trip 10 is a ramp rail which is adapted to be engaged by the shoe 103. As here shown, this ramp rail comprises two sections 101 and 102, insulated from each other. 100 is a source of current, one terminal of which is constantly connected with a track rail 12 by wire 110, and the other terminal of which is constantly connected with section 102 of the ramp rail by wire 111. The other section 101 of the ramp rail is connected with or disconnected with the last-mentioned terminal of the source 100 according as a circuit controller 109 is closed or open. This circuit controller 109 may be operated by any suitable means, such, for example, as by a railway signal as shown in my hereinbefore mentioned co-pending application.

The operation of the apparatus is as follows: Assume that the vehicle 13 is traveling in the direction indicated by the arrow, and that the circuit controller 109, is open, as shown in the drawing. When the contact shoe 103 engages section 101 of the ramp rail, the circuit for magnet 79 is not closed because section 101 is not connected with the source of current 100. When, however, the contact shoe 103 reaches sec-

tion 102 of the ramp rail, the following circuit for magnet 79 is closed: from source 100, through wire 111, section 102 to ramp rail, contact shoe 103, wire 105, magnet 79, wire 106, brush 107, axle 108, wheel 113, rail 12, and wire 110 to source 100 The energization of magnet 79 operates the pin valve 80 to admit fluid pressure to the timing reservoir 73. If the speed of the vehicle 13 is such that the slide valve 65 is operated in time to cause arm 11 to be raised before this arm reaches the trip 10, then the valve 40 is not operated and the brakes are, therefore, not applied. If, however, the speed of the vehicle is such that arm 11 is not raised before it reaches trip 10, then this arm is raised by the trip and latch 36 is operated to open the valve 40, thereby applying the brakes. If the circuit controller 109 is closed, it will be clear that magnet 79 will be energized as soon as contact shoe 103 engages section 101 of the ramp rail.

It may be desirable in certain instances to obtain an "emergency" application of the brakes if the train is traveling at a high speed, in order to insure that it will be brought to a stop within a reasonable distance. If the train is traveling at low speed an "emergency" application of the brakes might result in unpleasant or dangerous shocks, hence at low-speed a "service" application of the brakes is preferable.

Referring now to Fig. 11, I have here shown means for causing a "service" or an "emergency" application of the brakes according as the speed of the vehicle is below or above a predetermined point. As here shown, this means comprises two valve devices 40 and 40^b, each of which is the same as the valve device 40 shown in Fig. 5, except that in valve device 40^b the exhaust port 56^b is larger than the exhaust port 56 in valve device 40 of Fig. 5. The valve stems 43 of both valve devices 40 and 40^b are in position to be operated by latch 36^a; valve device 40 is operated whenever the latch is moved laterally by relative movement of the nut 31 and crosshead 27, and valve device 40^b is operated only when this relative movement is so sudden that the energy transmitted to the latch by nut 31 rises above a certain value. As here shown, I provide a buffing device 122 with which the latch 36^a engages after it has moved laterally far enough to operate valve device 40. This buffing device comprises a rod 123, provided with a head 125, which rod and head are normally held in the position shown by a spring 124. The normal position of the head is such that when the latch has been moved laterally far enough to operate the valve device 40 (the position shown in dash lines) it engages the head 125. If the speed of the vehicle is below a predetermined value, the inertia of the latch is not sufficient to cause it to compress the spring 124. and the valve device 40 only is operated; if, however, the speed of the vehicle is above this predetermined point, the inertia of the latch is sufficient to cause it to compress the spring 124 to such an extent that the latch operates the valve 40^b. The two valve devices 40 and 40^b may be employed in any suitable way to cause respectively a "service" application and an "emergency" application of the brakes. If the pipe 41 is connected directly with the "train pipe," these two distinctive applications of the brakes may be obtained by providing a relatively small exhaust port 56 in the valve device 40, and a relatively large exhaust port 56^b in the valve device 40^b, thereby obtaining a relatively slow rate of reduction of fluid pressure when valve 40 alone is opened, and a relatively rapid rate of reduction in fluid pressure when both valves 40 and 40^b are opened. Other methods of obtaining the two distinct applications by the two valve devices may suggest themselves to those skilled in the art.

It is sometimes desirable that the apparatus be cut out of service by raising arm 11 out of position for engagement with trip 10 and holding it there. As I have hereinbefore stated, this may be accomplished with the apparatus shown in Fig. 1 by turning cock 84 to such position as to admit fluid pressure to chamber 85 of the timing valve device 59. This cut-out feature is especially desirable when two or more locomotives or other vehicles equipped with the apparatus are coupled together in one train; in such cases it is desirable that the arm 11 on all such vehicles except one should be raised out of operative position to avoid unnecessary engagement with the trips 10. It is also desirable in such cases that the control of the brakes should be removed from the drivers of the vehicles whose arms 11 are raised. In Fig. 12 I have shown one form and arrangement of apparatus for accomplishing these two functions simultaneously. In this view the apparatus contained in the box 22 is the same as in Fig. 1, but 136 is the main fluid pressure reservoir which is supplied with fluid pressure from any suitable source such as a compressor. 140 is the brake pipe which is controlled by an engineer's brake valve 132 in the usual and well-known manner. As here shown, the automatic control of the brakes by the valve device 40 is accomplished by connecting this valve device directly with the brake pipe 140, a normally open valve 128 being inserted in pipe 41 as in Fig. 1 to release the brakes after an automatic application. The pipe 83 leading to valve 59 is, as here shown, connected with main reservoir 136 through an orifice 137 of restricted area; a timing reservoir 139 is connected with pipe 83 for a

purpose hereinafter explained. 133 is a cock comprising two ports 134 and 135 arranged at substantially right angles to each other. Port 134 is adapted to connect the engineer's valve 132 with, or disconnect it from, the brake pipe 140, according as the cock is turned to the position shown in Fig. 13 or to the position shown in Fig. 12. Port 135 is adapted to connect pipe 83 with the main reservoir 136 or with atmosphere, according as the cock is turned to the position shown in Fig. 12 or to the position shown in Fig. 13. It will be seen, therefore, that when the engineer's brake valve 132 is connected with the brake pipe 140, the pipe 83 is connected with atmosphere, and that when the engineer's brake valve and brake pipe are disconnected, the pipe 83 is connected with reservoir 136.

The operation of the apparatus shown in Fig. 12 is as follows: The cock 133 usually occupies the position shown in Fig. 13, so that the engineer or driver of the vehicle has control of the fluid pressure brakes through the engineer's brake valve 132, and so that arm 11 is not raised out of operative position except when raised automatically as the vehicle passes a trip 10 at or below the permissive speed. When two or more vehicles equipped with the apparatus are coupled together, the cocks 133 on all such vehicles except one are turned to the position shown in Fig. 12, thereby disconnecting the engineer's brake valves from the brake pipe on these vehicles and also raising the arms 11 of these vehicles out of position for engagement with the trips 10, which is the position of the arm 11 as shown in Fig. 12.

It will be obvious that with the apparatus shown in Fig. 12 if the pipe 83 were connected directly with the reservoir 136 without the orifice 137 of restricted area and the timing reservoir 139, the apparatus could be misused by the driver to enable him to pass a trip 10 even though the ramp rail immediately in the rear thereof were deënergized. This misuse is prevented, however, by the orifice of restricted area and the timing reservoir; the operation in case of attempted misuse, is as follows: Because of the restricted orifice 137 and the timing reservoir 139, a considerable period of time is required after the cock 133 is turned to the position shown in Fig. 12 before the pressure in chamber 85 becomes sufficient to cause arm 11 to be raised. But when the cock 133 is turned to this position, brake pipe 140 is at the same time disconnected from the engineer's valve 132 and, therefore, from the reservoir 136, hence the fluid pressure in the brake pipe 140 immediately begins to leak out. The orifice 137 and reservoir 139 are so adjusted that the time required, after turning cock 133, for the arm 11 to be raised is greater than the time required for the pressure in the brake pipe 140 to fall to such value as to cause an application of the brakes. Hence, it will be seen that if the driver attempts to pass a trip 10 by raising the arm 11 by means of cock 133, the brakes will be applied before the vehicle reaches the trip 10.

Although I have herein shown only a few forms of apparatus embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. In combination, a railway track, a vehicle, adapted to travel thereon, a trip located in the trackway, an arm on the vehicle biased to position for engagement with the trip, a member adapted to move the arm out of said engaging position against the bias but to permit similar movement of the arm by the trip without causing movement of said member, means for moving said member, and means operated by relative movement of said arm and said member for controlling the vehicle.

2. In combination, a railway track, a vehicle, adapted to travel thereon, a trip located in the trackway, an arm on the vehicle biased to position for engagement with the trip, means for moving the arm out of said engaging position against its bias and for permitting movement of the arm by the trip in the same direction relative to said means, and means controlled by said movement of the arm relative to its moving means for governing the vehicle.

3. In combination, a railway track, a vehicle adapted to travel thereon, a trip in the trackway, two members on the vehicle, means on the vehicle operated by the trip for moving one of said members relative to the other, means on the vehicle for moving said members simultaneously out of position for movement of the one member by the trip, a third member on the vehicle moved by the said movement of one of the first two members relative to the other, the movement of said third member being in a lateral direction with relation to the movements of the first two members, and means operated by said lateral movement of the third member for controlling the vehicle.

4. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway, an arm on the vehicle adapted to engage the trip and to be moved thereby, a member on the vehicle moved by said movement of the arm, a second member on the vehicle, means for causing simultaneous movements of said two members or for permitting movement of the first member relative to the second mem-

ber, a third member moved laterally by said relative movement but not moved laterally by said simultaneous movement of the first two members, and means operated by said third member for controlling the vehicle.

5. In combination, a railway track, a vehicle, adapted to travel thereon, a trip located in the trackway, an arm on the vehicle biased to position for engagement with the trip, a member adapted to move the arm out of said engaging position against the bias but to permit movement of the arm in the same direction by the trip without causing movement of said member, means operated by relative movement of said arm and said member for controlling the vehicle, a source of fluid pressure on the vehicle, a cylinder and a piston one of which is operatively connected with said member, and means for admitting fluid pressure to the cylinder to cause movement of the arm out of position for engagement with the trip.

6. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway, an arm on the vehicle biased to position for engagement with the trip, a head connected with said arm, a crosshead adapted to engage the head to move the arm out of said position for engagement with the trip but to permit the head to move away from the crosshead when the arm is moved by the trip, means for moving said crosshead, and means operated by said movement of the head away from the crosshead for controlling the vehicle.

7. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway, an arm on the vehicle biased to position for engagement with the trip, a rod connected with the arm and provided with a head, a second rod provided with a crosshead adapted to engage said head to move the arm out of such engaging position but to permit the head to move away from the crosshead when a similar movement of the arm is caused by the trip, so that said movement of the arm by the trip does not cause movement of the second rod; means for moving said second rod, and means operated by movement of the head away from the crosshead for controlling the vehicle.

8. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway and having an inclined face, an arm on the vehicle biased to position for engagement with said inclined face, a member on the vehicle adapted to move the arm out of position for engagement with said inclined face but adapted to permit the arm to be moved by said inclined face without moving the member, and means operated by the relative movement of the arm and the member for controlling the vehicle.

9. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway, an arm on the vehicle adapted to engage the trip at times, a spring biasing said arm to position for engaging the trip, a head connected with said arm, a crosshead adapted to engage the head to move the arm out of position for engagement with the trip against the action of the spring but also adapted to permit the head to move away from the crosshead when the arm engages the trip, means operated by said movement of the head away from the crosshead for controlling the vehicle, a cylinder, a piston therein operatively connected with the crosshead, a source of fluid pressure on the vehicle, and means for admitting fluid pressure to the cylinder on either side of the piston.

10. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway, an arm on the vehicle biased to position for engagement with the trip, a head member connected with the arm, a crosshead member adapted to engage the head member to move the arm out of position for engagement with the trip but also adapted to permit the head member to move away from the crosshead member when the arm engages the trip, a latch mounted on one of said members and adapted to be moved laterally by the other of said members when the head member moves away from the crosshead member, and means operated by lateral movement of the latch for controlling the vehicle.

11. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway, an arm on the vehicle biased to position for engagement with the trip, a head member connected with the arm, a crosshead member adapted to engage the head member to move the arm out of position for engagement with the trip but also adapted to permit the head member to move away from the crosshead member when the arm engages the trip, a latch pivotally mounted on one of said members and adapted to be moved laterally by the other of said members when the head member moves away from the crosshead member, a fluid pressure brake apparatus on the vehicle, and a valve operated by the lateral movement of said latch for controlling said brake apparatus

12. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway and having an inclined face, an arm mounted on the vehicle and biased to position for engagement with said inclined face, a rod one end of which is connected with the arm and the other end of which is provided with a nut, a crosshead provided with a hole through which the rod passes and adapted to engage the nut to

move the arm out of position for engagement with the trip, whereby the nut moves away from the crosshead when the arm is moved by the inclined face of the trip, means for moving the crosshead, a latch pivotally mounted on the crosshead and provided with a shoulder which is engaged by the nut whereby the latch is moved laterally when the nut moves away from the crosshead, and means operated by lateral movement of the latch for controlling the vehicle.

13. In combination, a fluid pressure motor comprising a cylinder, a source of fluid pressure, a valve for controlling the supply of fluid pressure from said source to one end of said cylinder or the other according as the slide valve occupies one position or another, two pistons of different area operatively connected with the valve, means for constantly supplying fluid pressure from said source to the piston of smaller area to move the valve to one of said positions, means for at times also supplying fluid pressure from said source to the other piston to move the valve to the other of said positions, and railway traffic controlling apparatus controlled by said motor.

14. In combination, a fluid pressure motor comprising a cylinder, a source of fluid pressure, a valve for connecting one end of said cylinder with atmosphere or with said source of fluid pressure according as the valve occupies one position or another, two pistons of different areas operatively connected with said valve, means for constantly supplying fluid pressure from said source to the piston of smaller area to move the valve to one of said positions, means for at times also supplying fluid pressure from said source to the other piston to move the valve to the other of said positions, and railway traffic controlling apparatus controlled by said motor.

15. In combination, a fluid pressure motor comprising a cylinder, a source of fluid pressure, a valve for connecting one end of said cylinder with atmosphere or with said source of fluid pressure according as the valve occupies one position or another, two pistons of different areas operatively connected with said valve, means for constantly supplying fluid pressure from said source to the piston of smaller area to move the valve to one of said positions, a timing reservoir in communication with the piston of larger area, an orifice of restricted area connected with said reservoir, means for at times connecting said reservoir with the source of fluid pressure through said orifice whereby after an interval of time the pressure on the piston of larger area reaches a value sufficient to overcome the pressure on the piston of smaller area so that the valve is then moved to the other of said positions, and railway traffic controlling apparatus controlled by said motor.

16. In combination, a fluid pressure motor comprising a cylinder, a source of fluid pressure, a valve for connecting one end of said cylinder with atmosphere or with said source of fluid pressure according as the valve occupies one position or another, two pistons of different areas operatively connected with said valve, means for constantly supplying fluid pressure from said source to the piston of smaller area to move the valve to one of said positions, means for at times also supplying fluid pressure from said source to the other piston to move the valve to the other of said positions, timing means associated with said last-mentioned means for requiring an interval of time for the pressure on the larger piston to reach a value sufficient to overcome the pressure on the smaller piston, and railway traffic controlling apparatus controlled by said motor.

17. In combination, a fluid pressure motor comprising a cylinder, a source of fluid pressure, a valve for connecting one end of said cylinder with atmosphere or with said source of fluid pressure according as the valve occupies one position or another, two movable members of different effective areas operatively connected with said valve, means for constantly supplying fluid pressure from said source to the movable member of smaller effective area to move the valve to one of said positions, means for at times also supplying fluid pressure from said source to the other movable member to move the valve to the other of said positions, timing means associated with said last-mentioned means for requiring an interval of time for the pressure on the movable member of larger effective area to overcome the pressure on the other movable member, and railway traffic controlling means controlled by said motor.

18. In combination, a fluid pressure motor comprising a cylinder, a source of fluid pressure, a valve for connecting one end of said cylinder with atmosphere or with said source of fluid pressure according as the valve occupies one position or another, two movable members of different effective areas operatively connected with said valve, means for constantly supplying fluid pressure from said source to the movable member of smaller effective area to move the valve to one of said positions, a timing reservoir in communication with the movable member of larger effective area, an orifice of restricted area connected with said reservoir, means responsive to variations of temperature for varying the area of said orifice, means for at times connecting said reservoir with the source of fluid pressure through the orifice whereby after a predetermined interval of time the pressure on the member of larger area reaches a value sufficient to overcome

the pressure on the movable member of smaller area so that the valve is then moved to the other of said positions, and railway traffic controlling means controlled by said motor.

19. In combination, a fluid pressure motor comprising a cylinder, a source of fluid pressure, a valve for connecting one end of said cylinder with atmosphere or with said source of fluid pressure according as the valve occupies one position or another, two pistons of different areas operatively connected with said valve, the piston of smaller area having a smaller effective area when unseated than when seated, means for constantly supplying fluid pressure from said source to the piston of smaller area to move the valve to one of said positions the said piston being then seated, means for at times also supplying fluid pressure from said source to the other piston to move the valve to the other of said positions, said movement being rapid because of the reduced effective area of the smaller piston as soon as the latter is unseated, and railway traffic controlling apparatus controlled by said motor.

20. In combination, a fluid pressure motor comprising a cylinder, a source of fluid pressure, a valve for controlling the supply of fluid pressure from said source to one end of said cylinder or the other according as the valve occupies one position or another, two pistons of different area operatively connected with the valve, means for constantly supplying fluid pressure from said source to the piston of smaller area to move the valve to one of said positions, a timing reservoir in communication with the piston of larger area, an orifice of restricted area connected with said reservoir, means for at times connecting said reservoir with the source of fluid pressure through the said orifice whereby after an interval of time the pressure on the piston of larger area reaches a value sufficient to overcome the pressure on the smaller piston so that the valve is then moved to its other position, and railway traffic controlling apparatus controlled by said motor.

21. In combination, a fluid pressure motor comprising a cylinder, a source of fluid pressure, a valve for controlling the supply of fluid pressure from said source to one end of said cylinder or the other according as the valve occupies one position or another, a piston connected with said valve, means for constantly supplying fluid pressure from said source to one side of said piston to move the valve to one of its positions, a second piston of greater area than the first and also connected with the valve to move it to its other position, means for at times supplying fluid pressure from said source to one side of said second piston also whereby the valve is moved to its other position against the action of the fluid pressure on the first piston, a spring acting upon the valve and tending to move it to its second-mentioned position, and means for at times supplying fluid pressure from said source to the other side of the first piston whereby the pressure on the two sides of this piston are then equalized and the valve is moved to its second-mentioned position by the spring independently of the second piston.

22. In combination, a railway, a vehicle traveling thereon, a trip located in the trackway, an arm carried by the vehicle and adapted to engage the trip, a cylinder and a piston for moving the arm out of position for engagement with the trip, a source of fluid pressure on the vehicle, a valve for controlling the supply of fluid pressure from said source to the cylinder, a piston for operating said valve, a timing reservoir for supplying fluid pressure to the last-mentioned piston, a valve for controlling the supply of fluid pressure to said reservoir, an electromagnet for controlling said valve, and means for energizing said electromagnet when the vehicle reaches a predetermined point in the rear of the trip.

23. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway, a fluid pressure braking apparatus on the vehicle, a valve on the vehicle for effecting a service application of the brakes, and a second valve for effecting an emergency application of the brakes, an arm on the vehicle adapted to engage said trip, and means controlled by the impact of said arm against the trip for operating said service application valve or said emergency application valve according as the speed of the vehicle is below or above a predetermined point.

24. In combination, a railway track, a vehicle adapted to travel thereon, means on the vehicle for effecting a slow stoppage thereof and other means on the vehicle for effecting a quick stoppage thereof, a trip located in the trackway, an arm on the vehicle adapted to engage the trip, means controlled by the impact of the arm against the trip for operating the slow stoppage means and the quick stoppage means and resilient means for preventing the operation of the quick stoppage means when the speed of the vehicle is below a predetermined point.

25. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway, a fluid pressure braking apparatus on the vehicle, a valve on the vehicle for effecting a service application of the brakes, another valve on the vehicle for effecting an emergency application of the brakes, an arm on the vehicle adapted to engage said trip, means controlled by the impact of said arm with said trip for operating said service application valve and said emergency application valve, and resilient means

ior preventing the operation of said emergency valve when the vehicle is traveling below a predetermined speed.

26. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway, an arm on the vehicle adapted to engage the trip to control the vehicle: a fluid pressure braking system on the vehicle including a brake pipe and an engineer's brake valve, means on the vehicle for causing said arm to be moved out of and held out of position for engagement with the trip, and means operatively associated with said means for disconnecting the brake pipe from the engineer's brake valve.

27. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway, an arm on the vehicle adapted to engage the trip to control the vehicle; a fluid pressure braking apparatus on the vehicle including a source of fluid pressure and a brake pipe, means on the vehicle for causing said arm to be moved out of and held out of position for engagement with the trip, and means operatively associated with said means for disconnecting the brake pipe from the source of fluid pressure.

28. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway, an arm on the vehicle adapted to engage the trip to control the vehicle, means on the vehicle for moving the arm out of engaging position, a fluid pressure device for controlling said means; a fluid pressure braking system on the vehicle including a source of fluid pressure, an engineer's brake valve and a brake pipe; a cock adapted when in one position to connect the engineer's brake valve with the brake pipe and disconnect the said fluid pressure device from the source of fluid pressure, and when in another position to disconnect the engineer's brake valve from the brake pipe and connect the fluid pressure device with the source of fluid pressure.

29. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway, an arm on the vehicle adapted to engage the trip to control the vehicle, means on the vehicle for moving the arm out of engaging position, a fluid pressure device for controlling said means; a fluid pressure braking system on the vehicle including a source of fluid pressure, an engineer's brake valve and a brake pipe; a cock adapted when in one position to connect the engineer's brake valve with the brake pipe and connect the said fluid pressure device with atmosphere, and when in another position to disconnect the brake pipe from the engineer's brake valve and to disconnect the fluid pressure device from atmosphere and connect it with the source of fluid pressure.

30. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway, an arm on the vehicle adapted to engage the trip to control the vehicle, means on the vehicle for moving the arm out of engaging position, a fluid pressure device for controlling said means; a fluid pressure braking system on the vehicle including a source of fluid pressure, an engineer's brake valve and a brake pipe; a cock adapted when in one position to connect the engineer's brake valve with the brake pipe and connect the said fluid pressure device with atmosphere, and when in another position to disconnect the brake pipe from the engineer's brake valve and to disconnect the fluid pressure device from atmosphere and connect it with the source of fluid pressure, and means interposed between the source of fluid pressure and the fluid pressure device for requiring a period of time for the pressure in said device to become sufficient to cause the arm-moving means to operate.

31. In combination, a railway track, a vehicle adapted to travel thereon, a trip located in the trackway, an arm on the vehicle adapted to engage the trip to control the vehicle; a fluid pressure braking system on the vehicle including a source of fluid pressure, an engineer's brake valve and a brake pipe; means on the vehicle for moving the arm out of engaging position, controlling means for setting said means into operation, apparatus for requiring a period of time after the said moving means is set into operation before the arm is moved, and means operated simultaneously with the said controlling means for disconnecting the brake pipe from the engineer's valve.

32. In combination, a fluid pressure motor comprising a cylinder, a source of fluid pressure, a valve for connecting one end of said cylinder with or disconnecting it from the said source, according as the valve occupies one position or another, a piston operatively connected with the valve, means for biasing said valve and piston to one of said positions, means for constantly supplying fluid pressure to one side of said piston to overcome the bias and move the valve to the other of said positions, means for at times also supplying fluid pressure to the other side of said piston thereby balancing the fluid pressure on the piston whereby the valve is moved to the first-mentioned position by the said bias, means associated with said last-named means for requiring a period of time for the pressure on the last-mentioned side of the piston to reach a value sufficient to permit the valve to be moved by said biasing means, and railway traffic controlling apparatus controlled by said motor.

33. In combination, a railway track, a ve-

hicle adapted to travel thereon, a trip located in the trackway, a device carried by the vehicle and biased to position for engagement with the trip to govern the vehicle, a source of fluid pressure on the vehicle, a fluid pressure motor on the vehicle adapted to move the device out of position for engagement with the trip, a valve for controlling the supply of fluid pressure from said source to said motor, means for operating said valve, and means for requiring the elapse of a predetermined time interval from the time said last-mentioned means is set into operation to the time the valve is operated.

In testimony whereof I affix my signature in presence of two witnesses.

LLOYD V. LEWIS.

Witnesses:
A. HERMAN WEGNER,
WILLIAM ZABEL.