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APPARATUS FOR THE CONTROL OF RAILWAY CAR RETARDERS

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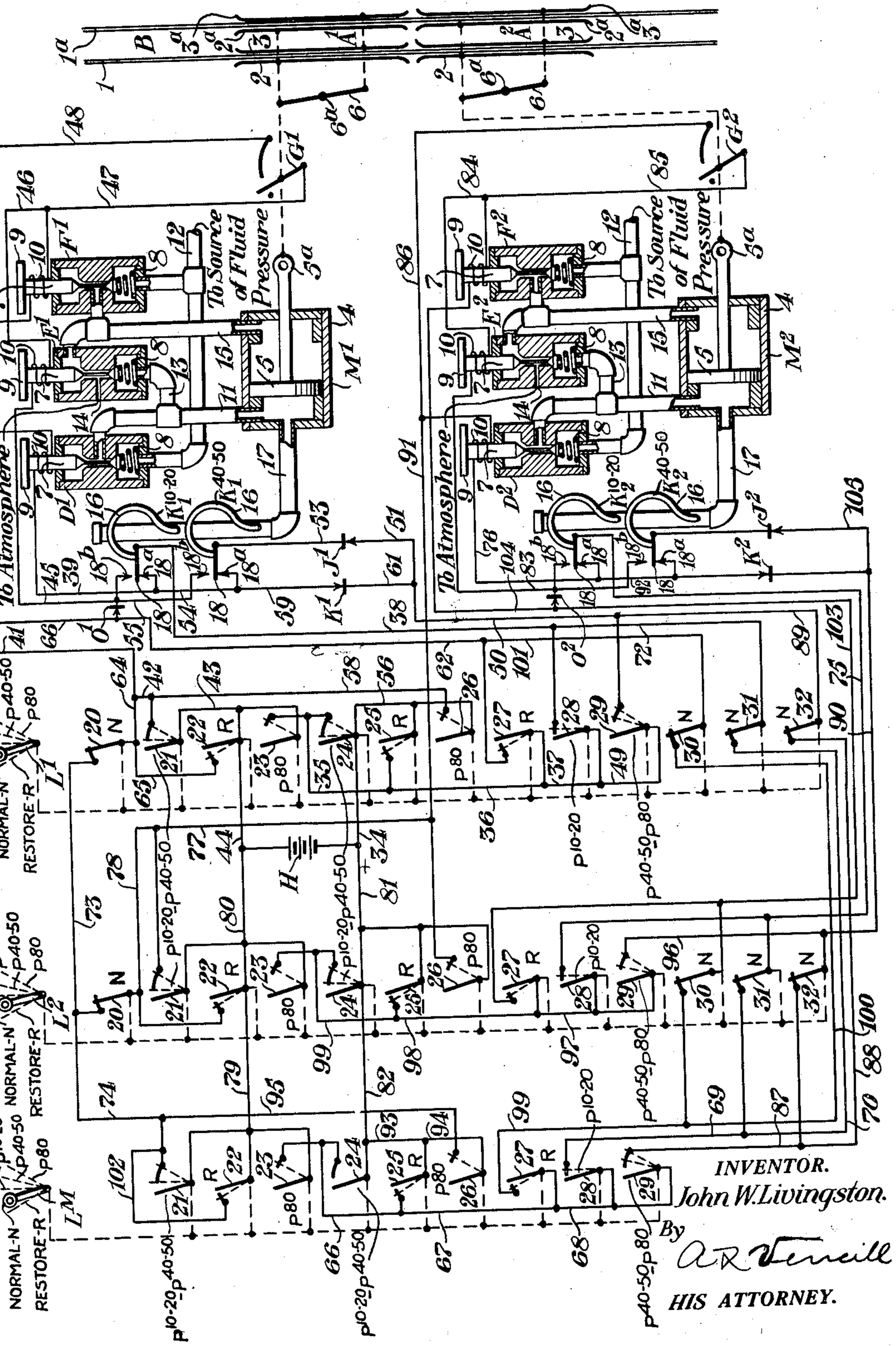

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APPARATUS FOR THE CONTROL OF RAILWAY CAR RETARDERS

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My invention relates to apparatus for the control of railway car retarders, and particularly to apparatus for controlling fluid pressure operated car retarders.

One object of my invention is to provide means for securing several different pressures in the actuating mechanism with a minimum number of line wires between the mechanism and its controller lever.

Another object of my invention is to provide means whereby several retarders may be operated either separately by individual controller levers or simultaneously by a master controller lever.

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

The accompanying drawing is a diagrammatic view showing one form of apparatus embodying my invention.

While my invention may be applied to the control of any desired number of car retarders, for purpose of illustration I have shown it applied to the control of only two car retarders in the drawing, this number being deemed sufficient for a clear understanding of my invention. These two car retarders, which are designated in their entirety by the reference characters A^1 and A^2, respectively, are similar, and each comprises two braking bars 2 and 3, located on opposite sides of, and extending parallel with, one track rail 1 of a stretch B of railway track, and two similar braking bars 2^a and 3^a, located on opposite sides of, and extending parallel with, the other track rail 1^a of the stretch B.

In accordance with my invention means are provided for controlling the two car retarders A^1 and A^2 either separately by individual controllers levers L^1 or L^2, or jointly by a master controller lever L^M. The means for controlling each retarder by its individual lever are similar, and it is believed, therefore, that a clear understanding of both means may be had from a description of only one.

Referring particularly to the means for separately controlling the retarded A^1, this means includes a fluid pressure motor M^1 comprising a cylinder 4 containing a reciprocable piston 5 which is attached to a piston rod 5^a. The braking bars 2, 3, 2^a and 3^a are operatively connected with the piston rod 5^a of motor M^1 through a suitable linkage including a lever 6 pivoted at 6^a. When piston 5 of motor M^1 moves to its left-hand position, braking bars 3 and 3^a of car retarder A^1 are moved toward the right, and braking bars 2 and 2^a are moved toward the left, and the braking bars then occupy their ineffective or non-braking positions, as shown in the drawing. When piston 5 is moved to its right-hand position, however, the braking bars are each moved toward the associated rail to their effective or braking positions in which they engage the sides of the wheels of a railway vehicle traversing rails 1 and 1^a.

Motor M^1 is controlled by three magnet valves D^1, E^1 and F^1. These valves are similar and each comprises a valve stem 7, biased to an upper position by a spring 8 and provided with an armature 9 and a winding 10. When valve D^1 is energized, valve stem 7 of this valve moves downwardly against the bias exerted by spring 8, and a pipe 11 which communicates with the left-hand or application end of motor M^1, is then connected with a pipe 12 which is constantly supplied with fluid pressure, usually air, from a suitable source not shown in the drawing. When valve D^1 is deenergized, however, valve stem 7 of this valve is moved upwardly by spring 8, and pipe 11 is then disconnected from pipe 12. When valve E^1 is energized, valve stem 7 of this valve moves downwardly, and pipe 11 is then connected with atmosphere through a pipe 13 and a port 14, but when valve E^1 is deenergized, pipe 11 is disconnected from atmosphere and a pipe 15 which communicates with the right-hand or restoring end of motor M^1, is vented to atmosphere through port 14. When valve F^1 is energized, valve stem 7 of this valve moves downwardly and connects pipe 15 with pipe 12, but when valve F^1 is deenergized, pipe 15 is disconnected from pipe 12. It will be apparent, therefore, that when valve D^1 is energized, the application end of motor M^1 is supplied with fluid pressure, and when valve F^1 is energized, the restoring end of motor M^1 supplied with fluid pressure. Furthermore, when valve E^1 is energized, the aplication end of motor M^1 is vented to atmosphere, and when valve E^1 is deenergized, the restoring end of motor M^1 is vented to atmosphere.

Valves D^1, E^1 and F^1 are controlled in part by a plurality of similar pressure responsive devices each designated by the reference character K with a distinguishing exponent and subscript. Referring to the pressure responsive device K_1^{10-20}, for example, this device comprises a Bourdon tube 16, connected by means of a pipe 17 with the application end of motor M^1, and hence subjected to the pressure in the application end of motor M^1. The Bourdon tubes 16

each control two contacts 18—18ª and 18—18ᵇ, and are arranged to operate in succession as the pressure in the application end of motor M¹ increases. For example, for a pressure below ten pounds per square inch, all contacts 18—18ª of both of these devices are closed. If the pressure exceeds ten pounds per square inch, however, contact 18—18ª of device K_1^{10-20} opens, and if the pressure exceeds twenty pounds per square inch, contact 18—18ᵇ of device K_1^{10-20} closes. In similar manner, the pressure responsive device K_1^{40-50} is adjusted to open its contact 18—18ª at forty pounds per square inch, and to close its contact 18—18ᵇ at fifty pounds per square inch. Of course, these specific pressures are not essential but are only mentioned for purposes of explanation.

The valves E¹ and F¹ are also controlled in part by a contact G¹ which, in turn, is controlled in accordance with the position of piston 5 of motor M¹ in such manner that this contact will be closed at all times except when the piston is moved to its extreme left-hand position in which the braking bars occupy their ineffective or non-braking positions, as shown in the drawing.

The valves D¹, E¹ and F¹ are further controlled by the lever L¹ which, as here shown, is capable of assuming five positions indicated by dotted lines in the drawing. The first position is designated R, and is the position in which the lever is placed when it is desired to restore the braking bars of the car retarder A¹ to their ineffective or non-braking positions. The second position of the lever L¹ is designated N, and is the normal position, that is, the position in which the lever L is placed when no control of the retarder by the lever L¹ is desired. The third and fourth positions of the lever L¹ are designated P^{10-20} and P^{40-50}, respectively, meaning that when the lever is in position P^{10-20} a pressure of between ten and twenty pounds per square inch will be maintained in the left-hand, or application end, of motor M¹, and when the lever is in the position P^{40-50}, a pressure of between forty and fifty pounds per square inch will be maintained in the application end of motor M¹. The last position of the lever L¹ is designated P^{80}; when the lever is in this position the full available pressure will be admitted to the left-hand end of the motor, it being assumed that the full available pressure is eighty pounds per square inch.

Lever L¹ controls a plurality of contacts 20 to 32, inclusive, adjacent each of which is placed a letter or letters which correspond to the lever position or positions for which the corresponding contact is closed. For example, contact 20 is closed only when lever L¹ occupies its N position. Similarly, contact 21 is closed in the P^{10-20} position of the lever, the P^{40-50} position of the lever, or any position intermediate these two positions.

Lever L¹ will usually be located at a point remote from the braking apparatus, as in the control cabin of a classification yard car retarder system, and will be connected with the braking apparatus by means of line wires extending from the control cabin to the braking apparatus.

As shown in the drawing, lever L¹ occupies its normal position, and all circuits leading to the retarder actuating apparatus are therefore open. The valves D¹, E¹ and F¹ are therefore all deenergized, so that the supply of fluid pressure to both ends of cylinder 4 of motor M¹ is cut off, and the right-hand end of cylinder 4 is vented to atmosphere. The contacts 18—18ᵇ of the pressure responsive devices K_1^{10-20} and K_1^{40-50} are both open, and the contacts 18—18ª are both closed. Piston 5 of motor M¹ occupies its extreme left-hand position, and the braking bars of the car retarder A¹ therefore occupy their ineffective or non-braking positions. Since piston 5 of motor M¹ occupies its extreme left-hand position, contact G¹ is open.

In explaining the operation of the apparatus thus far described as a whole, I will first assume that the operator desires to apply a pressure of between ten and twenty pounds per square inch to the application end of motor M¹ to cause the braking bars of the car retarder A¹ to exert a corresponding pressure on the wheels of a passing car. To do this, he moves lever L¹ to position P^{10-20}, whereupon a circuit for the application valve D¹ becomes closed, which circuit passes from a suitable source of current, here shown as a battery H, through wire 34, contact 24 of lever L¹, wires 35, 36 and 37, contact 28 of lever L¹, line wire 38, contact 18—18ª of pressure responsive device K_1^{10-20}, wire 39, winding 10 of valve D¹, line wire 41, wire 42, contact 21 of lever L¹, and wires 43 and 44 back to battery H. The application valve D¹ therefore becomes energized and admits fluid pressure to the application end of motor M¹ until the pressure reaches ten pounds per square inch, at which time contact 18—18ª of pressure responsive device K_1^{10-20} opens and interrupts the circuit just traced for valve D¹, so that this valve again becomes deenergized. The applied pressure is, however, retained in the application end of motor M¹. If the pressure of the application end of motor M¹ exceeds twenty pounds per square inch for any reason, contact 18—18ᵇ of pressure responsive device K_1^{10-20} will become closed and will complete a circuit for the exhaust valve E¹ which passes from battery H through wire 34, contact 24 of lever L¹, wires 35, 36 and 37, contact 28 of lever L¹, line wire 38, contact 18—18ᵇ of pressure responsive device K_1^{10-20}, wire 45, winding 10 of valve E¹, wires 46 and 47, contact G¹, wire 48, line wire 41, wire 42, contact 21 of lever L¹, and wires 43 and 44 back to battery H. The current flowing in this circuit will energize the exhaust valve E¹, and this valve will therefore operate to exhaust fluid from the application end of the motor M¹ until the pressure again decreases to twenty pounds per square inch, whereupon contact 18—18ᵇ will open and winding 10 of the exhaust valve E¹ will again become deenergized.

If, now, the operator desires to increase the pressure in the application end of motor M¹ to between forty and fifty pounds per square inch to increase the braking effect of the car retarder A¹, he moves lever L¹ to its P^{40-50} position. The application valve D¹ then becomes energized by virtue of a circuit which passes from battery H through wire 34, contact 24 of lever L¹, wires 35, 36, 37 and 49, contact 29 of lever L¹, line wire 50, wire 51, an asymmetric unit J¹ in its low resistance direction, wire 53, contact 18—18ª of pressure responsive device K_1^{40-50}, wires 54 and 39, winding 10 of application valve D¹, line wire 41, wire 42, contact 21 of lever L¹, and wires 43 and 44 back to battery H. The application valve D¹ remains energized under these conditions until the pressure in the application end of motor M¹ reaches forty pounds per square inch, whereupon the circuit just traced for this valve is opened at contact 18—18ª of pressure responsive device K_1^{40-50}. If the pressure in the application end of motor M¹ exceeds fifty pounds per square inch for any reason, exhaust valve E¹

will become energized, and will exhaust fluid from the motor until the pressure again decreases to fifty pounds per square inch, the circuit for the exhaust valve under these conditions being from battery H through wire **34**, contact **24** of lever L^1, wires **35**, **36**, **37** and **49**, contact **29** of lever L^1, line wire **50**, wire **51**, asymmetric unit J^1 in its low resistance direction, wire **53**, contact **18—18^b** of pressure responsive device K_1^{40-50}, wires **55** and **45**, winding **10** of exhaust valve E^1, wires **46** and **47**, contact G^1, wire **48**, line wire **41**, wire **42**, contact **21** of lever L, and wires **43** and **44** back to battery H.

If the operator desires to admit the full available pressure to the application end of motor M^1, he moves lever L^1 to position P^{80}. A circuit for the application valve D^1 is then closed which may be traced from battery H through wires **34** and **56**, contact **26** of lever L^1, wires **58** and **42**, line wire **41**, winding **10** of valve D^1, wires **39**, **54** and **59**, an asymmetric unit K^1 in its low resistance direction, wire **61**, line wire **50**, contact **29** of lever L^1, wires **49**, **37**, **36** and **35**, contact **23** of lever L^1, and wire **44** back to battery H. This circuit does not include any of the contacts of the pressure responsive devices K, and consequently, the full available operating pressure will be admitted to the application end of motor M^1 under these conditions.

It should be pointed out that if the operator moves the lever L^1 from a position corresponding to a higher pressure to a position corresponding to lower pressure, the apparatus will immediately and automatically reduce the pressure in the application end of motor M^1 to a value corresponding to the new position of the lever in a manner which will be apparent from the drawing without tracing the sequence of operation in detail.

In order to restore the braking bars of the car retarder A^1 to their ineffective or non-braking positions, the operator places lever L^1 in its R or restore position. When the lever occupies this position, circuits are completed for both the exhaust valve E^1 and the restoring valve F^1, so that both of these valves now become energized. The circuit for the exhaust valve E^1 passes from battery H through wires **34** and **56**, contact **25** of lever L^1, wire **36**, contact **27** of lever L^1, line wire **62**, an asymmetric unit O^1 in its low resistance direction, wire **45**, winding **10** of valve E^1, wires **46** and **47**, contact G^1, wire **48**, line wire **41**, wires **64** and **65**, contact **22** of lever L^1, and wire **44** back to battery H. The circuit for valve F^1 passes from battery H through wires **34** and **56**, contact **25** of lever L^1, wire **36**, contact **27** of lever L^1, line wire **62**, wire **66**, winding **10** of valve F^1, wire **47**, contact G^1, wire **48**, line wire **41**, wires **64** and **65**, contact **22** of lever L^1, and wire **44** back to battery H. The energization of the exhaust valve E^1 vents to atmosphere the fluid pressure which was previously supplied to the application end of motor M^1, while the energization of the restoring valve F^1 admits fluid pressure to the restoring end of the motor. Piston **5** of motor M^1 therefore now moves to its extreme left-hand position to restore the braking bars to their ineffective or non-braking positions.When piston **5** reaches its extreme left-hand position, contact G^1 opens and interrupts the circuits which were previously closed for valves E^1 and F^1, thus deenergizing these valves. Lever L^1 may then be restored to its normal or N position, and when this is done, all parts will occupy their normal positions in which they are shown in the drawing.

As previously pointed out, the construction and operation of the apparatus including the lever L^2 for separately controlling the car retarder A^2, is similar in all respects to the apparatus including the lever L^1 for controlling the car retarder A^1, and it is believed, therefore, that it will be readily understood from the foregoing, and from an inspection of the drawing, without describing it in detail.

Before entering into a detailed description of the control of the retarders A^1 and A^2 by the master lever L^M, it should be pointed out that this lever is similar to the levers L^1 and L^2 with the exception that the lever L^M is not provided with any contacts which are closed when the lever occupies its N position. It should also be pointed out that in order to effect the joint control of the car retarders by the master lever, it is necessary that the individual levers occupy their normal positions in which the associated contacts **20**, **30**, **31** and **32** are closed.

Assuming now that the levers L^1 and L^2 both occupy their normal positions, as shown in the drawing, and that the operator wishes to cause a pressure of between ten and twenty pounds per square inch to be simultaneously supplied to the application ends of both motors M^1 and M^2, he moves lever L^M to its P^{10-20} position. A circuit for the application valve D^1 will then be closed which passes from battery H through wires **81** and **82**, contact **24** of lever L^M, wires **66**, **67** and **68**, contact **28** of lever L^M, wires **69** and **70**, contact **31** of lever L^1, wire **72**, line wire **38**, contact **18—18^a** of pressure responsive device K_1^{10-20}, wire **39**, winding **10** of valve D^1, line wire **41**, wire **64**, contact **20** of lever L^1, wires **73** and **74**, contact **21** of lever L^M, and wires **79** and **80** back to battery H. At the same time, a circuit for the application valve D^2 will also be closed, this latter circuit passing from battery H through wires **81** and **82**, contact **24** of lever L^M, wires **66**, **67** and **68**, contact **28** of lever L^M, wire **69**, contact **31** of lever L^2, line wire **75**, contact **18—18^a** of pressure responsive device K_2^{10-20}, wire **76**, winding **10** of valve D^2, line wire **91**, wires **77** and **78**, contact **20** of lever L^2, wire **74**, contact **21** of lever L^M, and wires **79** and **80** back to battery H. The valves D^1 and D^2 will therefore now both become energized, so that the braking bars of both retarders A^1 and A^2 will be simultaneously moved toward their braking positions. When the pressure in the application end of motor M^1 reaches ten pounds per square inch, contact **18—18^a** of pressure responsive device K_1^{10-20} will open and will deenergize valve D^1, and if the pressure exceeds twenty pounds per square inch, exhaust valve E^1 will then become energized, the circuit for the valve E^1 under these conditions passing from battery H through wires **81** and **82**, contact **24** of lever L^M, wires **66**, **67** and **68**, contact **28** of lever L^M, wires **69** and **70**, contact **31** of lever L^1, wire **72**, line wire **38**, contact **18—18^b** of pressure responsive device K_1^{10-20}, wire **45**, winding **10** of valve E^1, wires **46** and **47**, contact G^1, wire **48**, line wire **41**, wire **64**, contact **20** of lever L^1, wires **73** and **74**, contact **21** of lever L^M, and wires **79** and **80** back to battery H. Similarly, when the pressure in the application end of motor M^2 reaches ten pounds per square inch, contact **18—18^a** of pressure responsive device K_2^{10-20} will open and will deenergize valve D^2, and if the pressure exceeds twenty pounds per square inch, contact **18—18^b** of pressure responsive device K_2^{10-20} will become closed and will complete a circuit for the exhaust valve E^2 which passes from battery H through wires **81** and **82**, contact **24** of lever

L^M, wires 66, 67 and 68, contact 28 of lever L^M, wire 69, contact 31 of lever L^2, line wire 75, contact 18—18^b of pressure responsive device K_2^{10-20}, wire 83, winding 10 of valve E^2, wires 84 and 85, contact G^2, wire 86, line wire 91, wires 77 and 78, contact 20 of lever L^2, wire 74, contact 21 of lever L^M, and wires 79 and 80 back to battery H.

If, when the levers L^1 and L^2 are still in their normal positions, lever L^M is moved to its P^{40-50} positions to increase the pressure in the application ends of the motors M^1 and M^2, valves D^1 and D^2 will both become energized and will remain energized until the pressure in the application end of the associated motor reaches forty pounds per square inch. The circuit for valve D^1 under these conditions passes from battery H through wires 81 and 82, contact 24 of lever L^M, wires 66, 67 and 68, contact 29 of lever L^M, wires 87 and 88, contact 32 of lever L^1, wire 89, line wire 50, wire 51, asymmetric unit J^1 in its low resistance direction, wire 53, contact 18—18^a of pressure responsive device K_1^{40-50}, wires 54 and 39, winding 10 of valve D^1, line wire 41, wire 64, contact 20 of lever L^1, wires 73 and 74, contact 21 of lever L^M, and wires 79 and 80 back to battery H. The circuit for valve D^2 under these conditions passes from battery H through wires 81 and 82, contact 24 of lever L^M, wires 66, 67 and 68, contact 29 of lever L^M, wire 87, contact 32 of lever L^2, line wire 90, wire 105, asymmetric unit J^2 in its low resistance direction, contact 18—18^a of pressure responsive device K_2^{40-50}, wires 92 and 76, winding 10 of valve D^2, line wire 91, wires 77 and 78, contact 20 of lever L^2, wire 74, contact 21 of lever L^M, and wires 79 and 80 back to battery H. If the pressure in the application end of motor M^1 now exceeds fifty pounds per square inch for any reason, the exhaust valve E^1 will become energized, the circuit for this valve being from battery H through wires 81 and 82, contact 24 of lever L^M, wires 66, 67 and 68, contact 29 of lever L^M, wires 87 and 88, contact 32 of lever L^1, wire 89, line wire 50, wire 51, asymmetric unit J^1 in its low resistance direction, wire 53, contact 18—18^b of pressure responsive device K_1^{40-50}, wires 55 and 45, winding 10 of valve E^1, wires 46 and 47, contact G^1, wire 48, line wire 41, wire 64, contact 20 of lever L^1, wires 73 and 74, contact 21 of lever L^M, and wires 79 and 80 back to battery H. In similar manner, if the pressure in the application end of motor M^2 now exceeds fifty pounds per square inch, the exhaust valve E^2 will become energized over a circuit which passes from battery H through wires 81 and 82, contact 24 of lever L^M, wires 66, 67 and 68, contact 29 of lever L^M, wire 87, contact 32 of lever L^2, line wire 90, wire 105, asymmetric unit J^2 in its low resistance direction, contact 18—18^b of pressure responsive device K_2^{40-50}, wire 83, winding 10 of valve E^2, wires 84 and 85, contact G^2, wire 86, line wire 91, wires 77 and 78, contact 20 of lever L^2, wire 74, contact 21 of lever L^M, and wires 79 and 80 back to battery H.

If, with the levers L^1 and L^2 still in their normal positions, lever L^M is moved to its P^{80} position, full line pressure will be admitted to the application end of both motors M^1 and M^2, the valve D^1 being energized under these conditions over a circuit which passes from battery H through wires 81, 82, 93 and 94, contact 26 of lever L^M, wires 95, 74 and 73, contact 20 of lever L^1, wire 64, line wire 41, winding 10 of the valve D^1, wires 39, 54 and 59, asymmetric unit K^1 in its low resistance direction, wire 61, line wire 50, wire 89, contact 32 of lever L^1, wires 88 and 87, contact 29 of lever L^M, wires 68, 67 and 66, contact 23 of lever L^M, and wires 79 and 80 back to battery H; and the valve D^2 being energized over a circuit which passes from battery H through wires 81, 82, 93 and 94, contact 26 of lever L^M, wires 95 and 74, contact 20 of lever L^2, wires 78 and 77, line wire 91, winding 10 of valve D^2, wires 76 and 92, asymmetric unit K^2 in its low resistance direction, line wire 90, contact 32 of lever L^2, wire 87, contact 29 of lever L^M, wires 68, 67 and 66, contact 23 of lever L^M, and wires 79 and 80 back to battery H.

Assuming now that the braking bars of both car retarders are in their braking positions, and that the operator wishes to simultaneously restore them to their ineffective or non-braking positions, he places lever L^M in its R position. Under these conditions, the valves E^1, F^1, E^2 and F^2 will all become energized. The circuit for valve E^1 passes from battery H through wires 81, 82 and 93, contact 25 of lever L^M, wire 67, contact 27 of lever L^M, wires 99 and 100, contact 30 of lever L^1, wire 101, line wire 62, asymmetric unit O^1 in its low resistance direction, wire 45, winding 10 of valve E^1, wires 46 and 47, contact G^1, wire 48, line wire 41, wire 64, contact 20 of lever L^1, wires 73, 74 and 102, contact 22 of lever L^M, and wires 79 and 80 back to battery H. The circuit for valve F^1 passes from battery H through wires 81, 82 and 93, contact 25 of lever L^M, wire 67, contact 27 of lever L^M, wires 99 and 100, contact 30 of lever L^1, wire 101, line wire 62, wire 66, winding 10 of valve F^1, wire 47, contact G^1, wire 48, line wire 41, wire 64, contact 20 of lever L^1, wires 73, 74 and 102, contact 22 of lever L^M, and wires 79 and 80 back to battery H. The circuit for valve E^2 passes from battery H through wires 81, 82 and 93, contact 25 of lever L^M, wire 67, contact 27 of lever L^M, wire 99, contact 30 of lever L^2, line wire 103, asymmetric unit O^2 in its low resistance direction, wire 83, winding 10 of valve E^2, wires 84 and 85, contact G^2, wire 86, line wire 91, wires 77 and 78, contact 20 of lever L^2, wire 74 and 102, contact 22 of lever L^M, and wires 79 and 80 back to battery H. The circuit for valve F^2 under these conditions passes from battery H through wires 81, 82 and 93, contact 25 of lever L^M, wire 67, contact 27 of lever L^M, wire 99, contact 30 of lever L^2, line wire 103, wire 104, winding 10 of valve F^2, wire 85, contact G^2, wire 86, line wire 91, wires 77 and 78, contact 20 of lever L^2, wires 74 and 102, contact 22 of lever L^M, and wires 79 and 80 back to battery H. The energization of the valve E^1 exhausts the fluid that was previously supplied to the application end of motor M^1, and the energization of valve F^1 admits fluid to the restoring end of this motor. Piston 5 of motor M^1 therefore moves to its left-hand position, thus restoring the braking bars of the car retarder A^1 to their nonbraking positions. When piston 5 of motor M^1 reaches its extreme left-hand position, contact G^1 opens and de-energizes the valves E^1 and F^1. In similar manner, the energization of the valve E^2 exhausts the fluid pressure that was previously supplied to the application end of motor M^2, while the energization of valve F^2 admits fluid pressure to the restoring end of motor M^2. Piston 5 of motor M^2 therefore moves to its extreme left-hand position, and restores the braking bars of the car retarder A^2 to their non-braking positions. When piston 5 of motor M^2 reaches its extreme left-hand position, contact G^2 opens and interrupts the previously described circuits for the valves

E^2 and F^2, so that these valves now become de-energized. Lever L^M may now be restored to its normal position, and when this is done, all parts will then be restored to the positions in which they are shown in the drawing.

It will be apparent from the foregoing, and from an inspection of the drawing, that the operation of the master controller lever L^M to any position when the individual controller levers L^1 and L^2 both occupy their normal or N positions energizes the same one or ones of the valves D^1, E^1 and F^1, and D^2, E^2 and F^2 as would be energized if the individual controller levers L^1 and L^2 were both moved to positions corresponding to the position of the master controller lever. It will also be apparent from the foregoing that the circuits controlled by the master lever for energizing any of the valves D^1, E^1 and F^1 are all carried over one or more of the contacts **20**, **30**, **31** and **32** of the lever L^1, and the circuits controlled by the master lever for energizing the valves D^2, E^2 and F^2 are all carried over one or more of the contacts **20**, **30**, **31** and **32** of the lever L^2, and since the contacts **20**, **30**, **31** and **32** of the levers L^1 and L^2 are closed only when these levers occupy their normal positions, the movement of any individual controller lever away from its normal position will immediately render the control of the associated car retarder by the master controller lever ineffective and restore the control of such retarder to its associated individual controller lever. Conversely, when an individual controller lever is returned to its N or normal position from some other position, the associated retarder will immediately assume a position determined by the setting of the master controller lever.

Although I have herein shown and described only one form of apparatus for the control of railway car retarders 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 plurality of car retarders, a plurality of fluid pressure motors, a plurality of individual controller levers one for each motor and each having a normal position and a plurality of other positions, means controlled by each lever for supplying to a different one of said motors fluid at a pressure which depends upon which one of said other positions the associated lever occupies, a master lever having a normal position and a plurality of other positions, and means controlled by said master lever for jointly supplying to each of said motors whose associated individual controller lever occupies its normal position fluid at a pressure which depends upon which one of said other positions said master lever occupies.

2. In combination, a plurality of car retarders, an operating motor for each retarder, an individual controller lever for each motor and each having a normal position and a plurality of other positions, means controlled by each lever for supplying operating energy to the associated motor at a pressure which depends on which of said other positions the lever occupies, a master lever having a normal position and a plurality of other positions, and means controlled by said master lever for jointly supplying to each of said motors operating energy at a pressure which depends on which of said other positions the master lever occupies, said last named means being effective only as to those motors whose associated individual levers are in and remain in their normal positions.

3. In combination, a plurality of car retarders, an operating motor for each car retarder, a plurality of electro-responsive devices for each motor for controlling the associated motor, an individual lever for each motor for selectively controlling the associated electro-responsive devices, each said individual lever having a normal position and a plurality of controlling positions, a master lever, and means for selectively controlling by said master lever independently of operation of said individual levers the electro-responsive control devices for all of those motors whose individual levers are in their normal position.

4. In combination, a plurality of car retarders, a fluid pressure operating motor for each car retarder, a plurality of magnet valves for each motor for controlling the supply of fluid pressure to, and exhaust of fluid pressure from, the associated motor, an individual manually operable lever for each motor for selectively controlling the associated valves, each said individual lever having a normal position and a plurality of controlling positions, a master lever, and means controlled by said master lever for simultaneously selectively controlling the valves for all of those motors whose individual levers are in their normal position.

5. In combination, a plurality of car retarders, a fluid pressure motor for operating each car retarder, two magnet valves for each motor one for controlling the admission of fluid pressure to and the other for controlling the exhaust of fluid pressure from the associated motor, an individual lever for each motor having a normal position and a plurality of other positions, means controlled by each individual lever for controlling the valves for the associated motor in a manner to supply such motor with fluid at a pressure which depends upon which one of said other positions the lever occupies, a master lever having a normal position and a plurality of other positions, and means controlled by said master lever when this lever occupies any one of its other positions for selectively controlling the valves for all those motors whose individual levers occupy their normal position in a manner to simultaneously supply such motors with fluid at a pressure which depends upon which one of said other positions said master lever occupies.

6. In combination, a plurality of car retarders, a fluid pressure operating motor for each car retarder, a first valve for each motor for controlling the admission of fluid pressure to the motor, a second valve for each motor for controlling the exhaust of fluid pressure from the motor, an individual lever for each motor having a normal position and a plurality of other positions, means effective when each individual lever is moved to any one of its other positions for selectively operating the valves for the associated motor in a manner to supply fluid to such motor until the pressure of the fluid builds up to a predetermined value which depends upon the position which the lever then occupies, and for subsequently maintaining the pressure in said motor within predetermined limits until the lever is moved to another position, a master lever having a normal position and a plurality of other positions, and means controlled by said master lever when this lever is moved to any one of its other positions

for selectively controlling the valves for each motor whose associated lever occupies its normal position in a manner to supply fluid pressure to such motor until the pressure builds up to a predetermined value which depends upon the position which the master lever then occupies, and for subsequently maintaining the pressure in such motor within predetermined limits until the master lever is subsequently moved to another position.

7. In combination, a plurality of car retarders, a fluid pressure motor for operating each car retarder, an application magnet for each motor effective when energized for admitting fluid pressure to the application end of said motor to operate said car retarder to its braking position, a restoring magnet for each motor effective when energized for admitting fluid pressure to the restoring end of the associated motor to operate said car retarder to its non-braking position, an exhaust magnet for each motor effective for exhausting fluid pressure from the application end or the restoring end of the associated motor according as the exhaust magnet is energized or deenergized, an individual controlling lever for each motor for selectively controlling the associated magnets, each said individual lever having a normal position and a plurality of controlling positions, a master lever, and means for selectively controlling by said master lever independently of operation of said individual levers the magnets for all those motors whose individual levers are in their normal positions.

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