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RAILWAY BRAKING APPARATUS

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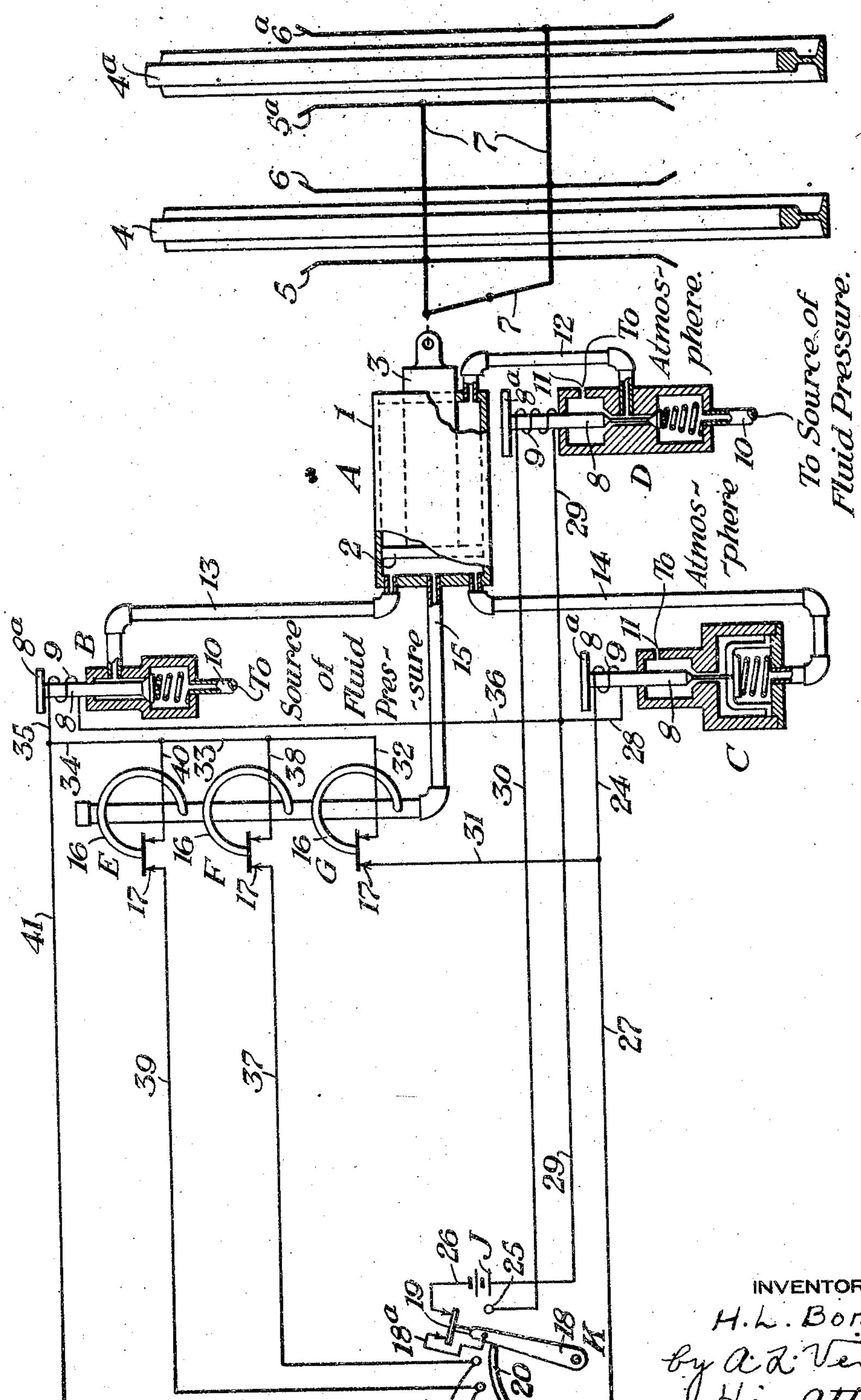

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UNITED STATES PATENT OFFICE

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RAILWAY BRAKING APPARATUS

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My invention relates to railway braking apparatus, and particularly to apparatus of the type comprising trackway mechanism adapted to engage a part of a railway vehicle.

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

The accompanying drawing is a view, partly diagrammatic, illustrating one form of railway braking apparatus embodying my invention.

Referring to the drawing, the reference characters 4 and 4ª designate the two track rails of a stretch of railway track provided with trackway braking mechanism. In the form here shown, this mechanism comprises two braking bars 5 and 6, located on opposite sides of the rail 4 and arranged to engage the opposite sides of a wheel of a car passing along the track. Two similar braking bars 5ª and 6ª are located on opposite sides of the track rail 4ª.

The braking bars 5, 6, 5ª and 6ª, are controlled by a fluid pressure motor device designated by the reference character A. As here shown, this motor device comprises a cylinder 1 containing a reciprocable piston 2. This piston carries a plunger 3, which is operatively connected with the braking bars through the medium of link work 7. When the piston 2 is in its left-hand position, the braking bars are in their non-braking positions. When piston 2 is driven to its right-hand position in cylinder 1, however, the braking bars associated with each of the track rails are urged toward the corresponding rail so as to engage the sides of the wheels of a railway vehicle, bars 5 and 5ª moving toward the right, and bars 6 and 6ª moving toward the left.

The reference character B designates a magnet valve comprising a valve stem 8 provided with an armature 8ª and a winding 9. When winding 9 is energized, the left-hand end of cylinder 1 is connected with a suitable source of fluid pressure not shown in the drawing, through pipe 10, valve B, and pipe 13. When winding 9 is de-energized, however, the valve B is closed, so that the supply of fluid pressure from pipe 10 to the left-hand end of cylinder 1 is discontinued. A second valve C comprises a valve stem 8 which is also provided with a winding 9 and an armature 8ª, and is so arranged that when winding 9 is de-energized cylinder 1 on the left-hand side of piston 2 is connected with atmosphere through pipe 14, valve C and port 11. If, however, winding 9 is energized, valve stem 8 is drawn downwardly to blank pipe 14 and prevents the escape of fluid pressure from cylinder 1. A third valve, designated by the reference character D, controls the supply of fluid pressure to the right-hand end of cylinder 1. When winding 9 of this valve is de-energized, pipe 12 communicating with the right-hand end of cylinder 1 is connected with atmosphere through port 11. When winding 9 of valve D is energized, however, valve stem 8 is moved downwardly and pipe 12 is disconnected from port 11 and is connected with a source of fluid pressure through pipe 10.

The three valves B, C and D, are controlled in part by three automatic circuit controllers E, F and G, each comprising a pressure responsive unit 16 such, for example, as a Bourdon tube, which controls a contact 17, so that when the pressure in the Bourdon tube 16 exceeds a predetermined amount, the contact 17 will be open. Each of the Bourdon tubes 16 is connected with the left-hand end of cylinder 1 through a pipe 15, but the parts are so proportioned that the circuit controllers E, F, and G operate at different pressures. For purposes of explanation, I will assume that all of the circuit controllers E, F and G are closed at pressures below 25 lbs. per square inch. At all pressures above 25 lbs. per square inch, circuit controller G is open; at all pressures above 50 lbs. per square inch, circuit controller F is open, at all pressures above 75 lbs. per square inch, circuit controller E is open.

The reference character K designates a manually operable circuit controller comprising a pivoted lever 18 and a plurality of fixed contacts 21, 22, 23 and 25 which may be selectively engaged by the lever 18, depending upon its position. The circuit controller K

also comprises a contact segment 20, so disposed that when lever 18 engages contacts 21, 22 or 23, the lever will also engage the segment 20. Contact 18—20 may also be closed without closing any other contact. Carried on lever 18 is a push button designated by the reference character 19. This push button is normally closed, but is arranged to be opened manually.

As shown in the drawing, all of the valves B, C and D, are de-energized, and the piston 2 is in its left-hand position, so that the braking bars located in the trackway are in their non-braking or ineffective positions. I will first assume that the operator wishes to make a light brake application. To accomplish this, he moves lever 18 into engagement with segment 20. Push button 19 is closed, so that current flows from a suitable source of energy, such as a battery J, through wire 26, push button 19, wire 18ª, lever 18, segment 20, wires 27 and 24, winding 9 of valve C, and wires 28 and 29, back to battery J. Valve C is therefore closed to blank pipe 14 and prevent the escape of fluid pressure from the left-hand end of cylinder 1. Furthermore, current flows from battery J, through wire 26, push button 19, wire 18ª, lever 18, segment 20, wires 27 and 31, contact 17 of circuit controller G, wires 32, 33, 34 and 35, winding 9 of valve B, and wires 36 and 29 back to battery J. Valve B therefore opens, and fluid pressure is supplied to the left-hand end of cylinder 1, forcing piston 2, and plunger 3 carried thereby to the right, and urging the braking bars into their brake applying positions. If the track rails 4 and 4ª are occupied by a railway vehicle, the braking bars will engage the flanges of the wheels with a force which depends upon the pressure supplied to cylinder 1. When this pressure reaches 25 lbs. per square inch, the contact 17 of circuit controller G opens, thereby interrupting the circuit just traced for winding 9 of valve B and interrupting the supply of pressure to cylinder 1. If the pressure in cylinder 1 is decreased, as by leakage past the piston 2, to a value below 25 lbs. per square inch, circuit controller G immediately closes and restores the pressure to the proper value.

Should the operator wish to increase the braking force applied to the braking bars in the trackway to 50 lbs. per square inch he moves lever 18 into engagement with contact 23. The lever still engages segment 20 and so valve C is still closed. The circuit just traced for winding 9 of valve B is also closed, but a new circuit is now closed from battery J, through wire 26, push button 19, wire 18ª, lever 18, contact 23, wire 37, contact 17 of circuit controller F, wires 38, 33, 34 and 35, winding 9 of magnet valve B, and wires 36 and 29 back to battery J. The valve B is now energized over this new circuit so that fluid pressure is supplied to cylinder 1 until the pressure in the left-hand end of the cylinder reaches 50 lbs. per square inch. Circuit controller F then opens. The pressure in the left-hand end of cylinder 1 is thereafter maintained at the proper value, as explained in connection with circuit controller G. In similar fashion, if lever 18 is moved into engagement with contact 22, magnet valve B is energized over contact 17 of circuit controller E, so that the pressure in the left-hand end of cylinder 1 will then be maintained at 75 lbs. per square inch. The circuit for valve B will then be from battery J, through wire 26, push button 19, wire 18ª, lever 18, contact 22, wire 39, contact 17 of circuit controller E, wires 40, 34 and 35, winding 9 of valve B, and wires 36 and 29 back to battery J. Finally, when lever 18 is moved into engagement with contact 21, current flows from battery J, through wire 26, push button 19, wire 18ª, lever 18, contact 21, wires 41 and 35, winding 9 of valve B, and wires 36 and 29, back to battery J. It will therefore be plain that when the lever 18 is in this position, the control of magnet valve B is independent of the pressure existing in cylinder 1 and that the full amount of pressure available in pipe 10 will be admitted to the fluid pressure motor A to give a maximum braking effect.

I will now assume that the lever 18 is in engagement with contact 21, so that full braking pressure is exerted by the braking apparatus, and that the operator wishes to reduce the braking force to a lower value, as for example to that corresponding to a pressure of 25 lbs. per square inch in the left-hand end of the cylinder 1. To accomplish this, the operator moves lever 18 into a position where it engages only segment 20. Valve C is still closed, and valve B is also closed because contact 17 of circuit controller G is now open. The operator then opens push button 19. As a result, the circuit is opened for magnet valve C, which valve immediately opens and vents the left-hand end of cylinder 1 to atmosphere. The operator continues this operation until the pressure in the left-hand end of cylinder 1 is somewhat below 25 lbs. per square inch. The push button 19 is then released, so that the circuit is again closed for valve C which valve immediately closes. The pressure in cylinder 1 is now below 25 lbs. per square inch, so that contact 17 of circuit controller G is closed and valve B opens to raise the pressure in the cylinder to 25 lbs. per square inch. The operation of the apparatus for accomplishing a reduction in braking pressure from any higher pressure to any lower pressure will be readily understood from the foregoing. It should be particularly pointed out in this connection, however, that whenever the push button 19 is opened to vent the cylinder to atmosphere through valve C, the circuit for valve B is also opened, no

matter what the pressure in the cylinder may be. It follows that only one of valves B and C can be open at any one time so that it is impossible to waste more than one cylinder full of air at one time.

If the operator wishes to restore the braking bars to their ineffective positions, he first moves lever 18 to the position in which it is illustrated in the drawing. All contacts of the circuit controller K are then open, so that valve B is closed and valve C is open. The left-hand end of cylinder 1 is therefore connected with atmosphere. The operator next moves lever 18 into engagement with contact 25. Current then flows from battery J, through wire 26, push button 19, wire 18[a], lever 18, contact 25, wire 30, winding 9 of valve D, and wire 29 back to battery J. Valve stem 8 of valve D therefore moves downwardly and fluid pressure is supplied to the right-hand end of cylinder 1. Piston 2 is therefore driven to the left and the braking bars are moved to their non-braking positions. With the braking apparatus thus released, the operator may return lever 18 to the position shown in the drawing, thereby de-energizing valve D and restoring the apparatus to its normal condition.

It will be observed that the control circuit for valve B over contact 17 of circuit controller G, and the control circuit for valve C both include the same wires from the circuit controller K to the brake controlling magnets. With this arrangement it is unnecessary to provide a separate contact on the circuit controller and a separate line wire for the 25 lb. control circuit of valve B. Since in actual practice the circuit controller K will usually be placed at a central control point from which a number of braking mechanisms are controlled, and since the braking mechanism may lie at a considerable distance from the control point, it will be seen that the saving of one line wire for each such mechanism is a feature of great economy.

Although I have herein shown and described only one form of railway braking apparatus embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claim without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

Railway braking apparatus comprising a braking bar located in the trackway, a fluid pressure motor for operating said bar, a first winding controlling the admission of fluid to said motor, a second winding controlling the exhaust of fluid from said motor, at least two contacts selectively responsive to different pressures in said motor, a manually operable circuit controller located at a considerable distance from the foregoing elements and having two normally open contacts the first of which may be closed without closing the second but the second of which cannot be closed without simultaneously closing the first, a circuit for said second winding including said first manually operable contact as well as a line wire and a common return wire, a first circuit for said second winding including said first manually operable contact and said line and common wires as well as the first of said pressure responsive contacts, and a second circuit for said second winding including said second manually operable contact and a second line wire as well as the second of said pressure responsive contacts and said common wire.

In testimony whereof I affix my signature.

HERBERT L. BONE.