No. 860,948. PATENTED JULY 23, 1907.

G. G. WACKER.

SAFETY DEVICE.

APPLICATION FILED JUNE 19, 1906.

3 SHEETS—SHEET 1.

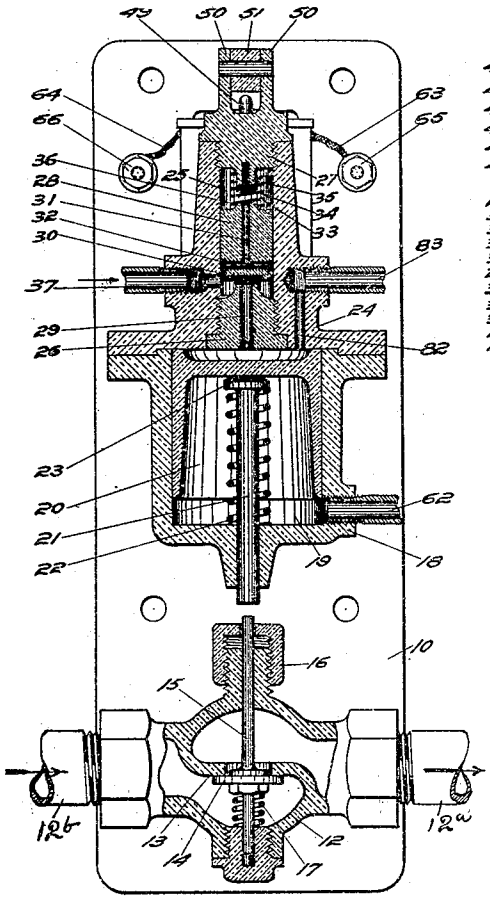

FIG. 1.

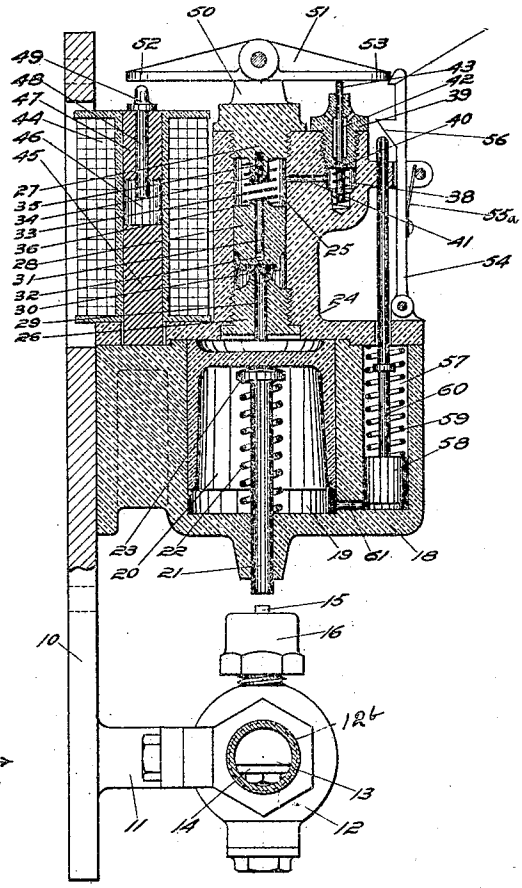

FIG. 2.

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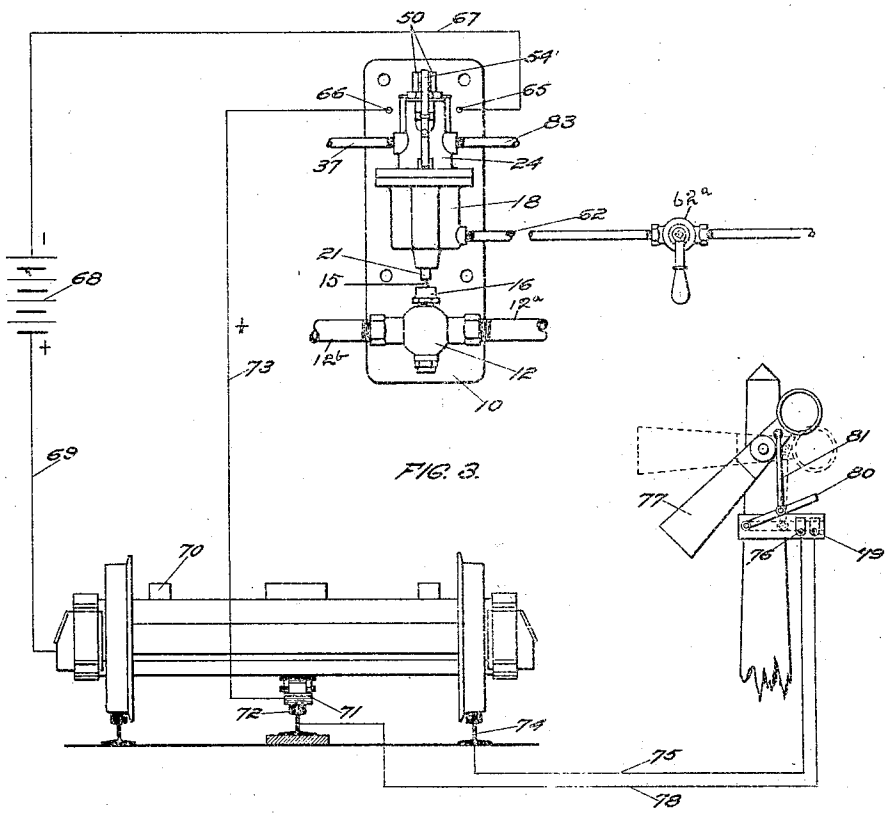

FIG. 3.

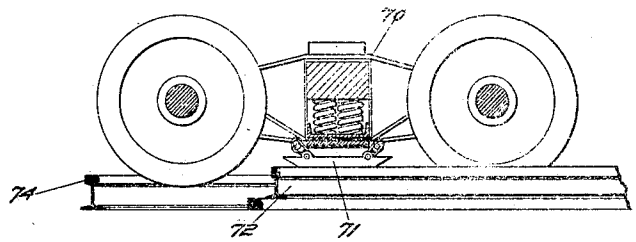

FIG. 4.

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3 SHEETS—SHEET 3.

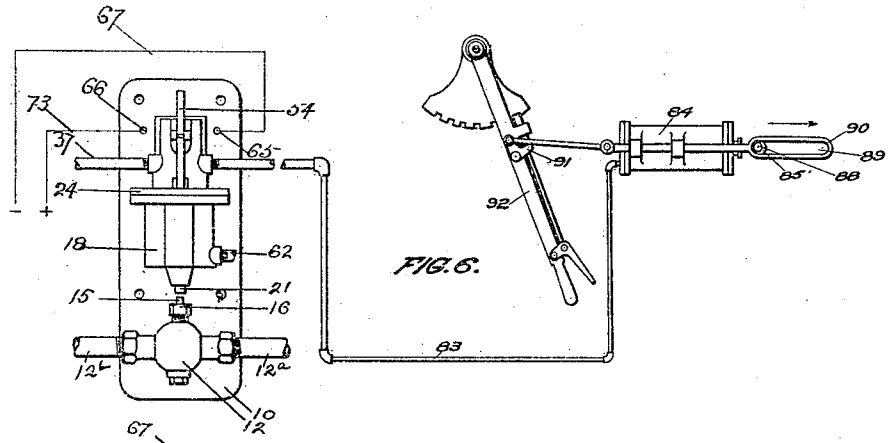

FIG. 6.

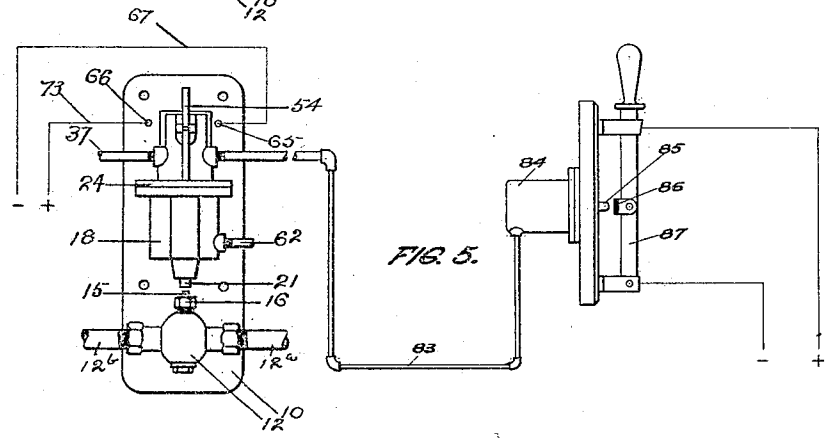

FIG. 5.

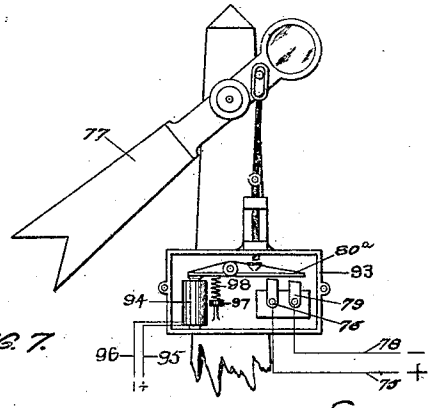

FIG. 7.

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UNITED STATES PATENT OFFICE.

GEORGE G. WACKER, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO GABRIEL L. SCHIESSER, OF NEW YORK, N. Y.

SAFETY DEVICE.

No. 860,948. Specification of Letters Patent. Patented July 23, 1907.

Application filed June 19, 1906. Serial No. 322,419.

To all whom it may concern:

Be it known that I, GEORGE G. WACKER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Safety Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to safety devices for railroad vehicles and trains, and has for an object to provide improved means whereby a moving train or car may be stopped in passing a signal set against the train, which may be disregarded by the person operating the said train or car.

A further object of the invention is to provide improved means whereby the ordinary air brakes of a train or car are automatically applied upon passing a semaphore or other block signal set at danger.

A further object of the invention is to provide improved means whereby when a semaphore or block signal is set at danger, an open circuit is partially closed which is completely closed by the passage of the train or car past the said signal, and further improved means whereby the closing of the said circuit releases mechanism for operating the air brakes, the said operation being performed by means of the compressed air itself.

With these and other objects in view, the invention comprises certain novel constructions, combinations and arrangements of parts, as will be hereinafter fully described and claimed.

In the drawings:—Figure 1 is a vertical, sectional view of the improved brake operating device. Fig. 2 is a vertical, sectional view of the brake operating device taken on a plane at right angles to the plane of section 1. Fig. 3 is a view in front elevation of the brake operating device and showing diagrammatically the means for connecting the said operating device electrically with the trucks of the moving car or train, and the means for establishing a circuit from the semaphore. Fig. 4 is a view in side elevation of a conventional car truck showing a conventional shoe adapted to close the circuit and actuate the brake operating device. Fig. 5 is a diagrammatic view of an electric switch with means for opening the switch when the brake operating mechanism is operated. Fig. 6 is a diagrammatic view of the throttle valve for a locomotive with means for actuating and closing the throttle valve when the brake actuating device is operated. Fig. 7 is a diagrammatic view of the semaphore provided with means for operating the brakes when any part of the track is ruptured.

Like characters of reference designate corresponding parts throughout the several views.

In its preferred embodiment, the improved brake operating device, forming the subject-matter of this application, is mounted upon any convenient and approved form of support or bracket, as the plate 10, which may be secured in the vehicle or cab of the locomotive and at any convenient and approved point. Adjacent the lower end, the plate 10 is provided with an outstanding bracket 11, supporting a valve casing 12, provided with a valve seat 13, and with a pop valve 14 coöperating therewith. The valve casing 12 is in communication upon opposite sides with pipes 12^a and 12^b, the latter of which is in communication with the train pipe of the air brake system and the former with the atmosphere or any approved signal. The valve 14 is provided with a stem 15 extending outwardly through the valve casing 12 and surrounded by a nut 16. The valve 14 is held normally to seat by means of the spring 17 surrounding the stem 15, below the valve 14, whereby the valve is held in operative contact with the under surface of the seat 13.

Above the bracket 11 a member 18 is mounted upon the plate 10 and provided with a vertically disposed cylinder 19, within which a piston 20 is mounted to reciprocate. The piston 20 is provided with a piston rod 21, which extends downwardly through the lower portion of the member 18, and is surrounded by a spring 22, which, bearing against the head 23 of the piston rod 21, holds the piston 20 normally at the upper extreme of its movement. The piston 20 is limited in its upward movement by a cover member 24, provided with any approved means for securing upon the upper end of the member 18, as the flange shown, and is provided with a bore 25. The bore 25 is closed at its lower end by the plug 26 and at its upper end by the plug 27, and forming within the said bore a cylinder in which is mounted to reciprocate a piston 28. The plug 26 is provided with an axial bore 29 forming communication between the bore 25 and the cylinder 19 and closed normally by means of an elastic washer 30, carried upon the lower end of the piston 28. The piston 28 is provided with a longitudinal bore 31 extending from its upper end adjacent to its lower end, and communicating with a lateral opening 32, whereby communication is established between that portion of the bore 25 above and below the piston 28. The piston 28 is held normally to seat upon the upper end of the plug 26 and to close the opening 29 by means of the spring 33 bearing upon the upper end of the said piston 28, and embracing an elastic washer 34 carried upon an extension 35 upon the lower end of the plug 27. The upper end of the

piston 28 is provided with an upwardly extending extension or boss 36 forming a valve seat for engagement by the said washer 34, and to close the longitudinal opening 31 when the valve is at the upward limit of its movement.

Communicating with the bore 25 above the plug 26 and below the piston 28 is a pipe 37 communicating with a source of compressed air as the main or auxiliary reservoir of the air brake system, whereby air under tension is constantly applied to the bore 25 below the piston 28.

Adjacent the bore 25 a valve chamber 38 is formed, closed by means of the plug 39 and with a pop valve 40 held normally to seat in the plug 39 by means of the spring, as shown. The valve chamber 38 is in communication with the bore 25 through a passage 41 whereby the pressures within the bore 25, and the valve chamber 38 are equalized. The plug 39 is provided with a bore 42 communicating with the external air and within which is mounted a valve stem 43 arranged to extend at its upper end outwardly beyond the upper end of the plug 39 and at its lower end to engage the valve 40.

Adjacent the bore 25 and preferably upon the side opposite the plug 39 is mounted an electro magnet or solenoid 44 having a freely reciprocating core 45, movable within the central opening 46 of the solenoid. The upper end of the opening 46 of the solenoid is closed by means of the fixed core or plug 47 within which is mounted to reciprocate a pin 48, provided with a head 49 extending above the said plug. The plug 27 is preferably provided with spaced ears 50 between which is fulcrumed a lever 51 having one of its ends, as 52, extending over and above the head of the pin 48, and its opposite end 53 extending over and beyond the upper extended end of the valve stem 43.

Upon the side of the member 24 is mounted a detent 54 provided with a notch 55 positioned to engage the end 53 of the lever 51 and hold the said end at a lowered position. The detent 54 is held in operative engagement with the lever 51 by any approved means as the spring 55^a, and is provided with an inclined cam surface 56, adjacent its upper end.

Within the member 18 is formed a cylinder 57 within which is mounted to reciprocate a piston 58 held normally at its lowered position by means of the spring 59, and provided with a pin 60 extending upwardly adjacent to the cam surface 56. The cylinder 57 is in communication with the cylinder 19, by means of the passage 61, and air under tension is supplied at times to the cylinder 19 and through the passage 61 to the cylinder 57, by means of a pipe 62, which is in communication with the source of compressed air, and the passage of air controlled by a manually operated valve, as shown.

The solenoid 44 is provided with terminal wires 63 and 64 connected, respectively, with binding posts 65 and 66. The binding post 65 is connected as by the wire 67 with one pole, preferably the negative of the local battery 68, the other pole of which is connected by means of wire 69 with any convenient portion of the truck structure 70. The truck 70 is provided with a brush or shoe 71, positioned to engage a third rail 72, and preferably disposed at such elevation as to pass freely over all frogs and other track connections, the said third rail 72 being for such purpose set at a higher level than the tread rails. The binding post 66 is connected by means of the wire 73 with the shoe 71, which said shoe is insulated from the structure of the truck 70.

One of the tread rails, as 74, is connected by means of the wire 75 with the contact block 76 mounted in any convenient position upon the structure of the semaphore 77 and the third rail 72 is connected by means of the wire 78 with the contact block 79 adjacent the block 76. Upon the semaphore structure is pivoted a switch 80 connected in any convenient manner as by the link 81 with the semaphore whereby when the semaphore arm is moved to danger position, as shown in dotted lines in Fig. 3, the switch 80 makes contact between the blocks 76 and 79 and closes the circuit.

Leading from the cylinder 19 is a port 82 communicating with the pipe 83, which, in turn, communicates with the cylinder 84, arranged to cut off the power from the motor of the vehicle. The cylinder 84 is provided with a piston having an outwardly extending piston rod 85 arranged for operating a switch of an electric motor, as shown in Fig. 5, or a throttle valve of a steam motor, as shown in Fig. 6. As shown in Fig. 5, the piston rod 85 may extend through the support or back of the switch and be in position to engage an insulated bearing block 86 mounted upon the switch bar 87, so that when air is admitted to the cylinder 19 through the pipe 37, it also passes through the port 82 and pipe 83, into the cylinder 84 to force the piston rod 85 against the switch and to open the switch. As shown at Fig. 6, the piston rod 85 is provided with a pin 88 engaging a slot 89 in the bar 90, which, at its opposite end, engages the pawl 91 of the throttle valve lever 92. The arrangement, as shown in Fig. 6, is such that when air is admitted through the pipe 37 to the cylinder 19 it passes through the port 82 and pipe 83 to actuate the piston rod 85 and to draw the bar 90 in the direction of the arrow and to close the throttle.

As shown in Fig. 7 a casing 93 is mounted to embrace the contact blocks 76 and 79 and within the casing is mounted an electro magnet or solenoid 94. The terminals 95 and 96 of the solenoid are connected with wires extending along the road-way or with one wire extending along the road-way and with the other terminal grounded in the usual manner to form a closed circuit. The lever or armature 80^a is held normally in contact with the core of the electro magnet or solenoid 94, and out of engagement with the contact blocks 76 and 79, and in such position that when the semaphore arm 77 is manually thrown to danger the armature 80^a is forcibly removed thereby from engagement with the core. Within the casing 93 is mounted a lug or bracket 97 upon which is disposed a push spring 98 so arranged that when the circuit is broken and the energy of the electro magnet 94 relieved the spring 98 will raise the end of the armature 80^a which was in contact with the core and depress the opposite end into engagement with the contact blocks 76 and 79 without operating the semaphore arm 77.

The operation of the air brake apparatus is such that when the semaphore arm 77 is at danger, the switch 80 closes connection between contact blocks 76 and 79, whereby the wires 75 and 78, and the rails 72 and 74 are electrically connected. When the vehicle provided with the apparatus passes over the electrically connected rails, and current is established through

the wires 69 and 73 by way of the truck and through the battery 68 to energize the electro magnet or solenoid 44.

While in the drawings, the solenoid is shown, it is to be understood that any form of electro magnet may be employed. In the solenoid form, the energizing of the solenoid draws the core 45 into the helix in the usual well known manner, and the said core 45 strikes the pin 48, and forces the head 49 against and to lift the end 52 of the lever 51. Raising the end 52 of the lever 51 depresses the end 53 so that the said end is engaged and held depressed by the detent 54. The depression of the end 53 of the lever 51 forces downwardly the valve stem 43, which, forces the valve downwardly against the tension of its spring to open communication between the bore 25 and the external air by means of the passage 41, valve chamber 38, and passage 42. It will be understood that air under pressure being admitted at all times to pipe 37 is introduced thereby into the bore 25 and by means of the passages 31 and 32, the compression upon both sides of the piston 28 are equalized so that the piston 28 is held to seat by its spring 33 with the washer 30 covering the upper end of the passage 29. The port or passage 31 longitudinally of the cylinder 28 is very small in comparison to the other openings employed, so that when the valve 40 is opened in the manner above described, the compression upon the upper side of the piston 28 is relieved and the compression upon the lower side raises the piston 28 against the tension of the spring 33. The lifting of the valve 28 opens communication between the bore 25 and the passage 29, whereby air under tension from the pipe 37 is admitted to the cylinder 19 upon the upper side of the piston 20. The admission of compressed air upon the upper side of the piston 20 forces the said piston and its associated piston rod 21 downwardly into engagement with the upper extremity of the valve stem 15, and thereby depresses and opens the valve 14. The amount of throw or opening in the valve 14 is regulated and controlled by manipulating the nut 16 disposed as shown upon the upper extremity of the valve casing, and whereby the said valve is opened to permit the passage of air through and from the air brake system, as indicated by the arrows. When air is admitted to the cylinder 19 through the port or opening 29, it is also admitted through the port 82 and pipe 83 to the mechanism for turning off the power, as heretofore described.

For returning the several parts to their normal position and for a subsequent operation, air is admitted under pressure from any convenient source through the pipe 62 into the cylinder 19 beneath the piston 20, such passage controlled by any approved valve shown conventionally at 62^a. The air admitted to the cylinder 19 also passes through the port 61 into the cylinder 57 beneath the piston 58, whereby the piston is raised against the tension of the spring 59. The raising of the piston 58 also raises the pin 60 so that the said pin contacts with the inclined cam surface 56 of the detent 54 and forces the said detent out of contact with the end 53 with the lever 51 and also forces the lever 51 to normal position. The end 53 being released from contact with the valve stem 43, the said pin and the valve 40 are raised to normal position by the valve spring, whereby communication is interrupted with the external air and the tension of the air admitted through the pipe 62 will ordinarily be drawn from the same source as the air admitted through the pipe 37 and of the same tension and aided by the tension of the spring 22 the air will raise the valve 20 while the air confined above will be forced through the passage 29. The pressure of the compressed air through the pipe 37 is again neutralized upon opposite sides of the piston 28 by passage through the ports 31 and 32, and the piston 28 is forced to seat by its spring 33. The closing of the passage 29 by the piston 28 permits the piston 20 to be raised by its spring 22, and the air through the pipe 62 which releases the piston rod 21 from engagement with the valve stem 15, and the valve is closed by its spring 17 thus interrupting the passage of air from the air brake system in the usual well known manner.

It is, of course, to be understood, that prior to the resetting of the parts, as above described, the vehicle is passed from contact with the third rail 72 so that the solenoid is no longer excited and the core 45 has fallen by gravity to normal position. It will thus be seen that the arrangement is such that the brakes of the vehicle or train will not only be applied but the power turned off and the application of the brakes continued until such application is relieved manually by manipulating any convenient valve arrangement connected with the pipe 62, as the valve shown conventionally at 62^a and that the resetting of the parts is entirely automatic upon the application of compressed air through the said pipe 62, as described. The valve for controlling the pipe 62 may be located at any convenient point and in any convenient manner, as in a locomotive cab or convenient to the hand of the motorman, or the said pipe may be controlled from the engineer's valve or in any approved and convenient manner so that air is admitted intentionally and manually to the said pipe.

While the manner of making a contact has been heretofore described as the third rail 72, and contact shoe 71, it is obvious that any of the usual, ordinary and well known means for making running contact may be substituted and employed instead of the shoe and third rail.

What I claim is:—

1. In a device of the class described, a valve communicating with an air brake system, a valve stem connected with said valve, a plunger arranged to contact with the valve stem and open the valve, a piston connected with and to operate the plunger, a duct arranged for communication with the piston and to carry a fluid under pressure, electrically controlled means for opening communication between the duct and the piston, and means whereby the electrical means is energized when passing a signal set at danger.

2. In a device of the class described, a valve arranged to control the flow of fluid in an air brake system, a cylinder mounted adjacent the valve, a piston mounted within the cylinder, a plunger arranged to be operated by the piston and to contact with the stem and open the valve, a duct arranged for communication with the cylinder, and for communication with a source of fluid under pressure, a valve arranged for closing communication between the duct and the cylinder, electrically controlled means for opening the valve, and establishing communication between the duct and the cylinder, and means for energizing the electrical means.

3. In a device of the class described, a valve arranged to control the flow of fluid in an air brake system, a cylinder adjacent the valve, a piston mounted within the cylinder, means operated by the piston for opening the valve, a duct arranged for communication with the cylinder, and with a

source of fluid under pressure, a balanced valve arranged to close and interrupt communication between the duct and the cylinder, a port for permitting the escape of fluid under tension from one side of and to destroy the balance of the valve, electrically controlled means for opening the port, and means for energizing the electrical means.

4. In a device of the class described, a valve arranged to control the flow of fluid in an air brake system, a cylinder mounted adjacent the valve, a piston mounted to reciprocate in the cylinder, means whereby the reciprocation of the piston opens the valve, a duct arranged for communication with the cylinder, and for communication with a source of fluid under pressure, a valve arranged to close communication between the duct and the cylinder, and provided with an opening whereby the pressure upon opposite sides of the valve is balanced, resilient means for holding the valve normally to seat and to close communication between the conductor and cylinder, a port arranged to relieve the pressure upon one side of the balanced valve and to destroy the balance, a valve arranged to close the port, electrical means for opening the last-mentioned valve, means for retaining the said valve in open position, means for energizing the electrical means, and means whereby the parts are released and returned to normal position by the admission of fluid under pressure manually controlled.

5. In a device of the class described, a valve arranged to control the flow of fluid in an air brake system, a cylinder adjacent the valve, a piston mounted to reciprocate within the cylinder and to actuate the valve, a balanced valve under fluid pressure arranged to control the flow of fluid into the cylinder, electrically controlled means to relieve the fluid tension upon one side of and to open the balanced valve, and to admit fluid to the cylinder, and means in communication with the cylinder arranged to actuate the power controlling mechanism.

6. In a device of the class described, a valve arranged to control the flow of fluid in an air brake system, a cylinder disposed adjacent the valve, a piston mounted to reciprocate within the cylinder, a balanced valve under fluid pressure arranged to control the passage of fluid to the cylinder, means to relieve the fluid tension upon one side of and to open the balanced valve, means for retaining the parts in position relieving the tension, a piston arranged to disengage the retaining members, means to admit fluid under tension to the cylinder to return the piston to normal position, and means whereby the fluid admitted to the cylinder actuates the releasing piston.

7. In a device of the class described, a valve arranged to control the flow of fluid in an air brake system, a cylinder adjacent the valve, a piston mounted to reciprocate within the cylinder, a balanced valve under fluid tension arranged to control the flow of fluid to the cylinder, a pop valve arranged to release the tension upon one side of and open the balanced valve, a lever arranged to control the pop valve, electrical means arranged to actuate the lever, means whereby the electrical means is energized upon passing a signal set at danger, means arranged to engage the lever and retain the pop valve in open position, means to admit fluid under tension to return the piston to normal position, and means whereby the admission of fluid to the cylinder releases the lever and permits the pop valve to close.

8. In a device of the class described, a valve arranged to control the flow of fluid in an air brake system, a cylinder mounted adjacent the valve, a piston mounted to reciprocate in the cylinder, a balanced valve under similar fluid tension upon both sides and arranged to control the flow of fluid into the cylinder, a pop valve arranged to open communication with the atmosphere and release the tension upon one side of and to open the balanced valve, a lever arranged to actuate the pop valve, electrical means for actuating the lever, means whereby the electrical device is energized upon passing a signal set at danger, a latch arranged to engage the lever and hold the pop valve in open position, an auxiliary piston arranged to disengage the latch, means communicating with the cylinder, whereby admission of fluid under tension thereto manipulates a power-controlling device, means for admitting fluid under tension to the cylinder to return the piston to normal position, and to actuate the auxiliary piston.

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

GEORGE G. WACKER.

Witnesses:
HUGO MOCK.
GABRIEL L. SCHIESSER.