T. E. CLARK & M. H. HOVEY.

ELECTRIC CONTACT DEVICE FOR RAILWAY VEHICLES.

APPLICATION FILED JUNE 26, 1916. RENEWED DEC. 9, 1918.

1,297,324.

Patented Mar. 18, 1919

2 SHEETS—SHEET 1.

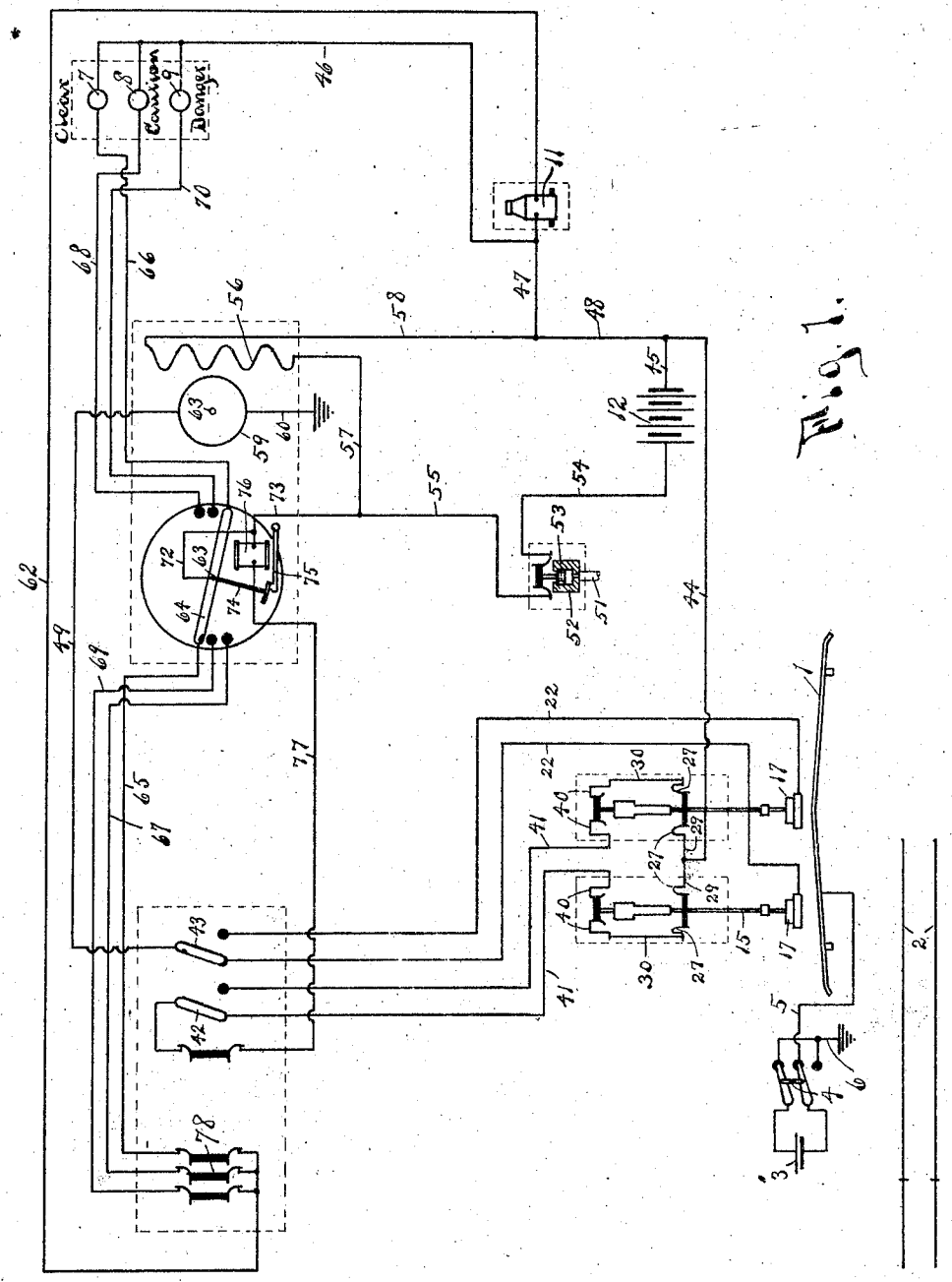


Fig. 1.

WITNESSES:

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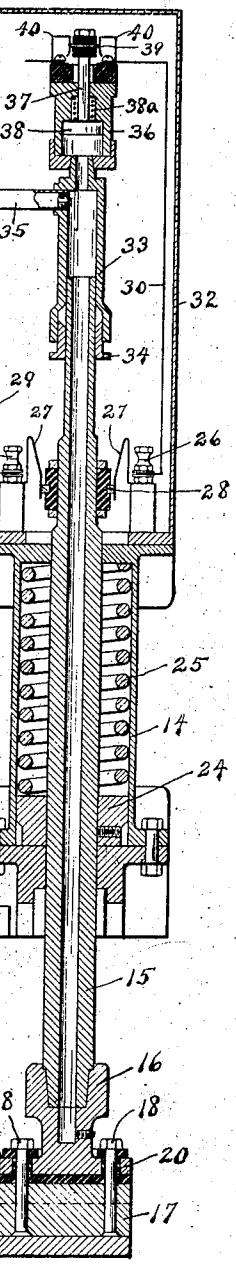


Fig. 3.

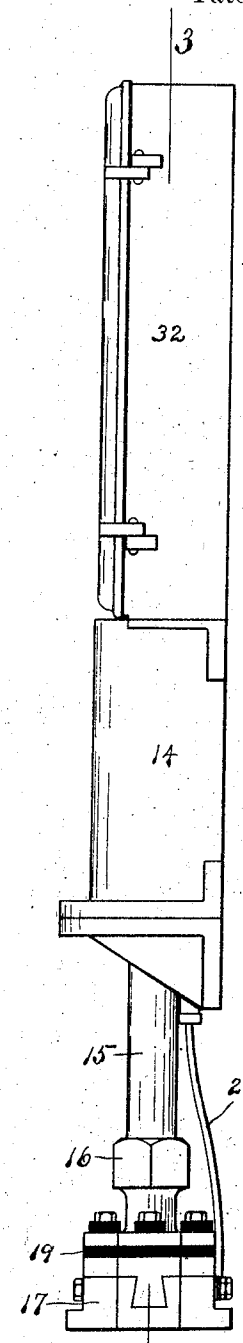


Fig. 2.

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UNITED STATES PATENT OFFICE.

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ELECTRIC CONTACT DEVICE FOR RAILWAY-VEHICLES.

1,297,324. Specification of Letters Patent. Patented Mar. 18, 1919.

Original application filed May 27, 1916. Renewed January 20, 1919, Serial No. 271,968. Divided and this application filed June 26, 1916, Serial No. 105,945. Renewed December 9, 1918. Serial No. 265,972.

To all whom it may concern:

Be it known that we, THOMAS E. CLARK and MARK H. HOVEY, citizens of the United States, and residents of Detroit, in the county of Wayne and State of Michigan, and Madison, in the county of Dane and State of Wisconsin, respectively, have invented a new and Improved Electric Contact Device for Railway-Vehicles, of which the following is a specification.

This invention relates to the control of the movements of railway vehicles by means of electrical devices mounted thereon and to the governing of these devices through electric currents transmitted to said devices by means of stationary conductors located at intervals alongside the railway track, and its object is to provide improved contact devices mounted on the vehicle which shall not only engage with the conductors and receive the current therefrom, but which shall cause the release of retaining devices forming a part of the electrical devices on the vehicle.

This invention consists, in combination with a vertically movable tube having a shoe at its lower end, of a frame in which the tube is slidable, a pair of switch members to which circuits of speed controlling mechanism for the vehicle are attached, and means mounted on the tube to normally bridge the space between the switch members. It further consists in combination with said tube, of a conductor of air under pressure, which conductor is of less capacity than the tube, a cylinder and a spring-pressed piston therein, which piston is normally pressed against the spring by means of the air under pressure within the tube, and a switch moved by said piston to circuit closing position when the piston is under sufficient pressure to compress the spring and which is moved to open the circuit when actuated by the spring.

In the accompanying drawings, Figure 1 is a diagram of an electrical installation of an electrical speed control system for railway vehicles. Fig. 2 is a side elevation of a contact device adapted to be mounted on the vehicle. Fig. 3 is a section on the line 3—3 of Fig. 2.

Similar reference characters refer to like parts throughout the several views.

These drawings are substantial reproductions of Figs. 1, 2 and 3 of the drawings of our prior application Number 271,968 filed May 27 1916, renewed Jan. 20, 1919, and this present invention comprises the details of construction of the contact devices, independent of the other mechanism. The ramps 1 are located at intervals along the rails 2 of the track, and any desired means may be employed for energizing these ramps. In the drawings a battery 3 and switch 4 are shown, connected to the ramp by the wire 5 and to the ground by the wire 6. Either positive or negative current may be sent to the ramp, and for the present case, it may be assumed that positive current will be sent when the two blocks of track in advance are vacant, negative current when the first block in advance is vacant and the second occupied, and no current when the first block in advance is occupied.

Means are mounted on the vehicle to indicate these conditions, consisting of lamps 7, 8 and 9, which signal "clear", "caution" and "danger", respectively, a valve 11, connected to the equalizer tank of the air brake system, is normally kept closed by electromagnetic means, and the circuit between this valve and the battery 12 is opened whenever the speed of the locomotive exceeds that which has been predetermined for "clear", "caution" or "danger" conditions, respectively. As ramps are to be mounted on the outer sides of double tracks so as to take care of traffic in both directions, two contact devices should be mounted on all engines liable to cross over from one track to the other and to run backward on either track, and means to cut-out one contact and cut-in the other are desirable.

The contact devices.

Mounted on the locomotive is a case 14 in which a hollow rod 15 is slidable. To it is secured a head 16 having a shoe 17 mounted on it by the bolts 18. The shoe is insulated by the sheet 19 and thimbles 20. A wire 22 extends from the shoe up through the pipe 23. A collar 24 secured to the rod

15 is forced down by the spring 25. Posts 26 carry the contact springs 27 that engage the insulated collar 28 when the shoe is down. When the shoe is pushed up by the ramp, the circuit between the wires 29 and 30 is broken.

At the upper end of the case 14 is a second case 32, in which a cylinder 33 is mounted and into which the upper end of the tube 15 extends, a gland 34 being provided to prevent leakage. A pipe 35 from the main reservoir of the air-brake system screws into this connection and supplies air. A cylinder 36 has a piston 38 whose rod 37 carries a disk 39 which makes contact between the spring contacts 40, one of which connects to a contact 27 by means of the wire 30. A wire 41 connects to the other contact 40.

As stated before, it is preferable that two contact devices are mounted on the vehicle, one on each side. Switches 42 and 43 may be employed to cut out one of these contacts and to cut in the other as necessitated by direction of travel.

The wires 29 connect to the wire 44 and that to the wire 45 which connects to the battery 12. The signal lamps 7, 8 and 9 connect to the wire 46 and that to the wire 47 which extends from the valve 11 to the wire 48, which, in turn, connects to the wire 45. The switch 43 connects to the automatic three-position switch which controls the operation of the vehicle, through the wire 49.

In order to prevent the battery from discharging while the vehicle is not in use, which substantially is equivalent to saying, when there is no pressure in the air-brake system, a small cylinder 52 is connected to this system by means of a pipe 51. A piston 53 is forced upward by the pressure of the air to close the gap between the wires 54 and 55, but falls when the pressure fails and thus cuts out the battery.

The three-position switch is diagrammatically shown. It is provided with a small motor having field windings 56 connected constantly to the battery by means of wires 57 and 58. The armature 59 is grounded by wire 60 and connects to switch 43 and the shoes 17 by means of wire 49. Any well known construction is employed so long as the shaft 63 turns in one direction when current of one character or direction passes to the armature over wire 49, and turns in the opposite direction when current of another character passes over this wire.

Secured to this shaft is contact plate 64 which may bridge between the wires 65 and 66, 67 and 68, and 69 and 70, respectively. Wires 72 and 73 connect to the plate 64 and to the wire 55 and thus to the battery. An arm 74 extends down from this plate and has a segmental head which is normally engaged by means of the armature 75 of the electro-magnet 76. A wire 77 connects this magnet to the switch 42.

A speed controller 78 of any desirable construction is mounted at any desired position so as to break the circuit between the wire 62 and the wires 65, 67 and 69 when the vehicle exceeds the predetermined speed for "danger", "caution" and "clear" conditions. At all other times the selected circuit will remain closed.

Operation.

The operation of the various parts is comparatively simple. The electro-magnet normally holds the plate 64 stationary so that the signal lamp which received current at the time the contact device left the last ramp will continue to receive it until the next ramp is reached. When the shoe 17 engages the ramp, a current passes over the wire 22, switch 43, wire 49 to the armature 63 and wire 60 to the ground, energizing the armature and tending to turn it. The electro-magnet 76, armature 75 and arm 74, however, prevent such turning. As soon as the shoe 17 reaches the high point of the ramp, the circuit between the battery 12 and the electro-magnet is broken between the contact springs 27 and the armature will release the arm 74, long enough to permit the armature to turn. If the same condition exists as before, the plate 64 does not move. When the current in the ramp is proper for clear indications, the plate 64 will close the circuit between the wires 72 and 66, causing the lamp 7 to burn. The circuit between the wires 72 and 65 will also be closed, and the speed controller will keep the circuit between this wire 65 and the wire 62 closed, so long as the maximum speed of the vehicle is not exceeded. Should this occur, the circuit to the valve 11 is broken and the valve will open to cause an application of the brakes until the vehicle slows down to the maximum speed permitted.

If the current in the ramp is that proper for "caution" indications, the plate 64, when released, will swing to close the circuit between the wires 72 and 68, the lamp 8 being ignited and the lamp 7 going out. The circuit to the wire 67 will also be closed and the circuit between it and the wire 62 will be closed so long as the vehicle does not move at higher speed than that which has been predetermined for "caution" conditions.

Should no current be received from the ramp, the plate 64, when released, will assume its normal position, closing the circuits to the wires 69 and 70, the lamp 9 being ignited and the current passing over the wires 69 and 62 so long as the speed of the vehicle is no gresten than that determined upon for danger conditions, the brakes being employed to reduce the speed to this limit if it

should be exceeded. Thus a railway vehicle passing a ramp 1 and receiving no current therefrom will be immediately checked down to such a speed that it can be stopped within a very short distance.

After the shoe 17 has passed the high point of the ramp, the circuit to the electro-magnet will be closed and the plate 64 locked before the armature 59 is deënergized.

The devices shown in Figs. 2 and 3 and designated by the characters 30 to 40 inclusive operate as follows. So long as the tube 15 remains unbroken, the pressure in the pipe 35 holds the piston 38 in its elevated position and the circuit between the contacts 40 closed. If, however, the shoe 17 should strike an obstacle and the tube 15 become broken, the pressure of air in the tube 15 is dissipated and the piston 38 will be forced down by means of the spring 38ª, thus opening the circuit between the contacts 40. This opens the circuit to the electro-magnet 76 and permits the plate 64 to swing to neutral position, if it is not already there, and thus causes the speed of the vehicle to be reduced to the predetermined maximum for danger conditions. The flow of air through the pipe 35 is normally sufficient to hold the plate 39 in its circuit-closing position but is not sufficient to hold up this plate and the piston 38 when the tube 15 is broken.

It is to be understood that this invention is not limited to the particular types of switches comprised by the contacts 27 and ring 28, and the contacts 40 and ring 39, respectively, but that any other desired means may be employed to bridge between the wires 29 and 30 and the wires 30 and 41, respectively, so long as one is connected to the tubular stem and the other is normally held closed until the tubular stem 15 is damaged. The other details of construction may all be changed by those skilled in the art without departing from the spirit of our invention.

We claim:—

1. In a contact device for railway vehicles, the combination of a vertically movable stem, a contact shoe mounted on the lower end of the stem and insulated therefrom, a spring to normally hold down the stem, a pair of spring contacts, and a connector mounted on the stem to engage the contacts when the stem is in its low position and to break the circuit to said contacts when the stem is elevated.

2. In a contact device for railway vehicles, the combination of a vertically movable stem, a spring to normally hold down the stem, a contact shoe mounted on the lower end of the stem and insulated therefrom, a support for said stem, a pair of wires leading to the support, and means on the stem for closing the circuit between the wires when the stem is in its lower position and to open said circuit when the stem is forced up.

3. In a contact device for railway vehicles, the combination of a support, a tubular stem mounted therein, a contact shoe at the lower end of the stem adapted to engage a conductor, a pair of contacts adjacent said stem, a cylinder adjacent thereto, a piston in said cylinder, circuit closing means connected to the piston, a casing into which said stem extends and to which the cylinder is connected, a connection between said casing and a source of air under pressure whereby pressure is applied to said piston to hold closed said circuit, said connection being of less capacity than the passage in the stem, and means to move said piston to open said circuit when the pressure fails in the cylinder.

4. In a contact device for railway vehicles, the combination of a support, a hollow stem mounted therein, and having the lower end closed, a casing into which the upper end of the stem extends, a connection between the casing and a source of air under pressure, said connection being of less capacity than the hollow stem, a switch, means actuated by the air under pressure to close said switch, and resilient means to open the switch when the pressure fails.

5. In a contact device for railway vehicles, the combination of a support, a tubular stem slidably mounted therein and having a normally closed lower end, a switch adjacent the stem which switch is closed when the stem is in its lower position and open when the stem is elevated, a second switch adjacent the stem, a casing into which the upper end of the stem extends, a connection between the casing and a source of air under pressure, said connection being of less capacity than the tubular stem when the closed lower end thereof is removed, means operated by the air under pressure to close said second switch, and resilient means to open said second switch when said pressure fails.

6. In a contact device for railway vehicles, the combination of a support, a tubular stem slidably mounted therein and having a normally closed lower end, an electric circuit, a pair of switches in said circuit, one of said switches being located adjacent the stem and closed thereby when the stem is in its lower position, means operated by air-pressure for closing the second switch which pressure is released when the air escapes through the tubular stem, and means for opening said second switch when said pressure is released.

7. In a contact device for railway vehicles, the combination of a support, a hol-

low stem mounted therein and having its lower end normally closed, a casing into which the upper end of the stem extends, a switch, means actuated by air under pressure within the casing to close the switch, and a connection between the casing and the air brake system of the vehicle of sufficient air-conducting capacity to cause the switch to remain normally closed but of insufficient capacity to cause it to remain closed when the stem is broken.

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