T. W. SCOTT AND H. V. RUDOLPH.

CONTROLLING MECHANISM FOR AIR BRAKES.

APPLICATION FILED MAY 10, 1916.

1,318,925.

Patented Oct. 14, 1919.

2 SHEETS—SHEET 1.

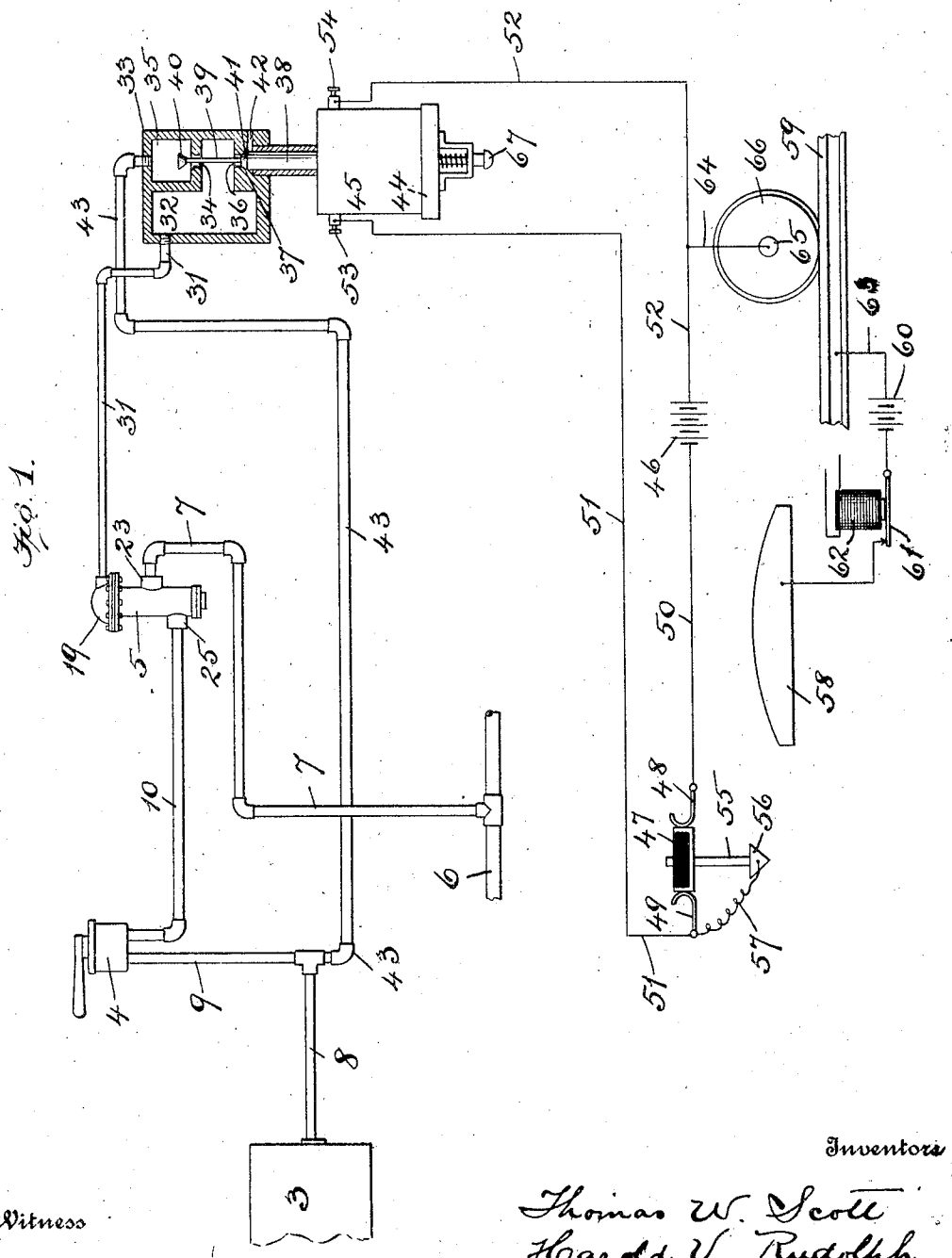


Fig. 1.

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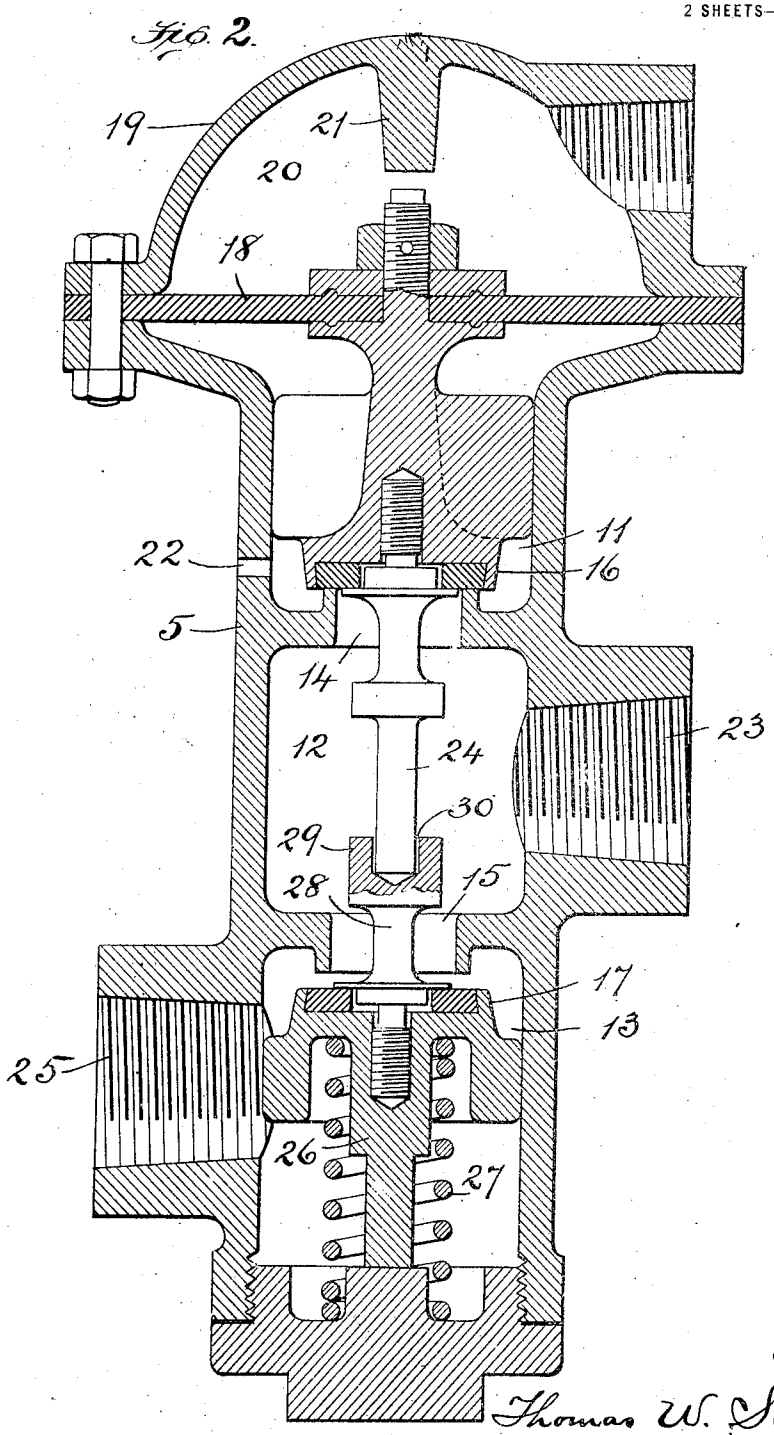
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

THOMAS W. SCOTT AND HAROLD V. RUDOLPH, OF BALTIMORE, MARYLAND, ASSIGNORS TO THE AMERICAN TRAIN CONTROL CO., OF BALTIMORE, MARYLAND, A CORPORATION OF MARYLAND.

CONTROLLING MECHANISM FOR AIR-BRAKES.

1,318,925. Specification of Letters Patent. Patented Oct. 14, 1919.

Application filed May 10, 1916. Serial No. 96,470.

To all whom it may concern:

Be it known that we, THOMAS W. SCOTT and HAROLD V. RUDOLPH, citizens of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Controlling Mechanism for Air-Brakes, of which the following is a specification.

This invention relates to improved controlling mechanism for air-brakes and is designed particularly to coöperate in a train-controlling mechanism of the automatic stop type by which a vehicle or train will be automatically brought to a stop in the event that the engineer or motorman disregards, or fails to note a danger or warning signal of unsafe conditions ahead.

The devices of the present improvement have to do with the operation of the air-brakes, and are designed to prevent a release of the brakes, by the engineer or motorman, after an automatic application of those brakes has been made, until the vehicle or train has been brought to a stop.

The present devices are especially an improvement on the mechanism shown and described in the pending application for patent of Thomas W. Scott, Serial Number 67,374, wherein two electro-pneumatic valve devices are employed,—one to effect an automatic operation of the brakes and the other to cut off the supply of main reservoir air through the engineer's valve to the train line. By means of the present invention only one electro-pneumatic valve mechanism is necessary to vent the train line and effect the application of the brakes and simultaneously with such application to cut off the passage of main reservoir air at a point between the engineer's valve and the train line, so that a single valve mechanism will effect both functions and thus prevent a recharging of the train line after an automatic operation of the brakes until the train or vehicle has been brought to a stop.

The invention is illustrated in the accompanying drawing wherein,—

Figure 1, diagrammatically illustrates the improved arrangement and circuits of the apparatus, and

Fig. 2, shows the improved differential relief valve device in enlarged vertical section.

In the drawing the numeral 3, designates the main reservoir; 4, the engineer's brake-valve; 5, the differential relief valve casing; 6, the train-line or brake-pipe and 7, the connection from the casing 5, to the train line. It will be noted that the differential relief valve mechanism in the casing 5, is interposed between the train-line and the engineer's brake-valve 4.

Connections 8 and 9 provide for the passage of main-reservoir air to the engineer's valve, while a pipe 10, connects the said engineer's valve with the differential valve casing.

By referring to Fig. 2, it will be noted that the differential valve device comprises the casing 5, having chambers 11, 12 and 13 respectively therein, and with a port 14, which provides communication between chambers 11 and 12, under certain conditions, and another port 15, to provide communication between chambers 12 and 13, under certain conditions. A valve 16, controls port 14, and another valve 17, controls port 15.

Valve 16, has a body which fits the wall of chamber 11, whereby to guide the valve during upward and downward movement thereof in the chamber 11, and at the upper end, this valve 16, has a stem which is engaged with a flexible diaphragm 18, which latter extends across the upper end of the casing 5, above the valve body, and is clamped in place by a dome cap or cover 19, so that a chamber 20, is formed at the upper side of the diaphragm. A stop lug 21, is provided on the inner side of the cap or cover, in alinement with but above the securing devices which connect the diaphragm and the stem of valve 16, whereby the upward movement of the diaphragm is restricted. Ports 22, are provided in the casing 5, above the seat of valve 16, and these ports open to the atmosphere for a purpose presently to be explained.

Beneath the valve 16, the casing 5, has a pipe connection 23, opening into the intermediate chamber 12, and the pipe 7, extends from said connection and communicates with the train line 6, so that the train line

and the chamber 12, will have communication with each other.

A stem 24, depends from valve 16, and extends through the port 14, into the intermediate chamber 12, for a purpose which will also presently be explained.

A pipe connection 25, is provided on the casing 5, which opens into the lower chamber 13, and the pipe 10, from the engineer's valve 4, engages said connection and provides a constant communication between the engineer's valve and said chamber 11.

The valve 17, which controls port 15, is located in the chamber 11, and has a stem 26, that depends therefrom. A spiral or coiled spring 27, encircles the stem 26, and constantly presses upwardly against the valve 17, and thereby tends to close or seat said valve over the port 15, when the pressure which normally holds valve 17, is released.

A stem 28, projects upwardly from valve 17, and extends through port 15, into chamber 12, and the upper end of this stem is provided with a head 29, having a central socket 30, therein in which the lower depending end of stem 24, of valve 16, projects. This depending end of stem 24, normally engages the head 29, and depresses the latter to hold valve 17, in a depressed position and thus keep port 15, open.

By referring to Fig. 2, of the drawing it will be noted that when valve 16, is seated against port 14, valve 17, will be depressed and away from port 15, therefore when valve 17, is depressed, as it is normally, the train line and engineer's valve will communicate by pipe 10, connection 25; chamber 13; port 15; chamber 12; connection 23 and pipe 7. This condition is maintained through the action of main reservoir pressure present at the upper side of diaphragm 18, and in chamber 20, which depresses the diaphragm and valve 16, as will presently be explained.

A pipe 31, leads from chamber 20, above the diaphragm and communicates with a chamber 32, in a casing 33, of an electro-pneumatic valve, from which chamber there is a port 34, which communicates with a passage 35, also in said casing. Directly opposite the port 34, the casing has another port 36, which communicates with a passage 37, in which an armature stem 38, has movement. This armature stem has a reduced portion 39, which extends across the chamber 32, and passes through the ports 34 and 36, and at the upper side of port 34, said stem has a valve head 40, to effect a closure of port 34, while at the lower side of port 36, said stem has a valve head 41, which serves to close port 36, when port 34, is open. A vent passage 42, extends laterally from the passage 37, and communicates with the atmosphere, whereby when the stem 38, is drawn down to open port 36, pressure in chamber 32, pipe 31, and chamber 20, above diaphragm 18, may be vented to the atmosphere, for a purpose presently to be explained.

A pipe 43, enters passage 35, of the electro-pneumatic valve casing and said pipe leads to and communicates with the main reservoir 3, so that passage 35, is always subject to the pressure that is carried in the main reservoir, which under present practice is about 90 pounds per square inch.

Armature stem 38, is carried by an armature 44, of an electro-magnet 45, which latter is normally energized and holds the armature and stem up to close port 36, and keep port 34, open. It will thus be seen that as long as electro-magnet 45, is energized air from the main reservoir 3, may pass by pipes 8, and 43, to passage 35; through port 34, to chamber 32, and by pipe 31, to diaphragm chamber 20, where the pressure of ninety pounds acting on the upper side of the diaphragm 18, will press the latter down seat valve 16, and hold valve 17, unseated. As long as valve 17, is unseated, which will be as long as electro-magnet 45, is energized, then the engineer's valve will have communication with the train line, for the ordinary operation of venting and recharging the train line.

Electro-magnet 45, is maintained by a normal vehicle circuit which includes a current supply 46, a shoe-switch 47, and its contacts 48 and 49 and the wire connections 50, 51 and 52,—the wires 51 and 52 being engaged with the binding posts 53 and 54, of the electro-magnet.

The shoe-switch 47, is diagrammatically shown as attached to a vertical stem 55, to the lower end of which latter a contact shoe 56, is attached. A wire or other conductor 57, connects the shoe with the contact 49, for a purpose presently to be explained.

In practice the road way is provided at spaced-apart intervals with ramp rails 58, which are located adjacent to the track rails 59, on which the vehicle travels.

Under conditions of safety, the ramp rail 58, has a connection with one side of a current supply 60, which connection includes an armature 61, of a track relay 62. The other side of the current supply 60, has a connection 63, with one of the track rails 59, and a connection 64, is provided on the vehicle between the wire 52, and the axle 65, and wheel 66, so that current may be picked up and a circuit completed from the current supply 60, through the electro-magnet 45, on the vehicle as will presently be explained.

By reference to Fig. 1, it will also be noted that the lower end of the electro-magnet carries a spring-depressed rod 67, by which the armature may be reset, and the normal vehicle circuit reëstablished, after the magnet

has been automatically deënergized to produce an automatic stop.

In the operation of the invention, and during the travel of the vehicle between ramp rails, the shoe-switch 47, will be in the normal position shown in Fig. 1, wherein it is shown closing the circuit between the contacts 48 and 49. When in this position the current from supply 46, will pass through electro-magnet 45, and energize the latter so as to hold the armature 44, and stem 38, up, thereby closing port 36, and keeping valve-head 40, raised from the port 34, to allow air from the main reservoir to pass from the passage 35, into chamber 32. From chamber 32, the reservoir air will pass through pipe 31, into the chamber 20 of the differential relief-valve casing where it will act on the upper side of diaphragm 18, and by depressing the latter seat valve 16, over port 14, and then depress stem 24, so as to hold valve 17, down and keep port 15, open.

As long as port 15, is open the engineer's valve 4, and train line 6, will be in communication for the ordinary operations of the brakes by the engineer.

When the vehicle reaches an energized ramp rail the conditions above noted will be maintained because electro-magnet 45, will be maintained by current picked up from the ramp rail 58, by the shoe 56, which current will travel by wires 57 and 51, to the electro-magnet and return by wires 52, and 64, to axle 65, wheel 66, track rail 59 and wire 63, to trackway current supply 60.

When an unsafe condition prevails however, ramp rail 58, will be disconnected from current-supply 60, because armature 61, will have dropped, and when the contact shoe 56, engages the deënergized ramp no current will be picked up, and shoe-switch 47, will move to open the normal circuit by breaking from contacts 48 and 49.

Immediately upon magnet 45, becoming deënergized, armature 44, and armature-stem 38, will drop, whereupon valve-head 40, will close the port 34; cut off the main reservoir pressure from passage 35, and valve-head 41, will drop and open port 36, from chamber 32. When port 36, is thus opened, the pressure in chamber 32, pipe 31, and diaphragm chamber 20, will be vented through the escape port 42, to the atmosphere so that the pressure on the upper side of the diaphragm 18, will be relieved and said diaphragm will spring upwardly, lifting valve 16, with it. The lifting of valve 16, will uncover port 14, and will also allow valve 17, to be raised and cover port 15,—the spring 27, aiding in the upward movement of valve 17. As soon as valve 17, covers port 15, all communication between the engineer's valve and the train line, through pipes 7 and 6, will be instantly cut off so that no manipulation of the engineer's valve can be made to reëstablish that communication as long as valve 17, remains closed. When port 14, is uncovered by the raising of valve 16, air from the train line 6, can vent through pipe 7, to valve-chamber 12; then from the latter through port 14, and escape through the vent ports 22, to the atmosphere. By thus venting the train line, when electro-magnet 45 is deënergized an application of the brakes will be automatically effected independently of the engineer and the latter cannot release those brakes because the engineer's valve is cut off by valve 17, from the train line and a recharging of the train line cannot be effected, as is necessary to build up or restore the pressure therein.

In practice, the electro-pneumatic valve mechanism and electro-magnet are contained in a box or housing beneath the running board of the locomotive and access thereto cannot be gained without bringing the train to a stop so the engineer can get off to get access to that box.

When the train has been brought to a stop, the engineer upon opening the box may reset the apparatus by simply pushing reset rod 67, up to lift the armature 44, so magnet 45, can hold it up, whereupon reservoir pressure may again pass through passage 35, to chamber 32, and depress the diaphram, thereby seating valve 16, and unseating valve 17. The engineer can then turn the handle of the engineer's valve so as to permit reservoir air to pass through pipe 10, to chamber 13, and from the latter through port 15, to chamber 12, then by pipe 7, to train line 6, to restore the pressure in the train line and thus recharge the auxiliary reservoirs through the triples in the usual way.

It will therefore be understood that we interpose a differential relief valve mechanism between the engineer's valve and train line, and maintain normal communication between the engineer's valve and train line through the relief valve mechanism by main reservoir pressure. It will further be seen that by means of our arrangement of relief valve, when an automatic operation of the brakes is effected by venting the train line through the relief valve, we simultaneously cut off the engineer's valve from the train line and thereby prevent the engineer from recharging the train line in an attempt to release the brakes.

Having described our invention what we claim is,—

1. In an air-brake controlling mechanism the combination with an air-brake apparatus including an engineer's valve, a train line, a main reservoir; connections between the main reservoir and engineer's valve; connections between the engineer's valve and train line; valve means normally open, but

when closed interrupting communication between the engineer's valve and train line; means operated by main reservoir pressure for holding said valve means open and electrically controlled means for cutting off and venting the main-reservoir pressure to allow the valve means to close.

2. In an air-brake controlling mechanism the combination with an air-brake apparatus including an engineer's valve, a train line, a main reservoir; connections between the main reservoir and engineer's valve; connections between the engineer's valve and train line; valve means interposed between the engineer's valve and train line; means normally subject to main-reservoir pressure for controlling said valve means, and means for cutting off the main-reservoir pressure and operate said valve means to simultaneously vent the train line and interrupt the communication between the engineer's valve and train line.

3. In an air-brake controlling mechanism the combination with an air-brake apparatus including an engineer's valve, a train line, a main reservoir; connections between the main reservoir and engineer's valve; connections between the engineer's valve and train line; a valve casing interposed in said connections between the engineer's valve and train line, said casing inclosing means to normally provide communication between the engineer's valve and train line and also having normally closed means between the train line and atmosphere, and means normally controlled by reservoir pressure but released when said pressure is vented for simultaneously operating the means in said valve casing to vent the train line and to cut off communication between the engineer's valve and train line.

In testimony whereof we affix our signatures in the presence of two witnesses.

THOMAS W. SCOTT.
HAROLD V. RUDOLPH

Witnesses:
L. N. ROYALL,
W. E. BARKER.