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RAIL FLAW DETECTING APPARATUS

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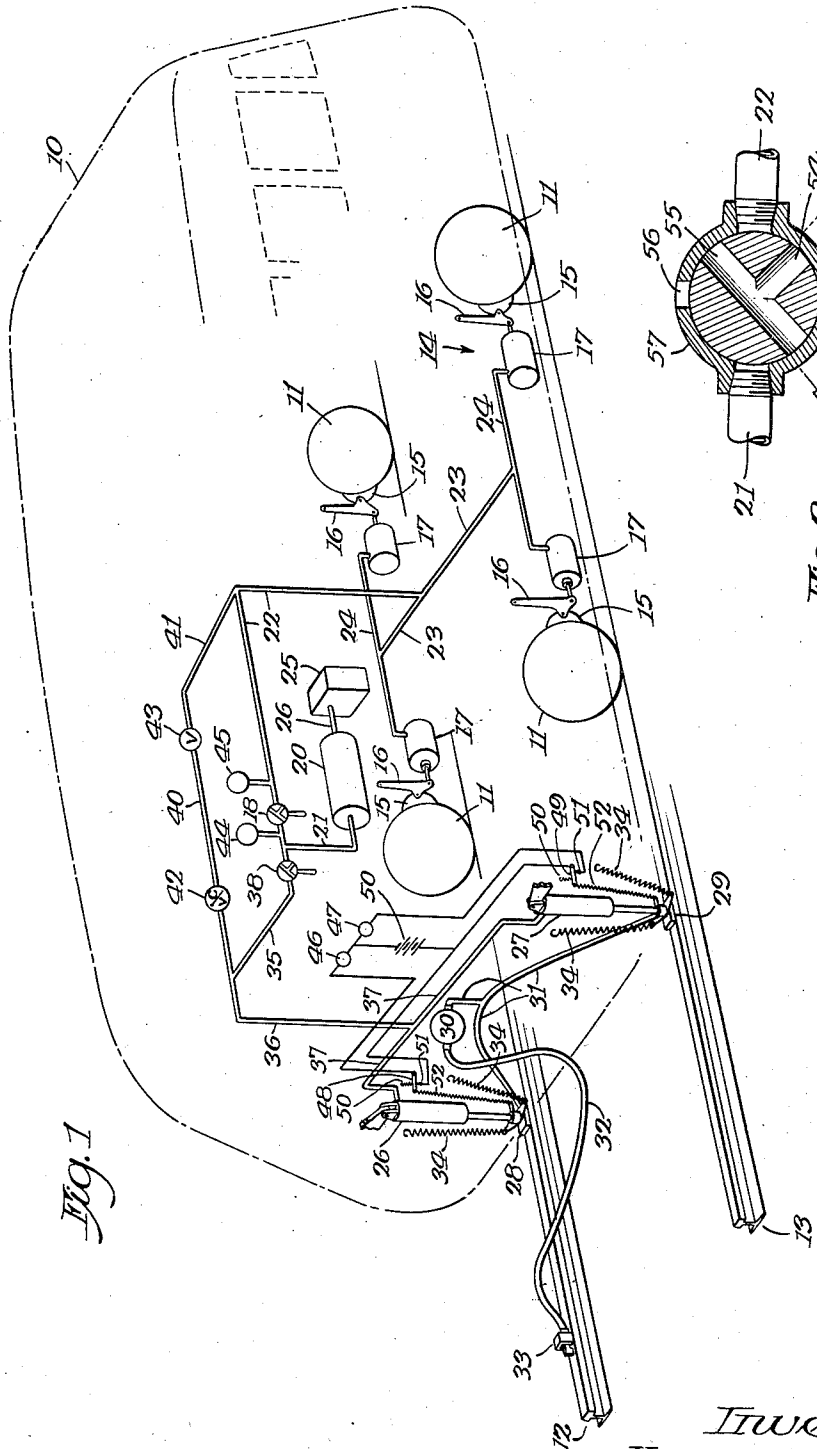


Fig. 1

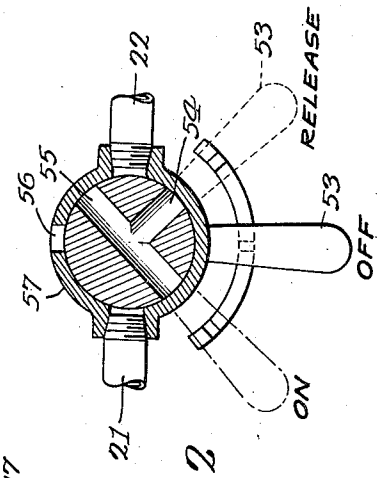


Fig. 2

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RAIL FLAW DETECTING APPARATUS

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4 Claims. (Cl. 303—6)

It is common practice today to periodically check railway track for internal flaws or fissures. This is done by a test car equipped with suitable apparatus for automatically locating and indicating the presence of internal defects in the track. It is impossible, however, with the methods now employed to determine with any degree of accuracy the precise location of the flaw and its approximate size from the apparatus used while the car is in motion. It is necessary to resort to some other more precise method in order to obtain this information, and the electrical drop in potential method is the one that is generally used.

In order to locate a flaw and determine its approximate size by the electrical drop in potential method, a relatively strong direct current of say 1500 amperes and .5 volt is passed through the portion of the rail which the car apparatus has indicated contains a fissure. A pair of spaced contact points which are connected to a millivoltmeter, are then moved along the top surface of the rail to observe any variations in the potential drop across the contact points. When the millivoltmeter indicates a marked change in potential drop for any particular section of the rail through which the current is passing, the inference is that the change is caused by a discontinuity in the body of the rail, and within certain limits, the change in the millivoltmeter reading is proportional to the size of the flaw.

A convenient way to establish the electrical contacts necessary for passing the direct current through the rail is to have one of the contacts for a given rail mounted on the end of a piston which travels in a vertically arranged cylinder mounted on the body of the test car and employ compressed air to force the contact into firm engagement with the rail. The other contact is ordinarily a hand clamp or some form of a magnetic clamp.

There is always a possibility that a car operator will forget that the contact made by the air cylinder is in engagement with the rail and will attempt to start the car wihout lifting the contact. Obviously, if this is done, serious damage to the car and its apparatus will very likely occur.

The principal object of this invention is to provide an interlock between the braking system on the car and the hand check device so that the brakes may be applied and released as desired, but the rail energizing contacts for the hand check device are permitted to engage the rail only when the brakes are locked against the wheels. By this method the operator is prevented from starting the car until he raises the contacts.

Other objects and advantages will become apparent as the disclosure proceeds and the description is read in conjunction with the accompanying drawing, in which:

Fig. 1 is an isometric view of a rail car shown in dotted lines with the interlock between the braking mechanism and the hand check cylinders shown in diagrammatic form.

Fig. 2 is a diagrammatic view of three-way valves for operating the air brakes and the hand check cylinders as shown in Fig. 1.

The choice of a particular embodiment of the invention for illustration is for the purpose of disclosure only and the appended claims should be construed accordingly.

Referring first to Fig. 1, a rail test car is shown having a body 10 mounted on wheels 11 adapted to travel along rails 12 and 13. Braking means 14 of any suitable type, such as air brakes, are provided and, as shown, consist of brake shoes 15 adapted to engage the tread of the wheels 11, brake levers 16 secured to the car frame (not shown) and brake cylinders 17 provided with pistons for operating the brake mechanism. These brake cylinders are supplied with compressed air from a reservoir 20 through pipes 21, 22, 23, and 24, and a three-way valve 18 is provided to control the flow of air in this circuit. Compressor 25 is connected to the reservoir, by means of pipe 26 and is adapted to maintain the pressure in the reservoir at a predetermined constant value.

A pair of hand check cylinders 26 and 27, one of which is positioned over the rail 12 and the other of which is positioned above rail 13 are secured to the car underframe in any suitable manner. These cylinders are provided with plungers at the lower ends of which are secured contact plates 28 and 29 adapted to engage the top surfaces of rails 12 and 13, respectively. These contacts act as conductors for electrical current from a direct current generator 30 through conductors 31 and 32 and any suitable contact clamp 33, as for example, a magnetic clamp which adheres to the rail as long as current passes through it into the rail. The generator preferably has a rating of 1500 amperes at approximately .5 volt or more. The complete electrical circuit includes the generator 30, conductor 13, contact plates 28 (if the contact clamp 33 is placed on rail 12 as shown in Fig. 1) rail 12, contact clamp 33, and back to the generator through conductor 32. If the contact clamp 33 is placed on rail 13, a similar electrical circuit is made through contact plate 29.

The contact members 28 and 29 are normally held in a raised position by some suitable means

such as springs 34 and are only lowered into contact with the rails when forced down by the plungers in the hand check cylinders 26 and 27, respectively.

These plungers are operated by means of compressed air from the reservoir 20, this circuit including pipes 21, 35, 36 and 37. A second three-way valve 38 controls the flow of air through this circuit. Pipes 40 and 41 are provided to by-pass the three-way valve 18 and to connect the hand check circuit with the brake cylinder circuit. The check valve 42 is employed to permit flow in only one direction, thereby preventing air from flowing into the hand check circuit when valve 18 is turned on. An emergency manually-controlled shut-off valve 43 is provided in the by-pass circuit to prevent reverse flow of the air through this circuit in case the check valve 42 fails for any reason. A pressure gauge 44 is located on the discharge side of the reservoir between the three-way valves 38 and 18 so as to indicate the air pressure in the reservoir, and another pressure gauge 45 is positioned on the discharge side of the three-way valve 18 to register the air pressure at the brake cylinder.

A pair of signal lights 46 and 47 are operated by the hand check cylinder to indicate to the car operator when the plungers on the hand check cylinders are in their lowered position. These signal lights are in circuits with contact arms 48 and 49, respectively, and a source of D. C. current 50. Contact arms 48 and 49 are normally held in an open position by means of springs 50, and are closed against a contact point 51 by the pull of springs 52 when the plungers in the hand check cylinders are lowered.

The three-way valves 18 and 38 are positioned in the car so as to be conveniently within reach of the operator of the car, and are manipulated by means of a suitable handle 53 as shown in Fig. 2. The two valves, for the purpose of this disclosure, may be regarded as identical and hence valve 18 alone will be described. This handle 53 is movable from left to right, the central position being the off or "lap" position of the valve wherein the passage through the valve is as shown in Fig. 2. When the handle is moved to the right to the release position, a passage indicated at 54 alines itself with the pipe 22 and the passage indicated at 55 alines itself with the opening 56 which communicates with the atmosphere. When the handle is moved to the left or "on" position, the passage 54 is sealed by the casing 57 and the passage 55 is in communication with the pipes 21 and 22.

In operation, assume that both valves 38 and 18 are in the "off" position, as shown in Fig. 1. When it is desired to apply the brakes, the operator moves the brake handle of valve 18 to the "on" position, thus allowing compressed air from the reservoir to pass through passage 55 in the three-way valve 18 and then through pipes 22, 23 and 24, into the brake cylinder 17 forcing the brake shoes against the tread of the wheels 11. The air is prevented from flowing through pipes 41 and 40 into the hand check circuit by means of the check valve 42, or by means of emergency valve 43 in the event of failure of check valve 42. As soon as sufficient pressure is provided in the braking system, the handle is returned to lap position and when it is desired to release the brakes, the handle is moved to the release position permitting the air in the braking line to exhaust into the atmosphere through the port 56.

When it is desired to stop the car to make a hand check of the rails, the operator first applies the brake as just described, returning the brake handle to "lap" position but permitting the air under pressure to remain in the braking system. The brakes may be released if desired, but valve 18 must be returned to its "off" or "lap" position (which it does automatically when the handle 53 is released) in order to permit the hand check cylinders to operate. Obviously, if valve 18 is kept in the "release" position, the air flowing through valve 38 will exhaust into the atmosphere through valve 18, thereby preventing the air from operating the hand check cylinders. The valve 38 is then moved to its "on" position permitting the air to pass from the reservoir, through pipe 21, passage 55 in the three-way valve and then through pipes 35, 36 and 37 into the hand check cylinder thereby forcing the plungers downwardly so that contacts 28 and 29 engage the rails 12 and 13, respectively. In this position of the valve 38, the air also passes through the check valve 42 into pipes 40 and 41 and into the braking system so as to maintain the braking pressure on the brake cylinder 17, or again apply the brakes if they have been released. The contacts 28 and 29 are returned to their normal raised position by merely moving the handle on valve 38 to the release position so as to discharge the air from the cylinders 26 and 27 into the atmosphere, thus permitting the spring 34 to raise the contacts. In order to release the brakes, it is necessary to move the handle 53 on the valve 18 to the release position to discharge the air from the braking system into the atmosphere.

By means of this interlocking of the braking system and the hand check system, it is seen that it is impossible to put the car in motion while the contacts 28 and 29 engage the rails since in this position of the contacts, the brakes are always locked against the wheels.

I claim:

1. In a car having a braking system, means for operating the system to apply and release the brakes at will, a device carried by the car for operation when the car is stopped, a control for advancing and retracting the device at will, and means for establishing the application of the brakes independently of the brake operating means when the device is advanced and for retracting the device when the brakes are released by the brake operating means.

2. In a car having a braking system, means for operating the system to apply and release the brakes at will, a detector carried by the car for use when the car is stopped, a control for lowering and raising the detector when the car is stopped, and interlocking means for applying the brakes independently of the brake operating means when the detector control is operated and for raising the detector independently of the detector control when the brakes are released by the brake operating means.

3. In a car, a source of fluid under pressure, a braking system, a device carried by the car for operation when the car is stopped, a conduit leading from said source to the braking system, a hand control valve and vent disposed in the conduit, a second conduit leading from said source to the braking system, a second hand control valve and vent in the second conduit, a third conduit interconnecting said device and the controlled side of the second conduit, and a freely opening check valve in the second conduit

between the third conduit and the braking system, the check valve opening in a direction permitting air under pressure to flow from the second conduit to the braking system to supply the braking system with air under pressure admitted to the second conduit by the second control valve and to vent the second and third conduits when the first control valve is moved to vent the braking system.

4. In a car, a source of fluid under pressure, a braking system, a device carried by the car for operation when the car is stopped, a conduit leading from said source to the braking system, a hand control valve and vent disposed in the conduit, a second conduit leading from said source to the braking system, a second hand control valve and vent in the second conduit, a third conduit interconnecting said device and the controlled side of the second conduit, and a freely opening check valve in the second conduit between the third conduit and the braking system, the check valve opening in a direction supplying the braking system with air under pressure when the second control valve is supplying air under pressure to the third conduit so that a continuous warning escapement of air through the first mentioned vent is provided in event the first control valve is operated to release the brakes before the device is removed from operation.

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