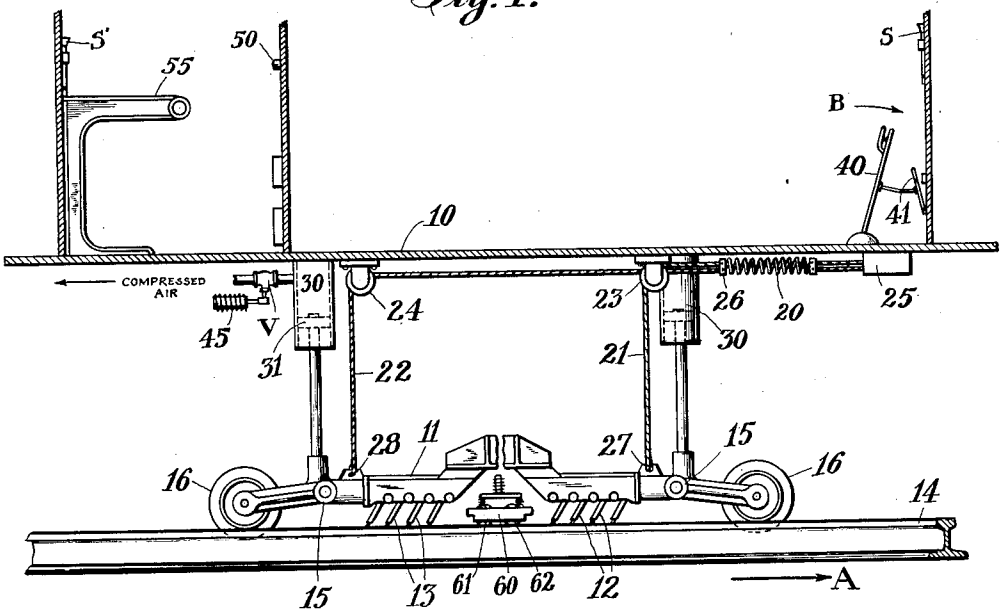
Aug. 8, 1933. G. L. JONES 1,922,019

FLAW DETECTOR CAR

Filed Dec. 13, 1930

Fig. 1.



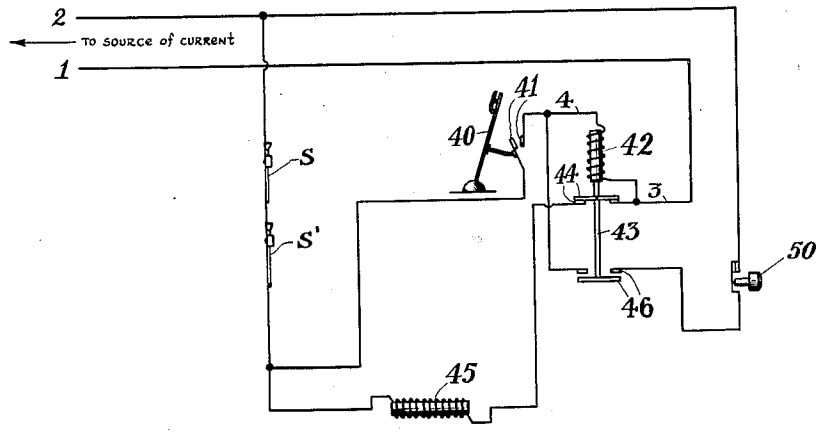


Fig. 2.

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FLAW DETECTOR CAR

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Serial No. 502,160

16 Claims. (Cl. 175—183)

This invention relates to apparatus for detecting flaws in electric conductors. More particularly, the invention relates to the type of flaw detecting apparatus employed in the Sperry rail flaw detector car, in which a plurality of contacts are lowered into engagement with a rail for the purpose of leading current into and out of the rail. Said contacts are normally inclined to facilitate the movement thereof over the rails, but this position results in severe damage to the contacts should the car reverse its direction of movement without first raising the contacts out of engagement with the rail.

My invention therefore has for its principal object the provision of means whereby the contacts are automatically raised when the direction of movement of the car is reversed.

It is a further object of my invention to provide means, as indicated above, for permitting the contacts to be raised automatically when the direction is reversed and which will hold the contacts in raised position even when the car is again traveling in its normal forward direction until the operator by a special operation lowers the contacts. This obviates the condition which would result when the apparatus is operated for forward running of the car, but the car continues to move in the reverse direction so that lowering the contacts at this time would cause damage.

It is a further object of my invention to provide means under the joint control of the car operator and the observer so that the contacts may not be lowered until both operator and observer have jointly performed the necessary act to cause said contacts to be lowered.

Further objects and advantages of my invention will become apparent from the following detailed description thereof.

In the accompanying drawing,

Fig. 1 is a side elevation, partly sectioned vertically, of a portion of the Sperry rail flaw detector car, showing the contact mechanism and my invention applied thereto.

Fig. 2 is a wiring diagram illustrating the principle of operation of my invention.

In the drawing there is shown the floor 10 of a Sperry rail flaw detector car, on the bottom of which is mounted a support 11 on which are pivotally mounted the contacts 12 and 13 in engagement with the electrical conductor, in this case the rail 14. The support 11 may have pivoted thereto at 15 flanged guide wheels 16. The said support 11 and its contacts 12 and 13 may be raised and lowered. The support is normally held in raised position by resilient means, such as a spring 20 connected to the floor of the car at 25 and fastened at 26 to two cables 21 and 22, passing over rollers 23 and 24, the said cables being fastened to opposite ends of the support at 27 and 28. To lower the support so that the contacts 12 and 13 engage the rail, I may provide fluid pressure means, such as compressed air, which may be admitted under the control of valves V to cylinders 30 to force pistons 31 downwardly against the action of spring 20.

To facilitate movement of contacts 12 and 13 over slight obstructions which may be encountered in the rail, the contacts are given an inclination with respect to the direction of travel, indicated by arrow A, and are resiliently mounted so that they may lift over such irregularities and obstructions. It will, however, be seen that should the direction of travel be reversed, the inclination of contacts 12 and 13 would be such as to engage every slight obstruction and cause serious damage to the apparatus. I therefore provide means whereby the contacts are automatically lifted out of engagement with the rail whenever the movement of the car is reversed. The car may be driven by a gas engine or other suitable driving means under the control of an operating lever 40. When said lever is operated in a direction to cause reversal of movement of the car, in Fig. 1 in the direction of arrow B, I cause the contact 41 to be closed to energize a magnet 42 which then draws upon its core 43 to break a set of contacts 44 and thus break the circuit through a magnet 45, which controls the valve V admitting compressed air to the cylinders 30. This will permit spring 20 to raise the support 11 and contacts 12 and 13 out of engagement with the rail.

If the reversing handle 40 is now moved to open contacts 41, this does not result in magnet 45 being energized again, because magnet 42 remains energized through the parallel circuit traced as 1, 3, 4, contacts 46 and return lead 2, the contacts 46 having been closed when the solenoid 43 was drawn upwardly to open contacts 44 and break the circuit through magnet 45. The support 11 and the contacts therefore remain in elevated position in spite of the fact that reversing handle 40 has been moved to forward position again, so that if the car is still running reverse due to momentum, the contacts 12 and 13 will not be lowered at this time to cause them to be damaged.

When the car has reached a full stop, the operator may lower the contacts by operating a push button 50 to break the auxiliary circuit 1,

3, 4, 46, 2, which will break the circuit through magnet 42, permit the solenoid 43 to drop, thus opening contacts 46 and closing contacts 44 to establish again the circuit through magnet 45. This circuit is then as shown in Fig. 2 and comprises the leads 1, 3, contacts 44, solenoid 45 and return lead 2.

In starting the car it may be desirable to provide that the contacts cannot be lowered into engagement with the rail until both the driver at the front in vicinity of handle 40 and the observer in the rear, sitting adjacent table 55, over which the recording chart travels, desire said contacts to be lowered. Therefore I cause the circuit through solenoid 45, which controls the air entering cylinders 30 and hence the lowering of the support 11, to include two switches S, S', one adjacent the operator and one adjacent the observer, as shown in Fig. 1. When both of these switches are closed, magnet 45 will be energized to admit air to the cylinders and lower the contacts.

The support 11 also supports by a universal mounting the detector carriage 60 in which are mounted the detector coils 61, 62 which cut the magnetic lines of force surrounding the rail 14 to induce differential E. M. F.'s when a flaw is encountered.

In accordance with the provisions of the patent statutes, I have herein described the principle and operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means. Also, while it is designed to use the various features and elements in the combination and relations described, some of these may be altered and others omitted without interfering with the more general results outlined, and the invention extends to such use.

Having described my invention, what I claim and desire to secure by Letters Patent is:

1. In a flaw detector car for testing electric conductors, means whereby said car may be operated forward or in reverse, means including contacts for leading current into and out of the conductor, and means rendered effective by the operation of said car in reverse whereby said contacts are moved out of engagement with the conductor.

2. In a flaw detector car for testing electric conductors, means whereby said car may be operated forward or in reverse, means including contacts for leading current into and out of the conductor, means for operating said contacts into and out of engagement with the conductor, and means rendered effective by the operation of said car in reverse whereby said operating means moves said contacts out of engagement with the conductor.

3. In a flaw detector car for testing electric conductors, means whereby said car may be operated forward or in reverse, means including contacts for leading current into and out of the conductor, means for moving said contacts to ineffective position out of engagement with the conductor, means for moving said contacts to effective position in engagement with the conductor and means rendered effective by the operation of said car in reverse whereby said second contact moving means is rendered ineffective and said first contact moving means is rendered effective.

4. In a flaw detector car for testing electric conductors, means whereby said car may be operated forward or in reverse, means including contacts for leading current into and out of the conductor, means for moving said contacts to ineffective position out of engagement with the conductor, means including a source of fluid pressure for moving said contacts to effective position in engagement with the conductor, and means rendered effective by the operation of said car in reverse whereby said second contact moving means is rendered ineffective and said first contact moving means is rendered effective.

5. In a flaw detector car for testing electric conductors, means whereby said car may be operated forward or in reverse, means including contacts for leading current into and out of the conductor, means for moving said contacts to ineffective position out of engagement with the conductor, means including a source of fluid pressure and a valve controlling the same for moving said contacts to effective position in engagement with the conductor, and means rendered effective by the operation of said car in reverse whereby said second contact moving means is rendered ineffective and said first contact moving means is rendered effective.

6. In a flaw detector car for testing electric conductors, means whereby said car may be operated forward or in reverse, means including contacts for leading current into and out of the conductor, means for moving said contacts to ineffective position out of engagement with the conductor, means including a source of fluid pressure and an electro-magnetically operated valve controlling the same for moving said contacts to effective position in engagement with the conductor, and means rendered effective by the operation of said car in reverse whereby said second contact moving means is rendered ineffective and said first contact moving means is rendered effective.

7. In a flaw detector car for testing electric conductors, means including a controller whereby said car may be operated forward or in reverse, means including contacts for leading current into and out of the conductor, means for moving said contacts to ineffective position out of engagement with the conductor, means including a source of fluid pressure and an electro-magnetically operated valve controlling the same for moving said contacts to effective position in engagement with the conductor, and means including an electric circuit through said valve and controlled by said controller, whereby said second contact moving means is rendered ineffective and said first contact moving means effective when said controller is operated to reverse position.

8. In a flaw detector car for testing electric conductors, means whereby said car may be operated forward or in reverse, means including contacts for leading current into and out of the conductor, means for operating said contacts into and out of engagement with the conductor, means whereby said operating means moves said contacts out of engagement with the conductor when the car is operated in reverse, and means for thereafter maintaining said contacts out of engagement with the conductor regardless of the direction of the car.

9. In a flaw detector car for testing electric conductors, means whereby said car may be operated forward or in reverse, means including contacts for leading current into and out of the con-

ductor, means for operating said contacts into and out of engagement with the conductor, means whereby said operating means moves said contacts out of engagement with the conductor when the car is operated in reverse, means for thereafter maintaining said contacts out of engagement with the conductor regardless of the direction of the car, and means whereby said last named means may be rendered ineffective to permit said contacts to engage the conductor.

10. In a flaw detector car for testing electric conductors, means including a controller whereby said car may be operated forward or in reverse, means including contacts for leading current into and out of the conductor, means for moving said contacts to ineffective position out of engagement with the conductor, means including a source of fluid pressure and an electro-magnetically operated valve controlling the same for moving said contacts to effective position in engagement with the conductor, means including an electric circuit through said valve and controlled by said controller, whereby said second contact moving means is rendered ineffective and said first contact moving means effective when said controller is operated to reverse position, and means for thereafter maintaining said contacts out of engagement with the conductor regardless of the direction of the car.

11. In a flaw detector car for testing electric conductors, means including a controller whereby said car may be operated forward or in reverse, means including contacts for leading current into and out of the conductor, means for moving said contacts to ineffective position out of engagement with the conductor, means including a source of fluid pressure and an electro-magnetically operated valve controlling the same for moving said contacts to effective position in engagement with the conductor, means including an electric circuit through said valve and controlled by said controller, whereby said second contact moving means is rendered ineffective and said first contact moving means effective when said controller is operated to reverse position, means for thereafter maintaining said contacts out of engagement with the conductor regardless of the direction of the car, and means whereby said last named means may be rendered ineffective to permit said contacts to engage the conductor.

12. In a flaw detector car for testing electric conductors, means including a controller whereby said car may be operated forward or in reverse, means including contacts for leading current into and out of the conductor, means for moving said contacts to ineffective position out of engagement with the conductor, means including a source of fluid pressure and an electro-magnetically operated valve controlling the same for moving said contacts to effective position in engagement with the conductor, means including an electric circuit through said valve and controlled by said controller, whereby said second contact moving means is rendered ineffective and said first contact moving means effective when said controller is operated to reverse position, and a separate electric circuit rendered effective when said contacts are moved to ineffective position for maintaining said contacts in ineffective position regardless of the operation of said controller.

13. In a flaw detector car for testing electric conductors, means including a controller whereby said car may be operated forward or in reverse, means including contacts for leading current into and out of the conductor, means for moving said contacts to ineffective position out of engagement with the conductor, means including a source of fluid pressure and an electro-magnetically operated valve controlling the same for moving said contacts to effective position in engagement with the conductor, means including an electric circuit through said valve and controlled by said controller, whereby said second contact moving means is rendered ineffective and said first contact moving means effective when said controller is operated to reverse position, a separate electric circuit rendered effective when said contacts are moved to ineffective position for maintaining said contacts in ineffective position regardless of the operation of said controller, and means for breaking said separate circuit to permit such contacts to be moved to effective position.

14. In a flaw detector car for testing electric conductors, means including a controller whereby said car may be operated forward or in reverse, means including contacts for leading current into and out of the conductor, means for moving said contacts to ineffective position out of engagement with the conductor, means including a source of fluid pressure and an electro-magnetically operated valve controlling the same for moving said contacts to effective position in engagement with the conductor, means including an electric circuit through said valve and controlled by said controller, whereby said second contact moving means is rendered ineffective and said first contact moving means effective when said controller is operated to reverse position, a separate electric circuit rendered effective when said contacts are moved to ineffective position for maintaining said contacts in ineffective position regardless of the operation of said controller, and a push button under the control of an operator for breaking said separate circuit to permit said contacts to be moved to effective position.

15. In a flaw detector car for testing electric conductors, means including contacts for leading current into and out of the conductor, means for operating said contacts into and out of engagement with the conductor, and means including a plurality of hand operated elements under the joint control of a plurality of operators for rendering said contact moving means effective to operate said contacts into engagement with the conductor.

16. In a flaw detector car for testing electric conductors, means including contacts for leading current into and out of the conductor, means for operating said contacts into and out of engagement with the conductor, and means including an electric circuit and a plurality of switches in series therein under the joint control of a plurality of operators for rendering said contact moving means effective to operate said contacts into engagement with the conductor.

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