Aug. 16, 1949. H. C. DRAKE 2,479,219

RAIL FLAW DETECTOR CAR MECHANISM

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Fig. 1.

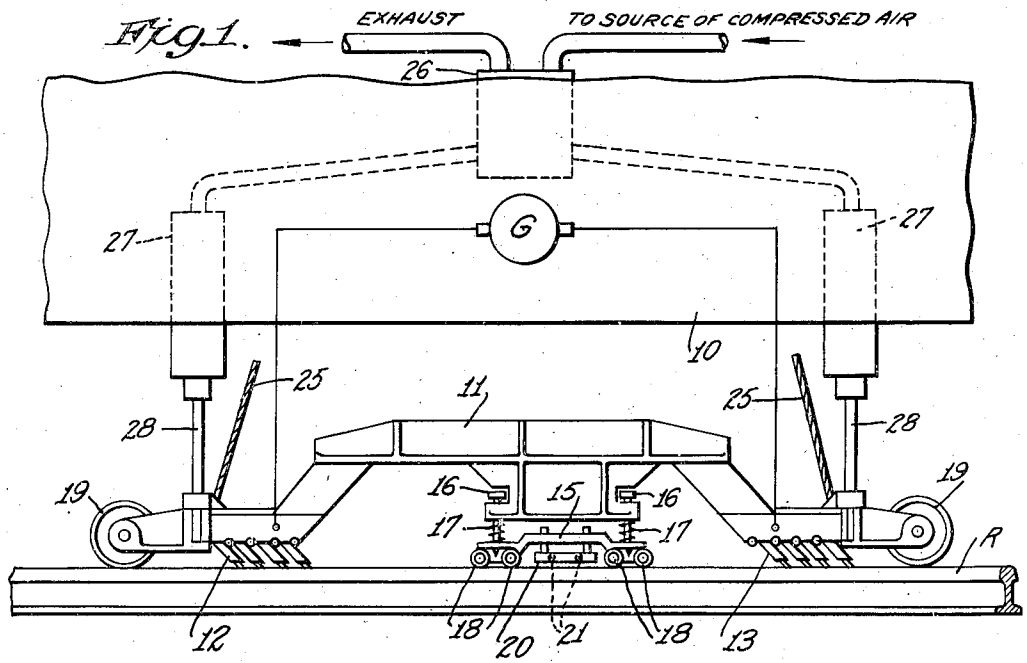


Fig. 2.

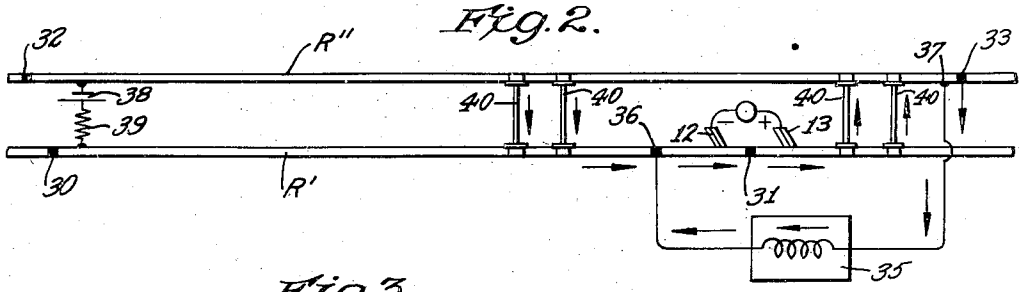
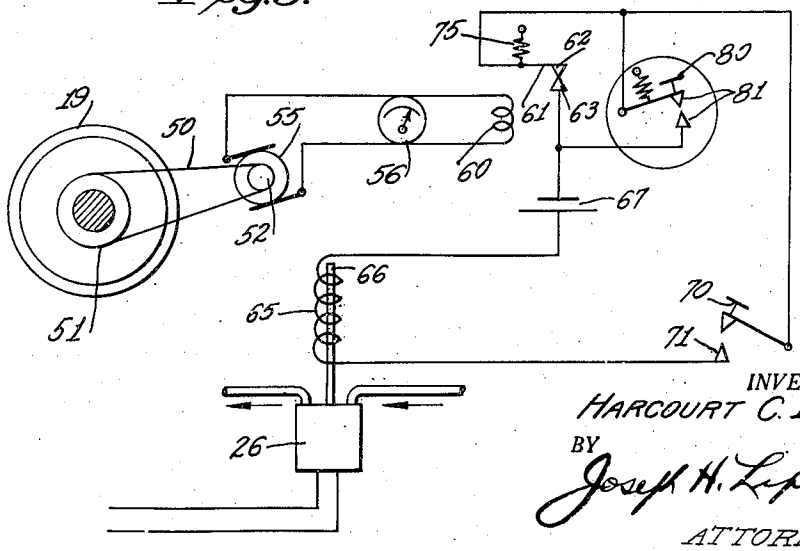


Fig. 3.



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RAIL FLAW DETECTOR CAR MECHANISM

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12 Claims. (Cl. 175—183)

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This invention relates to improvements in rail fissure detector car mechanisms of the type employed in the Sperry rail flaw detector car wherein spaced contact brushes are employed for the purpose of passing current through the rail between spaced points. Such current is for the purpose of establishing an electro-magnetic field surrounding the rail, which field is uniform except in a region of flaw where it will be distorted, and such distortion may be detected by means such as one or more pairs of induction coils which are moved along the rail in constant relation thereto.

The above mechanism creates a special problem in connection with the operation of the railway signals by a detector car. Ordinarily the detector car affects these signals in the same manner as other railway cars, that is to say, the current through the signal operating relay is short-circuited by the car, causing the signal light to turn to red. However, the electric circuit established between the spaced current brushes will supply current to the signal operating relay when the sets of brushes straddle the insulated joint. Thus current will be supplied to this relay at a time when it should be short-circuited and the signal light will show green when it should show red.

This condition is not dangerous when the car is moving, since the improper indication by the signal light will be only momentary for a period of one second or less which it takes the brushes to pass over the insulated joint. The dangerous condition arises when the car stops with the brushes down, and the brushes happen to straddle the insulated joint. At such time it is very important that the signal give the proper indication, but by reason of the condition described above, the signal will be giving the green indication when it should be indicating red.

It is one of the principal objects of this invention, therefore, to provide means which will prevent lowering of the contact brushes, or, if the brushes are in lowered position, will cause the brushes to be raised, when the car is stationary.

There are of course, times when it is necessary to have the brushes in lowered position when the car is standing still. It is, therefore, another object of this invention to provide means in conjunction with the means described above, which will nevertheless permit an operator to lower the brushes when the car is stationary.

Further objects and advantages of this invention will become apparent in the following detailed description thereof.

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In the accompanying drawings,

Fig. 1 is a side view of a portion of a Sperry rail flaw detector car having my invention applied thereto.

Fig. 2 is a wiring diagram illustrating the theory underlying this invention.

Fig. 3 is a wiring diagram illustrating one form of this invention.

Referring to Fig. 1 of the drawings there is disclosed a detector mechanism applied to a Sperry detector car. A portion of the car body 10 is shown, having suspended therefrom a current brush carriage 11 having front and rear sets of brushes 12 and 13 designed to lead current into and out of a rail R, the current being supplied from a generator G within the car. The current brush carriage is supported on the rail by wheels 19 and supports in turn the detector carriage 15. Said carriage may ride along the rail on any suitable means such as rollers 18 and may be connected to the current brush carriage by means such as loosely fitting bolts 16 and springs 17 whereby the detector carriage may move relative to the current brush carriage in order to align itself with the irregularities in the rail surface. The detector carriage supports within a housing 20 flux responsive means such as pairs of induction coils 21 arranged in tandem and oppositely connected so as not to be affected by variations in current supply. The current through the rail between brushes 12 and 13 sets up an electro-magnetic field surrounding the rail, which field is uniform except in the region of flaw. The coils normally cut a constant number of lines of force, but on entering a region of flaw, first one and then the other of the coils will cut a different number of lines of force to generate a differential E. M. F., which is caused to actuate suitable indicators.

The current brush carriage 11 is normally maintained in elevated position by springs (not shown) and cables 25, but may be lowered by opening a valve 26 to permit compressed air to enter cylinders 27, to depress pistons therein and hence depress piston rods 28 connected to the pistons, said piston rods being connected to carriage 11. The carriages are thus lowered into engagement with the rail against the action of the springs, but as soon as the compressed air is shut off and the exhaust opened, the springs will raise the carriage.

Referring to Fig. 2, the problem which the above structure creates, under certain conditions, can now be described. It will be seen that rail

sections R' and R'' are contained between insulated joints 30, 31, 32 and 33. Signal operating relay 35 is normally connected to rail R' at 36 and to rail R'' at 37, so that a circuit is established through the relay from a battery 38, resistance 39 to rail R', the relay 35, rail R'' and return to battery 38. When a railroad car enters the section of track which includes rail sections R' and R'', it will be seen that the wheels of the trucks (each pair of wheels and axles being indicated at 40) provide a short circuit between the rail sections, which reduces the current through relay 35 and causes the signal to turn red. This is the case when the trucks of the detector car enter the section of track which includes R' and R'', but when the sets of brushes 12 and 13 straddle an insulated joint, such as joint 31, current from the generator G is supplied to the relay and counteracts the short-circuiting effect of the trucks. The relay thus remains energized and the signal light shows green when it should show red.

As stated in the introduction, this condition is objectionable and dangerous only when the car happens to be standing still with the brushes 12 and 13 straddling the insulated joint. When the car is moving, this condition lasts for only one second or fraction thereof. Therefore, I have provided means which will prevent brushes 12 and 13 from remaining in lowered position in engagement with the rail when the car is standing still. This will prevent such a condition arising as is shown in Fig. 2. For accomplishing this purpose, I utilize the speedometer which is now employed on the cars and may comprise a belt and pulley drive 50, 51, 52 which operates a generator 55 to generate a voltage which is a function of the speed of the car. The speed may thus be read directly on voltmeter 56. Connected to the generator 55 is a relay 60 which will receive current from the generator if the car is in motion, but if the car is not in motion, the coil 60 will be de-energized. When the car is in motion and current is passing through coil 60, it will attract its armature 61 to cause contact 62 carried thereby to engage contact 63 and close the circuit through coil 65 which operates the stem 66 of the compressed air valve 26. The battery 67 supplies the current for this circuit and when the operator depresses switch 70 to close contact 71, the circuit through coil 65 is energized, valve 26 is opened to admit compressed air to cylinders 27, and the carriage 11 is depressed. However, when the car is standing still, generator 55 does not supply current to relay 60, thus allowing spring 75 to separate contacts 62 and 63 to break the circuit through coil 65 even though switch 70 is closed. Compressed air valve 26 is thus closed, the exhaust is opened and the springs are permitted to raise the carriage 11. Thus, when the car stops, the current brush carriage 11 will be raised so that the condition shown in Fig. 2 cannot arise and the signal will not be wrongly operated.

At those times when it is desired to lower the carriage even though the car is stationary and coil 60 is de-energized, and hence contacts 62 and 63 are broken, there may be provided a switch 80 controlling a pair of normally open contacts 81 which short circuit the contacts 62, 63. Thus by closing contacts 81 a circuit is established through coil 65 after switch 70 is closed. The switch 80 may be kept under a special lock so that it cannot ordinarily be accidentally operated.

The foregoing description of the invention is merely illustrative and changes may be made within the scope of the appended claims.

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

1. In a rail flaw detector car having a carriage, spaced current brushes supported on said carriage, means for raising the carriage out of engagement with the rail, means for lowering the carriage into engagement with the rail and means for supplying current to the brushes, characterized by means for preventing said carriage from remaining in engagement with the rail when the car is stationary, said last-named means comprising means responsive only to movement of the car, and means whereby said responsive means controls said carriage raising and lowering means.

2. In a rail flaw detector car having a carriage, spaced current brushes supported on said carriage, means for raising the carriage out of engagement with the rail, means for lowering the carriage into engagement with the rail and means for supplying current to the brushes, characterized by means for preventing said carriage from remaining in engagement with the rail when the car is stationary, said last-named means comprising means responsive only to movement of the car, and means whereby said responsive means renders said carriage raising means ineffective and said carriage lowering means effective during movement of the car.

3. In a rail flaw detector car having a carriage, spaced current brushes supported on said carriage, means for raising the carriage out of engagement with the rail, means for lowering the carriage into engagement with the rail and means for supplying current to the brushes, characterized by means for preventing said carriage from remaining in engagement with the rail when the car is stationary, said last-named means comprising means responsive only to movement of the car, and means whereby said responsive means renders said carriage raising means effective when the car stops.

4. In a rail flaw detector car having a carriage, spaced current brushes supported on said carriage, means for raising the carriage out of engagement with the rail, means for lowering the carriage into engagement with the rail and means for supplying current to the brushes, characterized by means for preventing said carriage from remaining in engagement with the rail when the car is stationary, said last-named means comprising means responsive only to movement of the car, and means whereby said responsive means renders said carriage raising means ineffective and said carriage lowering means effective during movement of the car and renders said carriage raising means effective and said carriage lowering means ineffective when the car stops.

5. In a rail flaw detector car having a carriage, spaced current brushes supported on said carriage, means normally effective for raising the carriage out of engagement with the rail, means for lowering the carriage into engagement with the rail and means for supplying current to the brushes, characterized by means for preventing said carriage from remaining in engagement with the rail when the car is stationary, said last-named means comprising means responsive only to movement of the car, and means whereby said responsive means controls said carriage lowering means.

6. In a rail flaw detector car having a carriage, spaced current brushes supported on said car-

riage, means normally effective for raising the carriage out of engagement with the rail, means for lowering the carriage into engagement with the rail and means for supplying current to the brushes, characterized by means for preventing said carriage from remaining in engagement with the rail when the car is stationary, said last-named means comprising means responsive only to movement of the car, and means whereby said responsive means renders said carriage lowering means effective and ineffective.

7. In a rail flaw detector car having a carriage, spaced current brushes supported on said carriage, means normally effective for raising the carriage out of engagement with the rail, means for lowering the carriage into engagement with the rail and means for supplying current to the brushes, characterized by means for preventing said carriage from remaining in engagement with the rail when the car is stationary, said last-named means comprising means responsive only to movement of the car, and means whereby said responsive means renders said carriage lowering means effective and ineffective when the car is moving and stationary, respectively.

8. In a rail flaw detector car having a carriage, spaced current brushes supported on said carriage, means normally effective for raising the carriage out of engagement with the rail, means including an electric circuit for lowering the carriage into engagement with the rail and means for supplying current to the brushes, characterized by means for preventing said carriage from remaining in engagement with the rail when the car is stationary, said last-named means comprising means for generating current only in response to movement of the car, means including a relay for controlling said circuit to render the carriage lowering means effective and ineffective, and means whereby said current generating means supplies current to said relay to render the same effective and ineffective when the car is moving and stationary, respectively.

9. In a rail flaw detector car having a carriage, spaced current brushes supported on said carriage, means for raising the carriage out of engagement with the rail, means for lowering the carriage into engagement with the rail and means for supplying current to the brushes, characterized by means for preventing said carriage from remaining in engagement with the rail when the car is stationary, said last-named means comprising means responsive only to movement of the car, means whereby said responsive means renders said carriage raising means ineffective and said carriage lowering means effective during movement of the car and renders said carriage raising means effective and said carriage lowering means ineffective when the car stops, and a second means for rendering the carriage raising means ineffective and the carriage lowering means effective when the car stops.

10. In a rail flaw detector car having a carriage, spaced current brushes supported on said carriage, means for raising the carriage out of engagement with the rail, means for lowering the carriage into engagement with the rail and means for supplying current to the brushes, characterized by means for preventing said carriage from remaining in engagement with the rail when the car is stationary, said last-named means comprising means responsive only to movement of the car, means whereby said responsive means renders said carriage raising means ineffective and said carriage lowering means effective during movement of the car and renders said carriage raising means effective and said carriage lowering means ineffective when the car stops, and a second means for rendering the carriage raising means ineffective and the carriage lowering means effective when the car stops, the second means including means for bypassing the means for rendering the carriage lowering means ineffective.

11. In a rail flaw detector car having a carriage, spaced current brushes supported on said carriage, means normally effective for raising the carriage out of engagement with the rail, means including an electric circuit for lowering the carriage into engagement with the rail and means for supplying current to the brushes, characterized by means for preventing said carriage from remaining in engagement with the rail when the car is stationary, said last-named means comprising means for generating current only in response to movement of the car, means including a relay for controlling said circuit to render the carriage lowering means effective and ineffective, means whereby said current generating means supplies current to said relay to render the same effective and ineffective when the car is moving and stationary, respectively, and a second means for rendering the carriage lowering means effective when the car is stationary.

12. In a rail flaw detector car having a carriage, spaced current brushes supported on said carriage, means normally effective for raising the carriage out of engagement with the rail, means including an electric circuit for lowering the carriage into engagement with the rail and means for supplying current to the brushes, characterized by means for preventing said carriage from remaining in engagement with the rail when the car is stationary, said last-named means comprising means for generating current in response to movement of the car, means including a relay for controlling said circuit to render the carriage lowering means effective and ineffective, means whereby said current generating means supplies current to said relay to render the same effective and ineffective when the car is moving and stationary, respectively, and a second means for rendering the carriage lowering means effective when the car is stationary, said second means including means for short-circuiting the relay.

HARCOURT C. DRAKE.

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