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H. C. DRAKE ET AL

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RAIL FLAW DETECTOR MECHANISM

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Fig. 2.

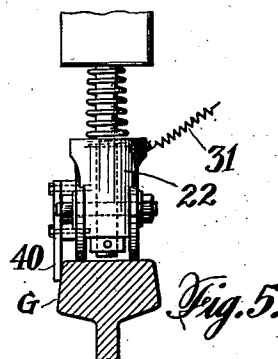
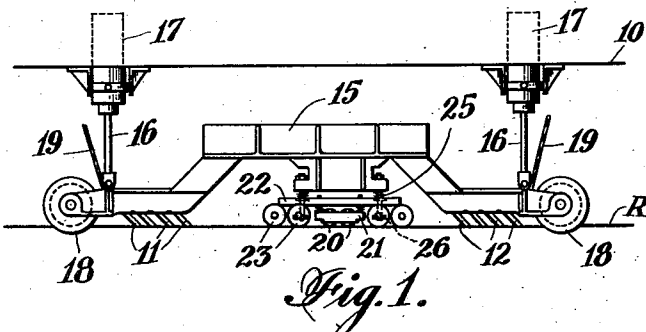
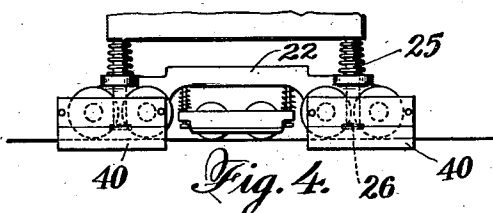
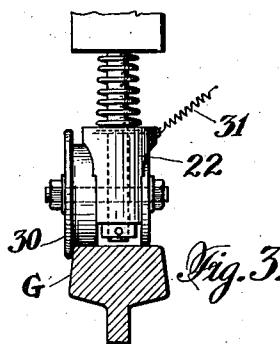
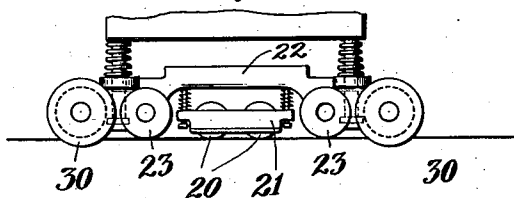


Fig. 7.

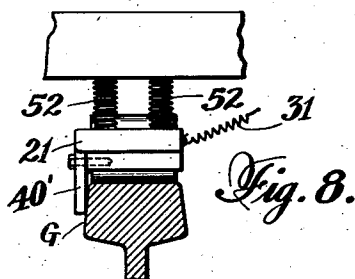
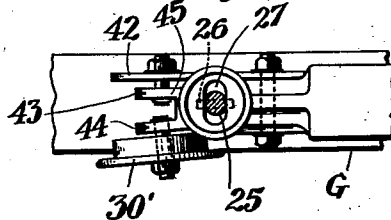


Fig. 6.



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RAIL FLAW DETECTOR MECHANISM

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5 Claims. (Cl. 175—183)

This invention relates to rail flaw detector mechanisms of the Sperry type. In these mechanisms a source of current such as a generator within the car supplies current to the rail through brushes carried by a current brush carriage suspended from the car to establish an electromagnetic field surrounding the rail. The presence of an internal flaw in the rail will cause displacement of the electromagnetic field, and such variation in the field is detected by means of detector mechanism comprising induction coils which normally cut a uniform number of lines of force but which cut a different number of lines of force on entering a region of flaw. The coils are connected in opposition so that when one of said coils enters the region of flaw there is generated a differential E. M. F. which is then amplified and caused to actuate an indicator such as a recorder.

The detector unit comprises the induction coils which have heretofore been suspended from the current brush carriage in such manner as to permit lateral movement of the coils with respect to the rail. Such lateral movement resulted in cutting a different number of lines of force within a given time and hence sometimes resulted in an indication similar to that of a flaw where none in fact existed. It is the principal object of our invention, therefore, to provide means which will prevent such lateral movement of the detector unit with respect to the rail head.

It is a further object of our invention to provide such means as noted in the preceding paragraph for maintaining the coils in fixed relation laterally with respect to the rail head while at the same time permitting said coils to follow all the variations in the contour of the rail surface so as to be parallel to said surface at all times to maintain a constant gap between the induction coils and the rail surface.

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

In the accompanying drawing,

Fig. 1 is a side elevation of a portion of a Sperry rail flaw detector car with the detector mechanism suspended therefrom.

Fig. 2 is an enlarged view of the detector carriage and having applied thereto one form of our invention for preventing lateral movement of the detector unit with respect to the rail head.

Fig. 3 is an end view of the device shown in Fig. 2.

Fig. 4 is a view similar to Fig. 2 with another form of our invention applied thereto.

Fig. 5 is an end view of the form of invention disclosed in Fig. 4.

Fig. 6 is a horizontal section through a portion of a detector carriage similar to the carriage of Fig. 2 but showing another form of our invention applied thereto.

Fig. 7 is a side elevation of a portion of a modified form of detector mechanism having our invention applied thereto.

Fig. 8 is an end view of the Fig. 7 form of our invention.

Referring to Fig. 1, it will be seen that the Sperry detector car comprises a car-body 10 within which is mounted a source of current such as a generator (not shown) for supplying current to sets of brushes 11 and 12 adapted to engage the rail surface R for leading current into and out of said rail to establish an electromagnetic field surrounding the same. The said sets of brushes are carried by a current brush carriage 15 adapted to be suspended from the car body 10 by means such as pistons 16 operating within fluid pressure cylinders 17 so that when the fluid pressure is admitted to said cylinders the carriage 15 is lowered until the wheels 18 engage the rail. The carriage may be retracted by means such as cables 19 and springs not shown. The cables 19 extend outwardly toward the outside of the car so as to bias the flanges of wheels 18 into engagement with the gage side of the rail. In addition, the said wheels 18 may be toed-out slightly to cause the carriage 15 to keep in close contact with the gage surface of the rail. As the car moves along, induction coils, which in this case are shown mounted within cylinders 20, cut the lines of force. The coils within cylinders 20 may be mounted within a frame 21, said frame and coils constituting the search unit or detector unit. Said search unit may be mounted upon a detector carriage 22 adapted to ride on the rail by means such as rollers 23, the said detector carriage being in turn supported on the current brush carriage 15 by means which permit lateral movement of the detector carriage. Said means may comprise bolts 25 pivoted within the detector carriage 22 on a pivot 26 close to the rail surface and extending upwardly through the carriage 15 to which it is bolted. The pivotal mounting of bolts 25 permits lateral movement as shown in Fig. 6, said bolt operating within a slot 27 in the detector carriage frame 22. It will be seen that as the car moves along the rails the coils within cylinders 20 normally cut a constant number of lines of force, and since said coils are connected in opposition no differential E. M. F. will be generated during such movement. On entering a region of flaw, first one and then the other of said coils will cut a different number of lines of force than the other and generate a differential E. M. F. which, after being suitably amplified, may be caused to operate an indicator such as a recorder.

The mounting of the detector carriage on the current brush carriage described above sometimes resulted in movement of the search unit laterally of the rail which movement resulted in

cutting a different number of lines of force from the normal number and caused an indication as of a flaw. In order to prevent such lateral movement of the detector carriage and the search unit supported therefrom we provide means for normally maintaining the detector carriage in constant engagement with the gage side of the rail. One such means is disclosed in Figs. 2 and 3 and comprises substituting for one of the wheels 23 whereby the detector carriage is supported on the rail a flanged wheel 30. Thus, at least two flanged wheels, one at the front and one at the rear may be utilized in place of the wheels 23 without flanges, as shown in Fig. 1. In addition to said flanged wheels 30, we may provide springs 31 connected at one end to the detector carriage 22 and at the other end to the car-body 10 and extending from said detector carriage 22 outwardly toward the outside of the car so as to bias the carriage normally outwardly so that flanges 30 are maintained in firm engagement with the gage side G of the rail.

Another form of our invention is disclosed in Figs. 4 and 5. Instead of providing flanged wheels 30 in place of wheels 23, we fix guide plates 40 to the frame 22 on the inside surface thereof, said guide plates 40 extending downwardly below the rail surface into engagement with the gage side G of the rail. In this form, also, springs 31 may be employed to bias the guide members 40 into engagement with the gage side of the rail.

In a modified form of our invention, as shown in Fig. 6, we may provide in place of wheels 23 a pair of wheels, one of which, 42, may be similar to a wheel 23 and adapted to ride on the surface of the rail. The other wheel may be a flanged wheel 30' similar to flanged wheel 30 but displaced around a vertical axis so that said wheel is slightly toed-out. This will give wheel 30' a tendency to ride inwardly into engagement with the gage side G of the rail and will obviate the necessity for springs 31. The wheels 42 and 30' may be individually mounted in the arms 43 and 44 of a fourth member 45.

In Figs. 7 and 8 we have shown a modified form of our invention wherein we have taken advantage of the fact that the search unit is maintained in constant relation laterally with respect to the rail in order to provide a different type of universal action between said search unit and the supporting carriage. The search unit may be similar to the unit 21 shown in Figs. 1, 2 and 4, or it may be any other type of search unit. Said unit is connected to the current-brush carriage 15' solely by resilient means such as one or a plurality of springs 52. This will permit the search unit 21 to follow the contour of the rail and vary its position with respect to the carriage in all conceivable directions. The springs 52 have sufficient tension to press the search unit 21 firmly into engagement with the rail surface. Said unit 21 may be provided with a guide member 40' similar to guide members 40, but in this case fastened to the search unit instead of to the detector carriage on which the search unit was mounted. Springs 31 may be utilized as before to maintain the guide members

40' in firm engagement with the gage side G of the rail.

In accordance with the provisions of the patent statutes, we have herein described the principle and operation of our invention, together with the apparatus which we now consider to represent the best embodiment thereof, but we 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 our invention, what we claim and desire to secure by Letters Patent is:

1. In a flaw detector car having mechanism for detecting flaws in rails and the like, said mechanism comprising a search unit adapted to be moved along the rail, and means for supporting said search unit solely by resilient means, said search unit having means engaging the rail for preventing movement of the unit laterally of the rail.

2. In a flaw detector car having mechanism for detecting flaws in rails and the like, said mechanism comprising a search unit adapted to be moved along the rail, and means for supporting said search unit solely by resilient means, said search unit having means engaging the rail for preventing movement of the unit laterally of the rail and means for maintaining said preceding means constantly in engagement with a side of the rail.

3. In a flaw detector car having mechanism for detecting flaws in rails and the like, said mechanism comprising a search unit adapted to be moved along the rail, and means for supporting said search unit solely by resilient means, said search unit having means engaging the rail for preventing movement of the unit laterally of the rail and means for maintaining said preceding means constantly in engagement with the gage side of the rail.

4. In a flaw detector car having mechanism for detecting flaws in rails and the like, said mechanism including a search unit comprising a plurality of induction coils adapted to be moved along the rail with the axes of said coils maintained parallel to the rail surface, and means for supporting said search unit on said rail surface solely by resilient means for maintaining said parallel relationship between the axes of said coils and said rail surface.

5. In a flaw detector car having mechanism for detecting flaws in rails and the like, said mechanism including current brushes for leading current into and out of the rail, a current brush carriage for supporting said brushes and a search unit adapted to engage the rail, said search unit comprising a plurality of induction coils adapted to be moved along the rail with the axes of said coils maintained parallel to the rail surface, and means for supporting said search unit on said carriage solely by resilient means for maintaining the said parallel relationship between the axes of said coils and said rail surface.

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