April 7, 1936. H. C. DRAKE 2,036,857

RAIL FLAW DETECTOR MECHANISM

Filed Feb. 13, 1936

Fig. 1.

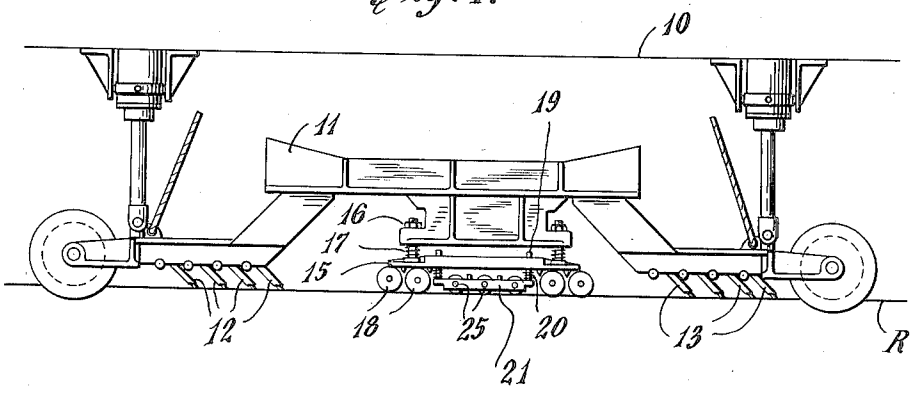


Fig. 2.

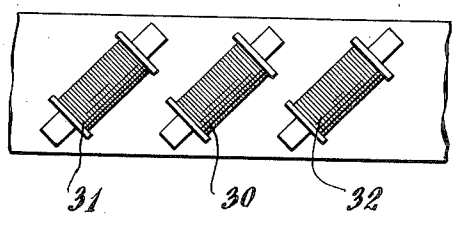


Fig. 3.

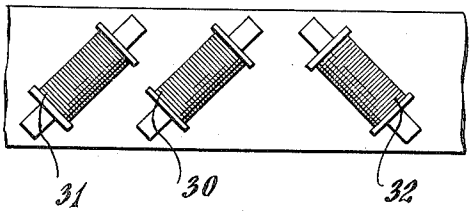


Fig. 4.

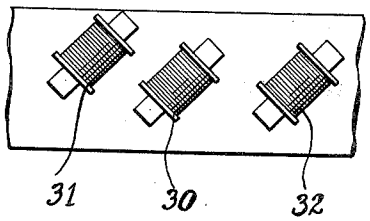
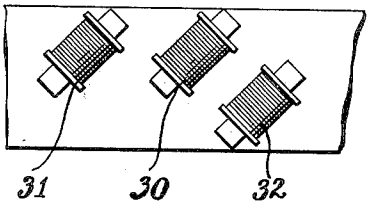


Fig. 5.



INVENTOR
Harcourt C. Drake
BY
Joseph N. Lipschutz
ATTORNEY

Patented Apr. 7, 1936 2,036,857

UNITED STATES PATENT OFFICE

2,036,857

RAIL FLAW DETECTOR MECHANISM

Harcourt C. Drake, Hempstead, N. Y., assignor to Sperry Products, Inc., Brooklyn, N. Y., a corporation of New York

Application February 13, 1936, Serial No. 63,718

4 Claims. (Cl. 175—183)

This application is a continuation in part of co-pending application Serial Number 607,728, filed as a joint application with Charles B. Roede on April 27, 1932, for Rail flaw detector mechanisms.

This invention relates to rail flaw detector apparatus of the type employed on the well-known Sperry rail flaw detector cars. In these cars the detector equipment comprises a source of current within the car, which is supplied to the rail by means of brushes to send the current through the rail and establish an electromagnetic field surrounding the same. Any variations in this field caused by the presence of internal fissures are picked up during the movement of the car by means of induction coils which are maintained a constant distance above the rail surface so that normally they cut a constant number of lines of force, but on encountering the region of a flaw they will cut a different number of lines of force. The coils are connected in opposition so that variations in current supply will not have any effect on the out-put of said coils, while the presence of a flaw will cause one coil to cut more lines of force than the other and hence generate a differential E. M. F.

Heretofore, the detector coils have invariably been arranged with the axis of the coils at right angles to the longitudinal axis of the rail. It is one of the objects of my invention to provide for positioning the coils at an angle to the longitudinal axis of the rail other than a right angle.

Heretofore, when a plurality of coils were employed the axes of all the coils have been parallel. It is an object of my invention to provide for the positioning of a plurality of coils so that the axes of certain of said coils will be at an angle to the axes of certain other of said coils.

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

In the accompanying drawing,

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

Figs. 2–5, inclusive, are plan views, largely diagrammatic, showing the various coil arrangements of the detector unit.

Referring to Fig. 1, there is disclosed a detector mechanism such as is employed on the Sperry detector car. A portion of the car body 10 is shown having suspended therefrom the current brush carriage 11 whose front and rear sets of brushes 12 and 13 are designed to lead current into and out of the rail R, the said current being supplied from a source of current (not shown) within the car. The current brush carriage supports in turn the searching unit or detector carriage 15 by means such as bolts and springs 16, 17. Said carriage may ride along the rail on any suitable means, such as rollers 18, and supports thereon by any suitable means, such as bolts 19 and springs 20, the searching unit 21 which may consist of a plurality of induction coils designed to cut the lines of force of the electromagnetic field surrounding the rail R. The said coils normally cut a uniform number of lines of force and induce a constant E. M. F., but upon entering the region of a flaw said coils cut a different number of lines of force to induce a different E. M. F. Heretofore, these coils have been employed in pairs, the coils of each pair being opposed so that only the differential E. M. F. generated by said pair of coils resulted when a flaw was encountered. Said E. M. F., after being suitably amplified, was caused to operate any suitable indicating means such as a recorder.

While it is customary to use one or more pairs of opposed coils, the coils of each pair being balanced, one may employ an odd number of coils as shown in Figs. 2 to 5, for example, wherein one coil is balanced against the other two. Substantially the same effect is obtained by this arrangement as in the case of two pairs of opposed coils.

Heretofore it has been customary to position the induction coils at all times with their axes parallel to the rail surface and at right angles to the longitudinal axis of the rail. We have found that we may employ such coils at an angle to the longitudinal axis of the rail other than a right angle, as, for instance, in Fig. 2 where the coils are arranged at an acute angle to the longitudinal axis of the rail. In Fig. 3 is shown a modification wherein all of the coils are inclined at an acute angle less than a right angle with respect to the longitudinal axis of the rail, certain of said coils (in this case coil 32) being inclined in the opposite direction to the remaining coils (30 and 31). The coils of Figs. 2 and 3 may be arranged in line as shown in said figures, or they may be offset laterally to coact with different portions of the rail as shown in Figs. 4 and 5.

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 equivalent 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 device for detecting flaws in rails, means for passing current through the rail to establish an electromagnetic field, and a detector unit, said unit comprising an induction coil positioned in inductive relation to said rail and with its axis at an angle other than a right angle with respect to the longitudinal axis of the rail.

2. In a device for detecting flaws in rails, means for passing current through the rail to establish an electromagnetic field, and a detector unit, said unit comprising a plurality of induction coils conductively connected and in inductive relation to the rail, each of said coils comprising a plurality of substantially parallel turns, each of said coils being positioned with its axis at an angle other than a right angle with respect to the longitudinal axis of the rail.

3. The method of detecting flaws in an elongated metallic body which consists in passing an electrical current through the body and then exploring the magnetic field surrounding the body with a coil held at a constant angle to the longitudinal axis of the body and arranged so that only a small fraction of the magnetic flux passes through the coil.

4. In apparatus of the class described, an elongated metallic body under test for flaws, means for passing an electrical current through the body, a detector including a coil for exploring the magnetic field surrounding the body, said body and detector being relatively movable in parallel planes, and means for mounting the coil so that only a small fraction of the magnetic flux passes through the coil, said means maintaining the coil at a constant angle to the longitudinal axis of the body when the detector and body are relatively moved.

HARCOURT C. DRAKE.