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2,831,965

BROKEN FLANGE AND FLAT WHEEL DETECTOR

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2 Sheets-Sheet 1

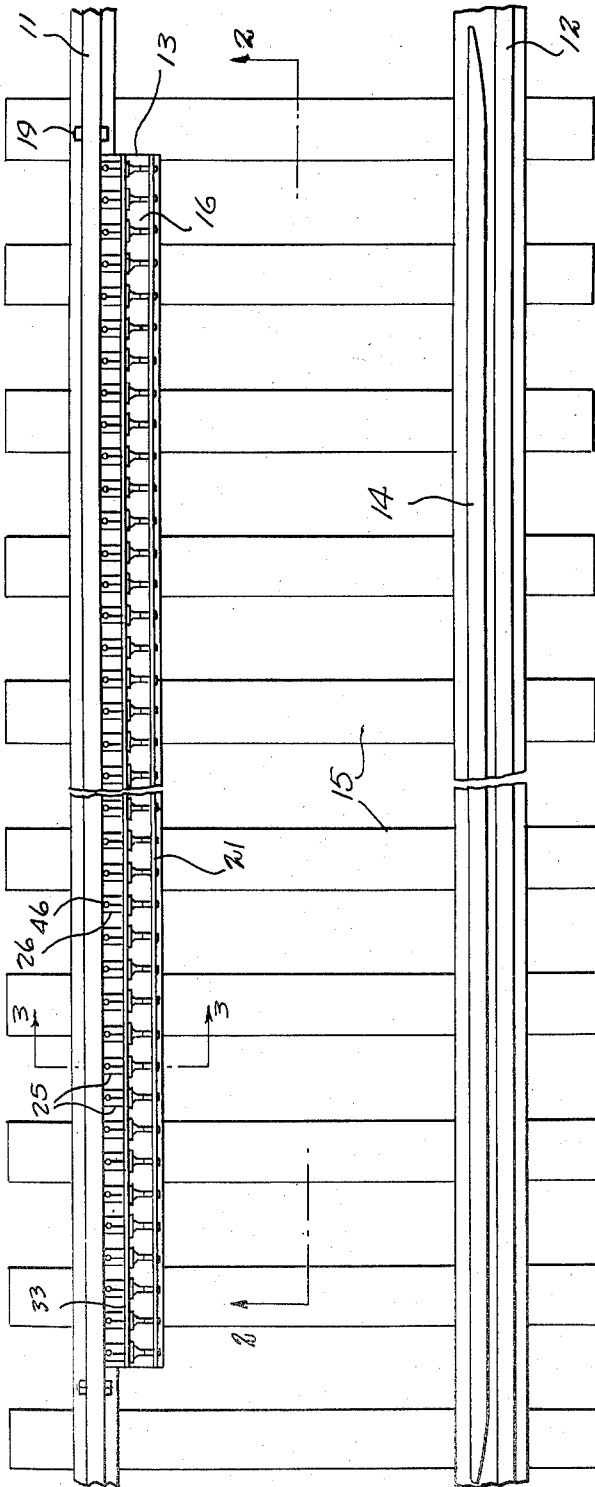


FIG. 1.

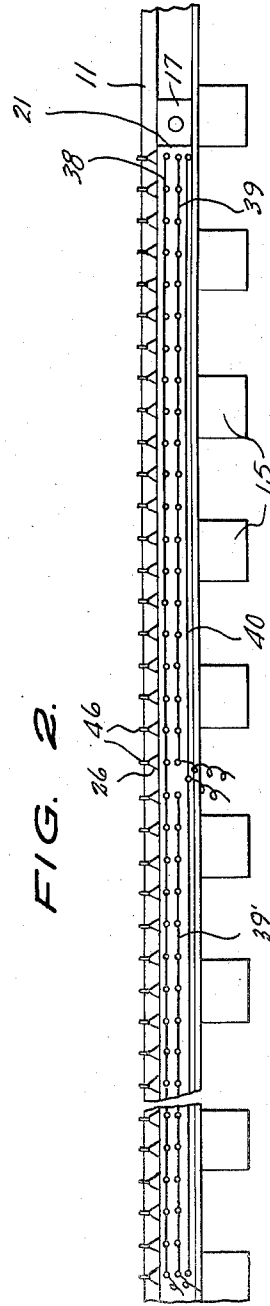


FIG. 2.

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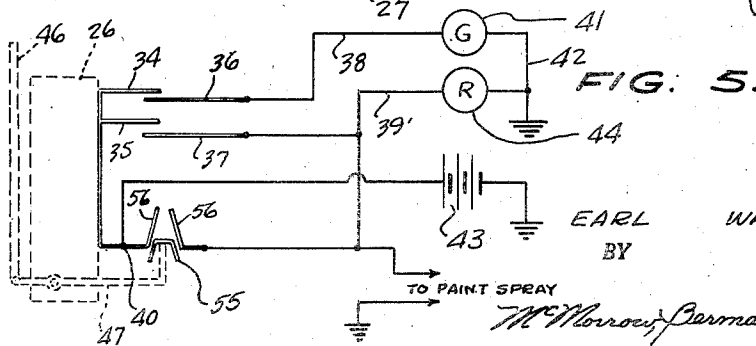
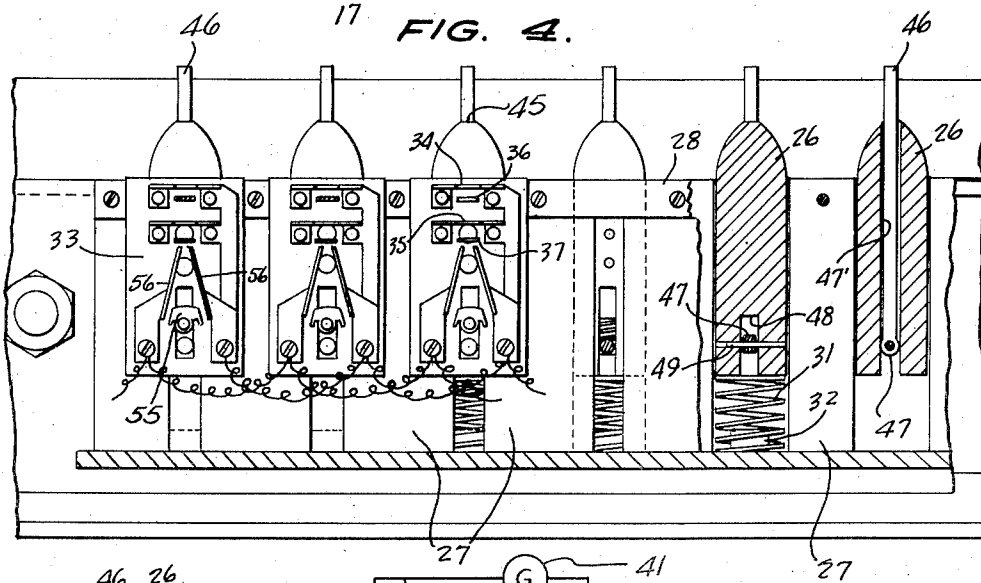
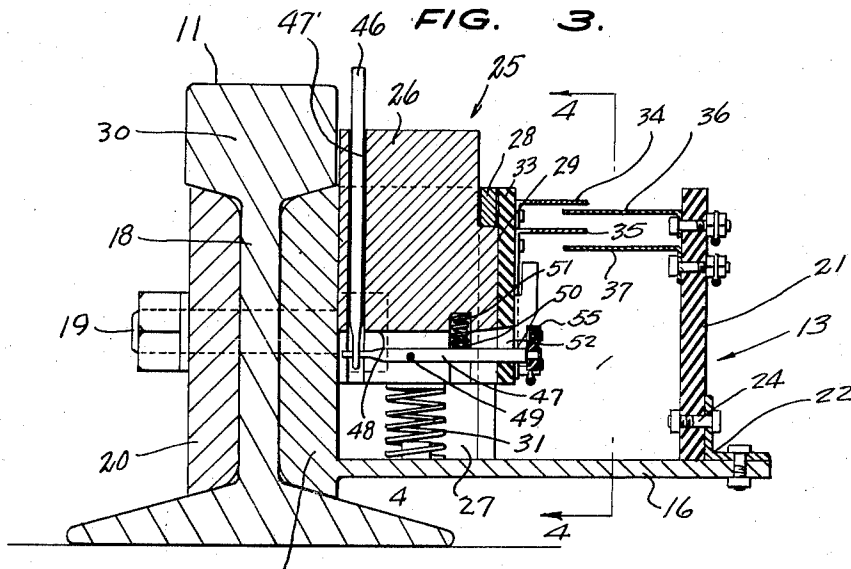
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BROKEN FLANGE AND FLAT WHEEL DETECTOR

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3 Claims. (Cl. 246—246)

This invention relates to signal devices for railway systems, and more particularly to means for detecting and marking defective wheels as they pass over the track rails of a railway system.

A main object of the invention is to provide a novel and improved means for detecting defective wheels in a railway system, such as broken flanges, flat wheels, or the like, the improved detection means being simple in construction, being reliable in operation, and providing unmistakable visual signals indicating the passage of a defective wheel over the device.

A further object of the invention is to provide an improved signal system for detecting broken wheel flanges, flat wheels, or other wheel defects, providing a visual signal to indicate the presence of a defective wheel as it passes over the apparatus, and also to provide an impulse adapted to control a paint spray apparatus, or similar marking device, so that the defective wheel may be marked so that its identification thereof may be easily made, the apparatus of the present invention involving inexpensive components, being durable in construction and being easy to install on existing railway tracks.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is a top plan view of a pair of railway tracks equipped with an improved defective wheel detection apparatus according to the present invention.

Figure 2 is a longitudinal vertical cross sectional view taken on line 2—2 of Figure 1.

Figure 3 is an enlarged transverse vertical cross sectional view taken on line 3—3 of Figure 1.

Figure 4 is a vertical cross sectional view taken substantially on line 4—4 of Figure 3, portions of the parts being shown in vertical cross section to illustrate internal constructional details.

Figure 5 is a schematic wiring diagram illustrating the electrical connections of the apparatus shown in Figures 1 to 4.

Referring to the drawings, 11 and 12 respectively designate a pair of railway tracks over which a railway vehicle is adapted to pass, the rail 11 being provided with electrical switch means, designated generally at 13, adapted to respond to the passage thereover of the wheels of the vehicle in a manner presently to be described, and the rail 12 being provided inwardly thereof with an auxiliary guard rail 14 adapted to maintain the vehicle against lateral swaying while it is passing over the section of the tracks 11 and 12 provided with the defective wheel detection apparatus. The guard rail 14 is secured to the railway ties 15 in any suitable manner and is spaced inwardly from the track rail 12 by a sufficient distance to receive the flanges of the wheels supported on track 12 and to cooperate with said flanges to hold the vehicle against lateral movement as it passes over the portions of the tracks 11 and 12 provided with the electrical switch apparatus 13.

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The electrical switch apparatus 13 comprises a horizontal support plate 16 which is rigidly secured to a fish plate member 17 engageable against the web 18 of the rail 11 and secured thereto by bolts 19 extending to the fish plate 17, the web 18, and an opposing fish plate 20 provided on the opposite side of said web, as is clearly shown in Figure 3.

Rigidly secured to the marginal portion of the plate 16 remote from the member 17 is an upstanding vertical plate member 21 of insulating material, said plate member 21 being fastened in vertical position to the plate member 16 by an angle bar 22, as shown in Figure 3, secured to the margin of the plate 16 and being fastened to the insulation plate 21 by bolts 24.

Uniformly spaced along the plate member 16 are a series of identical electrical switch assemblies, each being designated at 25. Each switch assembly 25 comprises a treadle member 26 which is resiliently mounted on the supporting plate 16 between a pair of adjacent upstanding guide members 27, 27 to the upper rear margin of which are secured a common horizontally extending retaining bar 28. As shown in Figure 3, the treadle member 26, slidably disposed between a pair of upstanding block members 27 is formed with a rearwardly extending portion 29 engageable beneath the retaining bar 28 to limit upward movement of the treadle 26 to a position wherein the top end of the treadle is below the level of the top surface of the rail head 30. The treadle member 26 is biased upwardly by a coil spring 31 engaged between the bottom end of the treadle member 26 and the supporting plate 16, as is shown in Figures 3 and 4. The lower end of the cross frame 16 is engaged around a guide stud 32 which acts to maintain the spring substantially centered.

Secured to the rearward extension 29 of each treadle member 26 is a vertical insulation plate 33, and secured on each insulation plate 33 are a pair of vertically spaced horizontally extending contact arms 34 and 35. The contact arms 34 and 35 extend over respective horizontal contact arms 36 and 37 secured to the outer insulation member 21 and extending forwardly, as shown in Figure 3. The vertical spacing between the contact arms 36 and 37 is larger than the vertical spacing between the contact arms 34 and 35, whereby contact arm 34 engages contact arm 36 under normal wheel conditions, namely, wherein a wheel flange is of normal length and depresses the treadle member 26 associated with the contact elements 34 and 35 a normal distance. Under these conditions, the contact arm 35 cannot engage the contact arm 37. However, if the flange is abnormally long, indicating the presence of a flat wheel, the treadle member 26 is depressed sufficiently so that the contact arm 35 engages the contact arm 37. The arms 34, 35, 36 and 37 are relatively yieldable, so that the treadle member 26 can be relatively easily depressed even after contact arm 34 engages contact arm 36, so that in the case of an excessively long flange, the contact arm 35 may engage the contact arm 37.

As shown in Figure 5, the contact arms 36 are connected to a common conductor 38 which in turn is connected to one terminal of a signal device, for example, a green lamp 41 located at a suitable station adjacent the rails 11 and 12. The other terminal of the signal device 41 is connected to ground, as by a conductor 42. The contact arms 34 and 35 are connected to a suitable common conductor 40 which is in turn connected to one terminal of a source of current, such as a battery 43, the other terminal of the source of current being connected to ground, as shown in Figure 5. The contact arms 37 associated with a first group of switch devices 25 are connected to a first common conductor

39' which is connected, in turn, to one terminal of a warning signal device 44, such as a red lamp, the other terminal of the warning signal device 44 being connected to ground, as shown. The second group of signal switch devices 25 have their switch arm elements 37 connected to another conductor 39, which is in turn connected to a terminal of a second warning device 44, similar to the previously described warning device, which is connected in the same manner as shown in Figure 5, the arrangement being such that if a defective wheel passes over the track 11, either the first signal device 44 will be actuated, or the second warning device 44 will be actuated as the wheel travels from the first portion of rail 11 to the second portion thereof which contains a second group of switch devices 25, depending upon where the defect is located on the wheel.

As shown in Figure 4, the treadle members 26 are arcuately tapered at their top ends, having the small top surfaces 45 adapted to be engaged by a wheel flange as it rolls over the rail section 11. A flange of normal length will cause the switch arms 34 and 36 to engage, as above described, providing energization of the green lamp 41, whereas a flange of excessive length will cause closure of the contact arms 35 and 37, causing energization of the red lamp 44.

Slidably mounted on each treadle member 26 is a vertical rod 46, the rod 46 extending slidably through a vertical bore 47' provided in the associated treadle member 26, the bottom end of each rod 46 being connected to the end of a lever 47 contained in a transverse bottom groove 48 formed in the treadle member 26, as shown in Figure 3, each lever being pivotally connected to the bottom portion of the treadle member 26 associated therewith by a transverse pin 49 extending through the intermediate portion of the lever and secured in the walls of the groove 48. A coil spring 50 is provided in each groove 48, the top portion of the spring 50 being secured in a recess 51 located above the portion of lever on the opposite side of pivot pin 49 from the connection of the lever to the associated rod 46. The spring 50 bears downwardly on the lever 47 and biases the lever clockwise, as viewed in Figure 3, namely, toward a position wherein the associated rod 46 is elevated. The outer end portion of each lever 47 passes through a vertical slot 52 in the lower portion of the associated insulation plate 33, the lever 47 engaging the bottom end of the slot 52 to limit the upward projections of rod 46 to a position thereof shown in Figure 3, namely, to a position wherein the top end of the rod 46 projects slightly above the level of the top surface of the rail head 30.

Secured to the outer end of each lever 47 is a contact member 55 of upwardly convergent shape engageable between a pair of downwardly divergent contacts 56, 56 responsive to upward movement of the outer portion of lever 47, namely, responsive to the depression of the associated contact rod 46. The rods 46 are spaced closely adjacent to the head 30 of the rail, and normally are not depressed relatively to the treadle member 26 when the flange normally engages said treadle member in the manner above described. However, where the flange is broken, the wheel engages the rod member 46 as it passes over track 11, without depressing the associated treadle member 26, causing the rod member 46 to be depressed relative to the treadle member 26 carrying same, whereby the associated lever member 47 is rotated counterclockwise, as viewed in Figure 3, and whereby the associated contact element 55 conductively engages between the contact arms 56, 56 spaced thereabove.

As shown in Figure 5, the contact arms 56, 56 are connected between the energizing conductor 40 and the ungrounded terminal of the associated warning signal device 44, whereby a broken flange on a wheel provides the same indication of an abnormal condition as does

an excessively long flange, namely, a condition prevailing in the case of a flat wheel.

A suitable marking device may be employed, connected in parallel with each warning signal device 44 to suitably mark the defective wheel as it passes over the apparatus. As shown in Figure 5, the electrical marking device is connected to the same terminals and between ground of the red lamp 44 as the contact arm 37, namely, the conductor 39'. The marking device may comprise, for example, an electrically operated paint spray device adapted to provide a jet of marking liquid, such as paint, against the defective wheel simultaneously with the energization of the red lamp 44, so that the defective wheel may be subsequently recognized.

While a specific embodiment of an improved railway signal system for detecting defective wheels has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. A railway signal system for detecting defective wheel treads and flanges comprising a pair of track rails, a support member, means securing said support member to one of said rails, a treadle member resiliently mounted on said support member adjacent the head of said one of the rails and being depressible by the broken tread extending from the flange to the outer rim of a wheel as it passes over said one of the rails, a pair of outwardly extending vertically spaced contact elements mounted on said treadle member, respective vertically spaced stationary contacts mounted on said support and extending subjacent the contact elements, the vertical spacing of the stationary contacts being different from the vertical spacing of said contact elements, a pair of signal devices, a source of current, circuit means connecting the respective signal devices in circuit with the source and the respective pairs of contact elements and stationary contacts subjacent thereto and being formed and arranged to energize one or both of the respective signal devices responsive to the depression of said treadle member by the broken tread extending from the flange to the outer rim of a wheel, a vertical rod slidably and resiliently mounted in said treadle member adjacent to and normally projecting slightly above the level of the rail head, and a pair of auxiliary switch contacts controlled by said rod and connected in circuit with said source and one of the signal devices and being formed and arranged to indicate the presence of a broken flange on the wheel passing over said one of the rails.

2. A railway signal system for detecting defective wheel treads and flanges, a pair of track rails, a support member, means securing said support member to one of said rails, a treadle member resiliently mounted on said support member adjacent the head of said one of the rails and being depressible by the broken tread extending between the flange to the outer rim of a wheel as it passes over said one of the rails, a pair of outwardly extending vertically spaced contact elements mounted on said treadle member, respective vertically spaced stationary contacts mounted on said support and extending subjacent the contact elements, vertical spacing of the stationary contacts being different from the vertical spacing of said contact elements, a pair of signal devices, a source of current, circuit means connecting the respective signal devices in circuit with the source and the respective pairs of contact elements and stationary contacts subjacent thereto and being formed and arranged to energize one or both of the respective signal devices responsive to the depression of said treadle member by the broken tread extending from the flange to the outer rim of a wheel, an auxiliary switch device connected in circuit with said source and one of the

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signal devices to indicate the presence of a broken flange on a wheel passing over said one of the rails, said auxiliary switch device comprising a vertical rod slidably mounted in said treadle member adjacent to and normally projecting slightly above the level of the rail head, a lever pivoted in said treadle member and connected at one end to said rod, spring means acting between the lever and the treadle member and biasing said rod upwardly, a first switch contact mounted on the treadle member, and a second switch contact secured to said lever and being engageable with said first switch contact when said rod is depressed relative to the treadle member.

3. A railway signal system for detecting defective wheel treads and flanges comprising a pair of track rails, a support member, means securing said support member to one of said rails, a treadle member resiliently mounted on said support member adjacent the head of said one of the rails and being depressible by the broken tread extending from the flange to the outer rim of a wheel as it passes over said one of the rails, a pair of outwardly extending, vertically spaced contact elements mounted on said treadle member, respective vertically spaced stationary contacts mounted on said support and extending subjacent the contact elements, the vertical spacing of the stationary contacts being different from the vertical spacing of said contact elements, a pair of signal devices, a source of current, circuit means con-

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necting the respective signal devices in circuit with the source and the respective pairs of contact elements and stationary contacts subjacent thereto and being formed and arranged to energize one or both of the respective signal devices responsive to the depression of said treadle member by a broken tread extending from the flange to the outer rim of the wheel, an auxiliary switch device connected in circuit with said source and one of the signal devices to indicate the presence of a broken flange on a wheel passing over the said one of the rails, said auxiliary switch device comprising a vertical rod slidably mounted in said treadle member adjacent to and normally projecting slightly above the level of the rail head, a lever pivoted in said treadle member and connected at one end to said rod, spring means acting between the lever and the treadle member and biasing said rod upwardly, a first switch contact mounted on the treadle member, a second switch contact secured to said lever and being engageable with said first switch contact when said rod is depressed relative to the treadle member, and a guard rail mounted inwardly adjacent to and parallel to the other track rail opposite said treadle member.

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