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VEHICLE WEIGHT RESPONSIVE MEANS

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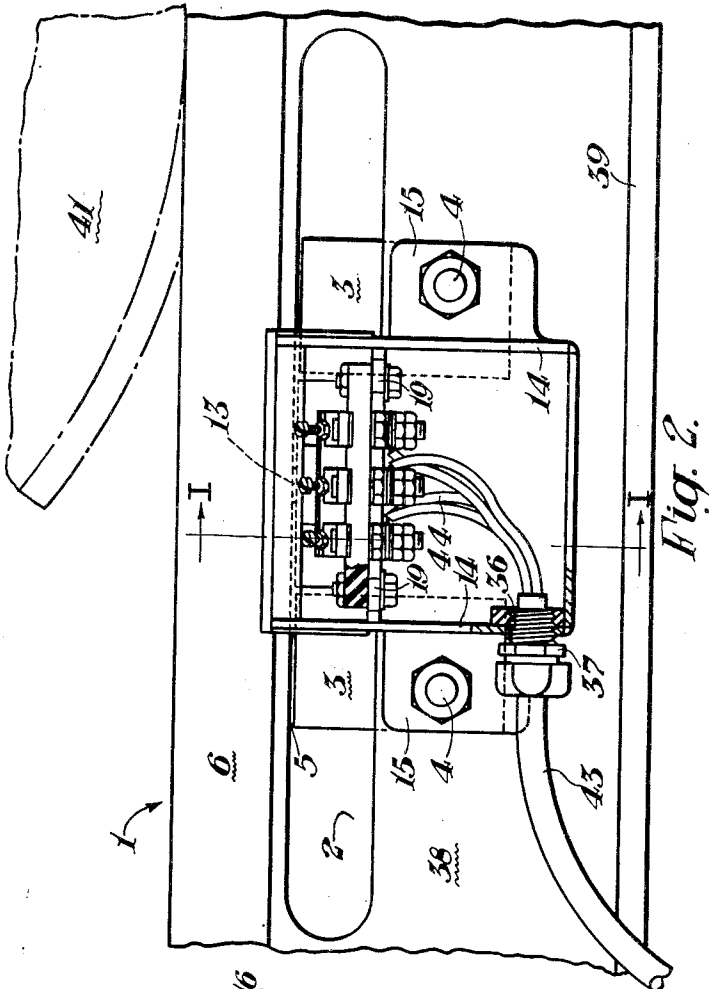


Fig. 2.

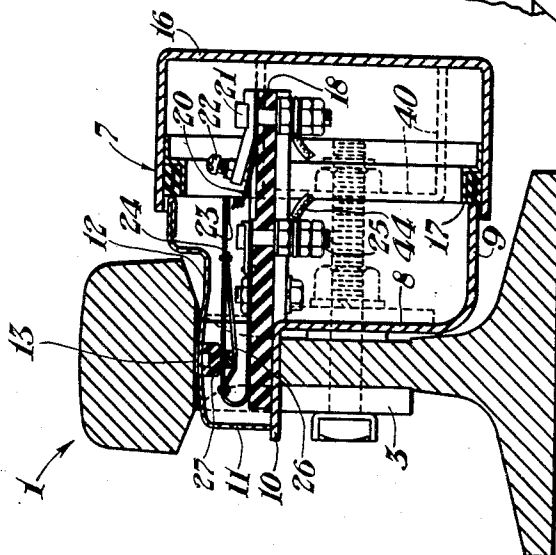
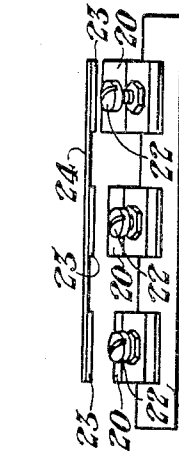


Fig. 1.



Insulation Fig. 5.

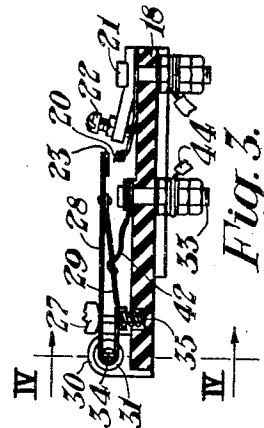


Fig. 3.



Fig. 4.

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VEHICLE WEIGHT RESPONSIVE MEANS

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13 Claims. (Cl. 265—27)

My invention relates to a vehicle weight responsive means, and particularly to a means mounted in a slot formed in the web of a railway track rail directly under the head of the rail and responsive to the deflection of the rail head as the car wheels pass over the slot.

In certain forms of weight measuring devices previously used, the deflection of the entire rail between two support points was measured and translated into weight readings. This arrangement has the disadvantage that it requires a very rigid support and rigid rail anchoring means. Other types of weight measuring devices which have been used require entire rail sections to be supported on scales or a portion of the rail head to be cut away to provide clearance for a weight responsive lever. The supporting of an entire rail section on scales requires an installation which is expensive to make and maintain, and the cutting away of a portion of the head of a rail is objectionable due to the resulting break in the wheel rolling surface.

It is therefore an object of my invention to provide a novel vehicle weight measuring device capable of low installation cost.

Another object of my invention is to provide a novel weight measuring device capable of operation in all kinds of weather conditions.

Another object of my invention is to provide a totally enclosed circuit controller that is capable of operation within a slot in a rail web by car wheels passing over the rail head.

Other objects, purposes and characteristic features of my present invention will be in part obvious from the accompanying drawings and in part pointed out as the description of the invention progresses.

In the following description the slotted member is referred to as a rail having a head, a web and a base, since this is the preferred embodiment. However, it is to be understood that a rail is merely a particular type of beam member carrying a variable load.

My invention is therefore not to be restricted to a rail but is applicable to any beam member having an upper portion, a web and a lower portion.

In practicing my invention I provide a rail with an elongated slot cut in its web adjacent the head of the rail. Secured to the web of the rail is a circuit controller having a portion which extends into the rail slot and co-operates with the rail head so that deflection of the rail head toward the bottom of the slot will cause operation of the circuit controller contacts. The circuit controller may be used for any desired purpose such for example as providing weight information for use in automatically controlling the braking action of a car in accordance with the weight of the car.

The provision of a circuit controller which can be mounted in a slot in the rail web in the manner indicated eliminates the need for special and expensive rail supports. The type of circuit controller disclosed is also capable of being operated through small rail head deflections, thus allowing the motion to be transmitted

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through the case of the controller. This permits the circuit controller to be made weather tight.

In describing my invention in detail reference will be made to the accompanying drawings in which corresponding parts are generally identified by corresponding reference characters and in which:

Fig. 1 is a vertical cross sectional view taken along the line I—I in Fig. 2 and showing one form of weight responsive circuit controller embodying my invention mounted in a slot in a rail web in accordance with my invention.

Fig. 2 is a side elevational view of the circuit controller shown in Fig. 1 with the cover of the circuit controller removed and certain parts shown in section to better illustrate the construction.

Fig. 3 is a sectional view similar to Fig. 1 showing one of the circuit controller contacts removed from the case and utilizing a modified form of support for the movable contacts.

Fig. 4 is a partial sectional view taken along the line IV—IV in Fig. 3 showing the pivot support for the arm which supports the movable contact of Fig. 3.

Fig. 5 is an enlarged view of the fixed and movable contacts showing one adjustment of each fixed contact which may be used to cause successive closing of the contacts due to successively greater rail head deflections.

In classification yards the need has arisen for a quick acting weight responsive circuit controller that will weigh a single wheel passing over a desired location without other wheels affecting the response. The need has arisen due to the use of automatic retarders in which it is necessary for initial retarder shoe pressure to be established according to the weight per wheel of a passing vehicle, hence a lightly loaded vehicle should receive a low initial retarder pressure while a heavy vehicle would receive a high initial retarder pressure.

Referring to the drawings, the reference character 1 designates a rail having an elongated slot 2 cut in the web 3 of the rail directly under the head of the rail. Inserted into the slot 2 are stops 3 held in position by bolts 4. These stops 3 are provided for the purpose of limiting the deflection of the rail head 6 into the slot 2 by a typical wheel 41 to an amount which will not exceed the fatigue limit of the rail head 6 and accordingly are spaced from the rail head by a gap 5 which is made sufficiently small to accomplish this result.

In one preferred arrangement, for example, the slot is provided with semicircular ends measuring 13.4" between the centers of the two end curves and 1.31" between upper and lower slot surfaces.

The circuit controller embodying my invention in the form here shown is adapted to be secured against the web of the rail and provided with a projecting portion capable of being inserted into the slot 2 in the rail web, and with a removable front cover 16 making readily available the operating contacts of the controller.

The case 7 comprises, in addition to the removable cover 16, a rear wall 8, a bottom 9, side walls 14, and a resilient top 12. Extending rearwardly from the top of the rear wall 8 is a horizontal portion 10 which rests on the bottom wall of the slot 2 in the rail 1. The portion 10 projects through the slot 2 and cooperates with a vertical portion 11 formed on the resilient top 12. The rear wall 8 is provided with laterally extending lugs 15 which are apertured to receive the same bolts 4 which serve to secure the limit stops 3 in place, thereby providing a convenient means for securing the controller in place on the rail.

Mounted on the upper surface of the top 12 in a position to contact the under side of the rail head 6 is a pressure button 13. With the pressure button 13 in

place the circuit controller projection is of a greater width than the slot 2, so that when the controller is installed the resilient top 12 is slightly depressed. This forces the pressure button 13 firmly against the under side of the rail head 6 and the portion 10 of the projection firmly against the bottom surface of the slot 2.

One of the side walls 14 is apertured and threaded as at 36 to receive a weather tight connector 37 for sealing and securing a cable 43 in place.

The case cover 16 which is of rectangular box like construction is provided with a gasket 17 adjacent its outer edge and securing lugs 40 on each side. The parts are so proportioned that when the cover is in place the gasket cooperates with the outer edges of the bottom 9, side walls 14 and top 12 to seal the case against the entrance of moisture, dirt or the like.

It should be particularly noted that the bolts 4 which are used to hold the stops 3 in place, not only secure the case 7 against the web 38, but also receive the cover lugs 40 for holding the cover tightly in place. This arrangement allows rapid and simple installation of the device.

Supported within the case 7 on supporting members 19 provided on the side walls 14 is an insulating member 18 the rear end of which rests firmly on top of the rearwardly projecting base portion 10. Secured to the insulating member 18 are a plurality of fixed contacts 20, held in place by bolts 21 and adjustable to different contacting positions by associated adjusting screws 22. Co-operating with the fixed contacts 20 are a plurality of movable contacts 23 supported on a single U-shaped spring support arm 24 attached to the insulating member 18 by bolts 25. The movable contact supporting portion of the U-shaped support is reinforced by a bridge member 26.

One of the U-shaped support holding bolts 25 receives the flexible lead wire 44 of the cable 43 for electrical connection to the movable contacts 23.

Located between the U-shaped support arm 24 and the resilient upper cover 12 is an insulated operating block 27. This block 27 transmits all rail head deflections to the support arm 24.

The modified form of contact structure shown in Fig. 3 differs from that shown in Fig. 1 in the construction of the supporting means for the movable contacts 23. As here shown, the movable contacts 23 are supported on a single, pivoted support arm 28 reinforced by a bridge member 29.

The pivoted support arm is biased upwardly by a biasing spring 35 to a position in which the movable contacts 23 are out of contact with the fixed contacts 20.

Electrical connection with the movable contacts is provided by a flexible lead 42 secured to a terminal post 33.

As shown in Fig. 4, the pivotal support for the arm 28 comprises a shaft 34 formed with trunnion 32 journaled in bearing member 31 mounted in upstanding lugs 30 provided on the insulating member 18.

Referring now to Fig. 5, I have here shown on an enlarged scale the positions of the fixed contacts 20 with respect to the movable contacts 23. The difference in the adjustment of the contacts is obtained by means of the adjusting screws 22. It is obvious from Fig. 5 that with the contacts adjusted as shown a small deflection of the cover member 12 will cause the right hand contacts to close, while a somewhat greater deflection will cause the center contacts to close and a still greater deflection will cause the left hand set of contacts to close.

With the controller constructed and arranged in the manner described it will be obvious that each car wheel will cause the rail head to deflect as it passes over the slot 2, thus narrowing the slot. This movement is transmitted through the button 13, the resilient upper cover 12, and the insulated operating block 27 to the

movable contacts support arm 24, causing this arm to move downwardly against the bias for the arm. Assuming that the wheel is on an empty car (approximately 20 tons) the wheel would exert a 5000 pound load on the rail. Accordingly, if it is desired to have one of the contacts operate in response to a lightweight car, this contact would have to be adjusted by means of the associated screw 22 so that the associated movable contact member would engage the associated fixed contact member in response to the resulting deflection of the rail head.

Similar operations would occur for medium weight cars (approximately 40 tons total; 10,000 pounds per wheel) and heavy cars (over 60 tons total; 15,000 pounds per wheel) by providing the successive adjustment of the remaining contacts. Obviously, with such an adjustment of the three contacts, two of the contacts would close each time a wheel of the medium weight car passed over the slot and all three contacts would become closed each time a wheel of a heavy car passed over the slot.

Should the load of a passing vehicle greatly exceed the heavy load condition, the stop members 3 would be engaged by the rail head 6, thus avoiding any rail head or circuit controller damage.

It is to be understood that it is within the scope of my invention to vary the rail slot position, shape and size to obtain the amount of rail head deflection desired.

It is to be further understood that it is within the scope of my invention to use other types of circuit control means with a slotted rail.

Although I have herein shown and described only two forms of circuit controller embodying my invention, it is to be understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. In a device of the class described, in combination, a beam member comprising an upper portion, a web and a lower portion, a slot formed in said web between said upper portion and said lower portion, said slot being in the form of an elongated opening located with its long dimension disposed longitudinally of the beam member and substantially adjacent said upper portion, and means located within said slot responsive to said upper portion displacement into said slot, said slot being provided with stop means for preventing said upper portion from deflecting beyond its fatigue limit, said slot located means comprising a circuit controller with a plurality of fixed and movable contacts, said circuit controller being totally enclosed within a weather tight case, said case being provided with a resilient slot receiving portion such that all movements of the upper portion into said slot will be transmitted through said case to said circuit controller contacts.

2. In a device of the class described, in combination, a rail comprising a head, a web and a base, a slot formed in said rail web between said head and said base, said slot being in the form of an elongated opening located with its long dimension disposed longitudinally of the rail and substantially adjacent said rail head, and means located within said slot responsive to said rail head displacement into said slot, said slot located means comprising a circuit controller with a plurality of fixed and movable contacts, said circuit controller being totally enclosed within a weather tight case, said case being provided with a resilient slot receiving portion such that all movements of the rail head into said slot will be transmitted through said case to said circuit controller contacts, said case containing an insulating member rigidly attached to said case with said fixed contacts supported on said insulating member, said movable contacts being movably supported on said insulating member with operating means extended into said resilient

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slot receiving portion of said case such that rail head deflection is translated into resilient case deflection and contact operation.

3. In a device of the class described, in combination, a rail comprising a head, a web and a base, a slot formed in said rail web between said head and said base, said slot being in the form of an elongated opening located with its long dimension disposed longitudinally of the rail and substantially adjacent said rail head, and means located within said slot responsive to said rail head displacement into said slot, said slot being provided with stop means for preventing said rail head from deflecting beyond its fatigue limit, said slot located means comprising a circuit controller with a plurality of fixed and movable contacts, said circuit controller being totally enclosed within a weather tight case, said case being provided with a resilient slot receiving portion such that all movements of the rail head into said slot are transmitted through said case to said circuit controller contacts, said case containing an insulating member rigidly attached to said case with said fixed contacts supported on said insulating member, said movable contacts being movably supported on said insulating member with operating means extended into said resilient slot receiving portion of said case such that rail head deflection is translated into resilient case deflection and contact operation.

4. In a device of the class described, in combination, a rail comprising a head, a web and a base, a slot formed in said rail web between said head and said base, said slot being in the form of an elongated opening located with its long dimension disposed longitudinally of the rail and substantially adjacent said rail head, and means located within said slot responsive to said rail head displacement into said slot, said slot being provided with stop means for preventing said rail head from deflecting beyond its fatigue limit, said slot located means comprising a circuit controller with a plurality of fixed and movable contacts, said circuit controller being totally enclosed within a weather tight case, said case being provided with a resilient slot receiving portion such that all movements of the rail head into said slot will be transmitted through said case to said circuit controller contacts, said case containing an insulating member rigidly attached to said case with said fixed contacts supported on said insulating member, said movable contacts being movably supported on said insulating member with operating means extended into said resilient slot receiving portion of said case such that rail head deflection is translated into resilient case deflection and contact operation, said movable contacts being supported adjacent one end of a U-shaped spring means, the other end of said U-shaped spring means being secured to said insulating member, said U-shaped spring means holding said movable and fixed contacts separated under non-deflection of said rail head.

5. In a device of the class described, in combination, a rail comprising a head, a web and a base, a slot formed in said rail web between said head and said base, said slot being in the form of an elongated opening located with its long dimension disposed longitudinally of the rail and substantially adjacent said rail head, and means located within said slot responsive to said rail head displacement into said slot, said slot being provided with stop means for preventing said rail head from deflecting beyond its fatigue limit, said slot located means comprising a circuit controller with a plurality of fixed and movable contacts, said circuit controller being totally enclosed within a weather tight case, said case being provided with a resilient slot receiving portion such that all movements of the rail head into said slot will be transmitted through said case to said circuit controller contacts, said case containing an insulating member rigidly attached to said case with said fixed contacts supported on said insulating member, said movable contacts being movably supported on said insulating member with operating

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means extended into said resilient slot receiving portion of said case such that rail head deflection is translated into resilient case deflection and contact operation, said movable contacts being supported by a pivoted arm, said pivoted arm being spring biased to an open-contact position under rail head non-deflection condition.

6. A circuit controller comprising a case, a plurality of fixed contacts and a plurality of movable contacts; said case comprising a rear wall with a projecting portion extended rearwardly thereof, a bottom, side walls, and a resilient top, said projecting portion being provided with a base and a vertical wall along the rearward edge of said projection base said vertical wall being integral with said resilient top, an insulating member mounted to rest firmly on said projection base, said insulating member having said fixed contacts mounted thereon, said movable contacts being mounted on a movable support arm that is secured to said insulating member, insulated operating means located between said resilient top and said movable support arm such that all deflections of said resilient top are translated to said movable contacts, said fixed contacts being provided with an adjustable means for adjusting the gaps between said fixed and movable contacts, cover means for said case, and securing means for holding said cover against the outward edges of said bottom, said side walls and said resilient top.

7. An enclosed weather-tight circuit controller comprising a case, a plurality of fixed contacts and a plurality of movable contacts, said case comprising a rear wall with a projecting portion extended rearwardly thereof, a bottom, side walls, and a resilient top, said projecting portion being provided with a base, and a vertical wall along the rearward edge of said projection base, said vertical wall being integral with said resilient top, an insulating member mounted to rest firmly on said projection base, said insulating member having said fixed contacts mounted thereon, said movable contacts being mounted on a support arm, said support arm being pivotally connected to said insulating member and biased to a contact open position, insulated operating means located between said support arm and said resilient top such that all deflections of said resilient top are transmitted to said movable contacts, said fixed contacts being provided with adjustable means for setting the clearance between said fixed and movable contacts, cover means for said case, and securing means for holding said cover in place against said bottom, side walls and resilient top, gasket means for sealing said cover against weather leakage.

8. A circuit controller for use in a rail having a slotted web, said circuit controller comprising a case provided with a projection arranged to be received within said slot, said case being provided with a removable cover, and fixed and movable contacts located within said case, said fixed contacts being mounted on an insulating means within said case, said movable contacts being supported on operating means responsive to deflection of said projection portion of said case such that narrowing of said slot will cause projection case deflection, operating means movement and contact operation.

9. A circuit controller for use in a member having a slotted web, said circuit controller comprising a case provided with a projection arranged to be received within said slot, said case being provided with a removable cover, fixed and movable contacts located within said case, said fixed contacts being mounted on an insulating means within said case, said movable contacts being supported on operating means responsive to deflection of a portion of said case over said projection such that narrowing of said slot will cause projection case deflection, and operating means movement and contact operation, said operating means comprising a U-shaped leaf spring and a cooperating insulating block secured to said projection portion of said case, said U-shaped leaf spring being secured to said insulating means adjacent one of the ends of said

spring with said movable contacts mounted on the other end.

10. In a rail having a head, a web and a base, an elongated slot formed in said web adjacent said head, means within said slot responsive to said rail head deflection into said slot, said means being a circuit controller comprising a case, a plurality of fixed contacts and a plurality of movable contacts, said case comprising a rear wall with a projecting portion extended rearwardly thereof, a bottom, side walls, and a resilient top, said projecting portion being provided with a base and a vertical wall, along the rearward edge of said projection base, said vertical wall being integral with said resilient top, an insulating member mounted to rest firmly on said projection base, said insulating member having said fixed contacts mounted thereon, said movable contacts being mounted on a movable support arm that is secured to said insulating member, insulated operating means located between said resilient top and said movable support arm such that all deflections of said resilient top are translated to said movable contacts, said fixed contacts being provided with an adjustable means for adjusting the gaps between said fixed and movable contacts, cover means for said case, and securing means for holding said cover against the outward edges of said bottom, said side walls and said resilient top.

11. In a device of the class described, in combination, a rail comprising a head, a web and a base, a slot formed in said rail web between the head and base and sufficiently close to said head to cause a greater head than base deflection upon a railhead carried load, and means located within said slot responsive to said greater head deflection and narrowing of said slot.

12. In a device of the class described, in combination, a beam comprising an upper portion, an intermediate portion and a lower portion, a slot formed in said intermediate portion between said upper and lower portions and sufficiently close to said upper portion to cause a downward deflection of said upper portion resulting in a nar-

rowing of said slot in response to a load applied to said upper portion above said slot, stop means located in said slot to limit said upper portion deflection to a value within its fatigue limit, and means located within said slot responsive to said upper portion deflection.

13. In a device of the class described, in combination, a beam having an upper portion, an intermediate portion and a lower portion, a slot formed in said intermediate portion between said upper and lower portions and sufficiently close to said upper portion to cause a downward deflection of said upper portion resulting in a narrowing of said slot in response to a load applied to said upper portion above the slot, a circuit controller having an operating means located within said slot and arranged to respond to said upper portion deflection, fixed contacts mounted on an insulating means within said circuit controller, and movable contacts supported in said circuit controller in a position to cooperate with said fixed contacts, said circuit controller operating means being arranged to actuate said movable contacts in response to said beam upper portion deflection such that a narrowing of said slot will cause movable contact operating means movement and contact operation.

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