March 10, 1931. R. F. ALLEN 1,795,591

THIRD-RAIL ELECTRIC RAILWAY SYSTEM

Filed June 29, 1929

Fig. 1.

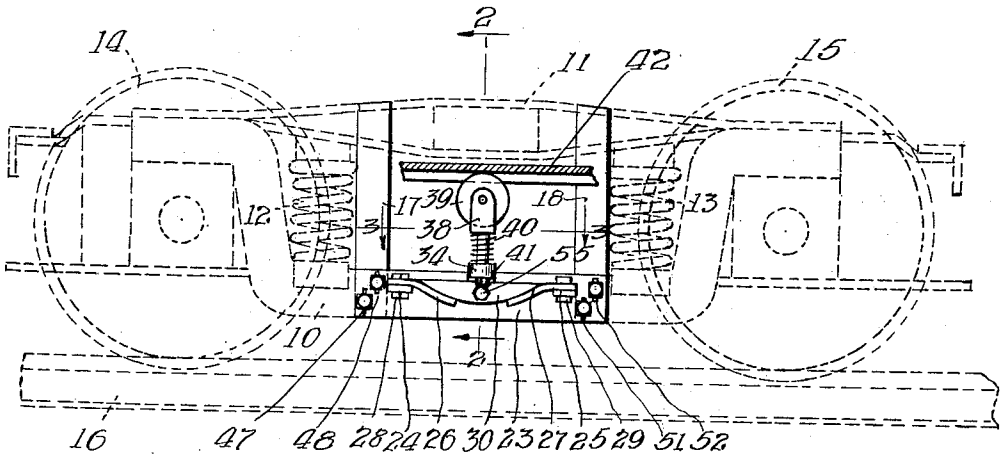


Fig. 2.

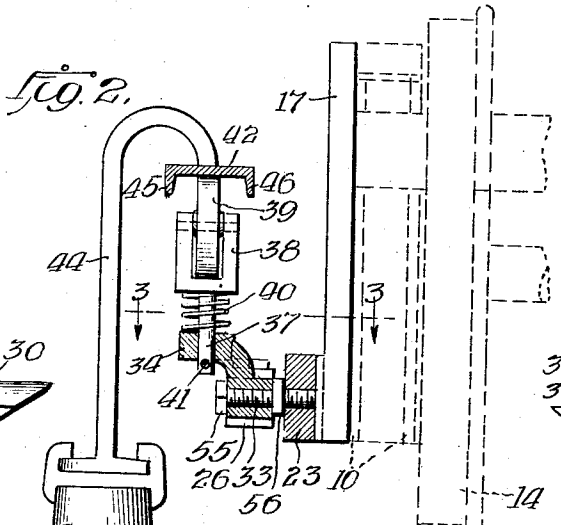


Fig. 4

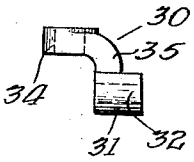


Fig. 6.

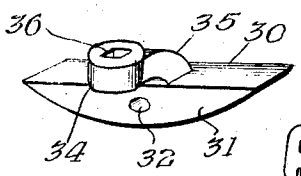


Fig. 5.

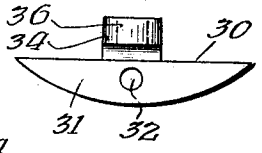
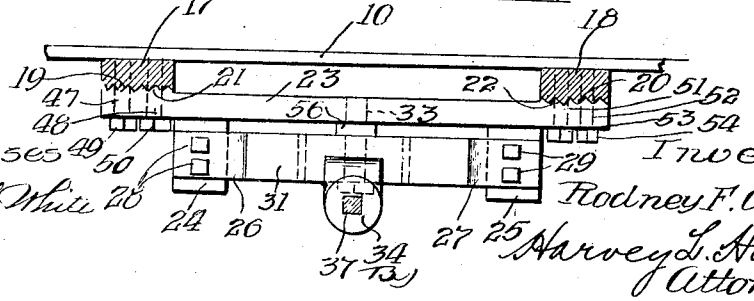


Fig. 3.



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UNITED STATES PATENT OFFICE

RODNEY F. ALLEN, OF CHICAGO, ILLINOIS

THIRD-RAIL ELECTRIC RAILWAY SYSTEM

Application filed June 29, 1929. Serial No. 374,848.

The invention relates to a third-rail electric railway system, and is particularly adapted for railway systems used for elevated railroads or interurban lines.

One of the primary objects of the invention is to employ a third-rail trolley which is secured to the truck body of the railway car and has the trolley wheel in contact with the under surface of the third-rail, which latter is preferably held in elevated position beside the track of the railway system, and which third-rail is so constructed and placed in such a position as to be free from rain, snow, ice etc., at all times, in order that a positive and uninterrupted electrical contact may always be made by the trolley wheel with the third-rail.

Another of the primary objects of the invention is to form the trolley and its associated parts in such a manner that a good contact between the trolley wheel and the third-rail, shall be established and maintained irrespective of any unusual obstructions, roughness or foreign substances on the rails, or unevenness or inequalities therein, or variations in the height thereof.

It will be readily apparent that it is important, to maintain a perfect electrical contact between the trolley wheel and the third-rail in order that the electric railway car and train may be under control and in perfect electrical operation at the will and control of the train operator.

It is another object of the invention to embody in the construction a rocking or oscillating element positioned with reference to, and operated by, certain springs whereby smoothness and evenness of operation of the third-rail trolley shall invariably and continuously be secured.

One of the further objects of the invention is to construct the third-rail trolley supports so that they may be readily adjusted to suit conditions of assembly and operation in order to secure satisfactory operation of the apparatus.

A further object of the invention is to construct the rocking element in such a manner that although the trolley may rock in either direction longitudinally of the truck and in the direction of travel of the electric railway car or train, no lateral or transverse motion of the trolley wheel will be possible.

The invention will be explained and more readily understood when read in conjunction with the accompanying drawings illustrating one embodiment of the invention, but it will be understood that various changes and modifications of which the invention is susceptible may be made without departing from the spirit of the appended claims forming a part hereof.

In the drawings:

Figure 1 is a side view of the third-rail trolley system of the invention shown in supported position on the truck of a railway car, shown in dotted lines, and also shows in section a portion of the third-rail.

Figure 2 is a vertical sectional view of the structure of the invention in position on the railway car truck, on the line 2—2 of Figure 1, and also shows the third-rail in section.

Figure 3 is a transverse view of the structure shown in Figures 1 and 2 on the lines 3—3 of Figures 1 and 2.

Figure 4 is a side elevational view of the rocker element of the structure.

Figure 5 is a front elevational view of the rocker element, and

Figure 6 is a perspective view of the rocker element.

The third-rail trolley mechanism of the invention is secured to the truck body of the electric railway car in any suitable manner. As shown in the drawings the structure of the invention is secured to the carriage 10 of the truck beneath the springs 11 and between the cushion springs 12 and 13. These various parts of the truck are assembled with the wheels 14 and 15 which ride upon the rail 16.

Vertical supporting bars 17 and 18 are secured to the truck body in any suitable manner. The lower ends of each of the bars are provided with corrugations 19 and 20, respectively, adapted to fit in corresponding corrugations 21 and 22, respectively, of the transverse supporting bar 23 which extends from the outer lower ends of the vertical supporting bars 17 and 18. The vertical supporting bars 17 and 18 and the transverse

supporting bar 23 form a structure in the nature of a stirrup for the support of the entire trolley and rocker mechanism.

The transverse supporting bar 23 is provided with a pair of outwardly extending ears or lugs 24 and 25. These lugs or ears 24 and 25 are integral with the transverse supporting bar 23 and must be made of sufficient strength and rigidity to support the outer ends of a pair of relatively heavy flat metallic compression springs 26 and 27, which are bolted to the ears 24 and 25, respectively, by means of the sets of bolts and nuts 28 and 29, respectively.

A rocker element, generally designated 30, is loosely mounted upon the flat springs 26 and 27. The rocker element is formed with the rocker body 31, having a round bolt hole 32 extending transversely through it for the insertion of a bolt 33, preferably a round bolt. Extending outwardly from the main rocker body 31, and integral therewith, is the trolley arm support 34. The trolley arm support 34 is connected to the main rocker portion 31 by the curved arm 35. The trolley arm portion 34 is provided with the square hole 36 extending vertically entirely therethrough for the reception and reciprocation of the rectangular depending stem 37 of the bifurcated trolley wheel arm 38. The trolley wheel 39 is suitably secured to rotate in the arms of the bifurcated arm 38. The trolley wheel 39 is mounted on a shaft fitted in the arms, and the shaft is suitably lubricated.

When in operative position a relatively strong compression coil spring 40 is placed about the depending stem portion 37. The upper end of the coil spring presses against the lower surface of the bifurcated portion of the trolley arm 38 and the lower end of the coil spring 40, is seated upon and presses against the upper face of the extended body portion or arm 34 of the rocker element. The lower end of the stem 37 of the trolley arm is provided with an aperture through which is extended a limiting pin 41, which serves to limit the movement of the trolley arm 38 with its stem 37 through the aperture 36.

The third-rail 42 may be supported in any approved manner, the particular design of support not forming a part of the invention. As shown the support 43, provided with the suitably insulated arm 44, is designed to hold the third-rail 42 in proper relative position to form electrical contact with the trolley wheel 39. The supporting rod 44 may be either round or square, as desired, and it may be secured to the third-rail in any approved manner, either as shown, with the curved portion to which the third-rail is welded, or otherwise secured, or it may have the arm extending directly in a straight line and secured to the third-rail. The third-rail preferably is a channel iron with downwardly extending flanges, such as 45 and 46, so that at all times the contacting surface of the third-rail with the trolley wheel 39, will be dry and clear and free from rain, sleet, ice, etc. The third-rail is preferaby made wide enough so that any drippings of rain or snow will fall away from the trolley arm, the coil spring and other associated parts.

The transverse supporting bar 23 is adjustably secured in the lower ends of the vertical supporting bars 17 and 18. Vertical slots 47 and 48 are placed in one end of the transverse supporting bar 23 and extend into and through the lower end of the vertical supporting bar 17. Bolts and nuts 49 and 50, respectively, are fitted into the slots 47 and 48 and permit vertical adjustment of the bar 23 carrying the integral extensions 24 and 25, and the flat springs 26 and 27, with relation to the vertical bar 17. A corresponding pair of slots 51 and 52 and bolts and nuts 53 and 54, similar in construction and operation to the slots 47 and 48 and the bolts and nuts 49 and 50, are placed in the other end of the transverse bar 23 and the lower end of the vertical bar 18.

The round bolt 33, which extends in the aperture 32 through the rocker body portion 31 and into the transverse supporting bar 23, is provided at its outer end with a nut 55. The nut 55 and the stem end of the trolley arm are placed in such relative positions that the stem 37 will be free to pass downwardly through the aperture 36 in the extension arm 34, past the nut 55, without interference.

A spacer nut 56 is placed on the round bolt 33 to maintain the rocker element 30 a suitable distance from the transverse supporting rod 23.

It will be understood from the foregoing description of the invention that in normal operation the trolley wheel arm will press against the under surface of the third-rail, because of the action of the compression spring 40 which always tends to raise the trolley arm and cause the trolley wheel to make the contact with the under surface of the third-rail.

It will also be understood that the resistance offered by the third-rail to the upward action of the spring 40 causes the depression of the rocker element 30 against the normal upward action of the flat flexible springs 26 and 27 causing the free ends of the latter to be depressed. These springs are sufficiently strong to resist complete bending or depression of the springs and the passage between their free ends of the rocker element 30.

It will be obvious that in the event that there is an irregularity, or unusual obstruction on the track rail, or a variation in the height of the track rail with respect to the third-rail, the trolley arm and wheel will rock longitudinally on the springs 26 and 27 through the medium of the rocker 30 secured by the bolt 33. Although the entire trolley

arm wheel and rocker are free to oscillate or tilt backwardly or forwardly longitudinally with the car, the trolley wheel is always kept in a straight forward position and free from lateral movement due to the rectangular form of the stem 37, fitted in the square or rectangular opening 36. It will also be obvious that not only may the adjustability of the transverse supporting bar 23, in an upward or downward direction be secured, but lateral movement or displacement of the transverse supporting bar 23 and the flat flexible springs 26 and 27 is prevented because of the connection of the ends of the transverse bar 23 with the ends of the vertical bars 17 and 18 by means of the corrugations 19, 21 and 20, 22, respectively.

It will be understood also that the third-rail will be located the usual distance outside of the nearest rail of the track, and the usual distance above the top of the rail, and that the rocker element, the trolley arm and wheel and the supporting members for the entire mechanism will be of suitable and proper dimensions to cause the entire third-rail system to be correctly and advantageously operated.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:

1. In a third-rail electric railway system the combination of a railway car truck, a stirrup secured to said truck, two flat springs secured at their outer ends to said stirrup, the free ends of said springs being separated from each other, and a rocker movable on the free end portions of said springs, said rocker being connected with a trolley having a trolley wheel adapted to contact with a third-rail.

2. In a third-rail electric railway system the combination of a railway car truck, an adjustable stirrup secured to said truck, two flat springs secured at their outer ends to said stirrup, the free ends of said springs being adjacent each other, and a rocker movable on said springs, said rocker being connected with a trolley having a trolley wheel adapted to contact with a third-rail.

3. In a third-rail electric railway system the combination of a railway car truck, vertical supports secured to said truck, a transverse support connected with said vertical supports and adjustable therewith, a pair of flat springs secured at their outer ends to said transverse support, and leaving a space between the inner free ends of said springs, and a rocker spanning said space and adapted to rock on said springs, a trolley arm associated with said rocker and adapted to move relatively thereto, said rocker permitting longitudinal rocking movement of said trolley but preventing lateral movement thereof with respect to the third-rail.

4. In a third-rail electric railway system the combination of a railway car truck, of vertical and horizontal supports, said supports being adjustable with each other in a vertical relation, said horizontal support having integral lugs or ears extending from its opposite end portions, a flat spring extending from each of said lugs or ears, a rocker adapted to rock on said springs, a trolley arm movably associated with said rocker, said trolley arm having a trolley wheel adapted to contact with a third-rail.

5. In a third-rail electric railway system the combination of a railway car truck, of vertical and horizontal supports, said supports being adjustable with each other in a vertical relation, said horizontal support having integral lugs or ears extending from its opposite end portions, two flat springs extending toward each other from each of said lugs or ears, but not meeting, a rocker adapted to rock on said springs, a trolley arm movably associated with said rocker, said trolley arm having a trolley wheel adapted to contact with a third-rail.

6. In a third-rail electric railway system the combination of a railway car truck, vertical and transverse supports secured thereto, flat flexible springs secured at opposite ends of said transverse support, the free ends of which springs extend toward each other but do not meet, a rocker element adapted to rock on said springs, the rocker element having a main rocking portion and an outwardly extending arm portion, a trolley arm vertically movable with relation to said outwardly extending rocker portion, a trolley wheel secured to said trolley arm and adapted to contact with a third-rail.

7. In a third-rail electric railway system the combination of a railway car trunk, vertical and transverse supports secured thereto, flat flexible springs secured at opposite ends of said transverse support, the free ends of which springs extend toward each other but do not meet, a rocker element adapted to rock on said springs, the rocker element having a main rocking portion and an outwardly extending arm portion, a trolley arm movable with relation to said outwardly extending arm portion, a trolley wheel secured to said trolley arm and adapted to contact with a third-rail, said main rocker portion being provided with a horizontal aperture for a supporting bolt and said extended arm portion being provided with an aperture for the reception and reciprocation of the trolley arm.

8. In a third-rail electric railway system the combination of a railway car truck, vertical and transverse adjustable supports secured thereto, flat metallic springs secured at opposite ends of said transverse support, the free ends of which springs extend toward each other but do not meet, a rocker element adapted to rock on the end portions of said springs, the rocker element having a main

rocking portion and an outwardly extending arm portion, a trolley arm vertically movable with relation to said outwardly extending arm portion, a trolley wheel secured to said trolley arm and adapted to contact with a third-rail, said main rocker portion being provided with a round horizontal aperture for a supporting bolt, and said extended arm portion being provided with a vertical square aperture for the reception and reciprocation of the trolley arm.

9. In a third-rail electric railway system the combination of a railway car truck, vertical supports on said car truck, a transverse support adjustably secured to said vertical supports, each of said vertical supports having corrugations at its outer lower end, said transverse support having corrugations at its opposite inner ends, said corrugations on said vertical and transverse supports being adapted to contact and register to avoid lateral displacement thereof, said transverse support being vertically adjustable with said vertical supports, said transverse support being provided with outwardly extending integral lugs at its opposite outer end portions, a flat metallic spring extending inwardly from each of said lugs, a rocker adapted to rock upon the free end portions of said flexible springs, said rocker having a main body portion with a round horizontal hole adapted to receive a supporting bolt, said rocker having an integral outwardly extending arm, said arm having a square vertical aperture, a trolley arm having an enlarged bifurcated head portion with a trolley wheel, said trolley arm having a dependent rectangular stem portion adapted to reciprocate in said square vertical opening in said outwardly extending rocker arm, and a coil compression spring surrounding said rectangular stem normally adapted to cause said trolley wheel to remain in contact with the third-rail.

10. In a third-rail electric railway system the combination of a railway car truck, an adjustable supporting stirrup, the adjustment of said stirrup being secured by a plurality of bolts and slots in the members of said stirrup, one of the members of the stirrup having outwardly extending lugs at its opposite end portions, flat metallic springs secured to said lugs at one end with their free ends extending toward each other but not meeting, a rocker element having a main body rocker portion with a hole therein for the reception of a rocking bolt, said rocker element also having an integral outwardly extending arm, which has a vertical rectangular hole therein, a trolley arm having a bifurcated main body portion, a trolley wheel adapted to rotate between the bifurcated arms, the trolley arm having a depending rectangular stem adapted to be reciprocated in said rectangular vertical hole in the outwardly extending rocker arm and a compression coil spring surrounding said depending rectangular stem interposed between the bifurcated portion of the trolley arm and the outwardly extending rocker arm portion.

11. In a rocker element for a third-rail electric railway trolley system the combination of a main body rocking portion with a transverse hole therein for a bolt or other supporting member, of an arm portion integral with said main rocking body portion and extending therefrom and having a hole therein at right angles to said first mentioned hole for the reception of the stem of a trolley wheel arm.

12. In a rocker element for a third-rail electric railway trolley system the combination of a main body rocking portion with a horizontal round hole therein, of an arm portion integral with said main rocking body portion and extending therefrom and having a vertical square hole therein, said horizontal round hole being adapted to contain a bolt for securing said rocker element and said vertical square hole being adapted to receive the rectangular stem of a trolley wheel arm.

In witness whereof, I hereunto subscribe my name this 25th day of June, A. D. 1929.

RODNEY F. ALLEN.