W. J. SPANGLER.

RAILWAY CAR.

APPLICATION FILED APR. 3, 1909.

981,131. Patented Jan. 10, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

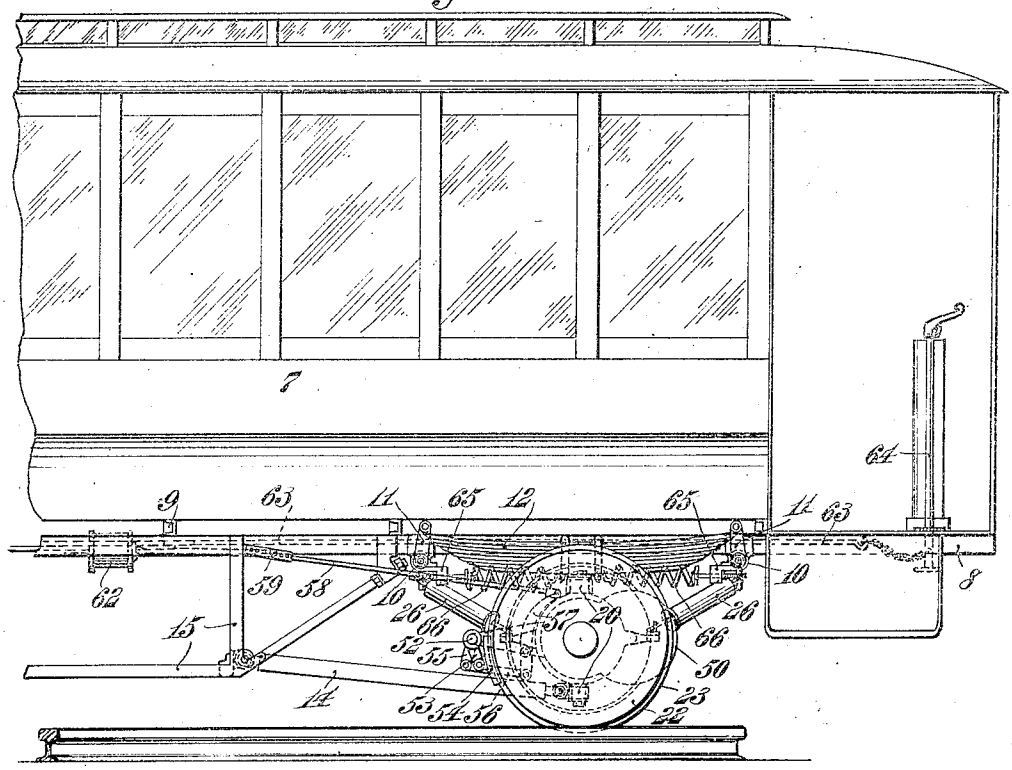


Fig. 2.

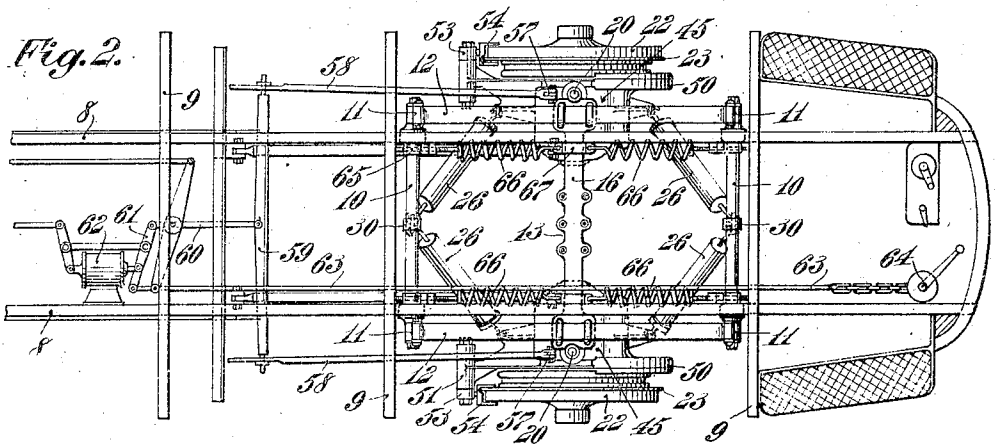
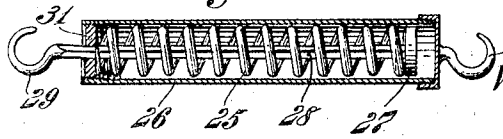


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

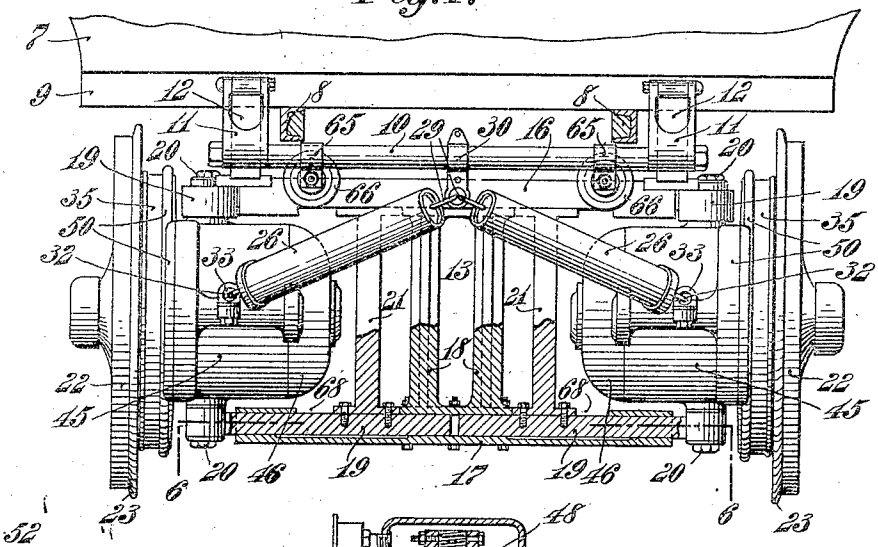


Fig. 5.

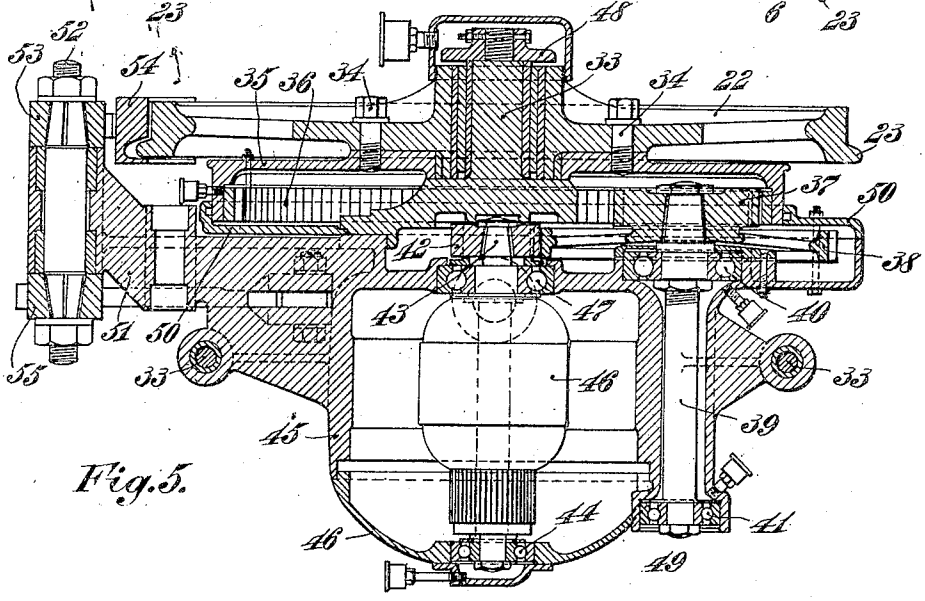
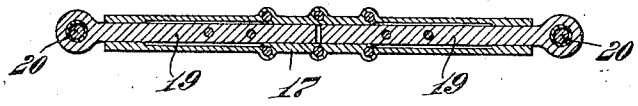


Fig. 6.



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RAILWAY-CAR.

981,131. Specification of Letters Patent. **Patented Jan. 10, 1911.**

Application filed April 3, 1909. Serial No. 487,660.

To all whom it may concern:

Be it known that I, WALTER J. SPANGLER, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Railway-Cars, of which the following is a specification.

My invention relates to railway cars, and in such connection it has particular relation to a railway car having individually driven wheels, and which is especially adaptable for use as a self contained power driven car, that is to say, the arrangement and construction are such as to render the car particularly adaptable for the reception of an electrical generating set for the purpose of supplying power to the individually driven wheels, the same being due to the fact that the peculiar construction and arrangement of the parts enables the car to be operated with a far less expenditure of power than heretofore, so that it is rendered quite practicable to mount a power generating set on each car.

The objects of my invention are, first, to provide a railway car wherein the design readily permits a lighter construction than is now employed, to the end that the foregoing results may be obtained; second, to provide in such a car means for separately driving each traction wheel thereof; and third, to so mount the wheels as to readily permit the same to adjust themselves to curves and irregularities of the track structure, to the end that a long wheel base may be obtained without employing the double trucks and their consequent disadvantages as at present in use.

My invention further contemplates certain improved details of construction in a railway car of the character described, whereby access may be readily had to the various parts thereof for the purpose of examination and repair.

The nature and characteristic features of my invention will be more readily understood from the following specification taken in connection with the drawings forming part hereof, in which,

Figure 1 is a side elevation of one end of a railway car embodying the main features of my present invention, the other end being a substantial duplicate thereof; Fig. 2 is a top or plan view thereof, with the body portion of the car removed for better illustrating the various parts of the structure; Fig. 3 is a longitudinal central section of a spring element employed in the car shown in Figs. 1 and 2 for the purpose of maintaining the wheels thereof in their normal positions; Fig. 4 is an end elevation, partly in section, of the wheel structure of the car shown in Figs. 1 and 2; Fig. 5 is a horizontal section of one of the wheels of the car and its associated individual driving mechanism; and Fig. 6 is a horizontal section, taken approximately on the line 6—6 of Fig. 4, of a portion of the extensible frame structure for supporting the wheels and their individual driving mechanism.

Referring to the drawings, 7 is a car body of any preferred type, which is preferably arranged on a framework composed of longitudinal members 8 running from end to end of the car and its platforms, and transverse beams 9 upon which the car body is supported. Secured to the longitudinal frame members 8, and extending across between the same, are transverse rods 10, which carry levers 11 at their outer ends, to which are secured the outer free ends of semi-elliptical springs 12. The semi-elliptical springs 12 are secured at their central portions to the upper side of a framework 13, which is suitably braced at its lower portion by a radius rod 14 extending from said framework 13 to a trussing 15 of the central portion of the car. The transverse spring rods 10 also carry brackets 65, to which are secured the ends of spiral springs 66, which are connected at their inner ends to brackets 67 at the top of the framework 13, as clearly shown in Figs. 1, 2 and 3 of the drawings, the springs 66 serving to prevent longitudinal swaying of the car with respect to the framework 13, as will be apparent would be the case were not some restraining means employed to prevent the same. Framework 13 is preferably made up of top and bottom tubular members 16 and 17, connected and braced at their center by vertical struts 18.

Slidably arranged in the tubular members 16 and 17 are bars 19, having journals at their outer ends in which the trunnions 20 of the wheel units are journaled. The bars 19 at the top and bottom are braced together near their inner ends by vertical struts 21, the fastening flanges whereof are adapted to abut against the ends of the cut out portions 68 of the tubular framework 13, to thereby

act as a stop or limit to the inward and outward movement of said bars 19 and their associated mechanism. The flanged traction wheels 22 and their associated driving mechanism constitute the wheel unit, which as before stated is journaled by means of trunnions 20 in the outer ends of the extensible bars 19 so that said wheel 22 and its associated mechanism may change its position both axially and longitudinally with respect to the framework. The purpose of thus swiveling and allowing the wheel 22 to change its position is that where the wheel base of the car is relatively long compared with the radius of the curves which said car may travel over, the wheels ordinarily would bind on the curves, producing a large amount of wear both on the track and the wheels. With the construction of the present invention, however, the wheels are allowed to adjust themselves readily to such conditions so that a longer wheel base may be employed, and wear and tear on the various parts will be reduced to a minimum. It is of course understood that in the present style of track work where grooved rails are employed in the curves thereof, that there must be necessarily a small range of variation between the radii of the curves on a defined railway system as well as the trucks of the rolling stock used thereon. With the construction of my present invention, however, the wheels will readily adjust themselves to various conditions. Considering now the action of the wheels of my present invention, it will be understood that as a car is going around a curve, the framework 13 will not occupy a radial position thereon, and consequently if the gage of the track be maintained uniform on the curves, the greater distance between the flanges of the wheels of each pair thereof on a given curve is readily compensated for by the bars 19 sliding in the tubular members 16 and 17 at the top and bottom of the framework 13 to thereby automatically adjust the wheels to the conditions to be met. The purpose of swiveling the wheels 22 and their associated driving mechanism is to permit the wheels to occupy a position tangent to the curves, it being understood that dependence is placed on the co-action of the flanges of the wheels 22 and the groove of the rails usually employed on curves, to cause the wheels to assume their proper position with respect to the track. To maintain the swiveled and extensible wheel units in their normal positions, there are provided a series of opposed pairs of springs 25, contained within casings 2, the detail construction of which is shown in Fig. 3 of the drawings.

The springs 25 bear at one end against a collar 27 secured to the inner end of a square rod 28, which is provided at its outer end with a hook 29 each adapted to engage a bracket 30, carried by the spring rods 10 hereinbefore described. The other end of spring 25 bears against an internally threaded plug 31, threaded on the interior of casing 26 for the purpose of adjusting the tension of the spring 25. The other end of casing 26 is provided with a hook 32 which engages a swivel eye bolt 33, secured to the exterior of the housing of the wheel unit, as clearly shown in Figs. 2 and 4, the arrangement being such as to normally maintain the wheels 32 in alinement with the track and in their innermost positions, that is to say with the trunnion bars 19, retracted within the tubular members 16 and 17 of the framework 13.

The detail construction of the wheel unit is shown in Fig. 5 of the drawings, and will now be described. The wheel 22 is journaled on a pin 33 extending from the main housing of the wheel unit proper, being held thereon by a threaded collar 48. Secured to the wheel 22 on its inner face, by means of bolts 34, is a casing 35 having an internal gear 36 attached therein, the arrangement being such that gear 36 and casing 35 are constrained to rotate with wheel 22. Meshing with gear 36 is a pinion formed integrally with a gear 38 and mounted on a shaft 39 which is suitably journaled in ball bearings 40 and 41 near the respective ends thereof in the stationary housing of the wheel unit proper. Gear 38 meshes with and is driven by a motor pinion 42, which is secured to the armature shaft 43, which is suitably journaled in ball bearings 44 and 47, carried by the housing of the wheel unit. The housing 45 of the wheel unit is so shaped and formed, in the usual manner, as to constitute part of the field magnets of the motor, of which 46 is the armature. Attention should now be called to the fact that the motor is readily accessible for the purpose of inspection and repair by removing a cap 46 on the inner end of the housing 45 thereof, and that the ball bearings 44 and 47 are so mounted in the housing that when the cap 46 is removed, the armature may be readily slipped out of place, this effect being accomplished by making the opening at the inner end of the armature shaft large enough, when the ball bearing 47 is removed therefrom, to permit the pinion 42 to pass therethrough. Also, that wheel 22 may be readily removed by first removing the collar 48 at the end of pin 33, the wheel taking with it, when removed, the casing 35 and its internal gear 36, after which access may be had to pinion 37 and gear 38 by removing the nut 49 at the inner end of shaft 39, pinion 37 and gear 38 and its associated shaft 39 and ball bearings may be readily removed. To prevent the entrance of dust and other extraneous matter, a casing 50 is employed to enshroud the inner side of

the internal gear 36 and its casing 35 as well as he pinion 37 and gear 38.

It will of course be understood that with the swiveled and extensible wheel units herein employed, some special means must be devised for applying the brakes to the wheels when desired. The preferred form of mechanism for accomplishing this is as follows. Extending from the housing 45 of the wheel unit is a bracket 51 in which is journaled a shaft 52 carrying a lever 53, at one end of which a brakeshoe 54 is secured, while at the other end of said shaft 52 there is carried a lever 55 connected by a rod 56 to a lever 57 pivoted intermediate its ends in the housing 45 and having its upper free end in proximity to the upper trunnion 20 of the wheel unit, so that as the wheel units are swiveled on their trunnions the brake mechanism will not be affected. To this upper free end of the lever 57, there is loosely secured a connecting rod 58, the other end of which is loosely pivoted to a compensating bar 59 loosely supported and pivotally connected at its center through a rod 60 to a lever operated by an air brake cylinder 62. The lever 61, adapted to be operated and controlled by the air brake cylinder 62, is also adapted to be operated and controlled by a rod 63 extending to the winding shaft 64 of any ordinary hand brake construction.

In the foregoing construction and arrangement, there is provided a means by which results can be obtained which have not been heretofore attainable. Heretofore in the practice of street railway construction and operation, it has been usual to employ cars having motors of much higher horse power than is required under ordinary conditions of operation, this being necessary for the reason that with the rigid form of axle and wheel construction in use, in going around a curve a great deal of power was necessary to overcome the slip resulting from the difference in distance to be traveled by the inner and outer wheels respectively. Power was not only wasted, but it acted to produce great wear and tear both on the tracks and the wheels, thus requiring constant renewals of these parts. On account of the necessity for increased power on the curves, an increase in weight in the entire structure occurred, which also resulted in requirement for still more power. For this reason it has not been heretofore practicable to construct a self contained car, that is one having its own power generating set, and while a power generating set is not shown in the drawings or described in this specification, still it must be borne in mind that the entire structure is designed and constructed with this end in view, it being readily understood that there is room and space under the body of the car at the central portion thereof for the reception and support of such a power generating set. The desired results are obtained by the construction herein shown and described, in the following manner. Each wheel having its own driving mechanism can run at the proper rate of speed which may be uniform with, or slightly different, as in rounding curves, from the speed of the other wheels of the car, and furthermore the wheels at all times assuming a position in alinement with the track due to the co-action of the flange of the wheel with the track structure, a much smaller amount of power is required in the aggregate than is required in the ordinary and usual means for driving railway cars as at present in use. Furthermore, with the construction and arrangement as herein shown and described there is provided a railway car peculiarly adapted for use in city streets where the space is limited and the curves are of necessarily short radius, a result which has heretofore been obtained either by the use of short cars or by the employment of swiveled double trucks, requiring eight wheels instead of four, and resulting in and requiring a much heavier construction throughout.

Having thus described the nature and characteristic features of my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a railway car, a plurality of independently driven traction wheels, said wheels being mounted in oppositely disposed pairs longitudinally extensible with respect to each other.

2. In a railway car, a plurality of independently driven traction wheels, said wheels being mounted in oppositely disposed pairs longitudinally extensible with respect to each other, and swiveled with respect to the car body.

3. In a railway car, a framework, a pair of wheel units slidably mounted therein and swiveled thereto, and means for maintaining the wheel units in their normal positions.

4. In a railway car, a framework, a pair of wheel units slidably mounted therein and swiveled thereto, said wheel units each comprising a motor and flanged traction wheel, and gearing interposed between the motor and the traction wheel for transmitting power therebetween.

5. In a railway car, a framework, a pair of wheel units slidably mounted therein and swiveled thereto, said wheel units each comprising a housing, a motor contained therein and a flanged traction wheel journaled thereto, and means for transmitting power from said motor to said traction wheel.

6. In a railway car, a framework, a pair of wheel units slidably mounted therein and swiveled thereto, said wheel units each comprising a housing, a motor contained therein, a flanged traction wheel journaled there-

to, a gear casing secured to the traction wheel, an internal gear contained within said casing, a pinion on the motor shaft, and a gear and pinion journaled in the housing for transmitting power from the motor pinion to the internal gear carried by the casing secured to the traction wheel.

7. In a railway car, a framework, a pair of wheel units slidably mounted therein and swiveled thereto, said wheel units each comprising a housing, a motor contained therein and a flanged traction wheel journaled thereto, means for transmitting power from said motor to said traction wheel, a removable cap secured to the housing, a motor bearing carried by said cap, a second motor bearing carried by the interior of the housing, a pinion on the motor shaft, the bearing carried by the interior of the housing being larger than said pinion, the entire construction and arrangement being such that when the housing cap is removed, the armature, its bearings and pinion may be slid from place within the housing.

8. In a railway car, a framework, a pair of wheel units mounted therein and swiveled thereto, said wheel units each comprising a housing, a motor contained therein, and a flanged traction wheel journaled thereto, a removable collar for maintaining said traction wheel in place on its journal, a gear casing secured to the traction wheel, an internal gear carried by said casing, said traction wheel, gear and internal casing constituting a unitary structure adapted to be simultaneously removable from the wheel unit.

9. In a railway car, a framework, a pair of wheel units slidably mounted therein and swiveled thereto, and means for maintaining the wheel units in their normal positions, said means comprising a resilient connection between said wheel units and the stationary portion of the car structure.

10. In a railway car, a framework, a pair of wheel units slidably mounted therein and swiveled thereto, a brake mechanism carried by said wheel units, and means for controlling said brake mechanism carried by the stationary framework of the car structure.

11. In a railway car, a framework, a pair of wheel units slidably mounted therein and swiveled thereto, a brake mechanism carried by said wheel units, and means for controlling said brake mechanism carried by the stationary framework of the car structure, said brake mechanism comprising a brakeshoe, a lever pivoted to the wheel unit for controlling said brakeshoe, and a connecting rod extending from said lever to the brake controlling mechanism carried by the car framework, said connecting rod and lever being loosely pivoted to each other at a point in proximity to the axis of the swivel of the wheel unit.

12. In a railway car, a car body, a framework upon which said car body is resiliently supported, said framework comprising tubular members and bars slidably mounted in said tubular members having journals in their outer ends, in combination with wheel units trunnioned in the journals at the outer ends of said sliding bars.

13. In a railway car, a car body, a framework upon which said car body is resiliently supported, said framework comprising tubular members and bars slidably mounted in said tubular members having journals in their outer ends, in combination with wheel units trunnioned in the journals at the outer ends of said sliding bars, and means for normally maintaining said bars in their retracted positions and said wheel units in their normal axial positions.

14. In a railway car, a framework, a pair of wheel units slidably mounted therein and swiveled thereto, and means for resiliently supporting a car body on said framework, said means comprising semi-elliptic springs secured to said framework at their central portions, levers secured to said springs at their outer free ends, said levers being journaled to the framework of the car body, and restraining means for preventing longitudinal swaying of the car body with respect to the wheel unit framework.

15. In a railway car, a framework, a pair of wheel units slidably mounted therein and swiveled thereto, and means for resiliently supporting a car body on said framework, said means comprising semi-elliptic springs secured to said framework at their central portions, levers secured to said springs at their outer free ends, said levers being journaled to the framework of the car body, and restraining means for preventing longitudinal swaying of the car body with respect to the wheel unit framework, said restraining means comprising spiral springs connected at their respective ends to the car body framework and the wheel unit framework.

In testimony whereof, I have hereunto signed my name in the presence of two witnesses.

WALTER J. SPANGLER.

Witnesses:
PERCIVAL K. REED,
MAE HOFMANN.