F. F. STOWE.

ELECTRIC CAR TRUCK.

APPLICATION FILED MAR. 10, 1905. RENEWED MAR. 16, 1908.

902,017. Patented Oct. 27, 1908.

4 SHEETS—SHEET 1.

Fig. 1

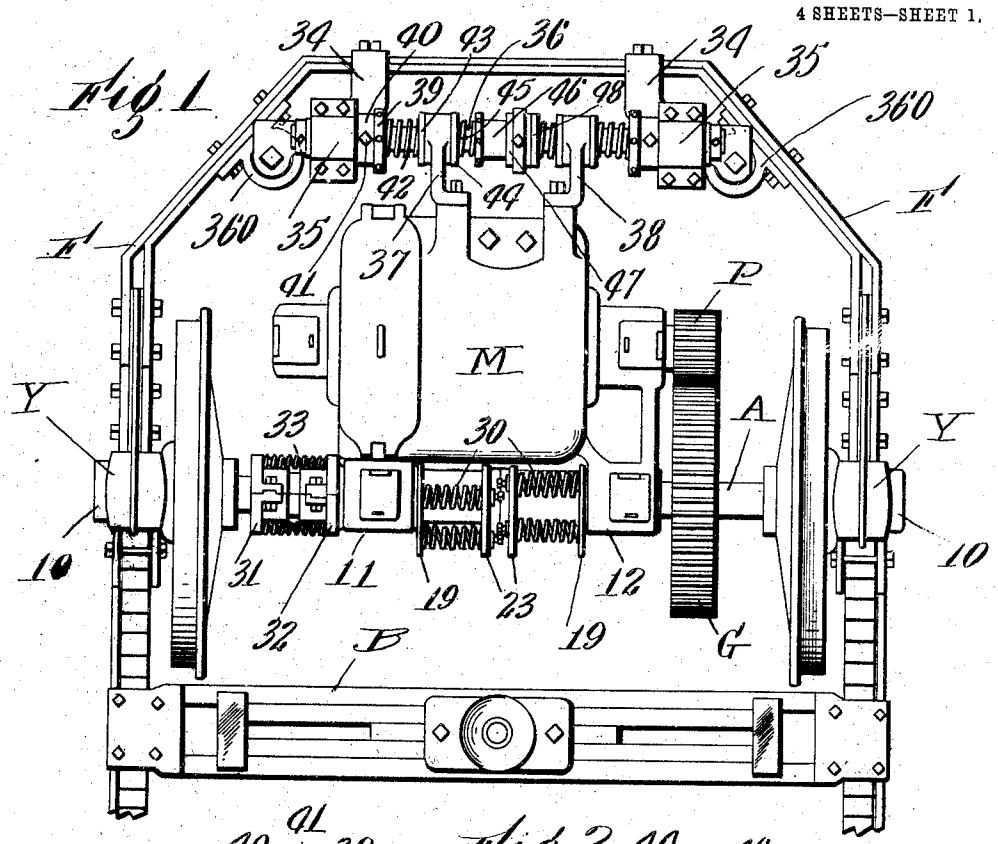


Fig. 2.

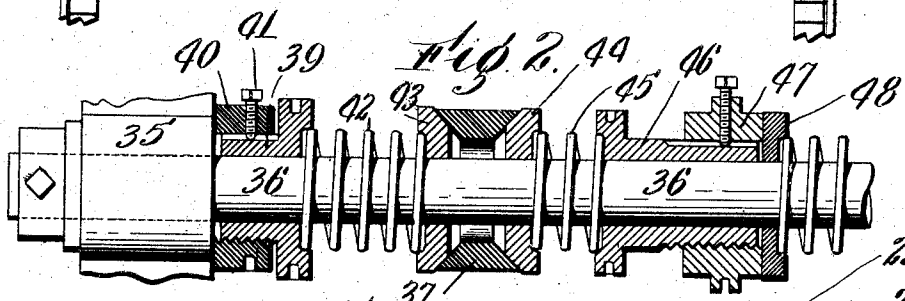
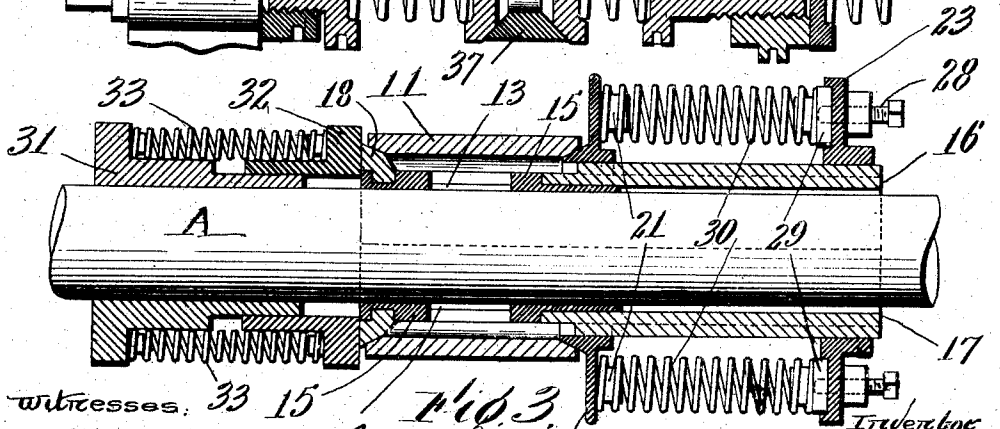


Fig. 3.



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By his Attys.
Sautlgate & Sautlgate

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4 SHEETS—SHEET 2.

Fig. 4.

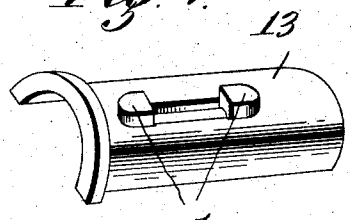
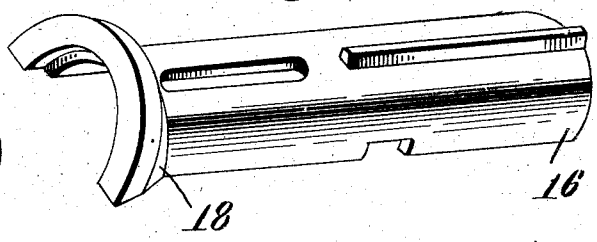


Fig. 5.



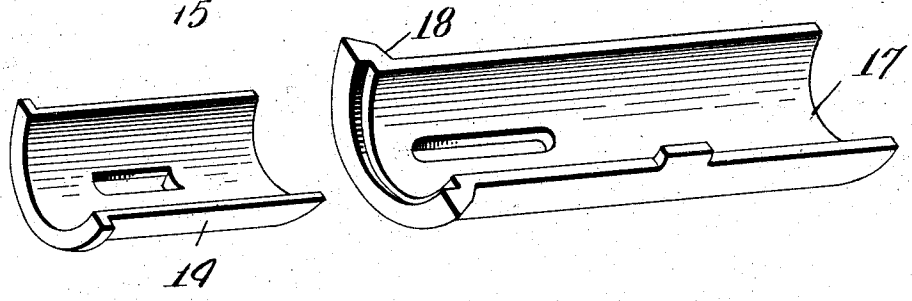


Fig. 6.

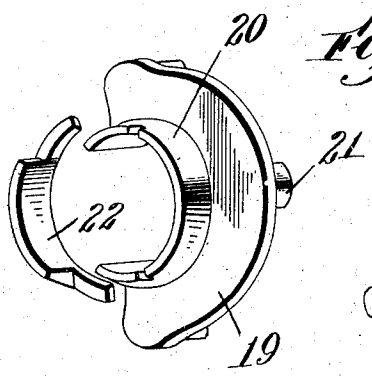


Fig. 7.

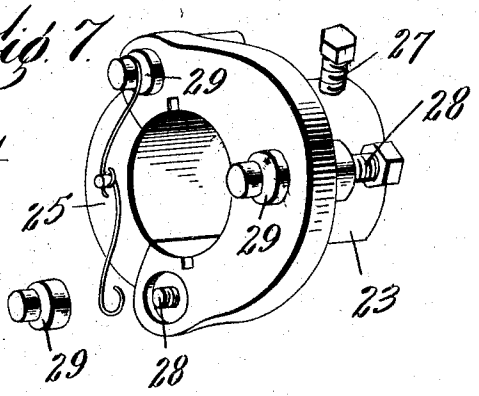


Fig. 8.

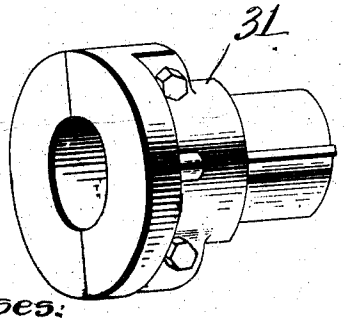
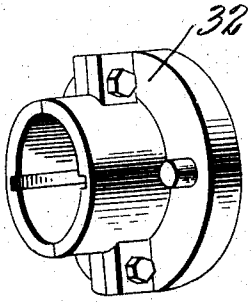


Fig. 9.



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4 SHEETS—SHEET 3.

Fig. 10.

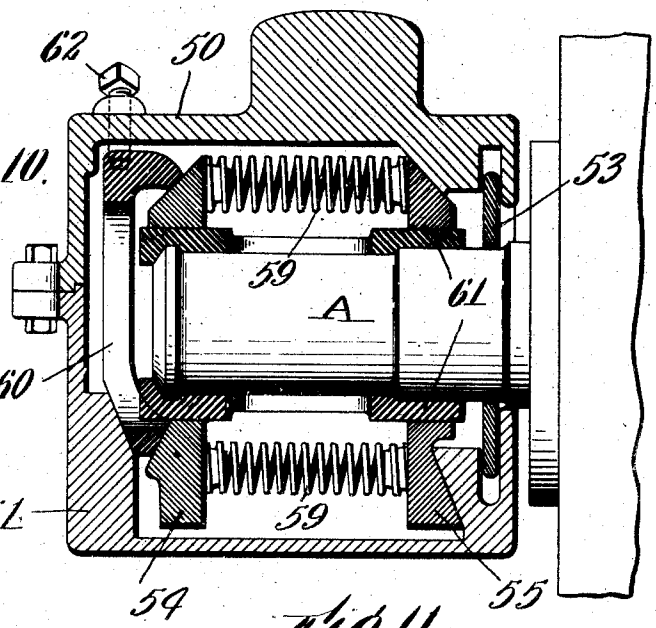


Fig. 11.

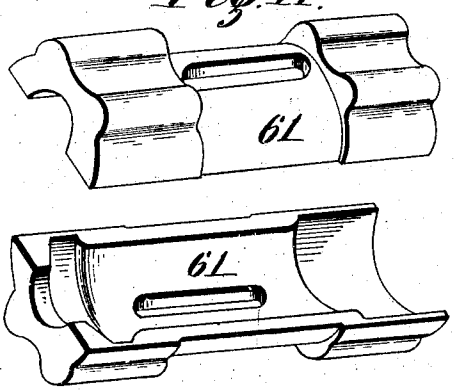


Fig. 12.

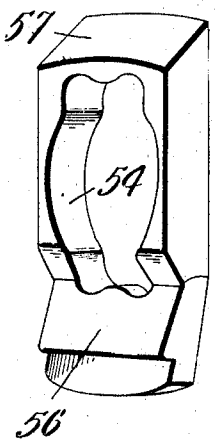


Fig. 13.

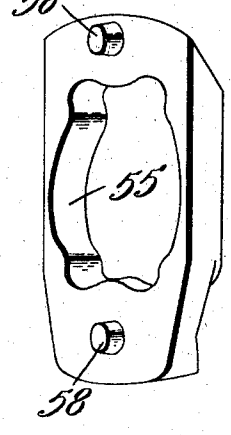


Fig. 14.

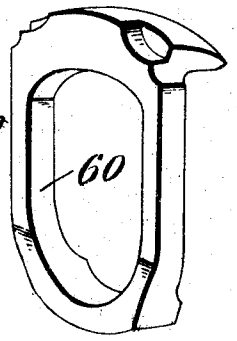
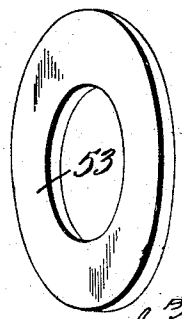


Fig. 15.



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4 SHEETS—SHEET 4.

Fig. 16.

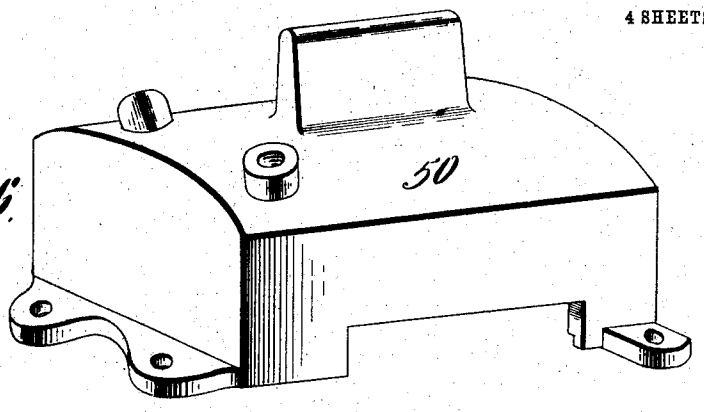


Fig. 17.

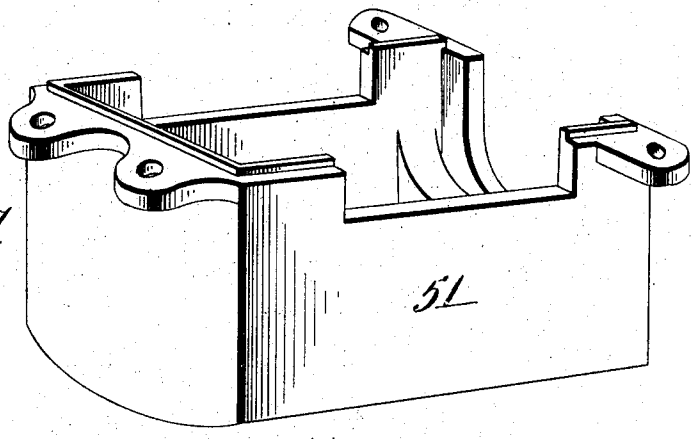
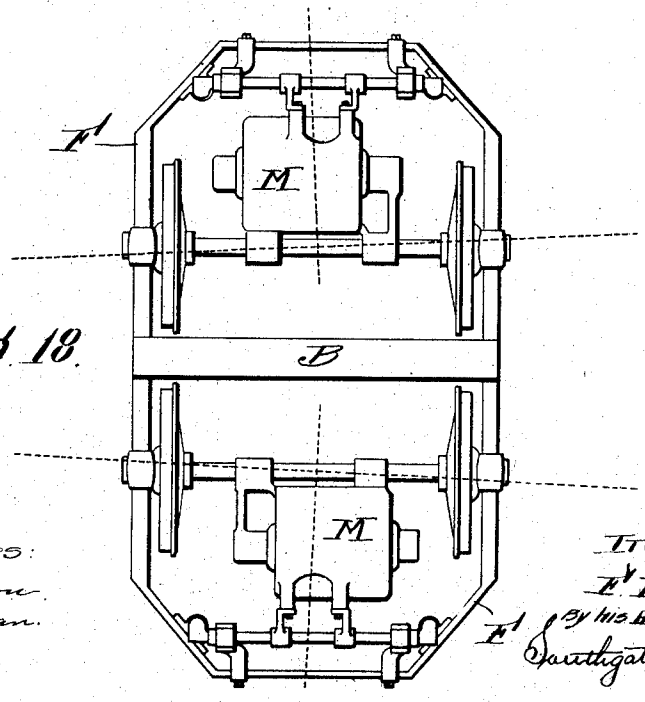


Fig. 18.



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UNITED STATES PATENT OFFICE.

FERNANDO F. STOWE, OF WORCESTER, MASSACHUSETTS.

ELECTRIC-CAR TRUCK.

No. 902,017. Specification of Letters Patent. Patented Oct. 27, 1908.

Application filed March 10, 1905, Serial No. 249,380. Renewed March 16, 1908. Serial No. 421,426.

To all whom it may concern:

Be it known that I, FERNANDO F. STOWE, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Electric-Car Truck, of which the following is a specification.

This invention relates to the running gear of electric cars.

The especial objects of this invention are to provide a yielding or elastic support for an electric motor in a truck frame; and to provide a construction in which an axle, although used for supporting the motor, will be permitted to have a movement with respect to the car truck.

To these ends, this invention consists of the truck for an electric car, and of the combinations of parts therein as hereinafter described and more particularly pointed out in the claims at the end of this specification.

In the accompanying four sheets of drawings, Figure 1 is a plan view of sufficient parts of a car-truck to illustrate the application of this invention thereto. Fig. 2 is a fragmentary sectional view of one of the cone bearings which connect the motor casing to the truck-frame. Fig. 3 is a fragmentary sectional view of one of the spring-pressed cone bearings which support one end of the motor casing on a wheel-axle. Figs. 4 to 9 inclusive are detail views of parts of the cone bearing between the motor and wheel-axle; Fig. 4 being a perspective view of the soft metal bushing in which the wheel-axle is journaled; Fig. 5 being a perspective view of the two-part sleeve which carries one of the bearing cones; Fig. 6 being a perspective view of the parts which carry the other bearing cone; Fig. 7 being a perspective view of the two-part sleeve which receives the thrust of the springs; Fig. 8 being a perspective view of a two-part collar, and Fig. 9 being a perspective view of the two-part spring pressed piece which holds the motor casing from swaying sidewise. Fig. 10 is a sectional view of the box which permits a play of the axle with respect to the truck-frame. Fig. 11 is a perspective view of the soft metal bearings for the axle. Fig. 12 is a perspective view of one of the spring-pressed bearing pieces. Fig. 13 is a perspective view of the other spring-pressed bearing piece. Fig. 14 is a perspective view of the clamping wedge. Fig. 15 is a perspective view of the dust excluding ring. Fig. 16 is a perspective view of the upper part of the box. Fig. 17 is a perspective view of the lower part of the box, and Fig. 18 is a diagrammatic view of sufficient parts of a car truck equipped according to this invention to show the relative play of the wheel axles and motor casing when the car truck is in use.

One of the most serious problems in constructing and operating electric cars is to provide for mounting the electric motors so that they will be maintained in geared relation to the axles, and so that they will be permitted to have a certain amount of play or swinging motion to adapt themselves to the twisting and swaying of the car-trucks which always occurs in a running gear of a car. The difficulty of mounting the electric motors in cars increases in proportion to the weight of the cars and the power and weight of the motors.

One of the heaviest expense items in the operation of electric railways is the cost of repairs and renewals of motors, and much of the damage to the electric motors is due to the rigidity and unsatisfactory way the motors are now mounted in the trucks. In ordinary electric car practice the motor casing is provided with eyes which are hinged or hung upon an axle at one end of the motor casing; while the other end of the motor casing is fastened to a cross-beam of the truck frame. I have found in practice that by using spring-pressed cone bearings for supporting the opposite ends of a motor-casing from a wheel-axle, and from a cross-bar or shaft fixed in the truck-frame, I have been enabled to provide an elastic support for a motor which will permit a limited play in any direction; while by providing means for adjusting the pressure of the springs of the cone-bearings, the motor casing can be as stiffly and flexibly cushioned as desired.

In using rolling-stock, not only in electric car service, but also on ordinary railways, the greatest wear of parts and the greatest amount of power is required in running around curves in the track, and this is due to mounting the wheel axles so that they will not permit the wheels to conform to the curves of the road-bed.

In practicing my invention, I have found that by mounting the motor casing of an electric car upon spring-pressed cone-bearings, I am enabled to permit a wheel-axle to have a limited amount of play to permit the wheels to conform to curves of the track

while still being able to keep the motor in gear with the axle which it drives. To accomplish this purpose I have invented a box in which the wheel-axle is maintained in proper position by means of spring-pressed cone-bearings. It is to be understood, however, that the adjustable box is regarded as a separate subject matter of invention which can be used in connection with different forms of rolling-stock, and in this application for patent the bearing-box itself is not claimed specifically, except in combination with parts for supporting the motor.

Referring now to the accompanying drawings for a detail description of a car-truck equipped according to this invention, as shown in Fig. 1, the truck consists of the truck-frame F which may be provided near its center with the ordinary bolster or cross-beam B.

The truck-frame F is provided with yokes Y for receiving the boxes 10 in which the wheel-axle A is journaled. These parts may be of the ordinary or usual construction, except that the boxes 10 are preferably provided with cone-bearings for permitting a limited play of the wheel-axle as hereinafter described.

The motor casing M may be of the ordinary construction, and contains an electric motor having an extending shaft provided with a pinion P which meshes with and drives a gear G upon the axle A. The parts thus far referred to, except as otherwise noted, may be of the ordinary or approved construction.

The motor casing M as herein illustrated is provided at one end with eyes or bearings 11 and 12 which loosely surround the axle A. At its other end the motor casing M is provided with eyes 37 and 38 which loosely surround a fixed rod or shaft 36 of the truck-frame.

Referring to Fig. 3 for an understanding of one of the spring-pressed cone-bearings by means of which the motor casing is hinged on the wheel-axle, the axle A is journaled in soft metal bushings 13 and 14, shown most clearly in Fig. 4. The soft metal bushings 13 and 14 are provided with lugs 15 which fit into holes in the sleeves 16 and 17 shown in Fig. 5. The sleeves 16 and 17 are provided at one end with half cones 18 which form one cone of a double cone-bearing. As shown in Fig. 6 the other cone 20 is carried by a piece 19 having spring-receiving lugs 21 at its opposite side. The piece 19 is opened at one side and this opening is closed and the cone completed by a piece 22. One particular object accomplished by this construction is that the parts may be applied to axles of an electric car which is already in use. To do this the brasses 13 and 14 and the sleeve sections 16 and 17 are first put in place. The opening at the side of the piece 19 permits the piece to be slipped sidewise onto the axle and then moved longitudinally onto the sleeve sections 16 and 17, so that inasmuch as the piece 19 is held from turning on the pieces 16 and 17 by reason of being splined or keyed thereon, the piece 19 will hold the brass sections and the sleeves 16 and 17 together. In the same way the construction shown in Fig. 7 is slipped over the axle and moved into place. That is to say, the pressure ring-piece 23 is slipped onto the end of the sleeve sections 16 and 17 and is held from turning thereon by splines or keys. The opened side of the pressure ring 23 is closed by a piece 25, and the pressure ring 23 may be fastened in place by a pointed screw 27, or by other means for preventing the same from moving longitudinally. Threaded into the flanges of the piece 23 are three adjusting screws 28, each of which is provided with a cap 29. Held in place between the caps 29 and the piece 21 are springs 30.

By tightening the screws 28 the tension of the springs 30 may be increased so that the eye 11 which supports the motor on the wheel-axle may be clamped between oppositely facing cones with any desired spring pressure.

To provide a buffer opposing the tendency of the motor casing to swing sidewise, a two-part sleeve 31 may be clamped on the axle, and fitting telescopically onto the two-part sleeve 31 is a two-part sleeve 32. Between the sleeves 31 and 32 is a coiled spring 33 for holding the motor casing from moving sidewise. The other spring-pressed cone bearing of the motor upon the axle A is substantially of the same construction as that already described, and need not again be described in detail.

As shown in Fig. 1, 34 designates the brackets which are clamped to the truck-frame F, and which carry the bearings 38 in which is clamped the shaft or cross-bar for supporting the other end of the motor casing M. Carried by each of the brackets 34 is a pin or finger which extends down into a bracket 360 also fastened to the truck-frame F.

One of the spring-pressed cone bearings for supporting the motor casing upon the cross-rod or shaft 36 is illustrated most clearly in Fig. 2. As shown in this figure, 39 designates a collar, and threaded onto the collar 39 is a ring 40. The collar 39 and ring 40 are provided with wrench sockets, and these parts may be held in their adjusted position by a screw 41 engaging a spot on the collar 39 from which the thread is filed or cut away. The ring 40 bears against the bearing 34, and engaged by the collar 39 is a spiral spring 42 which holds a cone 43 up into engagement with one side of the eye or bearing piece 37. Engaging the other side of the eye 37 is a cone 44 which is pressed into place by a spiral spring 45 which abuts against a

collar 46 adjustably threaded into a ring 47, the collar 46 and ring 47 being held in their relatively adjusted position by a set screw. Engaging the other side of the ring 47 is a ring 48 against which abuts one of the coiled springs of the other spring-pressed cone bearing for the other supporting eye 38 which incloses the shaft 36. The construction of this other spring-pressed cone support on the shaft 36 is the same as that already described, and need not be herein referred to at length. In the complete support of a motor casing as thus constructed it will be seen that the motor casing is hung upon four sets of spring-pressed cone bearings; two sets of spring-pressed cone bearings being used to hang the motor upon the axle, and the other two sets of spring-pressed cone bearings being used to hang the motor upon the cross-bar or shaft of the motor frame.

In practice by using a number of sets of bearing cones, a plurality of sets of such bearing cones supporting the motor casing upon the axle, and a plurality of sets of bearing cones supporting the motor casing on the cross-rod, I am enabled to provide an exceedingly reliable construction which does not depend exclusively upon any one set of supports for the motor casing. In some cases, however, the intermediate sets of bearing cones can be omitted both from the cross rod and from the axle. That is to say, the motor casing may be supported on the cross rod by the two outside inwardly-pressed bearing cones alone, and in a similar way the motor casing may be supported from the axle by two inwardly-pressed bearing cones.

In the use of a motor as thus constructed it will be seen that the motor casing is held in place by spring-pressure, and that said casing can have a limited amount of play in any direction, the relative stiffness with which the motor casing is held in place can be readily adjusted by regulating the tension of the springs. In practice I have found that a car-motor as thus hung can be maintained in proper relation to the axle, and at the same time, the axle may be given a limited amount of play to permit the wheels to conform to curves of the track. The form of adjustable box which I employ for this purpose is most clearly illustrated in the third and fourth sheet of drawing. As shown in Figs. 10, 16 and 17, the box comprises an upper section 50 which is bolted to a lower section 51. Extending up from the upper box section 50 is a key for holding the box in place in a yoke Y of the truck frame in the ordinary manner. Mounted in grooves in the box sections 50 and 51 is a ring 53 for excluding dust. At its end the wheel-axle A is journaled in the soft metal bearing pieces or brasses 61, and the brasses 61 are held in place by end-pieces 54 and 55 which are normally separated by springs 59. Each of the end pieces 54 and 55 is provided with an upwardly tapering wedge 56, and with a rounding cone surface 57. The end pieces 54 and 55 are also provided with inwardly-extending fingers 58 which receive the ends of the springs 59. The wedge section and cone of the end plate 55 engage corresponding bearings in the box, while the wedge section 56 and cone section 57 of the end plate 54 are engaged by a wedge piece 60 which is forced down by set-screws 62. By means of this construction it will be seen that the pressure of the springs between the side plates 54 and 55 causes said side plates to act as spring-pressed cone bearings, tending to hold the wheel axle rigidly in place in its box, and that by the adjustment of the wedge piece 60 the stiffness of the wheel-axle in its box may be regulated or adjusted as desired.

The operation of an electric car truck as a whole when equipped according to this invention is most clearly illustrated in Fig. 18. As shown to an exaggerated extent by dotted lines in this figure, the wheel axles will be permitted to have a sufficient amount of play to conform exactly to any of the ordinary railway curves; while, at the same time, the motor casing will be sufficiently elastically supported to conform to the various positions of the wheel axles without breaking the geared connection between the motor and said axles; and, inasmuch as the play of all parts is provided for by spring-pressed cone-bearings, the relative stiffness or rigidity of the parts can be regulated by adjusting the tension of the springs as desired. This will distribute the play or relative motion of the parts to any part of the structure desired. For example, if heavy spring-pressures are used for the cone bearings which hang the motor casing upon a shaft 36, this end of the motor-casing would be permitted to have less freedom of motion than other parts, so that all play or give of parts can be made to take place about one of the shafts 36, or by otherwise adjusting the spring pressure, the play of axle in its box; the play of motor casing upon wheel axle; and of motor casing upon cross-shaft of the frame, can all be distributed to produce the easiest riding and most efficient effects according to the particular style of car-truck, or weight of motor-casing to which this invention is applied.

I am aware that many changes may be made in applying this invention to electric car-trucks. I do not wish, therefore, to be limited to the constructions I have herein shown and described, but

What I do claim and desire to secure by Letters Patent of the United States is:—

1. In a car truck, the combination of a truck-frame, an electric motor, and spring-pressed cone bearings holding the motor in place in the truck-frame.

2. In a car-truck, the combination of a

truck-frame, an axle, an electric motor, a set of spring-pressed cone-bearings supporting one point of the motor from the axle, and a second set of spring-pressed cone-bearings supporting a different point of the motor from the truck-frame.

3. In a car truck, the combination of a truck-frame, an electric motor, spring-pressed cone bearings holding the motor in place in the truck-frame, and means for adjusting the springs to vary the rigidity with which the motor is supported.

4. In a car truck, the combination of a truck-frame, an axle, a motor, a set of spring-pressed cone bearings supporting one point of the motor from the axle, a second set of spring-pressed cone bearings supporting another point of the motor from the truck-frame, and means for adjusting the springs of the cone-bearings to regulate the comparative rigidity with which the motor is supported.

5. In a car truck, the combination of a truck-frame, an axle, and a set of spring-pressed cone-bearings supporting the motor from the axle, said cone-bearings being adapted to be applied to an intermediate part of the axle so that said parts may be put on to an axle already in use.

6. In a car truck, the combination of a truck-frame, an axle, an electric motor, and four sets of spring-pressed cone bearings supporting the motor, two thereof supporting the motor from the axle, and the remaining two supporting the motor from the truck-frame.

7. In a car truck, the combination of a truck-frame, an axle, two sets of spring-pressed cone bearings supporting the motor from the axle, two sets of spring-pressed cone-bearings connecting the motor with the truck-frame, and means for adjusting the springs of the cone bearings to regulate the rigidity with which the motor is supported.

8. In a car truck, the combination of a truck-frame, an axle, a motor casing having an eye inclosing the axle, and spring-pressed cone bearings for said eye comprising a two-part soft metal bearing box, a two-part sleeve having a cone engaging one side of the eye, a cone for engaging the other side of the eye carried by a partial ring having an opening permitting the same to be placed on the axle and slipped onto the ends of the two-part sleeve, and springs forcing the cones into engagement with opposite sides of the eye.

9. In a car truck, the combination of a truck-frame, an axle, a motor casing having an eye inclosing the axle, and spring-pressed cone bearings for the eye comprising a two-part box, a two-part sleeve having a cone engaging one side of the eye, a partial ring fitting onto the ends of the two part sleeve and carrying the cone engaging the other side of the eye, a pressure piece fitted onto the two-part sleeve, and adjusting screws and springs for applying pressure to force the cones into engagement with the opposite sides of the eye.

10. In a car truck, the combination of a truck-frame, an axle, a motor casing, a set of spring-pressed cone bearings supporting the motor casing from the axle, a second set of spring-pressed cone bearings supporting the motor casing from the truck-frame, and a spring-pressed buffer for preventing the motor frame from moving sidewise.

11. In a car truck, the combination of the truck-frame, an axle, spring-pressed cone bearings flexibly mounting the axle with respect to the truck-frame, a motor-casing, a set of spring-pressed cone bearings for mounting the motor casing upon the axle, and a set of spring-pressed cone bearings for connecting the motor casing to the truck-frame.

12. In a car truck, the combination of a truck-frame, an axle, spring-pressed cone bearings for flexibly mounting the axle with respect to the truck-frame, a motor-casing, a set of spring-pressed cone bearings mounting the motor casing on the axle, a set of spring-pressed cone-bearings connecting the motor casing with the truck-frame, and means for regulating the tension of the springs of all of said cone bearings to regulate the comparative rigidity of the parts.

13. In a car truck, the combination of a truck-frame, an axle, spring-pressed cone bearings for holding the axle in place, a motor casing, spring-pressed cone-bearings for hanging the motor casing on the axle, means for connecting the motor casing to the truck-frame, and means for adjusting the tension of the springs of the cone-bearings to regulate the relative rigidity of the axle in its boxes and of the motor-casing upon the axle.

14. In a car truck, the combination of a truck-frame, an axle, spring-pressed cone bearings holding the axle in place, a motor casing, means for supporting one end of the motor casing upon the axle, spring-pressed cone bearings connecting the motor casing to the truck-frame, and means for regulating the tension of the springs of the cone-bearings to regulate the relative rigidity of the axle in its boxes and of the motor with respect to the truck-frame.

15. In a car truck, the combination of a truck-frame, an axle, spring-pressed cone bearings holding the axle in place, a motor casing, spring-pressed cone bearings for hanging the motor casing on the axle, spring-pressed cone bearings connecting the motor casing to the truck-frame, and a spring-pressed abutment for preventing the motor casing from swaying sidewise.

16. In a car truck, the combination of a truck-frame, an axle, spring-pressed cone

bearings holding the axle in place, an electric motor, a pair of spur gears connecting the motor-shaft to the axle, spring-pressed cone-bearings for hanging the motor casing on the axle, spring-pressed cone bearings connecting the motor casing to the truck-frame, and means for adjusting the tension of the springs of the cone bearings, whereby the axle will have the play permitting the wheels to conform to curves in the track, while the motor will be supported in proper geared relation to the axle.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

FERNANDO F. STOWE.

Witnesses:
PHILIP W. SOUTHGATE,
MARY E. REGAN.