2 Sheets—Sheet 1.

H. C. HUNTER & J EVERDING.

Running-Gear for Street-Cars.

No. 203,154. Patented April 30, 1878.

FIG. 1.

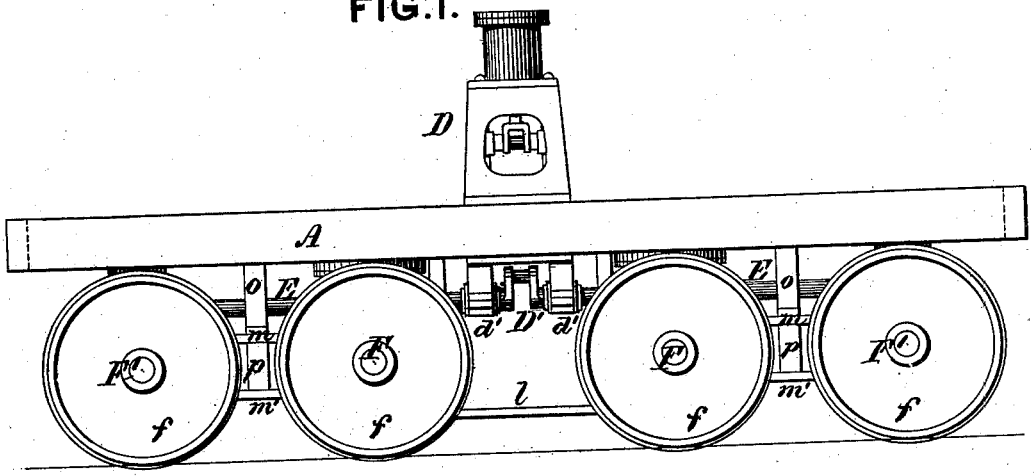


FIG. 2.

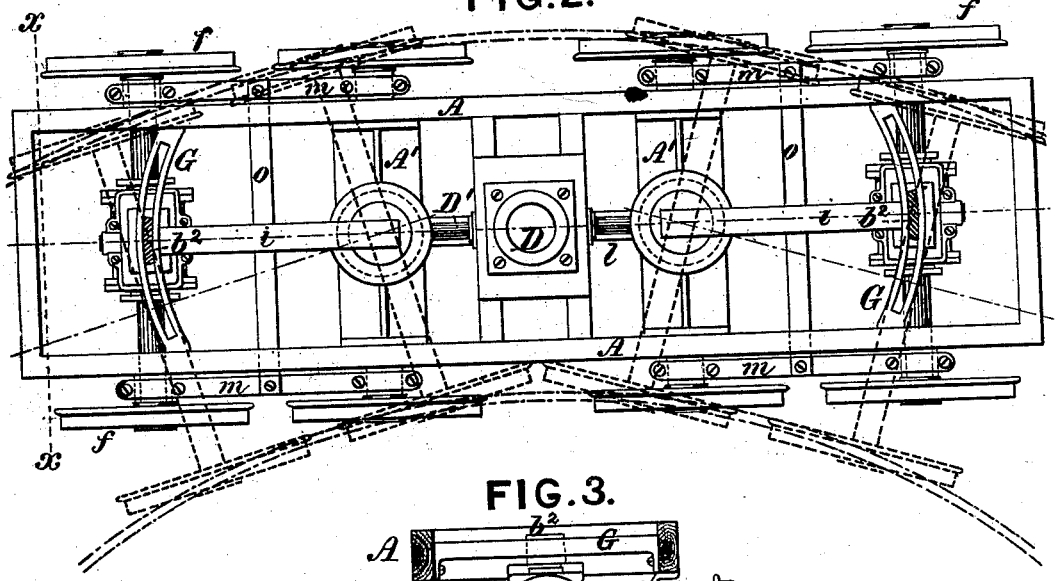
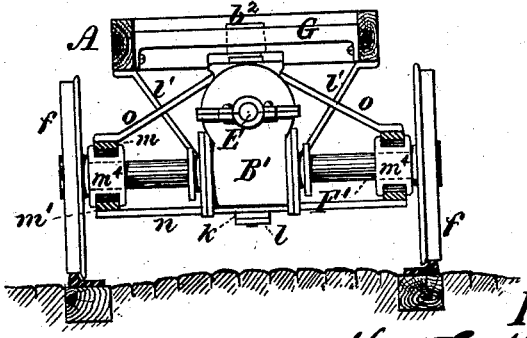


FIG. 3.



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2 Sheets—Sheet 2.

H. C. HUNTER & J. EVERDING.

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No. 203,154. Patented April 30, 1878.

FIG. 4.

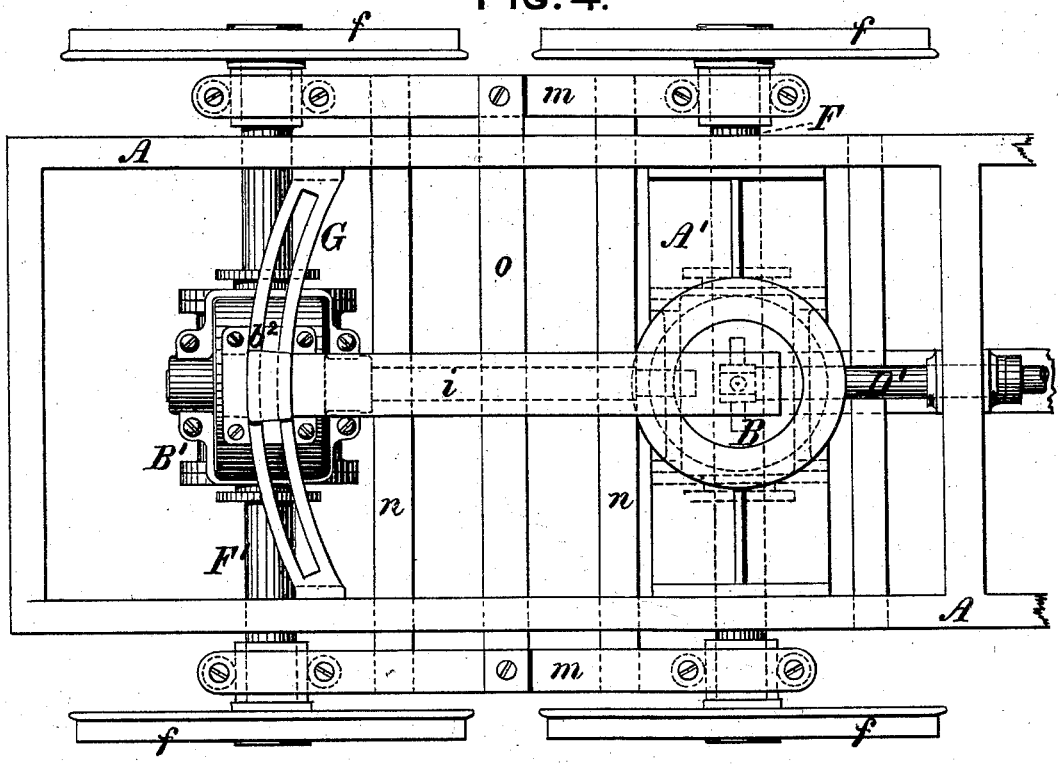


FIG. 5.

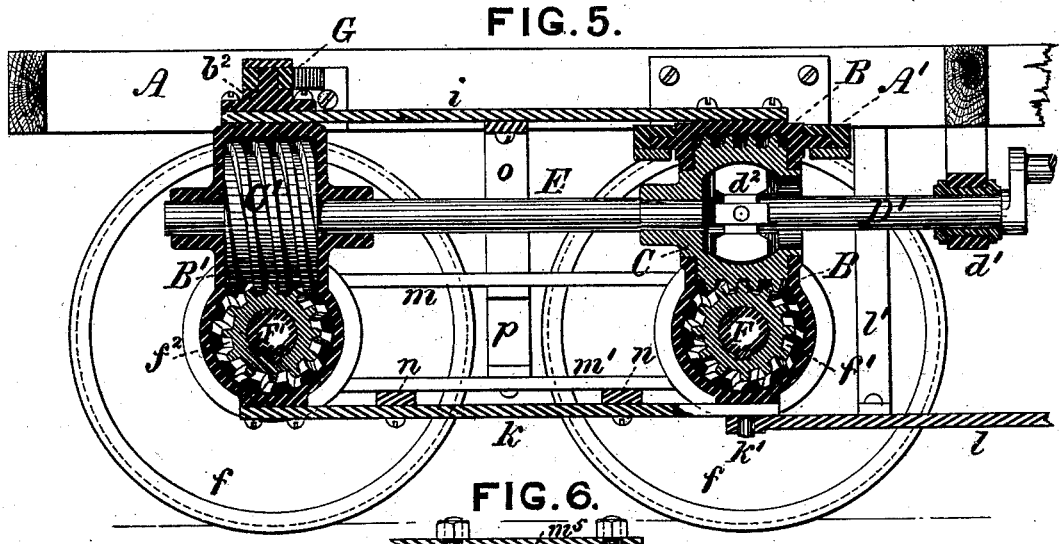
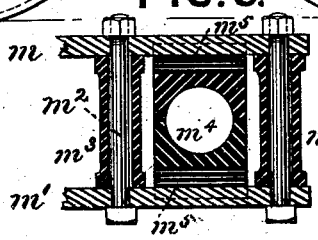


FIG. 6.



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UNITED STATES PATENT OFFICE.

HENRY C. HUNTER AND JOHN EVERDING, OF PHILADELPHIA, PA.; SAID HUNTER ASSIGNOR TO ABRAHAM S. JENKS, OF SAME PLACE.

IMPROVEMENT IN RUNNING-GEAR FOR STREET-CARS.

Specification forming part of Letters Patent No. **203,154**, dated April 30, 1878; application filed March 26, 1878.

To all whom it may concern:

Be it known that we, HENRY C. HUNTER and JOHN EVERDING, both of the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Running-Gear for Street-Railway Cars, of which the following is a specification:

Our invention relates to that class of cars employed upon street or branch lines of railway which are propelled by steam or other fluid-pressure engines, and in which the motive-power apparatus and the passenger-compartment are located in or upon the same body or frame.

As heretofore constructed, the running-gear of cars of this description has, in practice, developed objectionable features, in that, where the wheel-base has been made sufficiently short to allow all the wheels to be coupled and act as drivers, the wear upon the track, wheels, and coupling-rods is severe, and, by reason of the parallelism of the axles in traversing curves and the excessive end overhang of the car-body, the riding of the car is rough and uneven. The adoption of a longer and flexible wheel-base proportionately avoids the objections above stated, but is attended with the disadvantage that, so far as our knowledge and information extend, it has not, in such case, heretofore been found practicable to utilize all the weight of the car for adhesion, which utilization, under the circumstances governing the use of street-railway cars, is eminently desirable.

The object of our invention is to provide a construction of the running-gear which, without undue complication or lack of durability, will enable the advantages of a flexible wheel-base to be combined with the application of motive power to all, or as many as may be desired, of the axles of the car, and which will permit of a considerable increase of wheel-base without entailing difficulty in traversing curves of short radius, so that the wheels may enter and leave a curve without appreciable jar or side motion. We further seek to uniformly distribute the weight upon, and conveniently apply the motive power to, all the wheels of the car, and to avoid the use of friction-brakes as a means of checking and arresting its motion.

To these ends our improvements consist in the combination, with a main frame, which supports the motor and driving shaft, and to which the car-body is hung by any approved system of springs, of two swiveling pilot-trucks, each of which is pivoted to the main frame at a point in rear of or toward the center of the car relatively to its leading axle, and carries a worm-shaft, coupled to the driving-shaft, with the capacity of variation from a right line therewith, said worm-shaft having worms secured upon it, which mesh into worm-wheels on the axles of the truck, and are, together with their corresponding worm-wheels, mounted in bearings and cases forming part of the swiveling truck-frames, all as hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a side view, showing our improvements as applicable to an eight-wheel car; Fig. 2, a plan or top view of the same, the position of the trucks upon a curve being shown in dotted lines; Fig. 3, a transverse section at the line *x x* of Fig. 2; Fig. 4, a plan or top view, on an enlarged scale, showing one truck and its connections to the main frame; Fig. 5, a longitudinal central section of the same, and Fig. 6 a vertical section through one of the axle-boxes.

Our improvements are here described and shown as applied to an eight-wheel car, having two four-wheeled swiveling-trucks; but we likewise contemplate the use in cars of smaller dimensions of one four-wheeled and one two-wheeled truck, having a similar construction and mode of operation. In this instance, we provide a rectangular main frame, A, which supports the motor D, which may be a steam or other fluid-pressure engine, and the bearings d^1 of its driving-shaft D′. The car-body is supported, through the intermediation of springs of any approved construction, upon the main frame A, and is not here shown, as it, *per se*, is independent of our present invention, which relates specifically to the running-gear and its connection with and relation to the supporting-frame and driving-shaft.

Two transverse beams or bolsters, A′, are

secured to the frame A, each having a central pivot-bearing formed within it for one of the swiveling-trucks, to be presently described. Said trucks being identical in construction, a description of one only need be given, the same being shown on an enlarged scale in Figs. 4 and 5. The truck-frame is composed of upper and lower side bars m m^1, united by bolts m^2 passing through thimbles or distance-pieces m^3, and connected by cross-bars n n, which are, in turn, united by a longitudinal brace, k. The wheels f are firmly secured on axles F F′, mounted in boxes or bearings m^4, secured between the upper and lower side bars m m^1, strips of hard rubber or other elastic material m^5 being interposed between the boxes and bars at top and bottom to allow of a limited amount of vertical play to compensate for irregularities of the track, &c. The cylindrical pivot, upon the center of which the truck swivels in traversing curves, is perpendicular to the center of the axle F, which is nearest the center of the car, and bears in one of the transverse beams or bolsters A′ of the frame A. It is formed upon the upper portion of a casing, B, which incloses and forms the bearings for a worm, C, secured upon a horizontal shaft, E, above the axle F, the opposite end of which shaft, above the axle F′, carries a worm, C′, of similar diameter and pitch, which is mounted in bearings in an inclosing-case, B′, connected with the case B by upper and lower longitudinal braces i k, the lower of which, k, is, as before stated, united to the transverse braces n n of the truck. The lower portions of the casings B B′ inclose worm-wheels f^1 f^2, secured, respectively, upon the axles F F′, and meshing with the worms C C′.

It will be seen that the casings B B′, in addition to their function of inclosing and providing bearings for the worms and worm-wheels, further serve as vertical members of the truck-frame, and correspondingly increase its strength and stability.

A pin, k', formed upon or secured to the lower portion of the casing B concentric with its upper cylindrical pivot, is fitted to, and oscillates freely in, a socket formed in one end of a longitudinal brace, l, secured to the main frame A by transverse braces l', and the corresponding pin k' of the casing B of the other truck is similarly fitted to a socket in the opposite end of the brace l.

The casing B′, instead of being provided with an upper cylindrical pivot, like the casing B, has a segmental block, b^2, formed upon or secured to it, said block being fitted to, and moving freely in, a segmental transverse guide or transom plate, G, secured to the side sills of the frame A, the radius at center of said transom-plate being equal to the distance between the centers of the axles F F′, so that it shall admit of the swiveling movement of the truck about the center of its pivot, while guiding and limiting the range of circumferential movement of the casing B′ of the axle farthest from said pivot.

Each of the side frames of the truck may be braced by one or more vertical members, p, and the two frames are connected at top by a transverse brace or braces, o.

It will be obvious that, in order to transmit rotary motion from the driving-shaft D′ to the worm-shafts E E of the two trucks, provision must be made for the variation from a right line between the driving and worm shafts, incident to the swiveling movements of said trucks. This we accomplish by forming recesses or pockets in the worms C C adjacent to the driving-shaft, into which recesses are fitted blocks d^2, pivoted upon pins on the ends of the driving-shaft D′, the combination constituting two universal couplings, similar to that for which Letters Patent of the United States were allowed to us under date of February 21, 1878.

In cases where the circumstances of the required service are such that the adhesion of two pairs of wheels will be found sufficient, the worm-shafts E and the worms C′ and worm-wheels f^2 of the outer axles may be dispensed with, the arrangement of universal coupling, substantially as shown, being retained, and, in such case, two swiveling trucks, as described, with one pair of driving-wheels in each, will be provided.

In the operation of our improvements rotary motion is transmitted from the driving-shaft to each axle of the car, through the worms and worm-wheels, in the ratio of the relative proportions of the worms and worm-wheels, which is preferably, as in the instance shown, three to one; and from the construction and arrangement of the trucks relatively to each other and to the frame, either may serve, indifferently, as a pilot or as a follower.

As the driving members are worms, it will be seen that the cessation of movement of the driving-shaft entails a coincident and immediate stoppage of the rotation of the wheels, which would otherwise continue in virtue of the momentum of the car, as it is impossible for a worm-wheel to act as a driver unless specially designed so to do by being formed with an exceptionally rapid pitch.

In order to cover contingencies of derailment or other accident, we provide for readily withdrawing the keys which secure the worm-wheels to the axles, so that the wheels may be revolved without the prime mover, when required.

We have shown the prime mover as located between the trucks, but do not confine ourselves to such arrangement, as in some cases we contemplate locating it upon one of the trucks, and connecting it to the main shaft thereof, in which event the shaft here shown as the driver would fulfill the function of a coupling-shaft for transmitting motion to the shaft of the other truck.

We claim as our invention and desire to secure by Letters Patent—

1. The combination, with a railway-car frame and a common driving-shaft, mounted in bearings thereon, of two truck-frames, each provided with one or more axles and pairs of wheels, and having a swiveling movement independently of the other relatively to the car-frame, and driving mechanism mounted upon the truck-frames, for imparting rotation from the driving-shaft to one or more of the axles of each truck, substantially as set forth.

2. The combination, in a railway-car, of a main frame, supporting a motor and a longitudinal driving-shaft, two swiveling trucks, each pivoted to said frame at a point within or toward the center of the car relatively to its outer axle, and two worm-shafts, each of which is mounted in bearings on one of the trucks and coupled, with the capacity of variation from a right line, to the driving-shaft, said worm-shafts carrying worms meshing into worm-wheels on the truck-axles, substantially as set forth.

3. The combination, with a swiveling truck-frame, of a longitudinal driving-shaft, and casings which form bearings for said shaft and inclose the driving-gears, said casings constituting vertical members of the truck-frame, substantially as set forth.

4. The combination, with a truck-frame, of a longitudinal driving-shaft, worms secured upon said shaft, and meshing into worm-wheels on the truck-axles, and a coupling formed within one of the worms of the driving-shaft, substantially as set forth.

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