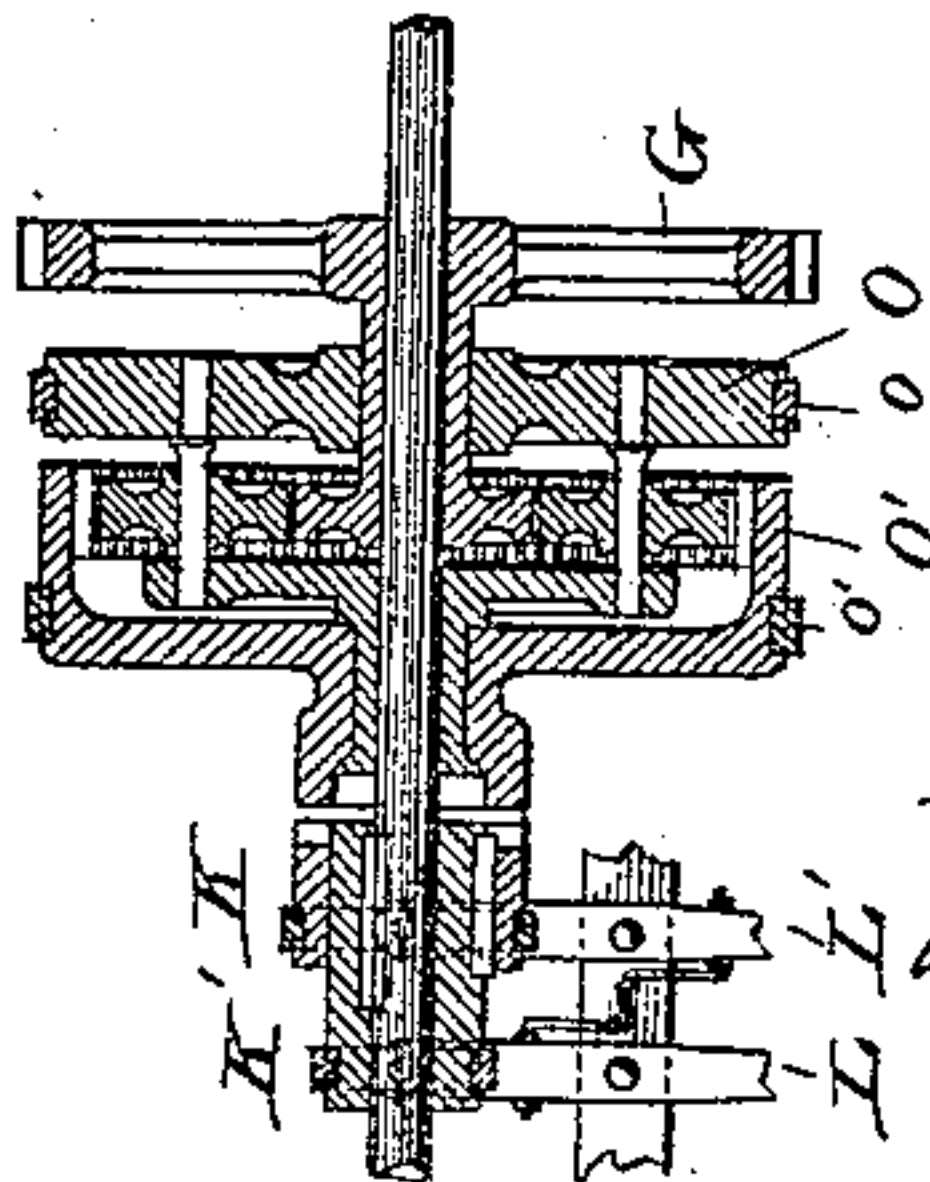
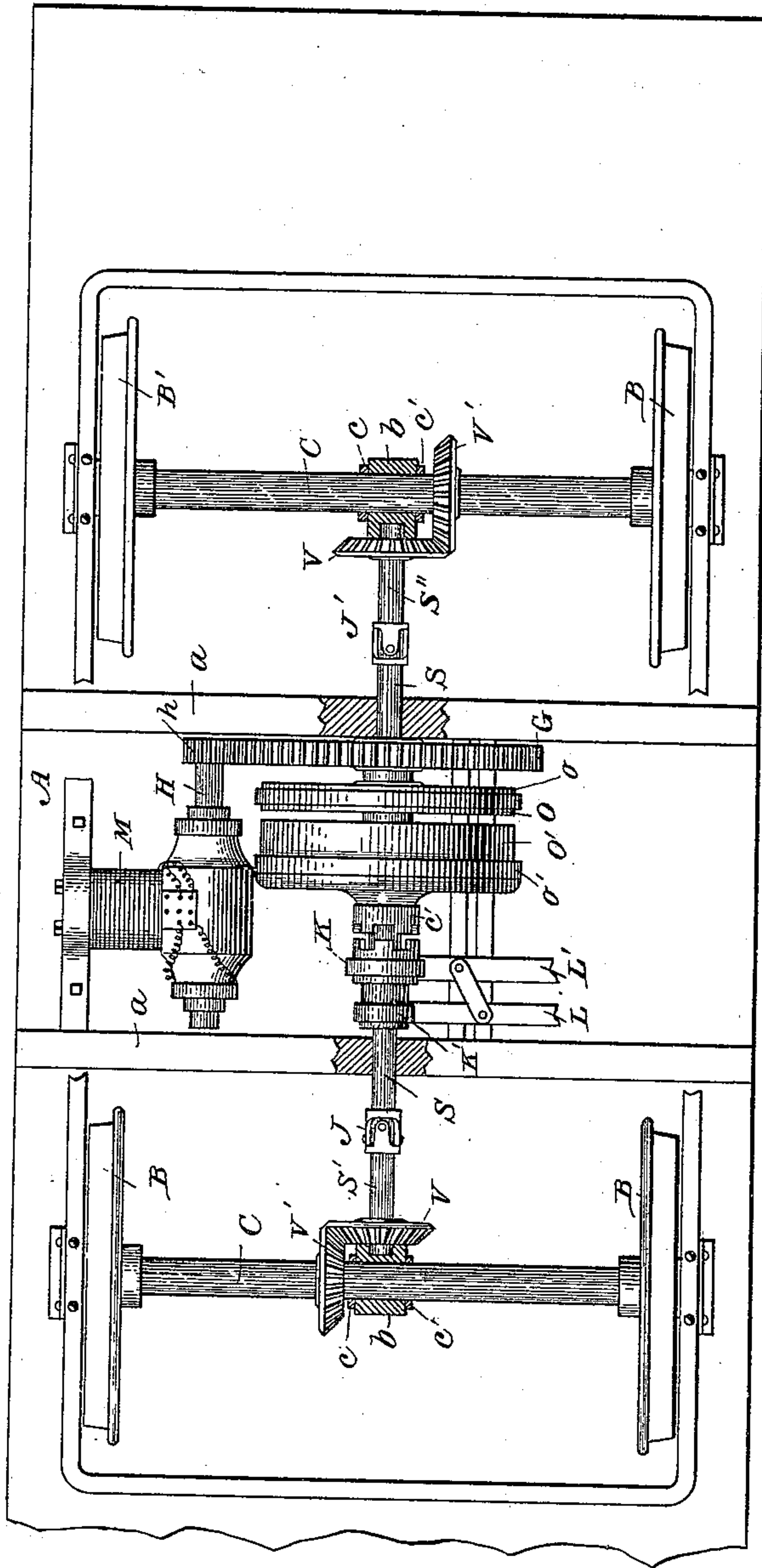


(No Model.)

G. R. BALDWIN.
ELECTRIC LOCOMOTIVE.

No. 446,245.

Patented Feb. 10, 1891.



WITNESSES

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UNITED STATES PATENT OFFICE.

GEORGE READE BALDWIN, OF MONTREAL, CANADA.

ELECTRIC LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 446,245, dated February 10, 1891.

Application filed July 17, 1890. Serial No. 359,011. (No model.)

To all whom it may concern:

Be it known that I, GEORGE READE BALDWIN, a citizen of the United States, residing at Montreal, in the Province of Quebec and Dominion of Canada, have invented certain new and useful Improvements in Electric Locomotives; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the improved gear for traction purposes hereinafter to be more fully described and claimed.

In the drawings, Figure 1 represents a bottom view of a motor-truck with the traction-wheels, an electric motor, and my invention applied thereto. Fig. 2 represents a sectional view of a preferable form of reversing-gear to be used in connection with my present invention.

In the common construction of motors for street purposes, and more especially in that of electric traction apparatus, the introduction of trains of gearing to reduce the speed of the motor to that of the traction-wheels has led designers to use a separate motor for each pair of traction-wheels and to keep the centers of the spur-wheel attached to the axle of the traction-wheels and the center of the corresponding pinion on the motor equidistant for all positions of the axle, one end of said motor or its frame being carried on said axle by means of bearings without the intervention of springs. Among the disadvantages of this arrangement are the use of two motors where one of greater capacity would be more economical of itself, and also in the introduction of the amount of gearing necessary, the fact that the delicate gearing and mechanism is subjected to all the jarring shocks with which the traction-wheels meet, the extra heavy axle made necessary to withstand the strain caused by attaching without springs half the weight of a motor and its gear, the cumbersome structure reaching nearly to the ground is exposed to collision with any obstacle between the rails, and other minor points of objection which it is unnecessary to here recount. To avoid these difficulties it has heretofore been proposed to employ flexible connections between the motor and the car-axles, whereby the several parts are permitted to yield to an irregular track,

so as to relieve the running-gear of destructive strains; but in all previous contrivances designed to overcome these difficulties the mechanism has been complex and expensive, rendering the same more or less impracticable in a commercial sense, owing to the original cost of production and of subsequent renewal of parts subject to wear; and the object of my invention is to overcome these several difficulties which have been heretofore encountered in practical electric railroading, and to provide a simple and inexpensive flexible connecting-gear for street or other railway purposes, and to secure a form of traction apparatus in which, if it be necessary to use two or more pairs of traction-wheels, one motor may still suffice to do the work, in which said motor may be mounted upon the car-body, which, being of course supported upon springs, is free from the vibrations to which the carrying-wheels themselves are subjected, and in which the motor and much of the gearing may be elevated beyond the reach of ordinary obstacles, I have designed the construction herein illustrated and described, in which—

A represents the bottom of a car-body supported on the traction and carrying wheels B B, &c., by means of an ordinary motor-truck attached to the frame D and the usual arrangement of springs. (Not shown.) The said frame D is broken away to show more clearly the central portion of the motor-truck to which the electric motor or other prime mover M is rigidly attached.

The main driving-shaft S is mounted in proper journal-bearings attached to the motor-truck or to proper beams *a a* thereon. This main driving-shaft is connected to the armature-shaft H of the electric motor, or to the corresponding power-shaft of whatever motor is employed, by proper gearing, said armature-shaft being preferably arranged parallel with the main driving-shaft, as shown, so as to economize space and simplify the arrangement of the parts.

In the drawings I have shown the ordinary spur-gearing, in which *h* is the pinion on the armature-shaft and G the spur-gear on the main driving-shaft. This spur-gear G may be rigidly attached to the driving-shaft or connected thereto by any of the well-known mechanisms for effecting a reversal of the driving-gear; but it is preferably connected to said

driving-shaft, as shown in the drawings, by means of the improved reversing-gear shown and described in my patent, No. 436,072, dated September 9, 1890, to which reference is made
 5 for a complete description of such reversing-gear, which is not specifically claimed herein, my present invention being confined to other features of construction in a traction apparatus, in connection with which any ordinary
 10 reversing-gear may be employed. The parts of said gearing shown in the drawings are the brake-wheels $O O'$, with the brake-bands $o o'$ surrounding the same, the clutches $K K'$, and the levers $L L'$, operating said clutches
 15 in the manner fully set out in my above-mentioned patent. Rotation being thus given to the main driving-shaft S , it is conveyed to the flexible extensions of said shaft $S' S''$ by any convenient form of universal joint. In the
 20 drawings I have shown the ordinary universal joints $J J'$ of the type known as the "Hooke joint."

On the axles C of the traction-wheels are mounted boxes $b b$, which are rotatable on
 25 said axles and are kept in proper position by the flanges or collars $c c'$ or by other equivalent devices. While the inner end of the flexible portions of the driving-shaft $S' S''$ are attached to the main portion of said driving-shaft S by universal joints, their outer
 30 ends are stepped in said rotatable boxes.

Proper gearing conducts motion from the flexible portion of the driving-shaft to the axles of the traction-wheels. In the drawings I have illustrated the ordinary form of
 35 bevel-gearing $V V'$.

The operation of my invention is evident from the foregoing description. The motion of the motor is transmitted either direct or
 40 through some reversing and reducing gear in the line of connections to the main portion of the driving-shaft, and from thence through the flexible portion of said shaft and the proper gearing to the axles of the traction-
 45 wheels. Said traction-wheels, being keyed or otherwise fastened upon their axles, revolve with them, and consequently the car is propelled. The vibration of the traction-wheels, due to the roughness of the track, obstacles
 50 encountered, &c., causes them to move up and down in the boxes in the frame D in which they are mounted; but through the agency of springs employed in the usual way said vibrations are not transmitted to the
 55 motor-truck or to the motor and main driving-shaft. At the same time the flexibility of the extensions to the driving-shaft $S' S''$ permits said motion without rupturing the train of gearing or interfering with the transmission of motion and the driving-power. The rotatable boxes b , revolving about a center
 60 coincident with that of the bevel gear-wheels V , do not permit the motion to interfere with the exact meshing of the teeth on the bevel-gearing. The slight variation, due to the fact that the driving-axle moves up and down in a straight line, which is the chord of an arc

which has its center at the universal joint and not in said arc itself, may be allowed for by a slight longitudinal play in the parts of
 70 said universal joint or in the bearing on the end of the shaft in the boxes b , or it may be so small as to be imperceptible.

The operation of the reversing-gear is through the manipulation of the brake-levers
 75 and clutches in the manner easily understood and fully set out in my said patent above referred to. As before stated, said reversing-gear might be introduced at any point in the line of connections from the motor to the
 80 driving-shaft, or it can be dispensed with altogether.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. In a traction apparatus, the combination of the motor-truck, the motor rigidly attached thereto, the main driving-shaft geared to said motor and mounted in bearings on the motor-truck, two pairs of traction-wheels keyed on
 90 their respective axles and supporting the motor-truck, boxes mounted and rotatable on said axles, flexible extensions to the main driving-shaft having their inner ends connected to said main shaft by universal joints
 95 and their outer ends stepped in the above-mentioned rotatable boxes, and gearing connecting said flexible shaft-extensions to the axles of the traction-wheels, together with the reversing-gear in the line of connections from the motor to the main driving-shaft, substantially as described.

2. In a traction apparatus, the combination of the motor-truck, traction-wheels supporting the same, a main driving-shaft having
 105 flexibly-jointed extensions whose free ends are stepped in boxes rotatable on the axles of said wheels, said jointed shaft forming a direct connection between said axles and being geared thereto, an electric motor rigidly attached to said truck, and intermediate gear-
 110 ing connecting said main driving-shaft with the armature-shaft of said motor, substantially as described.

3. In a traction apparatus, the combination of the truck, traction-wheels supporting the same, a main driving-shaft having flexibly-jointed extensions whose free ends are stepped in boxes rotatably secured on the axles of said wheels, said jointed shaft forming a direct
 120 connection between said axles and being geared thereto, an electric motor rigidly attached to said truck and having its armature-shaft in gear with said main driving-shaft, and suitable reversing mechanism arranged on said main driving-shaft, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE READE BALDWIN.

Witnesses:

WM. F. LIGHTHALL,
 GEO. R. LIGHTHALL.