G. H. DOWNS.

DRIVING MEANS OF ELECTRIC LOCOMOTIVES.

APPLICATION FILED NOV. 13, 1908.

1,006,732.

Patented Oct. 24, 1911.

5 SHEETS—SHEET 1.

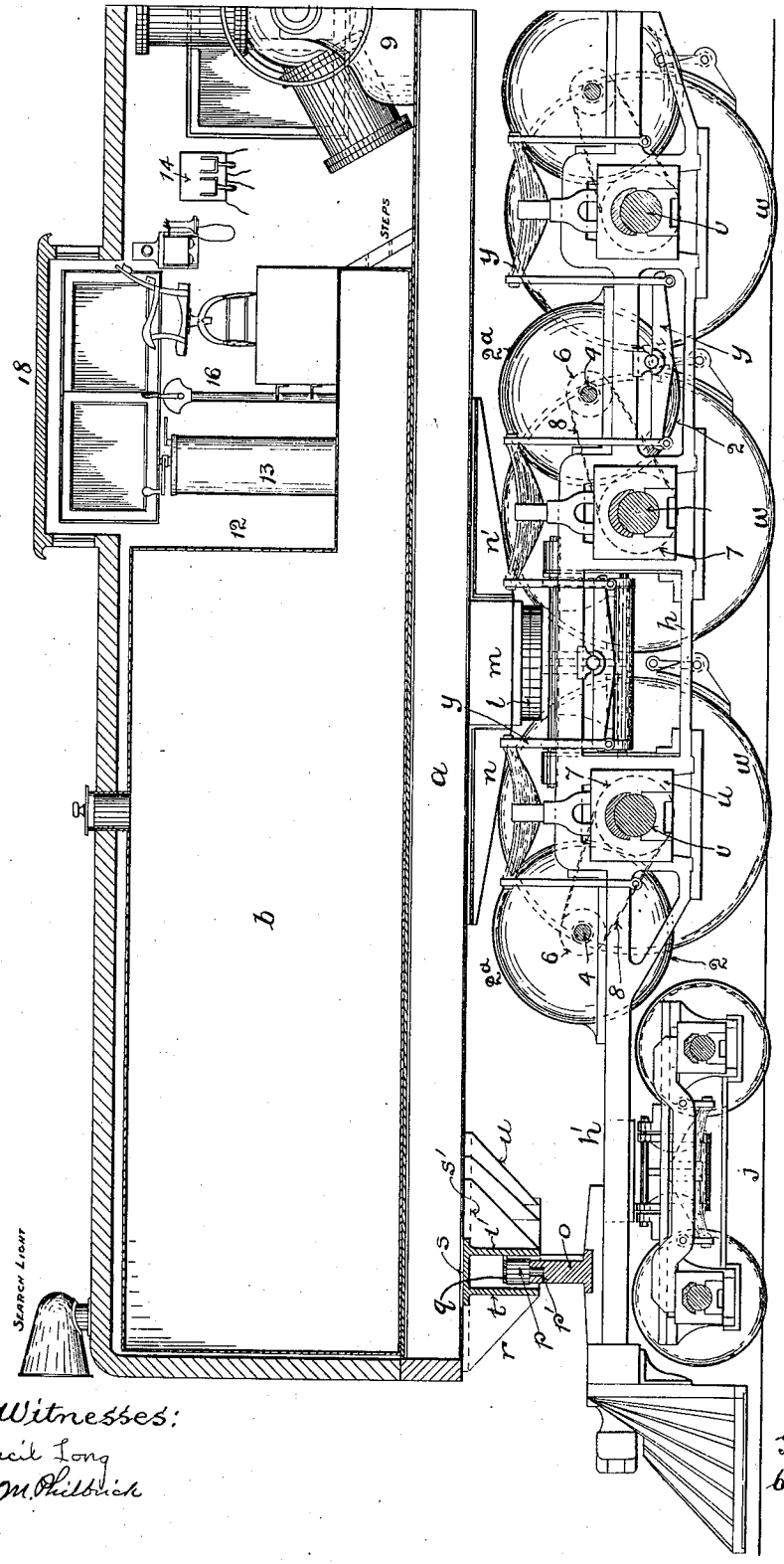

Fig. 1.

Witnesses:
Cecil Long
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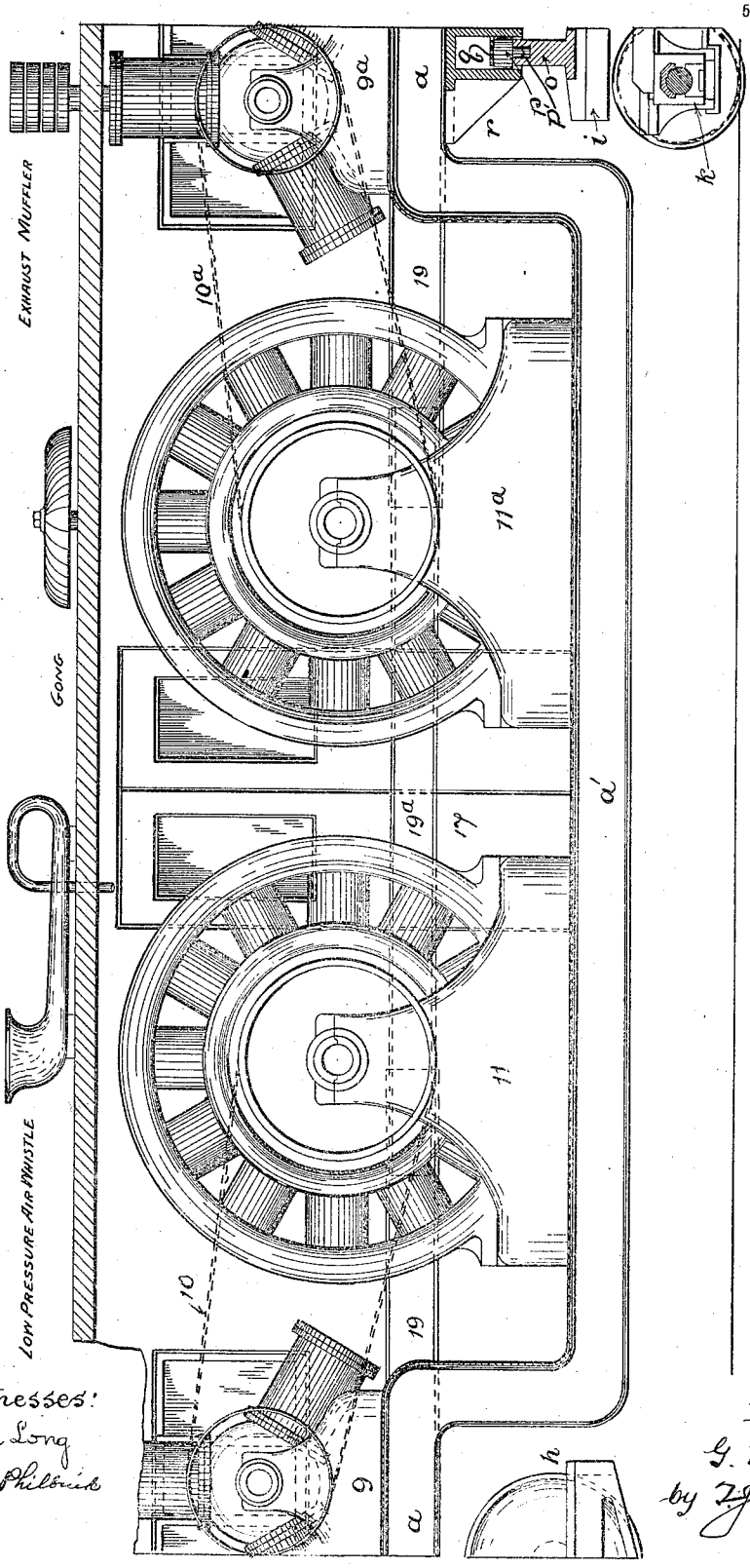

Fig. 2.

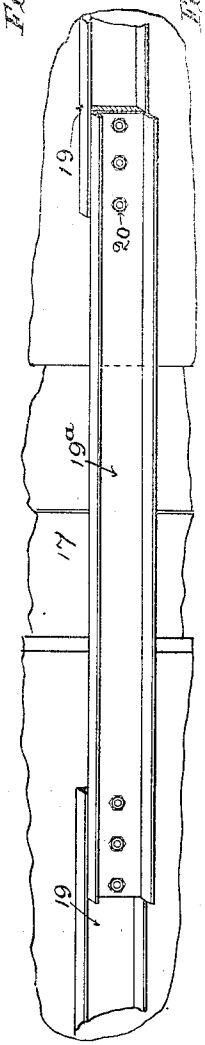

Fig. 1.

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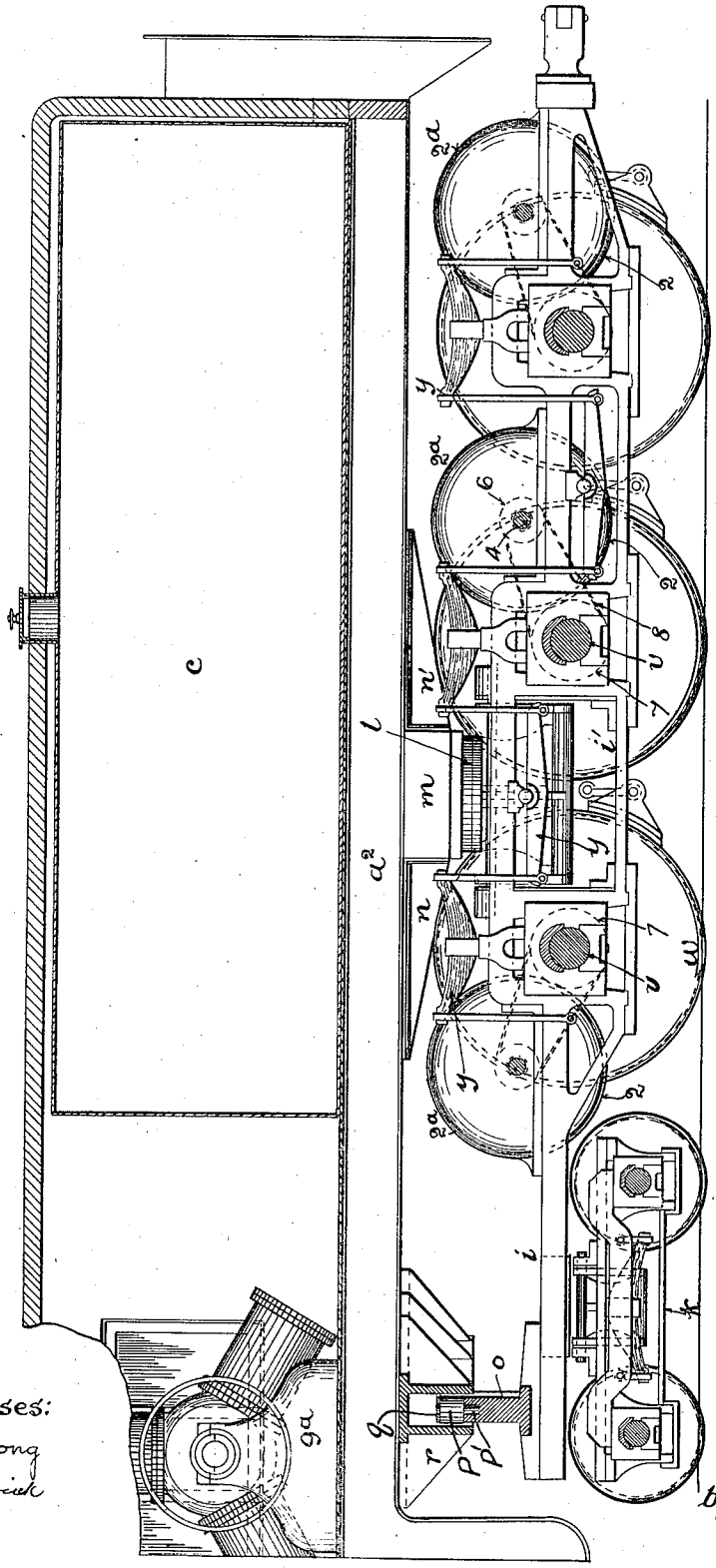

Fig. 3.

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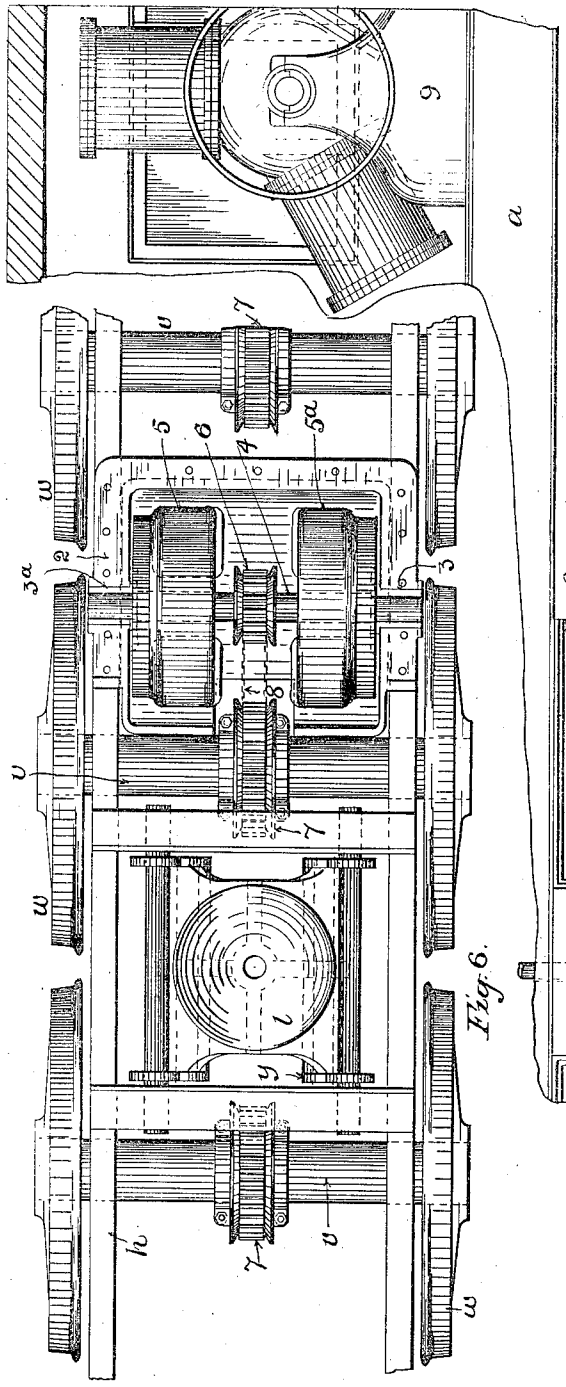

Fig. 6.

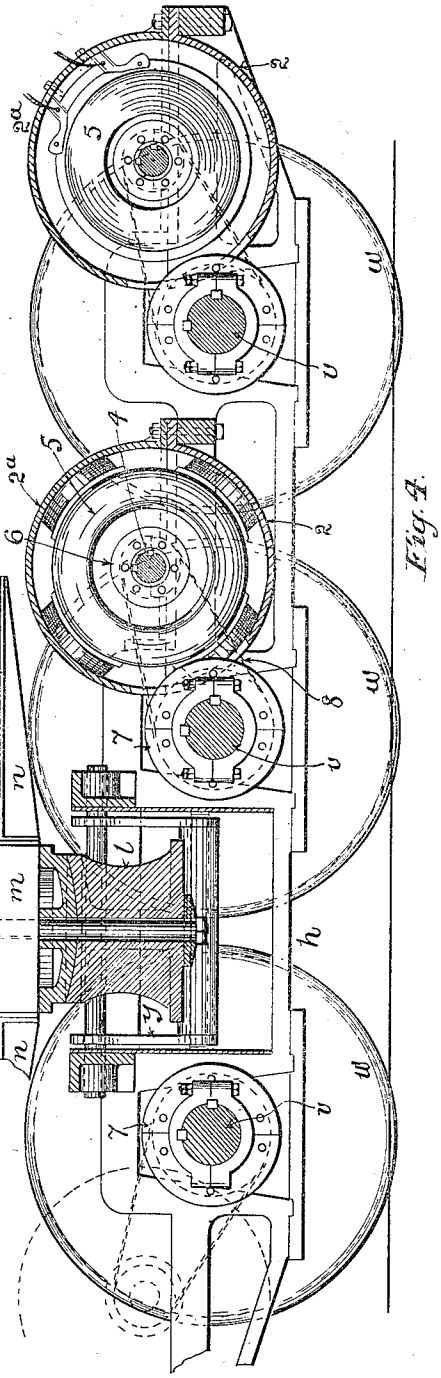

Fig. 4.

Witnesses:

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5 SHEETS SHEET 5.

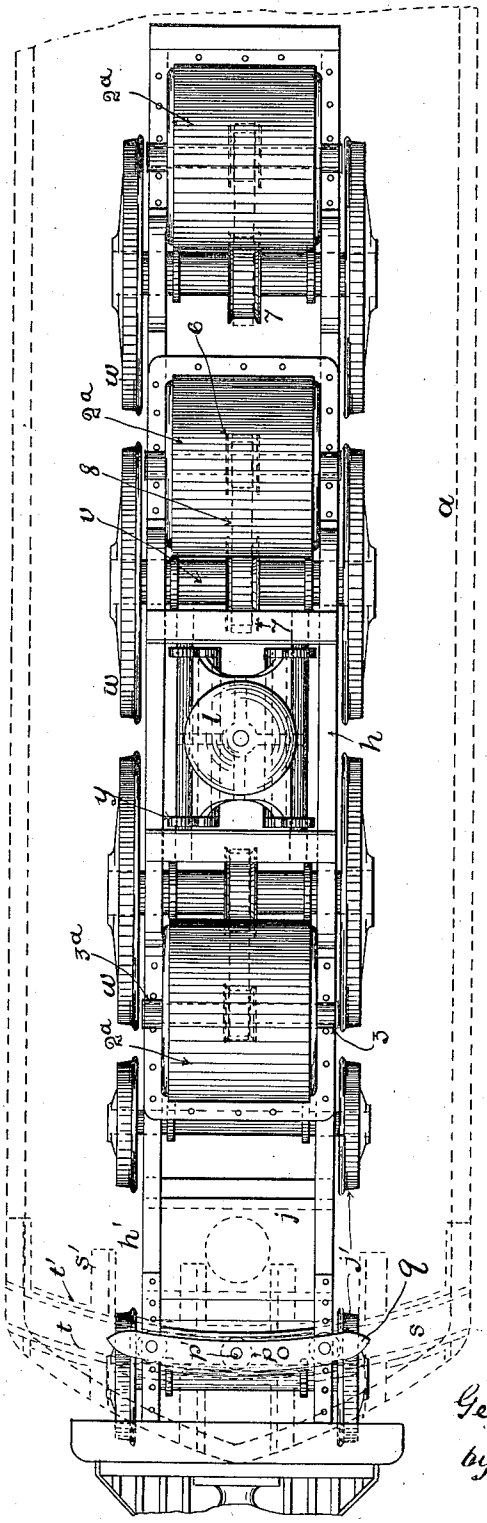

Fig. 5.

Witnesses:
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UNITED STATES PATENT OFFICE.

GEORGE H. DOWNS, OF PORTLAND, OREGON, ASSIGNOR OF ONE-HALF TO WILLIAM E. GRACE, OF PORTLAND, OREGON.

DRIVING MEANS OF ELECTRIC LOCOMOTIVES.

1,006,732. Specification of Letters Patent. Patented Oct. 24, 1911.

Application filed November 13, 1908. Serial No. 462,480.

To all whom it may concern:

Be it known that I, GEORGE H. DOWNS, a citizen of the United States, and a resident of Portland, in the county of Multnomah and State of Oregon, have invented a new and useful Improvement in Driving Means of Electric Locomotives, of which the following is a specification, reference being had to the accompanying drawings as constituting a part thereof.

This invention has for its object to obtain an electric locomotive which is adapted to travel over long distances, and is independent of overhead trolley or third rail; that is to say, the locomotive being provided with a primary engine to drive a dynamo, and the latter generating the electromotive force for the motors of the driving wheels.

Furthermore, my invention has for its object to equip my locomotive with the same type of running gear as is at present in use on the standard steam locomotive, in this; that such running gear shall comprise wheel-trucks pivotally supporting the car-body of the locomotive, said wheel-trucks comprising journal-bearings adapted to have vertical play, equalizing means therefor, and driving wheels having their axles journaled in such bearings; and to use power-transmitting means, between the motor and the axles of the driving wheels, which do not require that the motors be supported in swinging frames in order to accommodate the vertical play of the journal-bearings of the driving wheels. In short, to avoid rigidity in the power-transmitting devices from the motors to the axles of the driving wheels, and to provide for a center drive from the centers of the motor axles to the centers of the driving axles.

I accomplish the purposes of my invention by the arrangement of the devices hereinafter fully described and illustrated in the drawings.

In the drawings: Figures 1, 2, and 3, taken together, are a longitudinal section, representing my locomotive in three parts, namely: the front end, the central portion, and the rear end; the views being drawn with overlapping connecting ends so as to facilitate the reading of the same; Fig. 4 is a longitudinal section, on a larger scale than the preceding figures, and represents a portion of the running gear, at the front end of my locomotive, including the wheel-trucks, the bearing pivotally supporting the superposed end of the car-body, the driving wheels, the motors, and operative connections; Fig. 5 is a plan view of the wheel-truck of the front end of my locomotive, the superposed car-body being shown in dotted outline *a;* Fig. 6 is a partial plan view, agreeing with Fig. 4, of the front wheel-trucks, showing the driving wheels and one of the motors thereof, the upper part of the motor-housing being removed; and Fig. 7 is a detail of the construction of the frame of the car-body.

Referring to the letters in the several views: The body, *a*, of my locomotive is made of elongated form, and the floor of the middle portion *a'* thereof is dropped below the level of the two ends, so as to provide ample room to accommodate the large dynamos 11, 11^a. To install these the floor-girders 19, of the ends of the car-body, are connected by removable girder-pieces 19^a, which, when taken out, will clear entirely the openings in the sides provided by the sliding doors 17. The front end of the car-body is provided with an oil tank *b*, and the rear end with a water tank *c*. The car-body is pivotally supported at its ends on wheel-trucks *h*, *i*, the construction of which is substantially the same. Said wheel-trucks represent a common type of construction, except that they have each projecting portions, *h'*, *i'*, under which is pivoted a bogie truck, *j*, *k*. A pivotal bearing *l*, of a common type of construction, is provided at the center of the frame of each wheel-truck, and on such pivotal bearing rests the bolster *m*, which is provided with longitudinal, bracket-like portions *n*, *n'*, to afford an efficient support for the car-body.

A chock-block *o* is mounted on the front end of each wheel-truck. The head of such chock-block is provided with cavities in which are journaled friction wheels *p*, the lower ends of the journal-pins *p'* of which are journaled in the body of the chock-block, and the upper end of said journal-pins are journaled in a plate *q*. The friction wheels are of such diameter as to project beyond the faces of the chock-block, as illustrated in Fig. 5.

To the bottom of the car-body, at the ends, there are fastened above the chock-blocks

bulk-heads r, each of which consists of a head-plate s, having lateral members s', bearing walls t, t', spaced apart, so as to provide an intermediate groove, in which to receive the head of the chock-block o; and webs u connect said walls t, t' with the lateral members s' of the head-plate s. The bulk-heads and chock-blocks constitute supplemental connecting mediums between the car-body and the wheel-trucks, and serve to relieve the strain imposed on the pivotal connections of the wheel-truck with the car-body, in case of sudden stops, or collision with an obstruction on the track.

The features described in the last two paragraphs constitute the subject matter of my contemporaneous application for Letters Patent.

The truck-frames are alike in construction. Each is provided with vertically movable journal-boxes u, in which are journaled the ends of the axles v of the driving wheels w. The journal-boxes u are connected by a spring-equalizing gear y, of the type commonly employed in the running gear of standard steam locomotives, and for the same purpose.

On the frame of the wheel-trucks are mounted motor-housings, each of which consists of two parts, namely, a lower part 2, on which is fastened a removable cover 2^a. The lateral ends of the motor-housings are provided with journal-bearings 3, 3^a, integral parts of the casting, and in said journal-bearings are journaled the ends of the motor axles 4.

In order to obtain a center drive from the motor-axles to the car-axles v, each of the motors is divided into two units 5, 5^a, mounted on the same axle, which units are spaced apart, as shown in Fig. 6, and centrally between said motor-units there are rigidly mounted on the motor-axles 4 sprocket-gears 6. Said sprocket-gears 6 are preferably made of divided body, clamped on its axle, and the rim-sides provided for the gear-body are removable so as to permit the renewal of this gear, when worn or injured in service.

On the axle v of the driving wheels w there is centrally, rigidly mounted a sprocket-gear 7. This gear is made with a two-part body, and two-piece flange-sides, arranged substantially as shown in Figs. 4 and 6, whereby this gear is adapted to be removed from the axles v of the driving wheels, and replaced by other gears of larger or smaller diameter, to change the speed ratio of transmission.

The details of construction of the two types of gears, just above described, constitute the subject matter of two co-pending applications by me for Letters Patent.

Sprocket-chains 8 connect the sprocket-gears 6, 7, as illustrated in dotted outline. It will be apparent that the means for operatively connecting the gears of the axles of the motors and the driving wheels are especially designed to allow either wheel axle to have the vertical play required to adjust itself to inequalities in the rail surface. To this end I use sprocket-chains, as the flexible medium for transmitting the power from the motor-axles to the wheel-axles. Besides, such power-transmitting means are much less liable to injury than meshing gears. I use sprocket-gears provided with deep flange-rims to prevent any accidental displacement of a sprocket-chain from the gears over which it is running. Since the wheel-base of the driving wheels is not very long—approximately fifteen feet—there would, in consequence, be no apprehension of the individual vertical play of the wheel axles—due to inequalities in the rail surfaces—being sufficient to interfere with the proper working of the sprocket-chains. A further advantage obtained in the use of sprocket-gears and chains for power-transmission is that, in case of a break-down in one of the motors, the sprocket-chain running thereon can be readily removed, so that the related driving wheels can revolve independently of the motor. Further, each of the driving-wheel axles is individually driven, and there are no rigid connecting bars.

My driving means I have arranged in two units, one for operating the driving wheels of the running gear under the front end of the locomotive, and the other for operating the driving-wheels under the rear end of the locomotive. Each of said driving units consists of a primary engine, 9, 9^a, that shown being a well known type of gasolene engine. The driving engines are connected by power-transmitting means, 10, 10^a, with dynamos, 11, 11^a. The dynamo 11 is electrically connected, by a suitable system of wiring, with the motors of the running gear under the front end of the locomotive-body, and the dynamo 11^a is likewise connected with the motors of the running gear under the rear end of the locomotive-body. Such electric connections I have not detailed because they are well understood by those practiced in the art of electricity, as related to electric railways.

The observation station 12, provided in the car-body for the engineer is provided with a controller 13, and switches 14, whereby the engineer can cut in and out the motors of the respective units of the driving means, as desired. Either unit of the driving means is designed to furnish sufficient power to move the locomotive and the load hauled thereby; but, of course, the use of only one unit of driving means is intended merely for emergency cases, such as a break-down in one of the dynamos, or in the mo-

tors thereby operated, and normally the two units of driving means would be operated simultaneously.

16 represents the lever of the air-brakes, which are not shown, but supposed to be arranged as usual.

The observation station of the engineer is built above the floor of the car, so as to make it convenient for the engineer to look out through the windows of the hood 18. These details, as well as the other features of construction appearing in the drawings, are, however, unimportant to this invention; and some of the parts not referred to in this description are named in the drawings to suggest their purpose.

In many of the views the usual connecting bolts of the parts have been omitted to avoid obscuring other features shown in the drawings.

I claim:

1. In an electric locomotive, the combination of a car-body, driving means comprising a primary engine and a dynamo driven thereby, truck-frames pivotally supporting the car-body at its ends, journal-bearings arranged to have independent vertical play in said frame, equalizing devices connecting the journal-bearings, driving wheels fast on common axles, the ends of which are journaled in said bearings, a motor for each driving-wheel axle, the axle ends of said motors being journaled in bearings on the frame of the wheel-trucks, electrical connections between the dynamo and the related motors, sprocket-gears fast on the motor axles, sprocket-gears fast on the driving-wheel axles, one of each pair of connected sprocket-gears being removable so as to be replaceable by another of different diameter and thereby change the speed ratio of transmission, and sprocket-chains connecting the sprocket-gears of the axles of the related motors and driving-wheels.

2. In an electric locomotive, the combination of a car-body, driving means comprising a primary engine and a dynamo driven thereby, truck-frames pivotally supporting the car-body at its ends, journal-bearings arranged to have independent vertical play in said frames, equalizing devices connecting the journal-bearings, driving wheels fast on common axles, the ends of which are journaled in said bearings, a motor for each driving-wheel axle, the axle ends of said motors being journaled in bearings on the frame of the wheel-trucks, said motors consisting each of two units mounted, spaced apart, on a common axle, electrical connections between the dynamo and the related motors, sprocket-gears fast on the centers of the motor axles between said units of the motors, sprocket-gears fast on the driving-wheel axles, one of each pair of connected sprocket-gears being removable so as to be replaceable by another of different diameter and thereby change the speed ratio of transmission, and sprocket-chains connecting the sprocket-gears of the axles of the related motors and driving-wheels.

3. In an electric locomotive, the combination of a car-body, driving means comprising a primary engine and a dynamo driven thereby, truck-frames pivotally supporting the car-body at its ends, journal-bearings arranged to have independent vertical play in said frame, equalizing devices connecting the journal-bearings, driving wheels fast on common axles, the ends of which are journaled in said bearings, a motor for each driving-wheel axle, the axle ends of said motors being journaled in bearings on the frame of the wheel-trucks, said motors consisting each of two units mounted, spaced apart, on a common axle, electrical connections between the dynamo and the related motors, sprocket-gears fast on the motor-axles, sprocket-gears fast on the driving-wheel axles, one of each pair of connected sprocket-gears being removable so as to be replaceable by another of different diameter and thereby change the speed ratio of transmission.

4. In an electric locomotive, the combination of a car-body, driving means comprising a primary engine and a dynamo driven thereby, truck-frames pivotally supporting the car-body at its ends, journal-bearings arranged to have independent vertical play in said frame, equalizing devices connecting the journal-bearings, driving wheels fast on common axles, the ends of which are journaled in said bearings, a motor for each driving-wheel axle, the axle ends of said motors being journaled in bearings on the frame of the wheel-trucks, said motors consisting each of two units mounted, spaced apart, on a common axle, electrical connections between the dynamo and the related motors, removable sprocket-gears fast on the motor axles, sprocket-gears fast on the driving-wheel axles, and sprocket-chains connecting the sprocket-gears of the axles of the related motors and driving-wheels.

5. In an electric locomotive, the combination of a car-body, driving means comprising a primary engine and a dynamo driven thereby, truck-frames pivotally supporting the car-body at its ends, journal-bearings arranged to have independent vertical play in said frame, equalizing devices connecting the journal-bearings, driving wheels fast on common axles, the ends of which are journaled in said bearings, a housing secured on said truck-frame, said housing having removable top, and journal-bearings integrally formed at the ends of the housing, a motor for each driving-wheel axle, said motor having an axle journaled in said bearings of the motor-housing, electrical connections be-

tween the dynamo and the related motors, sprocket-gears fast on the motor axles, sprocket-gears fast on the driving-wheel axles, and sprocket-chains connecting the sprocket-gears of the axles of the related motors and driving-wheels.

6. In an electric locomotive, the combination of a car-body, driving means comprising a primary engine and a dynamo driven thereby, truck-frames pivotally supporting the car-body at its ends, journal-bearings arranged to have independent vertical play in said frame, equalizing devices connecting the journal-bearings, driving wheels fast on common axles, the ends of which are journaled in said bearings, a housing secured on said truck-frame, said housing having a removable top, and journal-bearings integrally formed at the ends of the housing, a motor for each driving-wheel axle, said motor having an axle journaled in said bearings of the motor-housing, electrical connections between the dynamo and the related motors, removable sprocket-gears fast on the motor axles, sprocket-gears fast on the driving-wheel axles, and sprocket-chains connecting the sprocket-gears of the axles of the related motors and driving wheels.

7. In an electric locomotive, the combination of a car-body, driving means comprising a primary engine and a dynamo driven thereby, truck-frames pivotally supporting the car-body at its ends, journal-bearings arranged to have independent vertical play in said frame, equalizing devices connecting the journal-bearings, driving wheels fast on common axles, the ends of which are journaled in said bearings, a housing secured on said truck-frame, said housing having removable top, and journal-bearings integrally formed at the ends of the housing, a motor for each driving-wheel axle, said motor having an axle journaled in said bearings of the motor-housing, said motors consisting each of two units mounted, spaced apart, on a common axle, electrical connections between the dynamo and the related motors, removable sprocket-gears fast on the motor axles, sprocket-gears fast on the driving-wheel axles, and sprocket-chains connecting the sprocket-gears of the axles of the related motors and driving wheels.

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