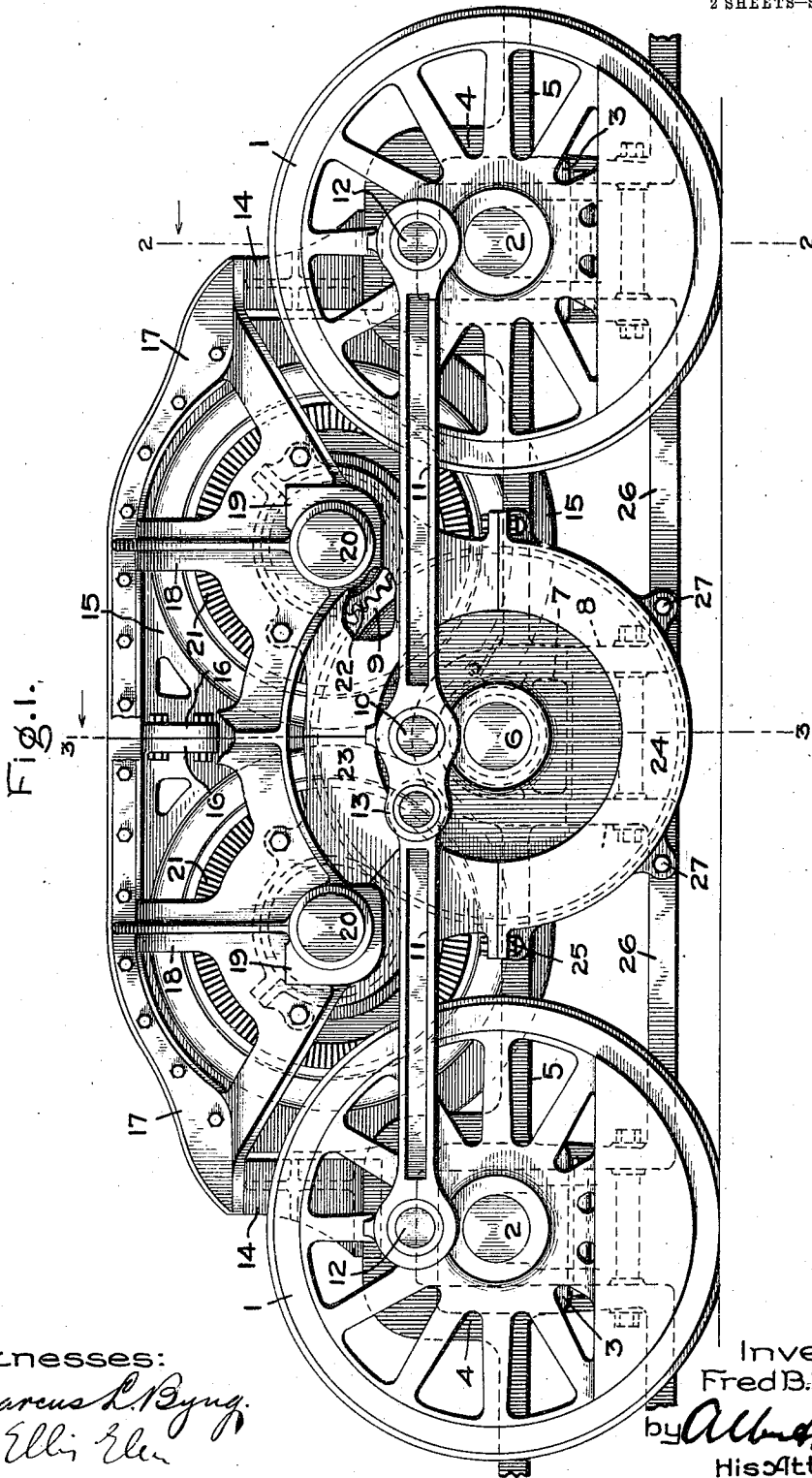


F. B. HOWELL.
ELECTRIC LOCOMOTIVE.
APPLICATION FILED SEPT. 15, 1910.

1,014,825.

Patented Jan. 16, 1912.

2 SHEETS—SHEET 1.



Witnesses:
Marcus L. Byng,
J. Ellis Elin

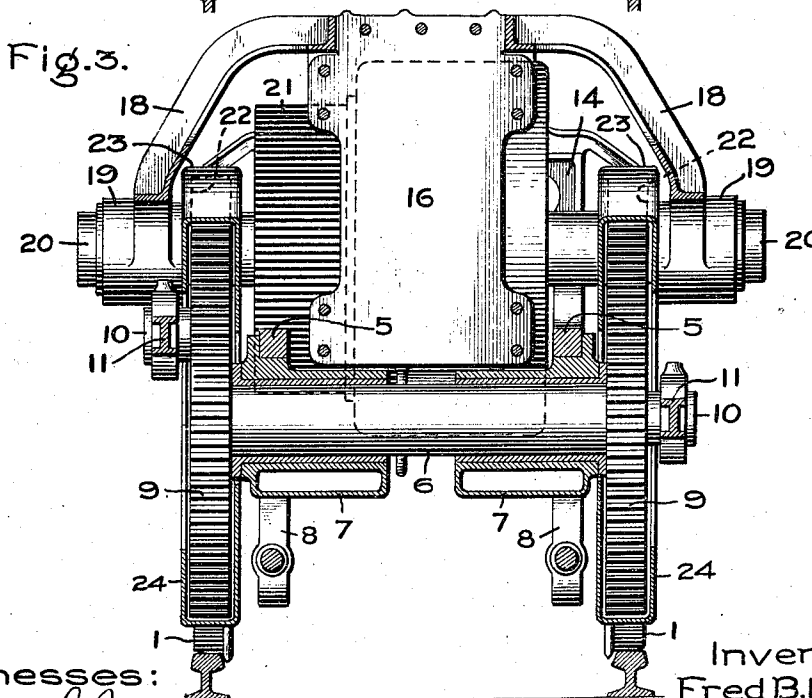
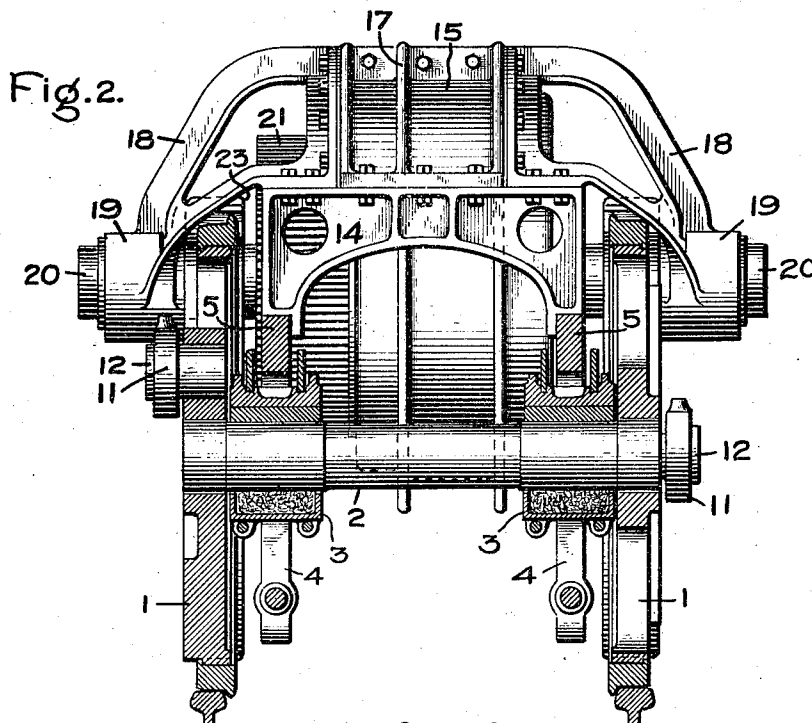
Inventor:
Fred B. Howell,
by *Albert H. Davis*
His Attorney.

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UNITED STATES PATENT OFFICE.

FRED B. HOWELL, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC LOCOMOTIVE.

1,014,825.

Specification of Letters Patent.

Patented Jan. 16, 1912.

Application filed September 15, 1910. Serial No. 582,171.

To all whom it may concern:

Be it known that I, FRED B. HOWELL, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Electric Locomotives, of which the following is a specification.

This invention relates to the propulsion of vehicles by electricity, and its object is to provide a geared electric locomotive in which the weight is reduced without any sacrifice of power and in which the pressure on the gear teeth and the heating of the motors are kept within safe limits. The entire machine is compact and simple in construction, and the transmission of power to the driving wheels is by means of cranks and side rods.

The invention will be better understood from the following detailed description taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of my improved locomotive, slightly broken away to show the gear teeth; Fig. 2 is a transverse vertical section on the line 2—2, Fig. 1, looking in the direction of the arrow, and Fig. 3 is a similar section on the line 3—3, Fig. 1, looking in the same direction.

The driving wheels 1 are secured upon axles 2, which are journaled in the boxes 3 held in the pedestals 4 of the frame 5, in the usual manner. Midway between the driving wheels a jack-shaft 6 is journaled in journal boxes 7, preferably held between jaws 8 similar to those of the driving axle pedestals. The jack-shaft, like the driving axles, has no vertical play between its jaws, its journal boxes being secured rigidly to the frame. This construction, however, enables the jack-shaft to be dropped out of the frame in a manner similar to that employed for removing the driving axles when repairs are needed.

On each end of the jack-shaft is a gear wheel 9 arranged preferably in the plane of the driving wheels. Both gears are of the same size, and each is provided with a crank-pin 10. The pin 10 at one end of the shaft is set quartering with respect to the pin at the other end. Each pin is connected by side rods 11 with suitable crank-pins 12 on the driving wheels on that side of the locomotive. The pins on each pair of wheels are set quartering like those on the jack-shaft.

Each pair of side rods is united by a knuckle joint 13.

Resting on the side frames at each end and preferably just over the driving axles, is a cross bar 14, and on these cross bars are supported the field frames 15 of the two electric motors. Said frames have abutting face plates 16 which meet on a transverse upright plane, as shown in Fig. 1, and are bolted together. The frames are preferably strengthened by ribs 17. Bolted to each side of the upper part of said frames is a depending bracket 18 which extends outward beyond the plane of the driving wheels, and is provided with two journal bearings 19. The armature shafts 20 of the motors are journaled in said bearings, said shafts running transverse of the locomotive and parallel with each other and with the jack-shaft. The armatures of the two motors are mounted, respectively, on these two shafts 20. The commutators 21 of said motors are shown in the drawings, but the brush holders, conductors and all control apparatus are omitted for the sake of simplicity.

On each end of each motor shaft, in the plane of each gear wheel 9 and inside of the journal bearing 19, is a pinion 22, meshing with said gear. All of the pinions are of the same size. The gear and pinions on each side of the locomotive are protected by a gear cover of which the upper part 23 is removably secured to the bracket 18. The lower half 24 of the cover for the gear wheel is detachable, and is supported by the bolts 25 which fasten it to the upper half, and also by the lower members 26 of the side frame to which said part 24 is secured by bolts 27.

The two motors are symmetrically disposed a little above and respectively in front of and behind the jack-shaft, and between said shaft and the driving axles. This makes a very compact arrangement, which keeps down the height of the locomotive. By using two motors instead of one, greater power is secured for the same weight of material. The distribution of the power between two motors and the consequent application of it to the gear wheels at two points instead of one, divides the pressure on the teeth of the gears and pinions so that they are much less liable to break and will not wear so rapidly. Moreover, the duplication of the gears and pinions on both sides of the locomotive still further reduces the trans-

verse stress or pressure sustained by the teeth of said gears and pinions, because of the distribution of the power transmitted. By providing a gear wheel on each end of the jack-shaft and putting a driving pinion on each end of each armature shaft, meshing with a gear wheel, the torsional strains on the armature shafts and jack-shafts are distributed evenly, without danger of distorting the machine. The reduction in size of the motors, due to using two instead of one, enables a quicker dissipation of the heat loss, and greater efficiency because the motors run cooler. The single gear reduction accords with the most approved practice in railway motor design, while the side-rod transmission is a simple and standard form and one most familiar to railway employees. By unfastening the field frames 15 and bracket 18 from the cross bars 14 and taking out the bolts 25, the motors and their pinions with the upper halves of the gear covers can be hoisted out of the locomotive without disturbing the driving and running gear.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. An electric locomotive comprising a frame, driving wheels and axles, a transverse jack-shaft between said axles, a gear wheel on each end of said jack-shaft, crank-pins on said wheels and gears, side rods connecting said crank-pins, two electric motors supported above said jack-shaft and between it and said driving axles, said motors having armature shafts extending across said locomotive, and a pinion on each end of each armature shaft, the pinions on each side of the locomotive both meshing with the gear wheel on that side.

2. An electric locomotive comprising a frame, driving wheels and axles, a jack-shaft journaled transversely in said frame, gear wheels on said jack-shaft, side rods connecting said gears and driving wheels, and two motors provided with pinions to mesh with said gears and having field

frames resting on said frame and removable vertically therefrom without disturbing the driving and running gear.

3. An electric locomotive comprising a frame, driving wheels and axles at the ends thereof, a transverse jack-shaft journaled at the middle thereof, a gear at each end of said shaft, side rods connecting said gears and wheels, two motors located above and on either side of said shaft and between it and the driving axles, pinions on the motor shafts meshing with said gears, and a gear cover for each set of gear and pinions, the upper half of each cover being secured to the motor frame and the lower half to the locomotive frame.

4. An electric locomotive comprising a frame supported on driving wheels, a motor field frame supported on the locomotive frame, brackets on each side of said field frame, and journal bearings in said brackets for the armature shaft of said motor.

5. An electric locomotive comprising a frame supported on driving wheels, a motor field frame supported on said locomotive frame, brackets secured to the upper part of said field frame on each side thereof, and extending laterally and downward therefrom, and journal bearings in said brackets for the armature shaft of said motor.

6. An electric locomotive comprising a frame supported on driving wheels, two motor field frames each supported at one end on the locomotive frame and having abutting face plates secured together, brackets depending from each side of the upper part of said united field frames and provided with journal bearings, and two armatures having their shafts mounted in said bearings.

In witness whereof, I have hereunto set my hand this 14th day of September, 1910.

FRED B. HOWELL.

Witnesses:

HELEN ORFORD,

THOMAS W. NOONAN.