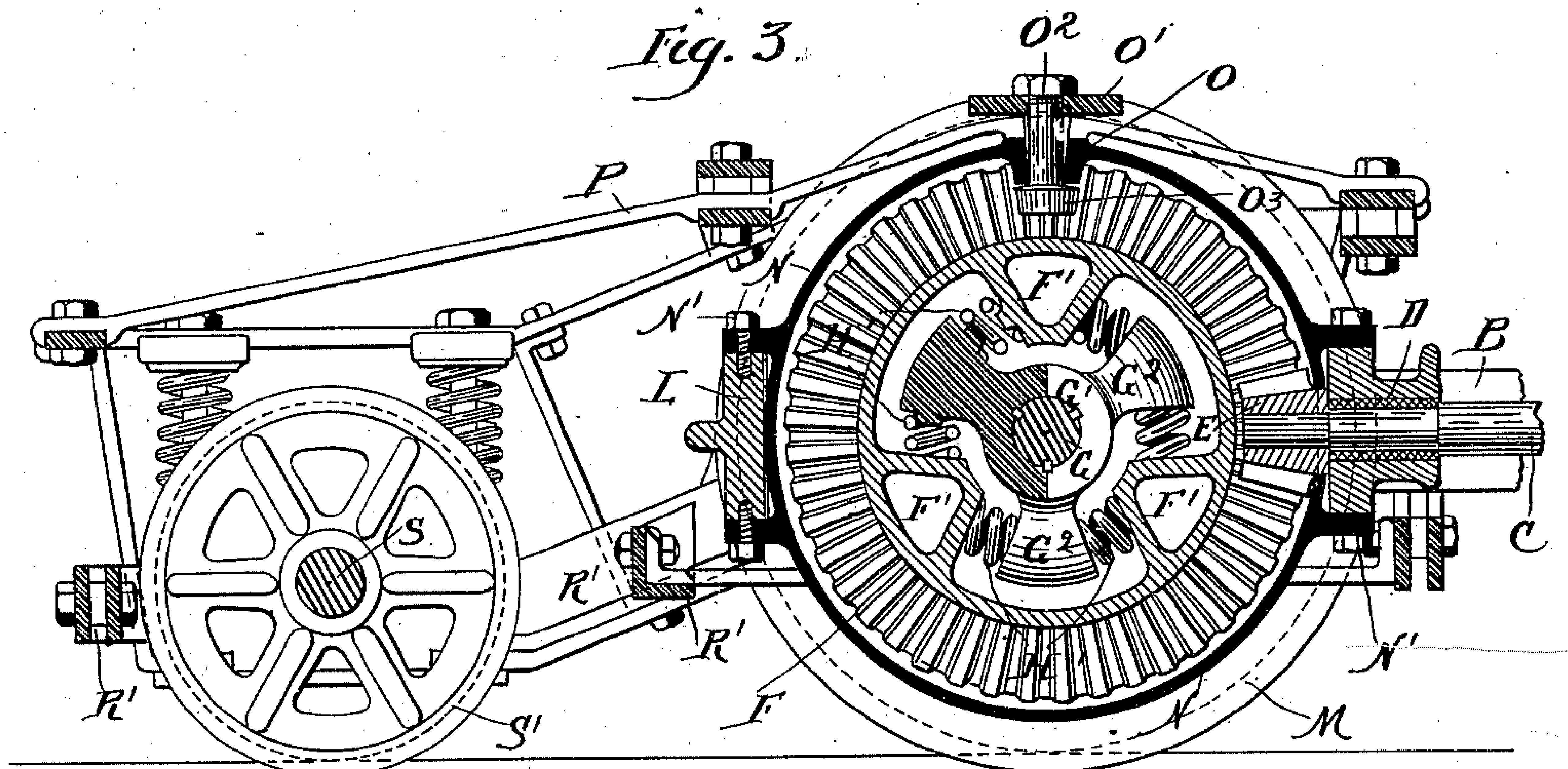
(No Model.) 2 Sheets—Sheet 1.

B. J. ARNOLD.

RUNNING GEAR FOR ELECTRIC RAILWAYS.

No. 542,617. Patented July 16, 1895.

Fig. 3.



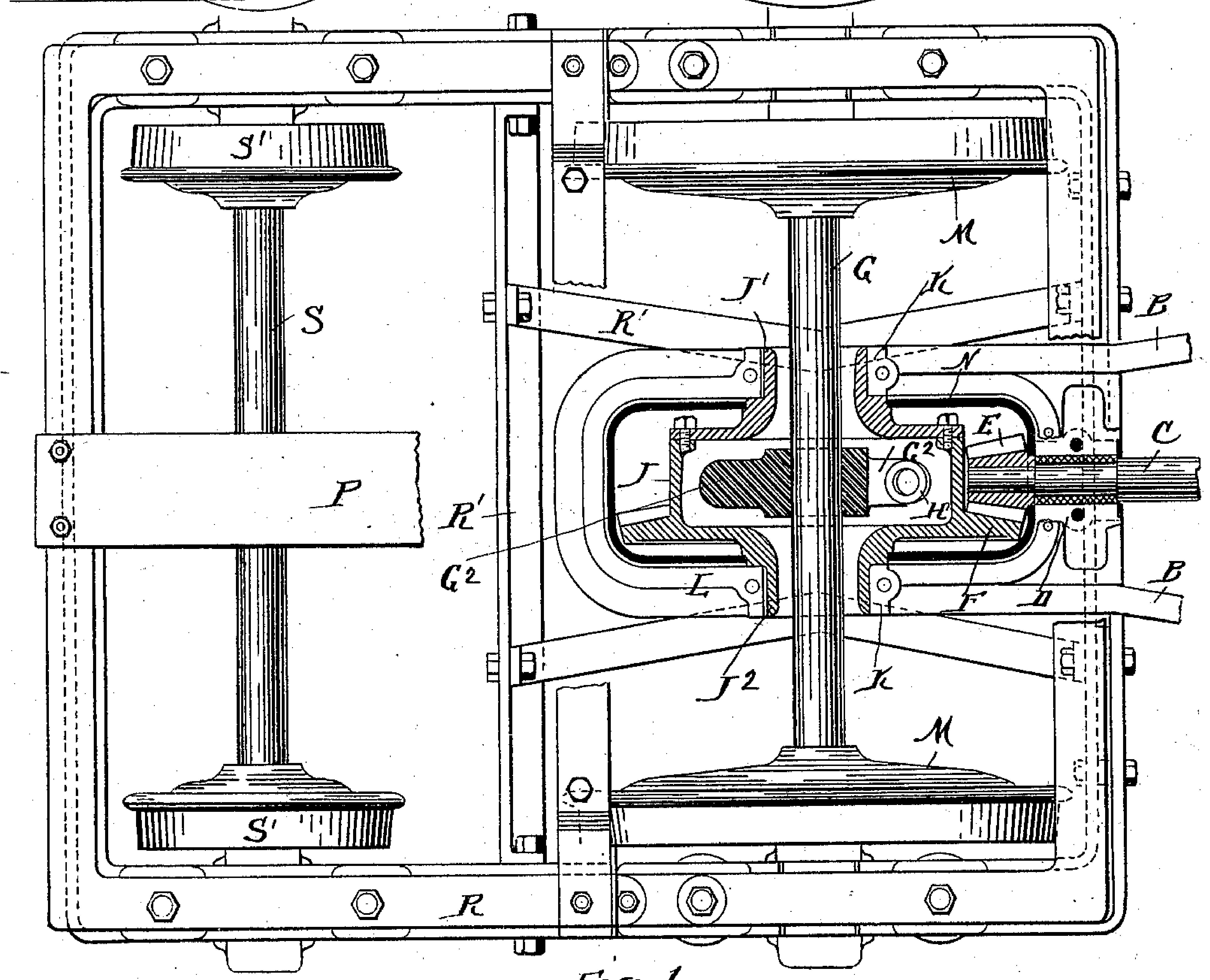


Fig. 1.

Witnesses:

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Celeste P. Chapman

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By Attorney

Francis W. Parker

(No Model.) 2 Sheets—Sheet 2.

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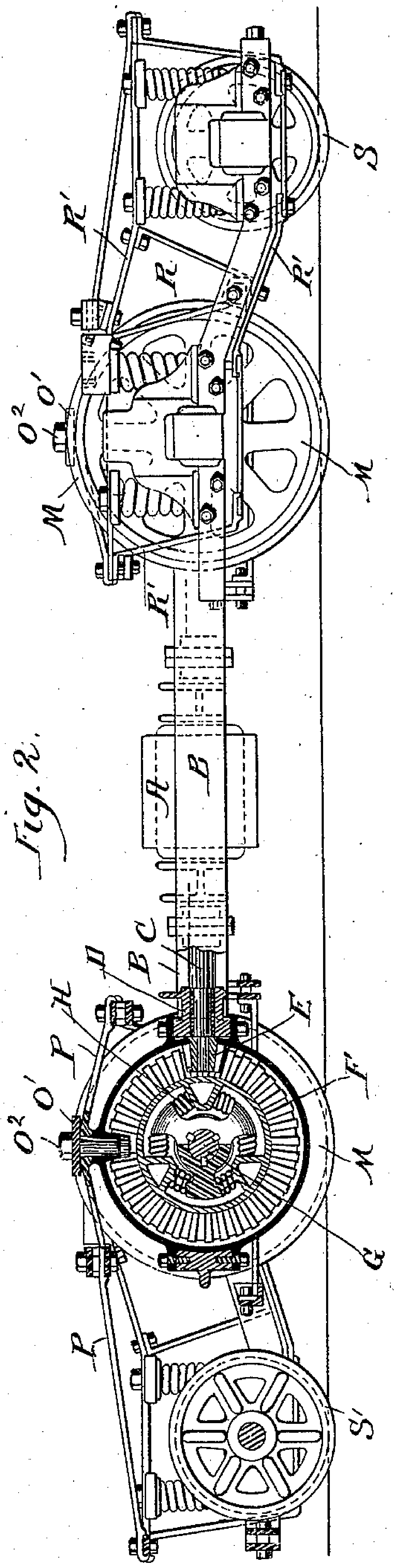
Fig. 2.

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UNITED STATES PATENT OFFICE.

BION J. ARNOLD, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE THOMSON-HOUSTON ELECTRIC COMPANY, OF CONNECTICUT.

RUNNING-GEAR FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 542,617, dated July 16, 1895.

Application filed April 13, 1891. Serial No. 388,631. (No model.)

To all whom it may concern:

Be it known that I, BION J. ARNOLD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Running-Gear for Electric Railways, of which the following is a full, clear, and exact specification.

My invention relates to running-gear for electric-railway cars and means for applying the motor thereto; and it has for its object to provide a motor connection so that the motor can be conveniently suspended between the trucks, a power-transmitting arrangement which will permit free movement of the parts while going around a curve, a truck connection which will compensate for the inequalities of the track, and otherwise to provide a convenient running-gear and motor connection.

My invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a plan and part-sectional view. Fig. 2 is a side elevation and part-sectional view. Fig. 3 is a side elevation and part-sectional view in detail.

Like parts are indicated by the same letters in the figures.

A is the motor, suitably supported from the trucks upon the bars B B and provided with the driving-shaft C, which projects in both directions from the motor, passes through the journal-box D, and carries the gear E, which is adapted to engage the large beveled gear F. Inwardly projecting from the gear F are the ledges F′ F′, three in number.

G is the driving shaft or axle of the truck, and keyed upon it is the collar G′, from which project the three lugs G^2 G^2 normally, each midway between two of the ledges. Between each lug and its opposed ledges are disposed spiral springs H H, held in place, if desired, by the projections H′ H′.

The large gear-wheel F is hollow and provided with the extended flange J, to which is bolted or secured the large bearing-sleeve J′. In the other direction the gear is outwardly extended so as to form a similar bearing-sleeve J^2. These sleeves are suitably journaled in the boxes K K, which are formed upon the frame-piece L, to which the bars or rods B B are firmly attached.

The driving-shaft G carries the wheels M M and passes through the bearing-sleeves J′ J^2, having free room to swing in the enlarged openings of such sleeve.

Exterior to and inclosing the two gears is a casing composed of the parts N N, suitably secured together by bolts N′ N′, and thus rigidly secured to the frame L, and the bars B B, whereby a self-contained device consisting of the casing, the gearing, the journals for the gears, and the bars B B is made. This casing is provided with a heavy vertical central portion containing a journal-box O, upwardly increasing in diameter, as shown.

O′ is a cross-beam, from the middle of which depends the journal-bolt O^2, having on its lower end the flange O^3 with upwardly-concave surface.

P is a brace which is at right angles to the beam O′ and is provided with an aperture through which the bolt O^2 passes, and it is also convex at the point of its engagement with the cross-beam O′. The brace and cross-beam are suitably supported upon the truck in any convenient manner.

R is such truck-frame containing the beams, bars, and braces R′ R′, and provided with suitable journal-boxes, so as to carry the wheels M M and the axle S and wheels S′ S′.

I do not consider it necessary to describe the construction of the truck, as this is no part of my invention, and that which is essential to my invention would be easily applicable to many and various kinds of trucks. The specific devices which I have described might also be greatly varied and changed in their positions, relations, and construction without materially departing from my invention, and I do not wish to be confined to the details of the construction shown.

The use and operation of my invention are as follows: With my running-gear and motor as herein shown applied to a car it is evident that when the motor is energized so as to move its shaft in either direction motion will be immediately imparted to the large gear F through the small gear E, and this motion will be transmitted by the springs, lugs, and ledges to the axle G, and hence to the driving-wheels M M. Thus the power is transmitted from the motor to the driving-wheels, so as to move them in either direction and through an elastic medium. When the car approaches a curve the truck will tend to occupy a position actually angular to the axis of the motor-shaft, and this motion is permitted without interfering with the driving connection, since the connection between the large gear-wheels and the shaft G is made by the spiral spring or an elastic medium, which permits the axle G thus to be at various angles to the motor-shaft as well as a right angle. This range of angular motion of the axle is limited only within reasonable bounds by the size of the apertures in the bearing-sleeves J′ J^2 and the relation between the diameters of such apertures and the diameter of the axle G.

It is found in operating roads that there are inequalities, so that the driving-wheels M and the wheels S′ would not always have exactly the same relation to each other; but there will be a certain tendency to move one set of wheels about the other as a center. Now since the driving-gear or power-transmitting device is supported at one point only on the truck, and that from a vertical pin or bolt O^2, this pin must be so journaled as to permit the movement of the wheels S′ about the wheels M for a short distance at least, and this requires that the central pivot-pin or journal O^2 should be journaled in an aperture of increasing diameter upwardly and that the flange O^3 and brace P should be provided with concave bearing-surfaces, as shown. When the trucks tend to turn or move themselves angularly with reference to the motor-shaft, they must of course swing upon a pivotal point, and this point must be vertically in line with the point of intersection of the axes of the motor-shaft and driving-axle G.

The casing which contains the driving-gears may have a quantity of oil or other lubricating material.

As previously stated, I do not care to be limited to the specific form of structure shown. An important feature of this device is the combination of the driving-axle of a truck with a driving-motor mechanism which contains or consists of a sleeve-like part encircling the axle, said sleeve-like part and axle having normally coincident axes of revolution, the interior diameter of said sleeve-like portion being greater than the diameter of the axle. This construction permits a considerable variation in the relative positions of said sleeve and axle, both with reference to the lateral, longitudinal, and angular motion of the axle with reference to the sleeve. The limit of these several movements will be determined by the peculiarities of the construction employed in any given case. Evidently, therefore, the motor may be at a distance and adapted to drive the sleeve-like portion, if desired. It will also be observed that the bars upon which the motor is suspended are themselves attached to the frame which carries the sleeve, and the bars themselves are suspended from the spring-supported part of the truck. Thus the motor is itself spring-supported.

I claim—

1. The combination of a frame carried upon trucks loosely supported at opposite ends upon wheeled axles, an electric motor thereon, speed-reducing gearing between the armature and the axle, and elastic connections permitting play of the gearing eccentrically out of normal alignment with the axle, as set forth.

2. The combination of trucks spring-supported at opposite ends upon wheeled axles, an electric motor carried by a supplemental frame supported thereon, a gear-wheel having a rigid bearing in the frame and driven by the armature, a second wheel meshing with the first, and surrounding the axle with sufficient clearance to allow relative play, and means for transmitting the rotating movement of said gear to the axle while permitting easy relative play of the parts, taking up the movements of the motor relatively to the axle, as set forth.

3. The combination of trucks spring-supported at opposite ends upon wheeled axles, an electric motor carried in a supplemental frame thereon, and elastic gearing connecting the armature to an axle upon each of the trucks and permitting play of the gearing eccentrically, taking up the play of the motor relatively to the axles, as set forth.

4. The combination of an electric motor carried in a frame mounted on spring-supported trucks, a gear having a rigid bearing therein and operated by the motor, a driven gear-wheel meshing therewith surrounding the axle and sharing the movements of the motor relatively to the axle so as to preserve it in fixed relation relatively to the armature, and elastic couplings joining the gear-wheel and the axle, as set forth.

5. The combination of a truck-frame spring-supported upon wheeled axles, an electric motor carried in a frame thereon, and a gearing between the armature and axle which shares the play of the motor, but permits the axle to play both angularly and eccentrically relatively to the driven member of the gearing, as set forth.

6. The combination of trucks spring-supported at opposite ends upon wheeled axles, an electric motor carried in a frame thereon having an armature extending longitudinally of the truck and geared to two of the axles, and two-part gears connecting the armature with the axles having elastic couplings permitting freedom of play of the axles relatively to the armature, as set forth.

7. In an electric car, the combination of a frame loosely supported at opposite ends on wheeled axles, a driving gear journaled in rigid bearings in the frame, and a loose connection between one axle and said gear permitting an eccentric oscillation of the axle in relation to the gear.

BION J. ARNOLD.

Witnesses:
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H. M. DAY.