(No Model.) 3 Sheets—Sheet 1.

C. J. VAN DEPOELE.

MULTIPLEX ELECTRIC LOCOMOTIVE.

No. 432,345. Patented July 15, 1890.

Fig. 1.

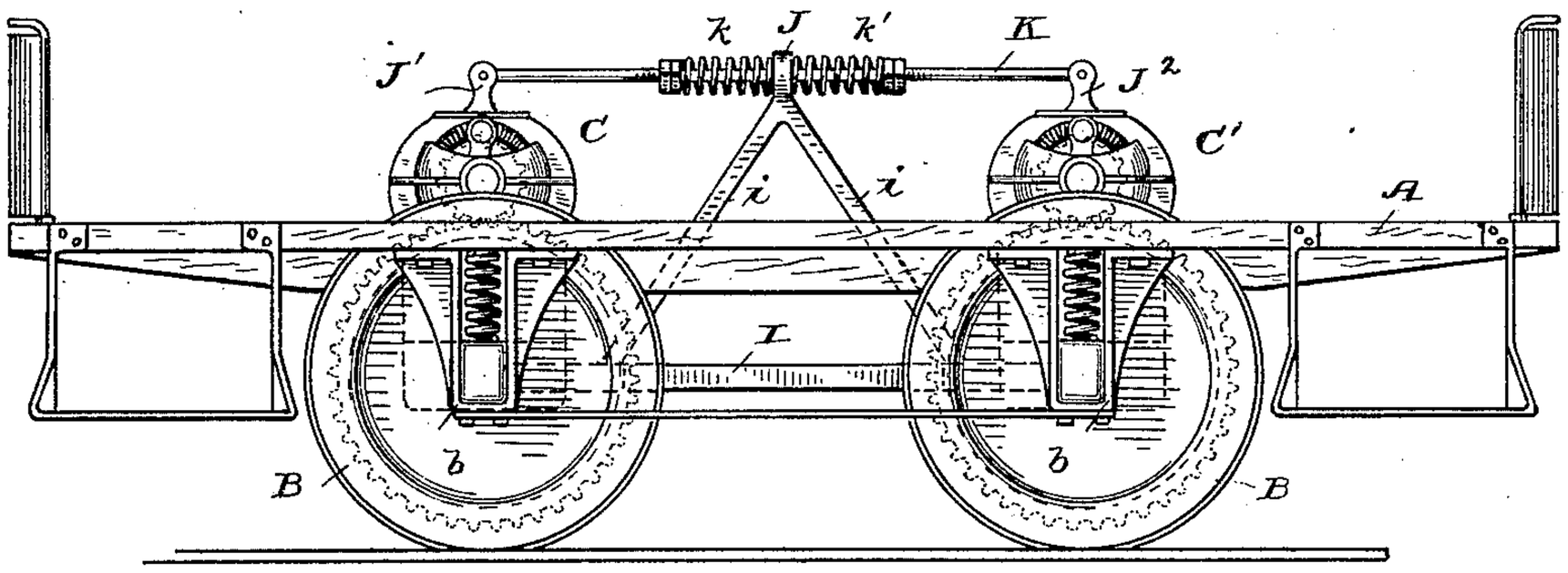


Fig. 3.

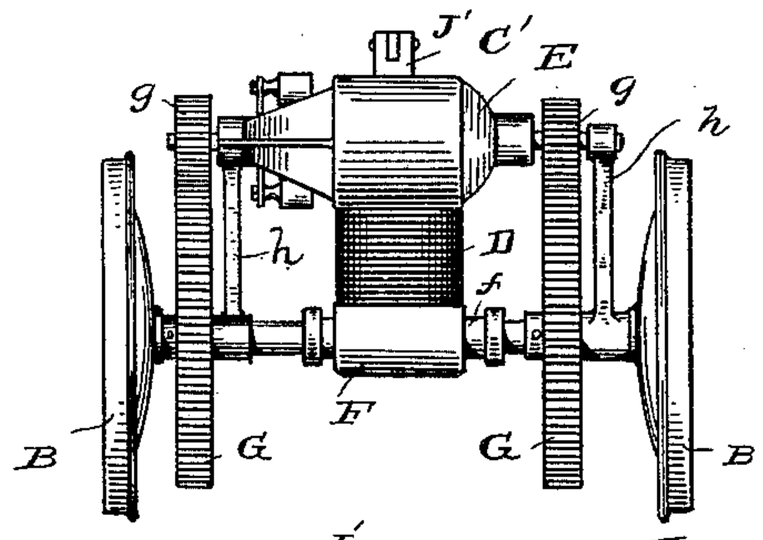
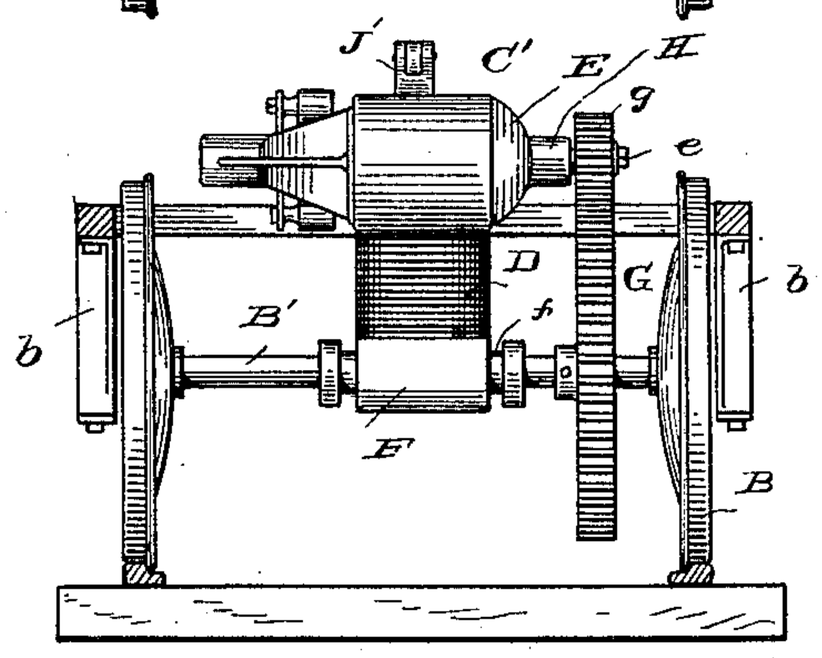


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 4.

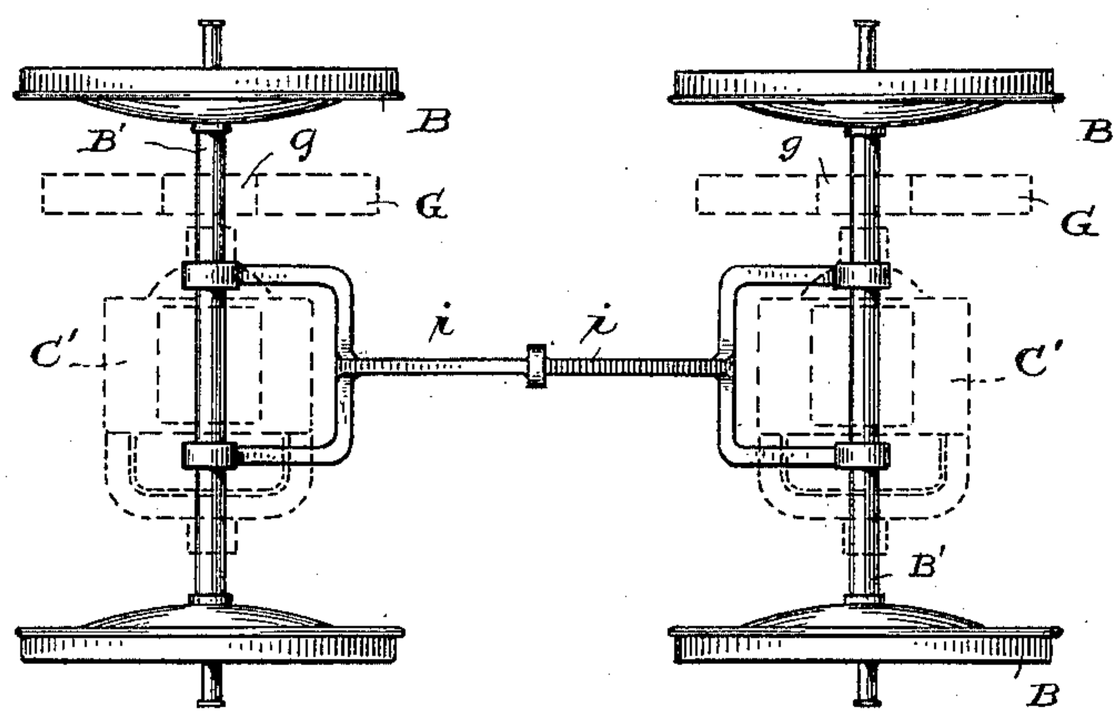

Fig. 5.

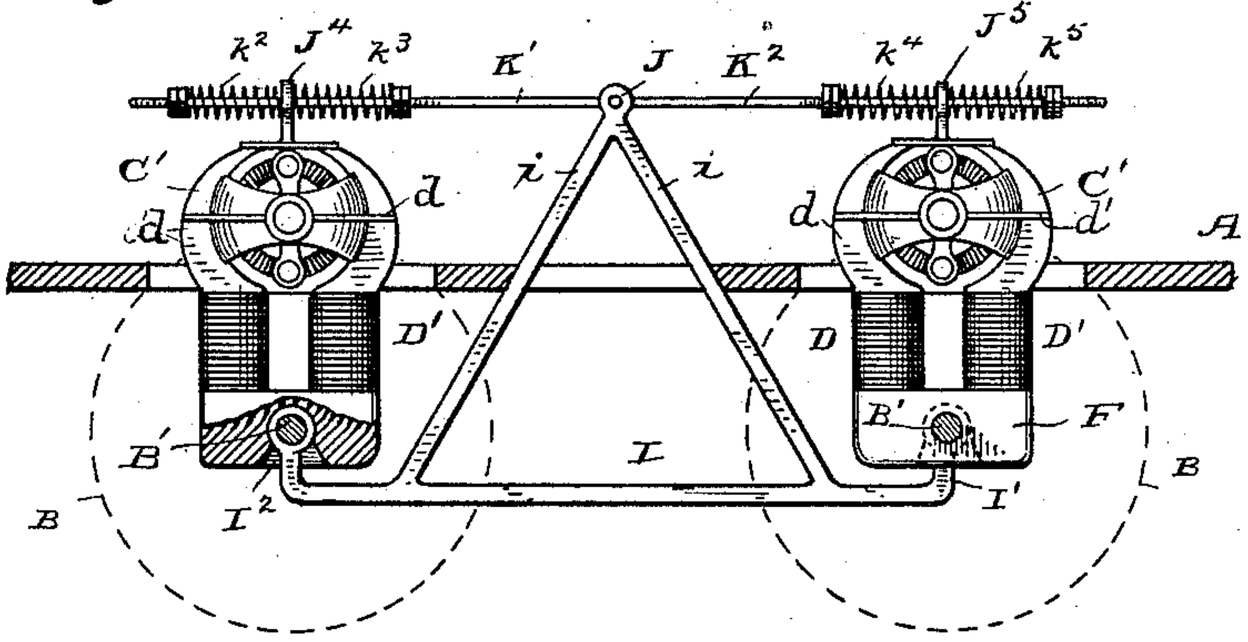

Fig. 6.

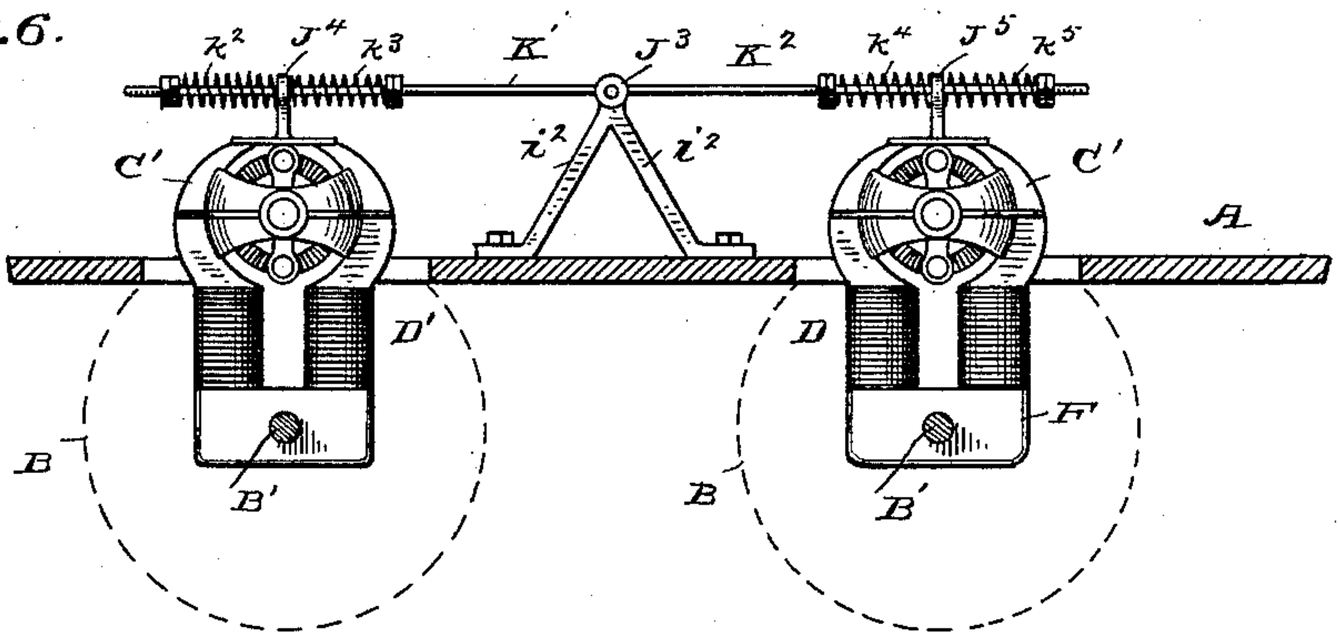

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Fig. 7.

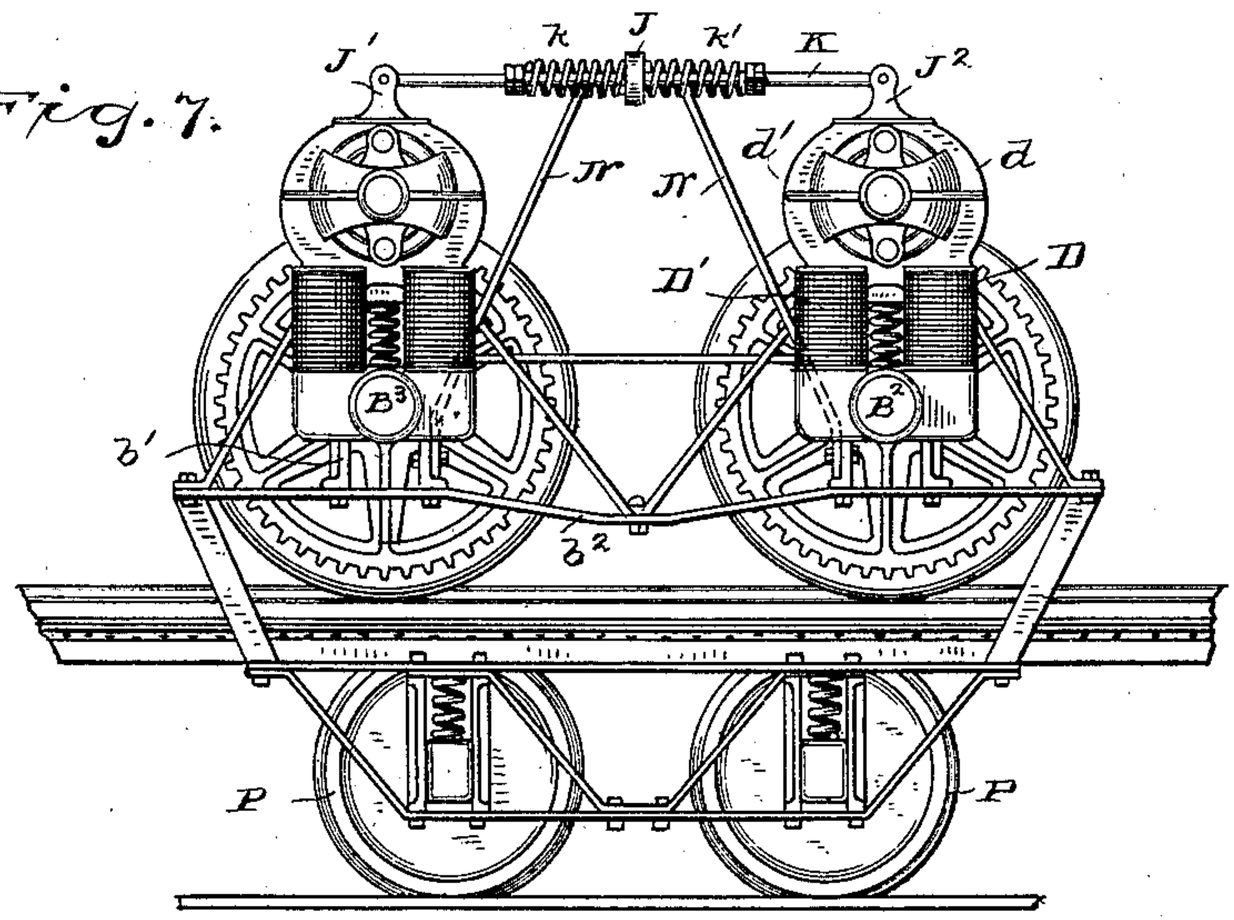
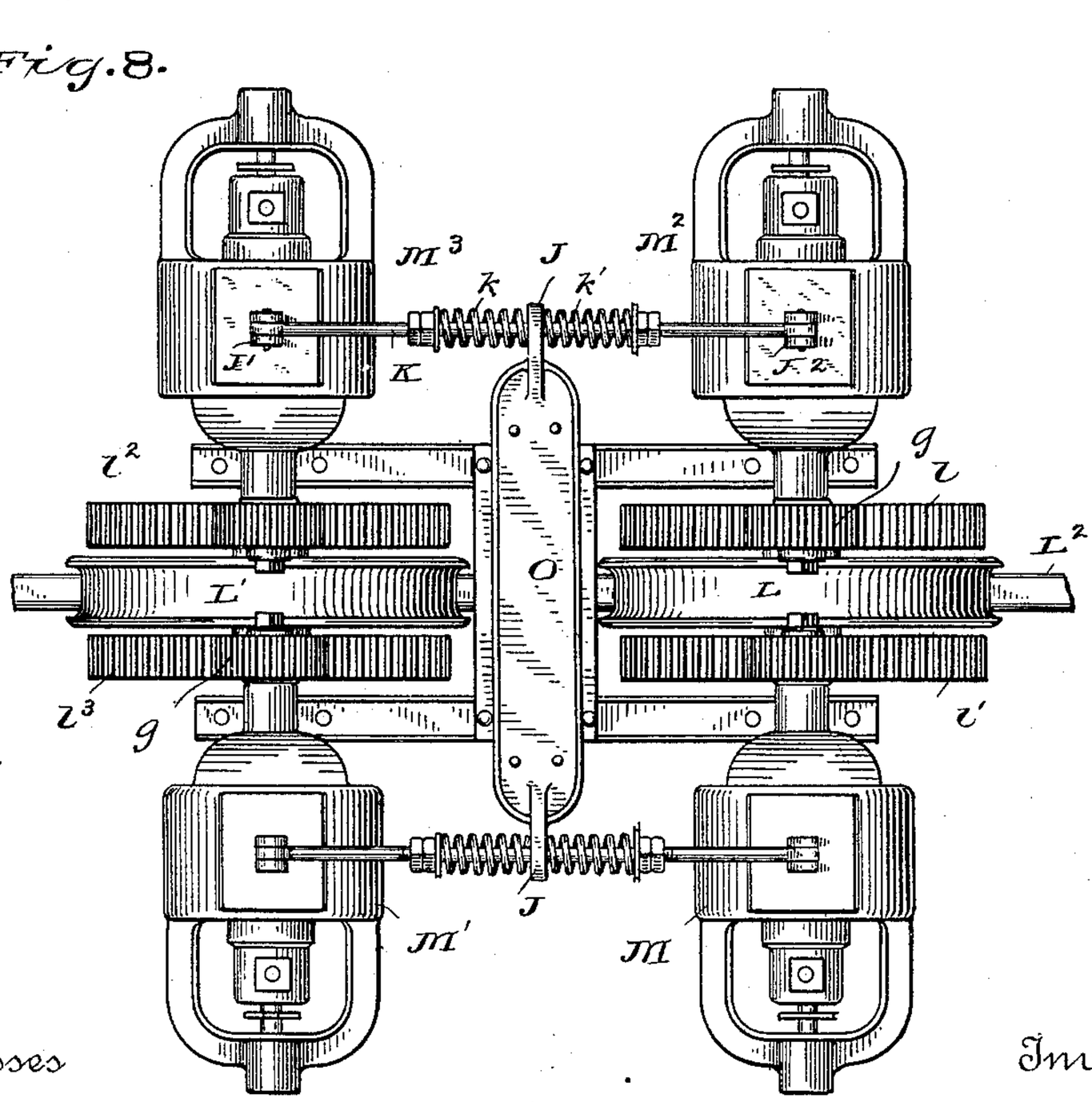


Fig. 8.



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UNITED STATES PATENT OFFICE.

CHARLES J. VAN DEPOELE, OF LYNN, MASSACHUSETTS.

MULTIPLEX ELECTRIC LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 432,345, dated July 15, 1890.

Application filed March 11, 1889. Serial No. 302,931. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. VAN DEPOELE, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Multiplex Electric Locomotives, of which the following is a description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to improvements in electric locomotives, and comprises an improved method of arranging, sustaining, and connecting the propelling motor or motors with relation to the axle or axles of the driving-wheels to which the power is to be applied.

The invention is not limited to any particular form of truck or vehicle, since it may be used wherever applicable.

The details of construction, arrangement, and operation of my improvements will be hereinafter fully described, and referred to in the appended claims.

In the drawings, Figure 1 is a view in elevation, showing an electric locomotive embodying my invention. Fig. 2 is an end view of the locomotive seen in Fig. 1. Fig. 3 is a detail view showing a slightly different construction of the motor-support. Fig. 4 is a plan view showing the motor-supporting devices seen in Fig. 1. Fig. 5 is a side elevation, partly in section, showing a somewhat different construction of the motor sustaining and supporting devices. Fig. 6 is also a side elevation showing a modification of the arrangement seen in Fig. 5. Fig. 7 is a side elevation showing the application of my invention to a truck of special form. Fig. 8 is a plan view of what is shown in Fig. 7.

As indicated in the drawings, A is the frame of a car or other vehicle, which frame is carried upon two pairs of separately-mounted supporting-wheels B B, which may be spring-supported in pedestals *b b* in any known manner, and are hereinafter referred to as the "driving-wheels."

B′ B′ are the axles of the driving-wheels.

C C′ are electric motors of the type provided with parallel field-magnet cores D D′, terminating in polar extensions *d d′*, between which the armature E is transversely supported. The lower extremities of the field-magnets D D′ are connected by an iron yoke F, which is formed or provided with a transverse central aperture *f*, forming a journal, which is secured about and includes the axle of the driving-wheels, to which the motor is applied. The motor is sustained in a substantially vertical position upon the axle of its driving-wheels by its bearing *f* thereon. The journal *f* may be lined with anti-friction material, requiring no oil, or of the ordinary Babbitt, and supplied with lubricating devices of any desirable form. The axle of each pair of driving-wheels is provided with single or double large toothed wheel or driving-gear G, and the armature-shaft *e* is provided with a driving-pinion *g*, or with one on each end meshing with the driving gear or gears G. Since the armature-shaft *e* is at all times parallel with the axle of the driving-wheels, the relation between the armature-pinion *g* and the driving-gear G will remain always the same. By suitably proportioning the sizes of the pinion and driving-gear the simplest possible mechanical connection is provided between the armature and driving shafts, and all complication is thereby avoided. The armature-shaft *e* is provided in rear of the pinion *g* with a strong sleeve-bearing H, which, being properly secured to the polar extensions of the field-magnets, will receive the upward pressure of the armature-shaft and the pinion in mesh with the driving-gear. It may, however, be desirable in some instances to extend the armature-shaft beyond the pinion G and to journal a link-connection *h* upon both the armature-shaft and the driving-axle to provide an additional element of strength and durability to the motor-support. Links *h* are desirably placed at each extremity of the armature-shaft when double gearing is used.

As here shown, both the driving-axles are provided with motors constructed and arranged as just described. Upon starting the motors the mechanical effect of the driving-pinion *g* upon the driving-gear G will tend to rock the motors upon their axes forward or backward, according to the direction of movement, but without altering the relation between the pinion and driving-gear. The same

effect will take place when the vehicle is being slowed down or stopped, and it will be impossible to successfully operate a locomotive constructed as here described without some means for absorbing or cushioning this rocking tendency of the motors, since, if held rigidly, so destructive a strain would be put upon the teeth of the gearing that it would result in very rapid wear, if not in actual breakage. I therefore provide buffer-springs arranged, for example, in the following manner:

Between the driving-axles is located a rigid bar or frame I, which, for convenience, may be bifurcated at each extremity and its ends f' f' journaled upon the ends of bearings f f or upon the driving-axles on each side of the bearings f f' of the motor. The frame I prevents any change of distance between the said driving-axles; but its connection therewith must be sufficiently flexible to permit of their accommodating themselves to differences in the height of the rails upon which the driving-wheels are supported. A vertical standard or standards i i extend upward from the bar I, terminating in a rigid guide J, located midway between the upper extremities of the motors C C'. Upon the upper extremity of each motor C C' are secured rigid lugs J' J^2, and a longitudinally-extending bar K is hinged to each of the lugs J' J^2, passing through the guide J. Upon either side of the guide J are placed buffer-springs k k', the outer extremities of which are securely connected to the bar K and their inner extremities resting against the guide J. The said inner extremities of the springs k k' may be attached to the guide J or merely in contact therewith, in order to secure single or double action, as may be desired. The opening in the guide J through which the rod K passes should be large enough to admit of some lateral movement in said rod, in order to permit lateral oscillation of the motors, as separate sets of driving-wheels pass over portions of the track of different heights. Each motor being mounted in fixed relation to its supporting-axle, the driving pinion and gear will remain always in the same relation. The two complete sets of driving mechanism represented by each moter and its driving axle and wheels will oscillate somewhat with respect to each other upon an uneven track, and by providing some play for the rod J in the guide K these movements can take place without disarrangement or injury to any of the parts. The rod K should, however, be longitudinally quite rigid, in order to keep the distance between the upper extremities of the motors constant. Then on either starting or stopping the said motors they will rock forward or backward against the pressure of the springs k k', which said springs will absorb any sudden strain or pressure to which the gearing would otherwise be subjected.

As indicated in plan view, Fig. 4, the bifurcated extremities of the bar I, being preferably supported upon the extremities of the sleeve-bearings f f', upon which the motors are journaled, will be somewhat separated and will depend for their freedom of movement upon a loose fit upon feed-bearings or upon the torsional flexibility of the bar I, which in case of very uneven track might subject the bar to undesirable strain. This difficulty can be entirely avoided by supporting the bar I centrally upon the axles B B', for example, as indicated in Fig. 5, where the bar I is provided with upturned extremities I', which are supported upon the sleeve-bearings f f' at about their central portion, the yokes F of the motors being provided or formed with suitable recesses i^2 in their lower portions to receive the ends i' of the bar I. With this arrangement very little play between the extremities of the bar I and the supporting-sleeve will be sufficient to prevent cramping of the axles B B'.

Instead of making the rod K rigid and in one piece, it may be made in two parts K' K^2, the rods K' K^2 being hinged to a projection J^3 upon the arms or standards i i. With this arrangement the lugs J^4 J^5 upon the upper portions of the motors are desirably apertured to receive the rods K' K^2, which pass horizontally therethrough and are provided on each side of the said lugs J^4 J^5 with buffer-springs k^2 k^3 k^4 k^5, the action of which is similar to that of the springs k k', but may give under some conditions a greater controllable range of movement, if desired.

When the separate arms K' K^2, articulated to their support, are used, it will not be necessary that the central brace should be connected to the axes of the motors, and an arrangement such as seen in Fig. 6 may be employed, in which the standards i^2 i^2 are secured directly to the frame or bed A of the vehicle, which, being secured in longitudinally-fixed relation to said axles, will then take the place of the bar I.

In Fig. 7 a form of truck is shown in which two driving-wheels L L' are shown and arranged tandem upon a single rail L^2, the said driving-wheels being each provided with separate axles B^2 B^3, which are supported in suitable journals spring-mounted in pedestals b', connected to longitudinal frame-bars b^2, instead of to the frame A, as in the case of the vehicle previously referred to. On opposite sides of the said driving-wheels are secured upon the axles thereof driving-gears l l' l^2 l^3. Two pairs of motors M M' M^2 M^3 are mounted upon the extremities of the said driving-axles in substantially the manner hereinbefore described. The armature-shaft of each motor is also provided with a pinion g, meshing with the gear-wheels l l' l^2 l^3. The motors rock upon their axes, as previously described, and their action is controlled by buffer-springs k k', working against the guide J, as stated with reference to the preceding figures.

Braces N N' extend upward from the central portion of the frame, and are secured at

their upper ends to and thereby support a transverse piece or bar O, upon the extremities of which are formed or secured the guides J J, through which pass the rods K, and against which the springs *k k'* have their bearing. The form of truck herein shown and referred to is designed for a special purpose, and is further provided with balancing or safety wheels P P, which are suitably connected to the main portion of the truck; but, since the peculiar form of operation or construction of the said truck forms no part of the operation further than the application of my improved manner of arranging, sustaining, and connecting the electro-motive power thereto, a detailed description thereof is unnecessary. It will be entirely obvious that instead of connecting the motors and mechanism shown in Figs. 1 to 5 to driving-wheels separately connected with the body of a vehicle the said driving-wheels might be connected to a separate truck, upon which the body of a vehicle might be subsequently placed, or to a separate truck designed to be pivotally connected under one end of a car-body, as in the well-known railway passenger-coach. The improved relation between the propelling-motors and the wheels to be driven secured by my present invention is wholly independent of the particular form of truck or connection with the vehicle to which they may be applied, and may be varied in many matters of detail without departing from the invention. It will be obvious, also, that the buffer-springs and support therefor might be used equally well where a single motor mounted upon its driving-axle was used instead of a plurality thereof; also, that instead of bifurcating the extremities of the bar I two separate bars might be used—one at each side of the motors—the said bars being each provided with braces *i*, to which the buffer-springs might be separately connected.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of two axles, two propelling-motors journaled upon and radially movable upon their respective axles, a stationary longitudinal connection between the motors, and buffer-springs upon the stationary longitudinal connection, whereby each motor is flexibly supported with reference to the axles.

2. In an electrically-propelled vehicle, a plurality of sets of driving-wheels secured rigidly upon transverse axles, a motor or motors journaled upon and radially movable upon said axles, driving-gears upon the driving-axles, and driving-pinions upon the armature-shafts in mesh with said driving-gears, longitudinal connections between the upper extremities of the motors, and a buffer spring or springs upon said rigid connection for absorbing the oscillations of the motors, substantially as described.

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

CHARLES J. VAN DEPOELE.

Witnesses:

J. W. GIBBONEY,

CHARLES L. OECHSNER.