

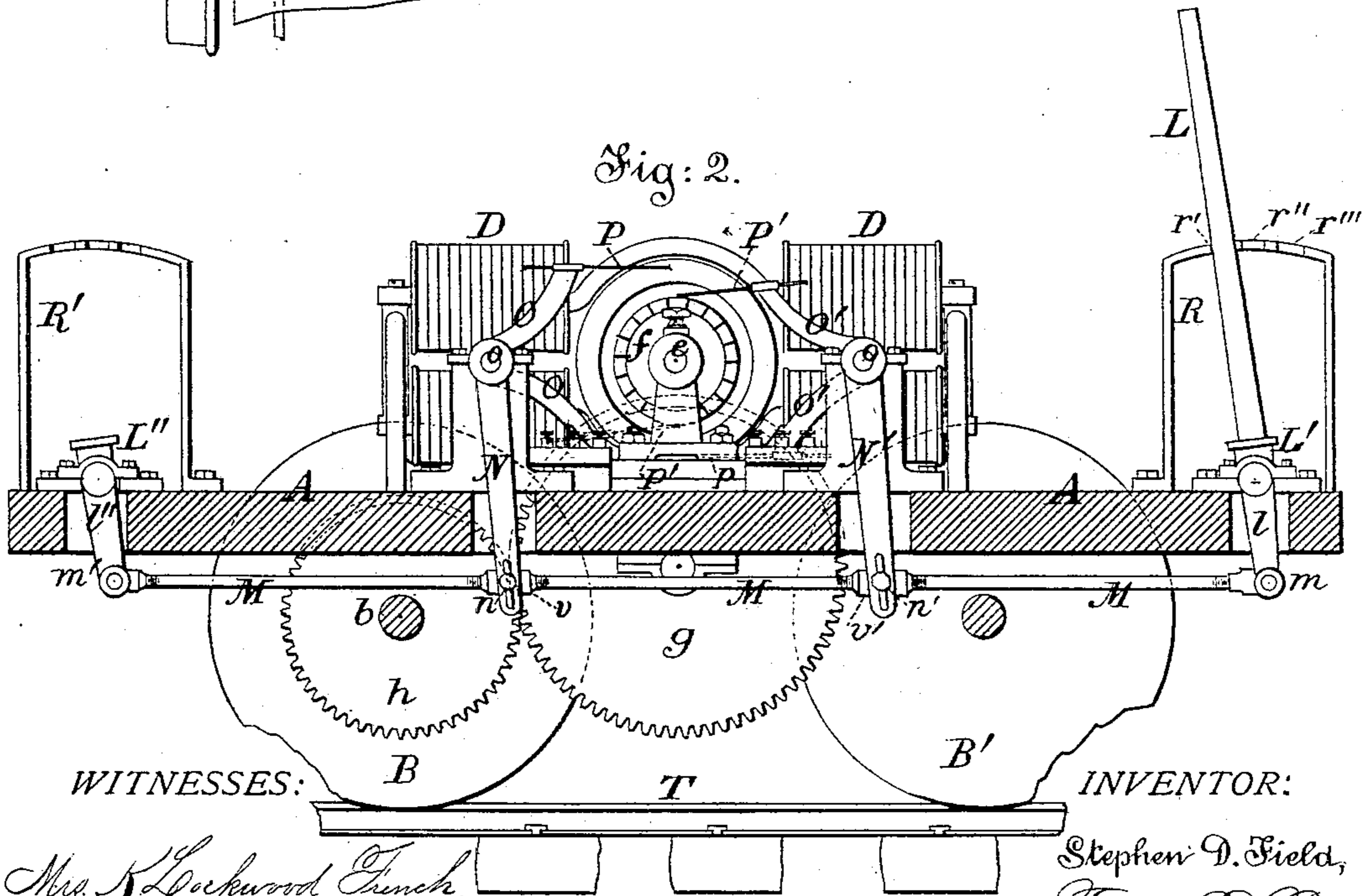
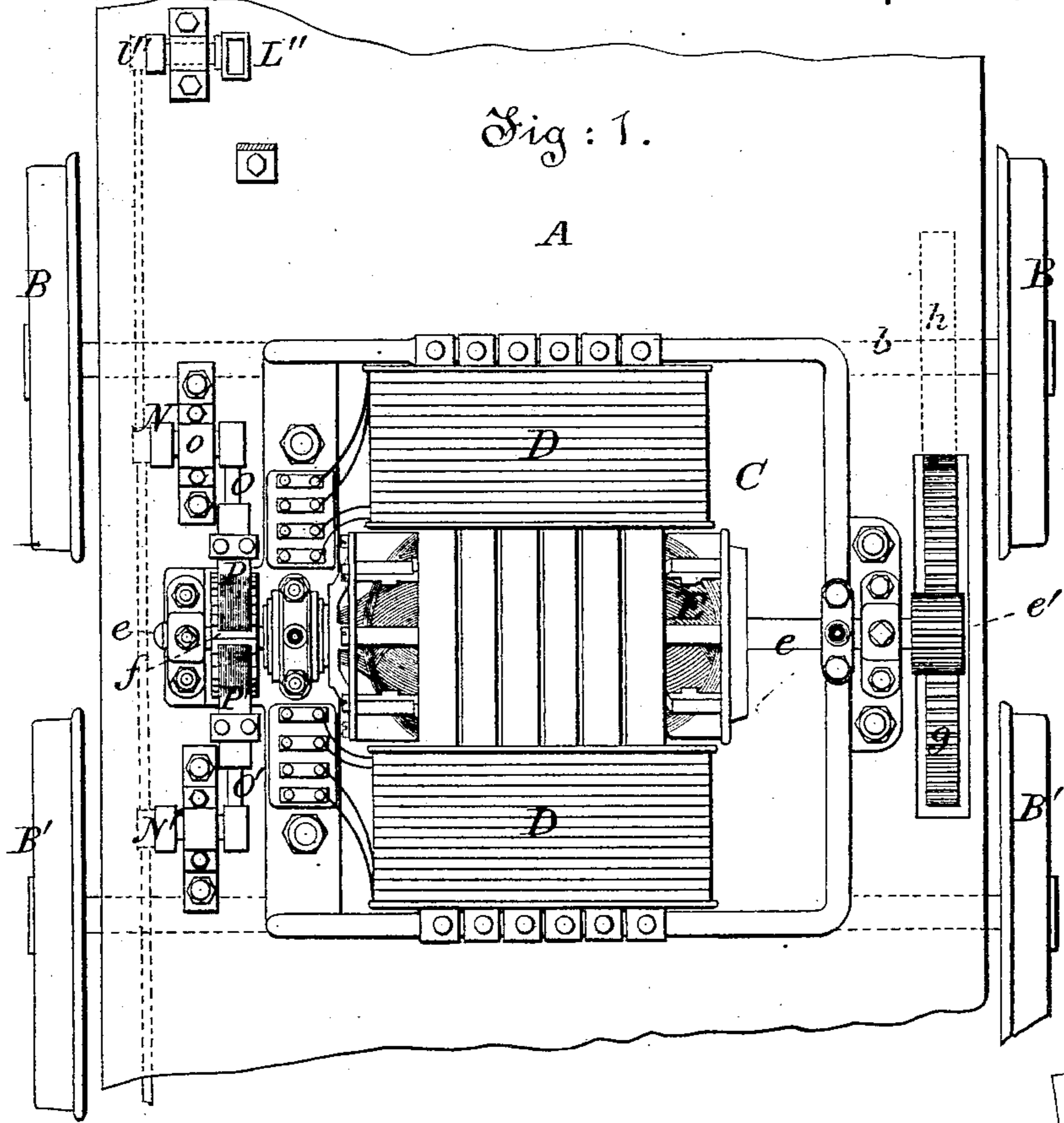
(No Model.)

S. D. FIELD.

Electro-Magnetic Locomotives.

No. 232,253.

Patented Sept. 14, 1880.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

STEPHEN D. FIELD, OF NEW YORK, N. Y.

## ELECTRO-MAGNETIC LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 232,253, dated September 14, 1880.

Application filed July 3, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, STEPHEN D. FIELD, of the city, county, and State of New York, have invented certain new and useful Improvements in Electro-Magnetic Locomotives, of which the following is a specification.

My invention relates to certain improvements in the method of and apparatus for propelling a car, carriage, or vehicle along the track of a railway by the action of an electro-motor mounted upon such vehicle, the axis of said motor being mechanically connected with the driving-wheels thereof by means of spur-gearing or otherwise, and the power which operates said motor being supplied by one or more stationary dynamo-electric generators, each of which is driven by a steam-engine or other suitable or convenient motor. Electric generators of this description are intended to be placed at suitable distances apart along and in the vicinity of the line of the railway. This system as a whole is particularly set forth and described in another application for Letters Patent, which was filed by me in the Patent Office on or about the 10th day of March, A. D. 1880, to which reference is had.

My present invention consists in certain improvements in the details of construction of the electro-magnetic locomotive described in my pending application hereinbefore referred to; and it consists, first, in combining with the electro-motor of said locomotive and its commutator two sets of contact-springs or other equivalent devices, one set being so adjusted in relation to the commutator as to produce rotation of the motor in one direction, while the other set is so adjusted as to produce rotation in the opposite direction, whereby the direction of rotation of the motor and the consequent direction in which the carriage or locomotive is propelled is determined by bringing one or the other of the two sets of contact-springs into operative connection with the commutator; second, in combining with the two sets of contact-springs and the electro-motor and its commutator, constructed and arranged in the manner hereinbefore stated, a lever adapted to throw either one of the two sets of contact devices into action and the other set out of action upon the commutator by a single movement, whereby

the driver or attendant is enabled to instantly reverse the direction of rotation of the motor at pleasure; third, in so arranging the controlling-lever, hereinbefore referred to, that it may be capable of being placed in three different positions, the first position throwing the devices for producing a direct motion of the motor into relation with the commutator, the second withdrawing all the contacts from the commutator, and the third throwing the devices for producing a reverse motion of the motor into relation with the commutator; fourth, in combining with the electro-magnetic motor and its commutator and two sets of commutator-contacts, respectively adjusted to produce a direct and a reverse motion of the motor, a shifting bar or rod so arranged that a movable lever for controlling the same may be attached at either one of two or more different points, whereby the driver is enabled to control the movements of the locomotive while stationed at the forward end thereof when traveling in either direction, and is thereby enabled to have a clear view of the track which is about to be passed over; fifth, in combining with an electro-magnetic motor and its commutator having two sets of contact devices respectively adjusted to produce a direct and reverse motion of said motor, a shifting bar or rod adapted to throw one set of contact devices into contact and the other set out of contact with the commutator by a single movement, and suitable means of adjustment, whereby the respective positions of the two sets of contacts with relation to each other, to the commutator, and to the shifting-bar may be regulated so as to compensate for the wear of the contact-springs and to secure the most effective action from the motor when rotating in either direction.

In the accompanying drawings, Figure 1 is a plan view of an electro-magnetic locomotive embodying my improvements; and Fig. 2 is a side elevation of the same, partly in section.

I have shown the various parts of the mechanism mounted upon or secured to a platform or frame, A, which forms the body of the locomotive or carriage. This platform is supported in the usual manner upon flanged wheels B B' B', which are adapted to run upon the track T.

Upon a suitable bed-plate, C, secured to the platform A, is mounted an electro-motor, which may be of any well-known and suitable construction.

I have shown in the drawings one form which is well adapted to the purpose, and which consists of two large and powerful stationary electro-magnets, D D, having an armature, E, wound with coils of insulated wire, and arranged to rotate upon the shaft *e*, within the field of force of the stationary magnets D D. The rotating armature-shaft *e* also carries a commutator, *f*.

The periphery of the commutator *f* is divided into a number of insulated sectors, which form the terminals of a like number of coils of wire upon the armature E.

The electric current which operates the motor is taken from a stationary conductor running parallel with the track, or the rail of the track itself may form such a conductor, and is conveyed thence to the two-armed lever O O, preferably through its axis *o*.

The manner in which a conducting-connection may be made between the stationary conductor running parallel with the track and the moving carriage or locomotive is set forth in detail in my pending application, hereinbefore referred to, and therefore needs no particular description in this place, as it forms no part of the invention hereinafter claimed.

The two-armed lever O O carries at its extremities two sets of contact-springs, P *p'*, the lowermost one, *p'*, being shown in dotted lines in Fig. 2. These contact-springs are so adjusted that only one set can be brought in contact with the commutator *f* at the same time. In the figure the uppermost contact-spring, P, is represented as being raised out of contact with the commutator, while at the same time the lowermost contact-spring, *p'*, attached to the other arm of the same lever, rests upon one of the divisions of the commutator *f*.

The position of the opposite lever, O' O', is the reverse of that of O O, inasmuch as its upper contact-spring, P', rests upon the commutator, while the lowermost one, *p*, is removed therefrom. The electric circuit therefore (when the apparatus is in the position shown in the drawings) passes into the armature-coils by the spring P' and out again by the spring *p*.

The two springs P and *p* are respectively adjusted in relation to the divisions of the commutator in a well-known manner, so as to produce a rotation of the armature E and its shaft in a particular direction, which acts to propel the carriage, for example, toward the right hand. In like manner the other two contact-springs P' and *p'*, when brought into electrical connection with the commutator, cause a rotation of the armature E in the opposite direction.

The apparatus which is employed to effect the necessary movements of the commutator-springs will now be described.

The two-armed levers O O and O' O', to

which the commutator-springs are attached, are mounted, respectively, upon rock-shafts *o* *o'*, moving in suitable bearings attached to the platform A. Levers N N', attached to the respective rock-shafts, project downward through apertures in the platform, the ends of both levers N N' being joined to a horizontal rod, M M, which extends the whole length of the carriage, and is jointed at its ends to the other rock-shafts, *l* and *l''*, which are fitted with short arms projecting upward and formed into sockets L' and L''. A movable handle or controlling-lever, L, is made to fit into either of these sockets, and when placed in one of them, as seen at the right hand in Fig. 2, enables the driver or attendant, by moving it to and fro, to control the position of the several contact-springs P *p'* P' *p* in relation to the commutator *f*, and consequently the movements of the armature E of the electro-motor. The lever L, when in position, moves along a curved horizontal guard, R, which has three recesses cut in it. These recesses serve to hold the lever L firmly in position when it has been sprung into them. The middle one of the three recesses, *r''*, retains the lever L in such a position that neither of the four contact-springs touch the commutator, and the electric circuit is therefore interrupted and the motor at rest. By placing the lever in one of the other two recesses, *r'*, the contacts are adjusted for the forward movement, and in the other, *r'''*, for the reverse movement. By removing the lever L from the socket L' and placing it in the socket L'', at the other end of the carriage, the same operations may be performed in the same way. This arrangement is especially convenient when the motor is applied to the cars of an ordinary street-railway, which are required to run in either direction without being turned round at the end of the trip, as the driver can stand on the front platform of the car and insert the controlling-lever into its socket, which gives him perfect command of the machinery, while the absence of the lever at the other end of the car renders it impossible for any unauthorized person to interfere with the apparatus.

The relation of the contact-springs to the divisions of the commutator should be rendered adjustable within the necessary limits in order to derive the greatest useful effect from the action of the motor at different speeds and under different conditions, and also to compensate for the wear of the contact-springs arising from continuous use, and it is also desirable that such means of adjustment should be independent in respect to each set of contacts. I have shown in the drawings one device for effecting this.

The respective levers N N' are joined to sleeves or couplings *v v'*, into which the sections of the shifting-rod M are inserted by means of a right and left screw-thread cut upon them, which arrangement enables the

normal positions of the levers  $N N'$ , in relation to each other and to the shifting-rod  $M$  to be varied as required, so as to secure the most effective working of the motor in either

5 direction.

The rotary motion of the armature  $E$  and its axis  $e$  in either direction is communicated to the driving-wheels  $B B$  of the locomotive by means of a pinion,  $e'$ , which works into a  
10 toothed wheel,  $g$ , preferably having a considerably greater number of teeth, and this, in turn, engages with another toothed wheel,  $h$ , on the axle  $b$  of the driving-wheels.

Various modifications may obviously be made  
15 in the construction and arrangement of the different parts of the locomotive without departing from the spirit of my invention.

Any well known and suitable form of rotary electro-motor may be employed. Rollers or  
20 brushes may be made use of in lieu of contact-springs, as shown, and other mechanical means of adjusting the position of the contacts may be employed, if preferable.

I claim as my invention—

25 1. The combination, substantially as hereinbefore set forth, of an electro-magnetic motor and its commutator with two sets of contact springs or devices, one set so adjusted in relation to said commutator as to produce rotation of the motor in one direction, while the  
30 other set is so adjusted as to produce rotation in the opposite direction.

2. The combination, substantially as hereinbefore set forth, of an electro-magnetic motor and its commutator with two sets of contact springs or devices, one set so adjusted in relation to said commutator as to produce rotation of the motor in one direction, while the  
35 other set is so adjusted as to produce rotation in the opposite direction, and a lever adapted to throw either one of the two sets of contact devices into contact and the other set out of contact with the commutator by a single movement.  
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3. The combination, substantially as hereinbefore set forth, of an electro-magnetic motor and its commutator with two sets of contact springs or devices, one set so adjusted in relation to said commutator as to produce rotation of the motor in one direction, while the  
45 other set is so adjusted as to produce rotation in the opposite direction, and a lever capable of being placed in three positions, the first position throwing the devices for producing a direct motion of the motor into contact with the  
50 commutator, the second withdrawing all the contacts from the commutator, and the third throwing the devices for producing a reverse motion of the motor into contact with the commutator.  
55 60

4. The combination, substantially as hereinbefore set forth, of an electro-magnetic motor and its commutator with two sets of commutator-contacts, respectively adjusted to produce a direct and reverse motion of the motor,  
65 and a shifting bar or rod so arranged that a removable lever for controlling the same may be attached at either one of two or more different points.

5. The combination, substantially as hereinbefore set forth, of an electro-magnetic motor and its commutator with two sets of commutator-contacts, respectively adjusted to produce a direct and reverse motion of the motor,  
70 a shifting bar or rod adapted to throw one set of contact devices into contact and the other set out of contact with the commutator by a single movement, and means of adjustment whereby the respective positions of the two  
75 sets of contacts with relation to each other, to the commutator, and to the shifting-bar may be regulated.  
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Signed by me this 30th day of June, A. D. 1880.

STEPHEN D. FIELD.

Witnesses:

WM. C. WITTER,  
FRANK L. POPE.