(No Model.) 2 Sheets—Sheet 1.

J. F. McLAUGHLIN.

ELECTRIC LOCOMOTIVE.

No. 428,175. Patented May 20, 1890.

Fig. 1.

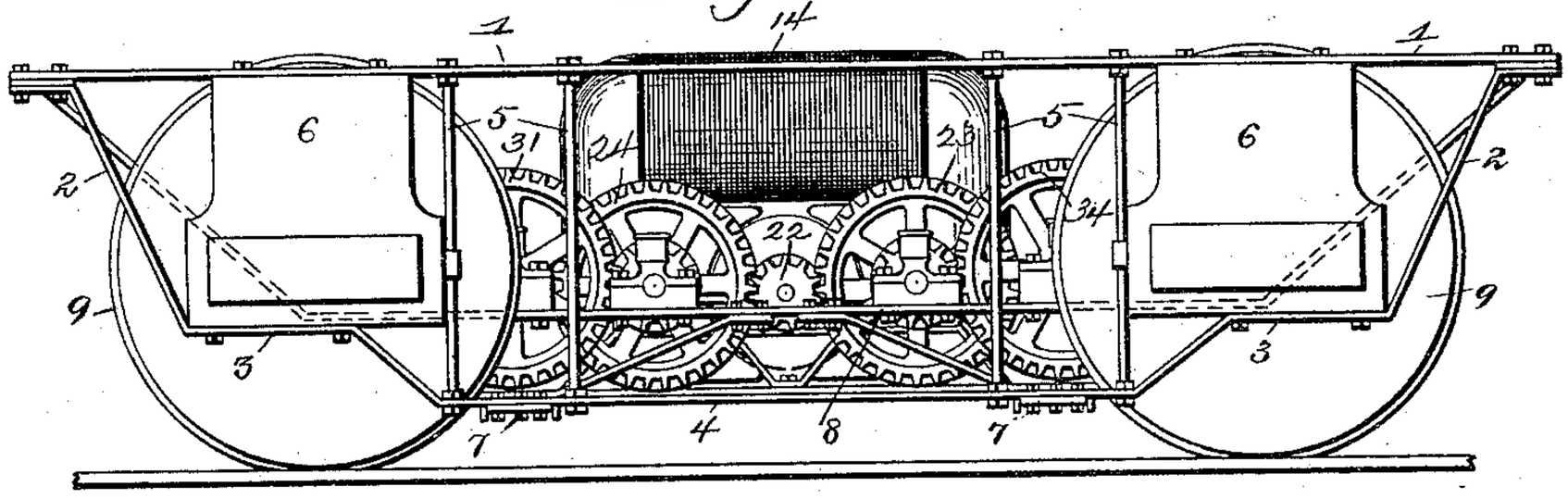
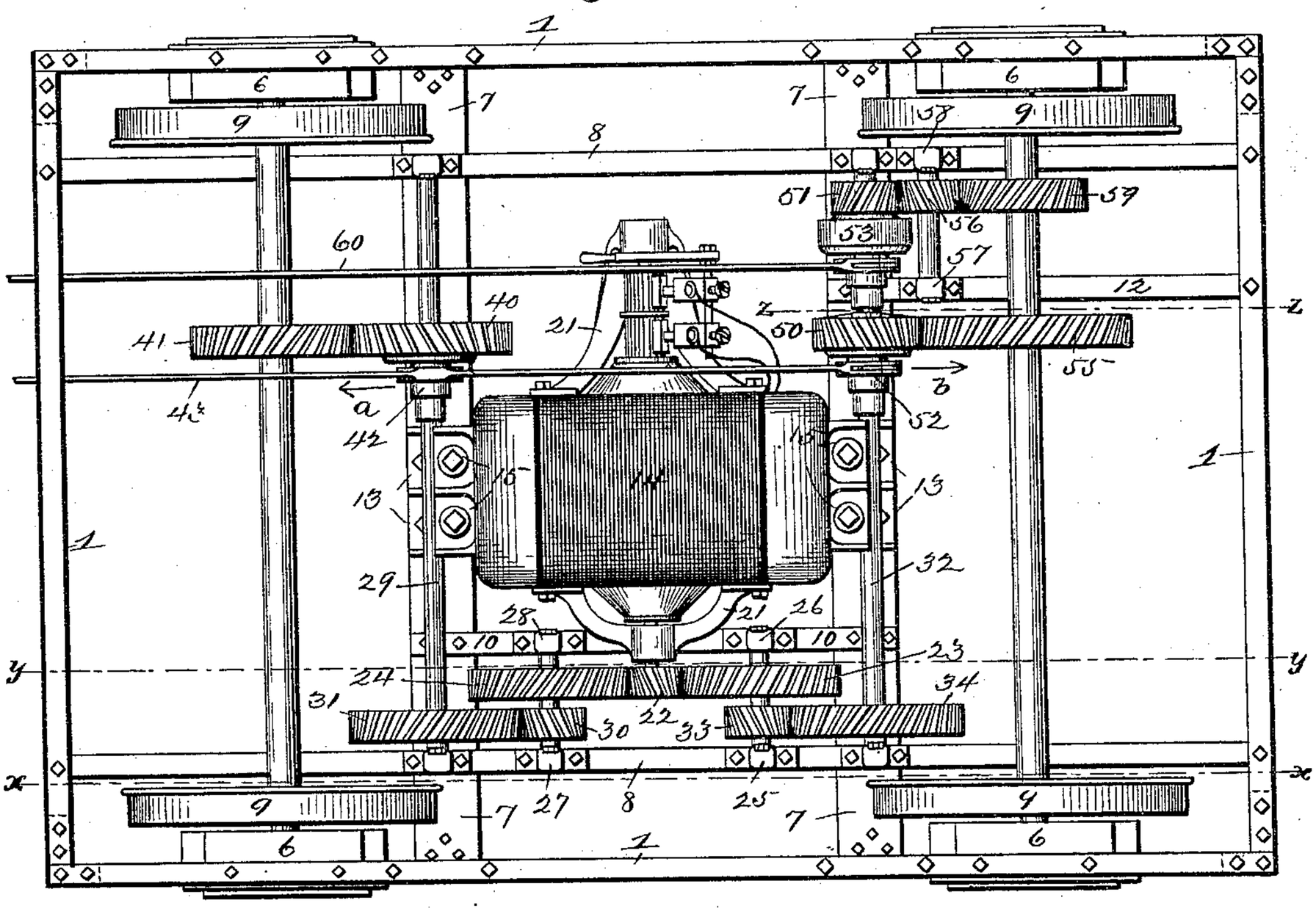


Fig. 2.



Witnesses:
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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

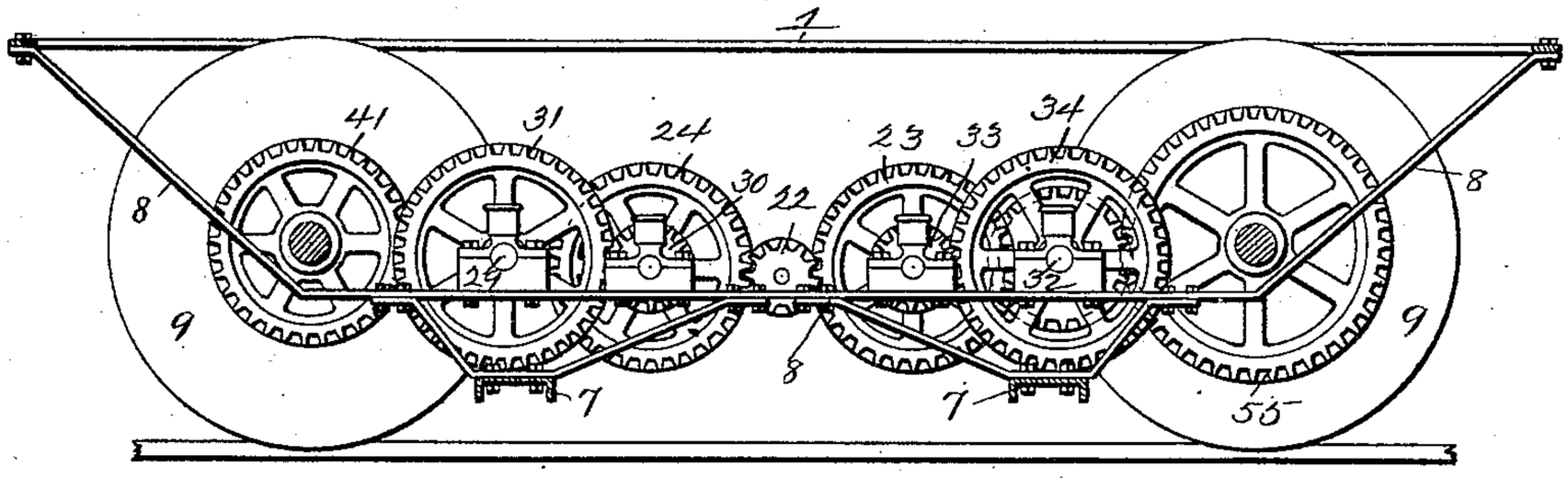


Fig. 4.

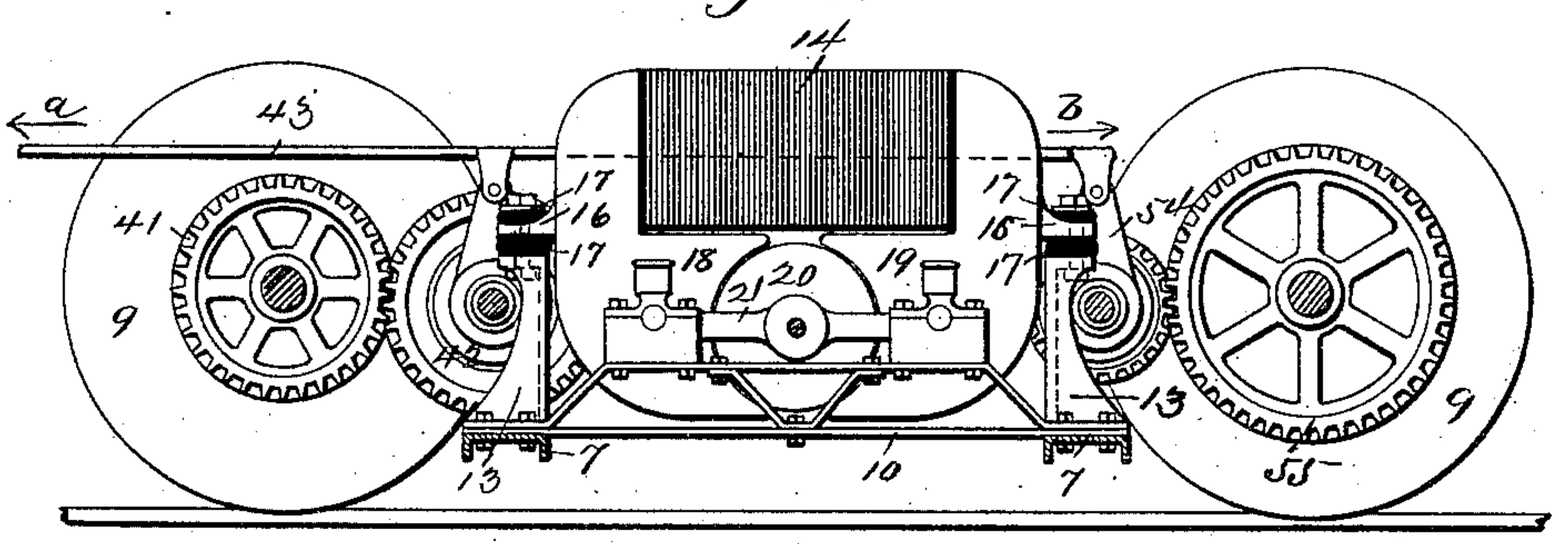
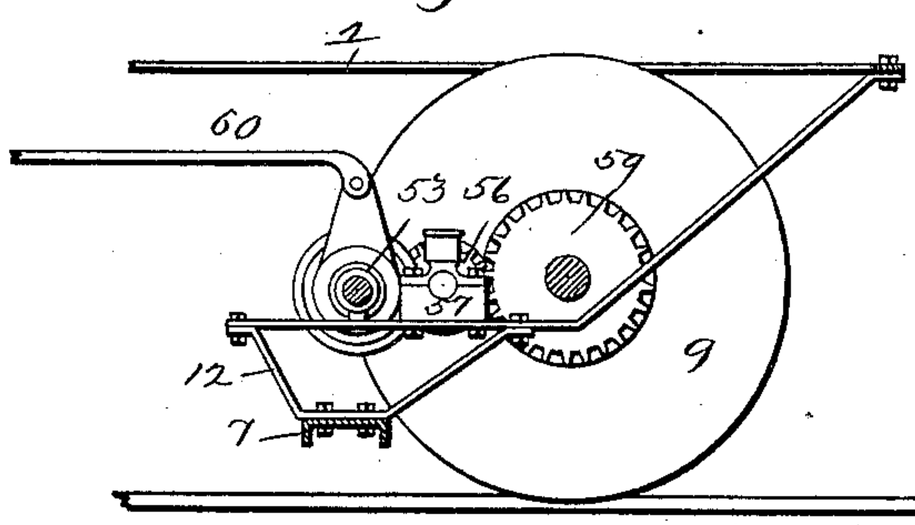


Fig. 5.



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UNITED STATES PATENT OFFICE.

JAMES F. McLAUGHLIN, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRIC LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 428,175, dated May 20, 1890.

Application filed March 17, 1890. Serial No. 344,182. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. McLAUGHLIN, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electric Locomotives, of which the following is a specification.

My invention relates to electric locomotives, and more particularly to the construction of the locomotive-truck; and its object is to provide means whereby the speed of the locomotive may be changed and its motion reversed, as desired, without stopping or reversing or changing the speed of the propelling electric motor.

It is also my object to so arrange the parts that the diversion or the shunting of the magnetic lines of force of the field-magnet from the armature will be avoided, notwithstanding the use of a truck-frame largely made of iron.

To this end my invention consists in a truck for electric locomotives which is provided with suitable gearing between the motor and the drive-wheels and suitable clutch mechanism, whereby the locomotive may be stopped or reversed or a change of speed effected.

My invention also consists in a skeleton frame, all parts of which running parallel and in proximity to the polar axis of the field-magnet of the motor are made of non-magnetic material.

My invention further consists in such additional features as will be described and claimed hereinafter.

I will now proceed to describe my invention in detail, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation of an electric locomotive-truck embodying my invention; Fig. 2, a plan of the same; Fig. 3, a vertical longitudinal section thereof on line *x x*, Fig. 2, with the body of the motor omitted; Fig. 4, a section on line *y y*, Fig. 2; and Fig. 5, a similar section on line *z z*, same figure.

The supporting parts of my truck are in the shape of a skeleton frame, whose various portions depend from the upper rectangular frame 1. As will be seen from Fig. 1, the side bars or girders of this frame are trussed by means of horizontal and oblique bars 2 3 4 and vertical stay-rods or braces 5. The outermost stay-rods 5 and the outer bars 2 and 3, together with the side bars of frame 1, inclose a space for the reception of the axle-boxes 6, which, being bolted to the frame and the truss, as shown, add considerably to their strength. The two trusses thus formed are connected and steadied by the two cross-bars 7, formed of angle-iron, and which perform an important part in the support of the motor mechanism of the truck. Two further trusses 8 (shown most clearly in Fig. 3) are provided between the truck-wheels 9 and the center of the truck, preferably in proximity to the said wheels. As shown, these trusses are also steadied by being bolted to the cross-bars 7. Finally, a short trussed support 12 (shown most clearly in Fig. 5) is bolted to and sustained by the frame 1 and one of the cross-bars 7. This skeleton frame thus constituted serves to support the driving and regulating mechanism, which I will now proceed to describe.

Near the center of the truck and rising directly from and bolted to the cross-bars 7 are the two stanchions 13, for supporting the field-magnet 14 of the dynamo, which rests on said stanchions, with the ears 15, which are bolted thereto, gaskets 16, of rubber or other suitable elastic material, being preferably interposed between the ears and the stanchions and the bolt-washers 17 for the purpose of obviating the effects of sudden jars and jolts. The shaft of the armature 20, which latter, when the motor is in operation, revolves between the pole-pieces 18 and 19, is supported in bearings 21, in the present instance extending out from the field-magnet. One end of the armature-shaft is provided with a pinion 22, and it is from this pinion that the rotary motion of the armature is imparted to the truck-wheels by a train of skew-gearing, now to be described. Meshing with the pinion 22 are the two skew-gear wheels 23 24, whose journals run in bearings 25 26 and 27 28, respectively supported by the trusses 8 and trussed bars 10. The gear-wheel 24 serves to transmit motion to shaft 29 by skew-pinion 30 and skew-gear 31, the gear 23 to transmit such motion to shaft 32 by similar gears 33 34. The shaft

29 serves to impart the normal forward speed when the clutch, presently to be described, is in operative position, while the shaft 32 serves to impart reduced speed or to reverse the locomotive when one or the other of two other clutches is operated.

I have devised the following system of clutches and gearing for this purpose: The shafts 29 and 32 run in bearings bolted to and sustained by the trusses 8. The former 29 carries the aforesaid gear-wheel 31 and another gear 40, meshing with the gear 41, fixed to the axle of the front wheels of the truck, and serves to impart the normal forward speed to the locomotive when the direct clutch 42, attached to the shifting rod 43, is in operative position. This clutch may be a friction-clutch of the character described in my application, Serial No. 337,590, filed January 21, 1890, and I do not deem it necessary to here give a detailed description of the same, inasmuch as its construction does not form any part of my present invention. The shaft 32 carries the two skew-pinions 50 51, which are loose thereon, except when the direct clutch 52 and the reversing-clutch 53, similar in construction to the clutch 42, are applied, causing one or the other pinion to turn with the shaft. The clutch 52 is operated by the same rod 43 which operates the clutch 42, and this rod extends rearwardly from said clutch 42 and is attached to an arm 54, extending upwardly from the clutch. The pinion 50, meshing with a skew-gear 55, fixed to the axle of the rear truck-wheels, is so proportioned in diameter to the said gear 55 that when its clutch is applied it will drive the truck at a reduced speed (about one-half in the present instance) for the purpose of ascending steep grades. The shifting rod 43 is actuated from any convenient point on the car in the ordinary well-known manner, and can thus be moved to and locked in three different positions. These positions are, first, the intermediate position indicated in Figs. 2 and 4 of the drawings, when both clutches 42 and 52 are out of engagement; second, the position assumed when the rod is pulled in the direction of the arrow *a* when the clutch 42 is applied, and, third, to position assumed when the said rod is pushed in the direction of the arrow *b*, in which the clutch 52 is applied. The skew-pinion 51 meshes with an idler 56, whose journals turn in bearings 57 58, carried by the trussed support 12 and truss 8, respectively, said idler in turn meshing with a second skew-gear 59, fixed to the rear axle. By this arrangement the motion of the car is reversed when the clutch 53 is applied by means of a second shifting rod 60, running to a second operating-lever, as in the case of shifting rod 43. The ratio of the gears 51 and 59 in the present instance is such that the car is backed at a reduced speed.

The operation of the clutching devices just described is as follows: When the car is at rest, while the motor is continuously running, the rods 43 and 60 occupy the position shown—that is to say, all three clutches 42, 52, and 53 are loose. When it is desired to start the car and it becomes necessary to develop a great amount of power, the rod 43 is first pushed in the direction of the arrow *b*, thereby applying the direct clutch 52 and operating the gears 50 and 55. The rod 43 is then pulled in the direction of the arrow *a* to its foremost position, whereby the clutch 52 is disengaged and the other direct clutch 42 is applied and the normal rate of speed established. When ascending a considerable grade, the rod 43 is again pushed in the direction of the arrow *b* until clutch 52 is applied to develop the necessary increased power. When it is desired to back the car, the rod 43 is again brought to the intermediate position indicated in the drawings and the rod 60 is pulled forward to apply the reversing-clutch 53, when the gearing 51 56 59 will be set in motion. I am thus enabled with a very simple arrangement of parts to adjust the speed and reverse the motion of the car.

In electric locomotive-trucks and in all structures where electric motors are employed the effect of the dynamo is greatly weakened by the presence of parts of magnetic metal—such as supporting-bars, gearing, &c.—running parallel to the polar axis of the electro-magnet, which diverts or shunts a portion of the magnetic lines of force from the armature. I therefore make all these parts—to wit, the trussed bar 10 and the gears 22, 23, 24, 30, 31, 33, and 34—of brass, copper, German silver, aluminium, bronze, or of any other non-magnetic material. The remainder of the truck-frame may then be, and is preferably, made of iron or steel.

Having thus described what I consider the best way of carrying my invention into effect, I claim and desire to secure by Letters Patent—

1. In an electric locomotive, the combination, with a continuously-rotating armature and two sets of gearing connected with and adapted to impart different speeds to the truck-wheels, of two loose gears, two clutches, one for each loose gear, and a shifting rod connected to both clutches, substantially as described.

2. In an electric locomotive, the combination, with a continuously-rotating armature and gearing for transmitting different speeds from the armature to the drive-wheels, of two connected and oppositely-operating clutches interposed between the said armature and drive-wheels, substantially as described.

3. In an electric locomotive, the combination, with a continuously-rotating armature and gearing for transmitting different speeds from the armature to the drive-wheels, of two oppositely-operating clutches interposed between the said armature and drive-wheels, and a single shifting rod connected to both clutches, substantially as described.

4. In an electric locomotive, the combina-

tion, with a continuously-rotating armature, of two counter-shafts connected to rotate with said armature, loose gears mounted on the counter-shafts and imparting different speeds to the drive-wheels, a clutch on each counter-shaft for connecting the respective loose gear thereto, and connections between the clutches for simultaneously moving one clutch into gear when the other is out of gear, substantially as described.

5. In an electric locomotive, the combination, with a continuously-rotating armature and gearing connecting the same to the drive-wheels for imparting different speeds thereto, of two connected and oppositely-operating clutches interposed between the armature and drive-wheels, and an independently-operated clutch and gearing for reversing the locomotive, substantially as described.

6. In an electric locomotive, the combination of a continuously-rotating armature, two shafts connected with the drive-wheels, and gearing between the armature and the shafts, one shaft being provided with loose gear and a direct clutch for the same and the other shaft with two loose gears and a direct and a reversing clutch, one for each loose gear, a shifting rod connecting the two direct clutches, and another shifting rod for operating the reversing-clutch, all substantially as described.

7. An electric locomotive-truck having all parts extending parallel to the polar axis of the field-magnet of the motor and in inductive proximity thereto of non-magnetic material, substantially as described.

8. An electric locomotive-truck having all parts bridging the space between the pole-pieces of the field-magnets and in inductive proximity thereto of non-magnetic metal, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES F. McLAUGHLIN.

Witnesses:
HERBERT P. KER,
H. F. REARDON.