

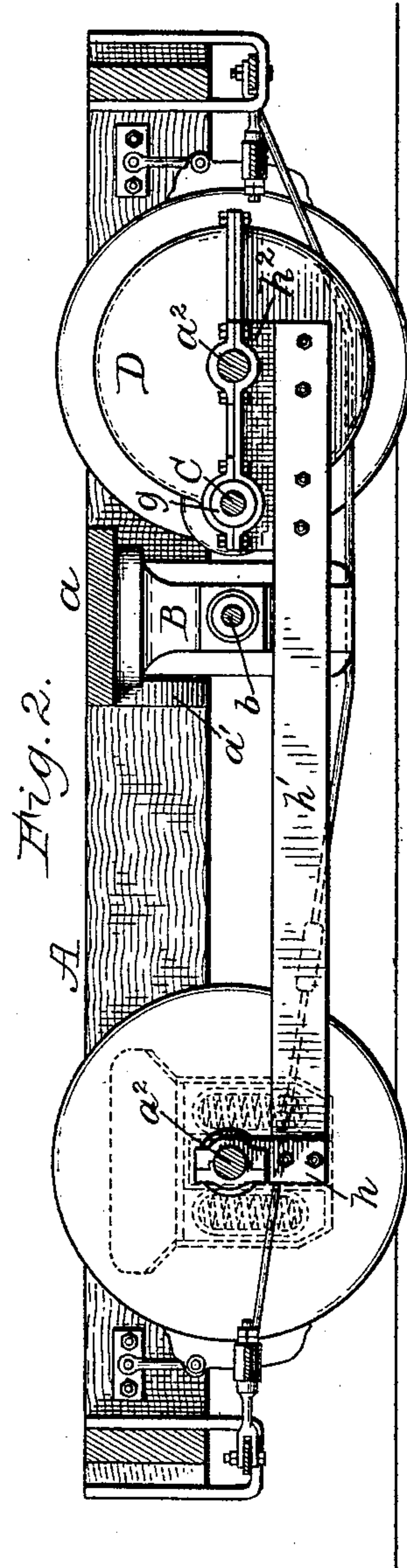
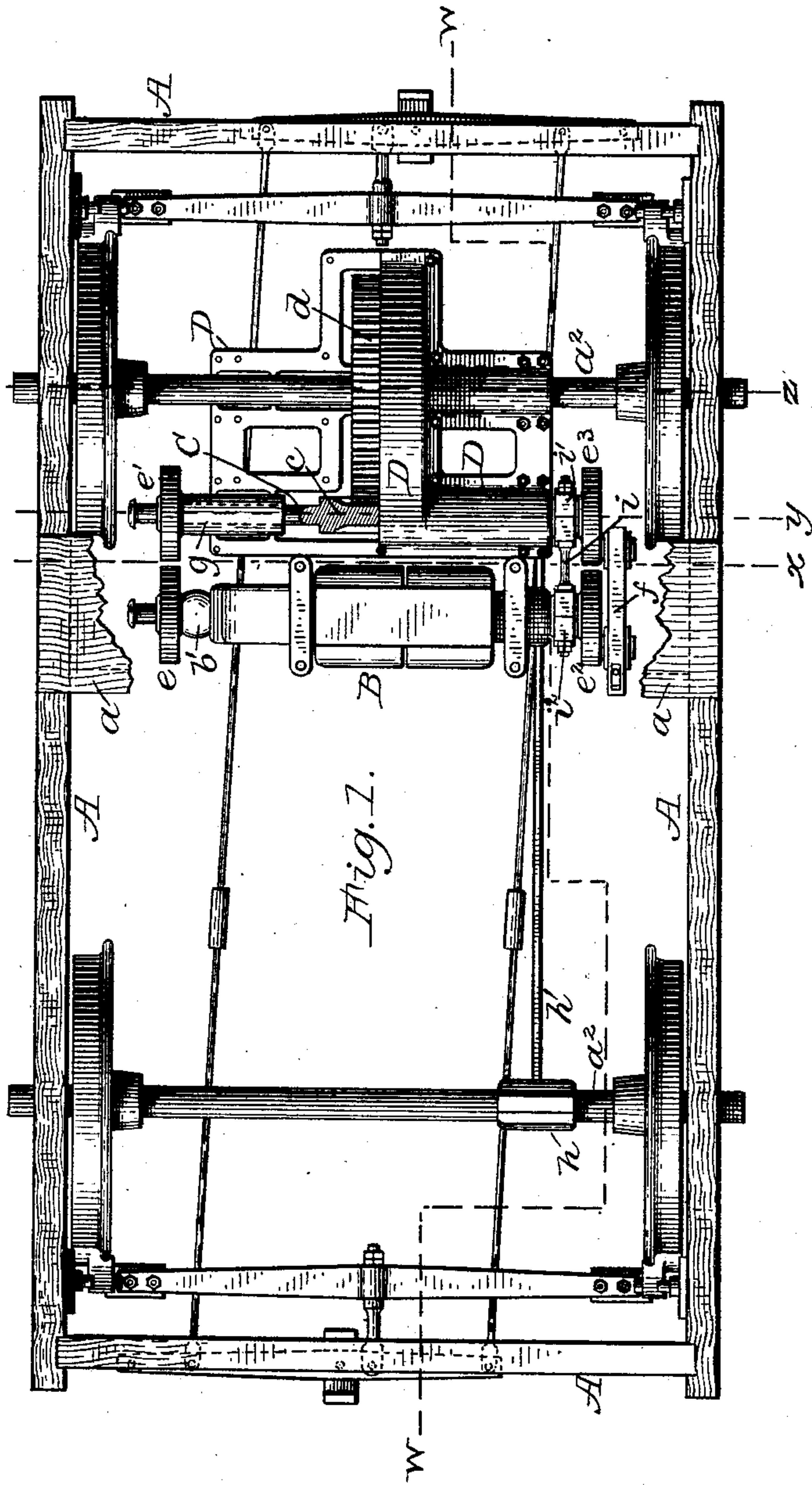
(No Model.)

2 Sheets—Sheet 1.

R. EICKEMEYER.  
ELECTRIC LOCOMOTIVE.

No. 480,918.

Patented Aug. 16, 1892.



Attest:  
Philip F. Larnier.  
Howell Battle

Inventor:  
Rudolf Eickemeyer.  
By *Wm. C. Wood*  
Attorney.

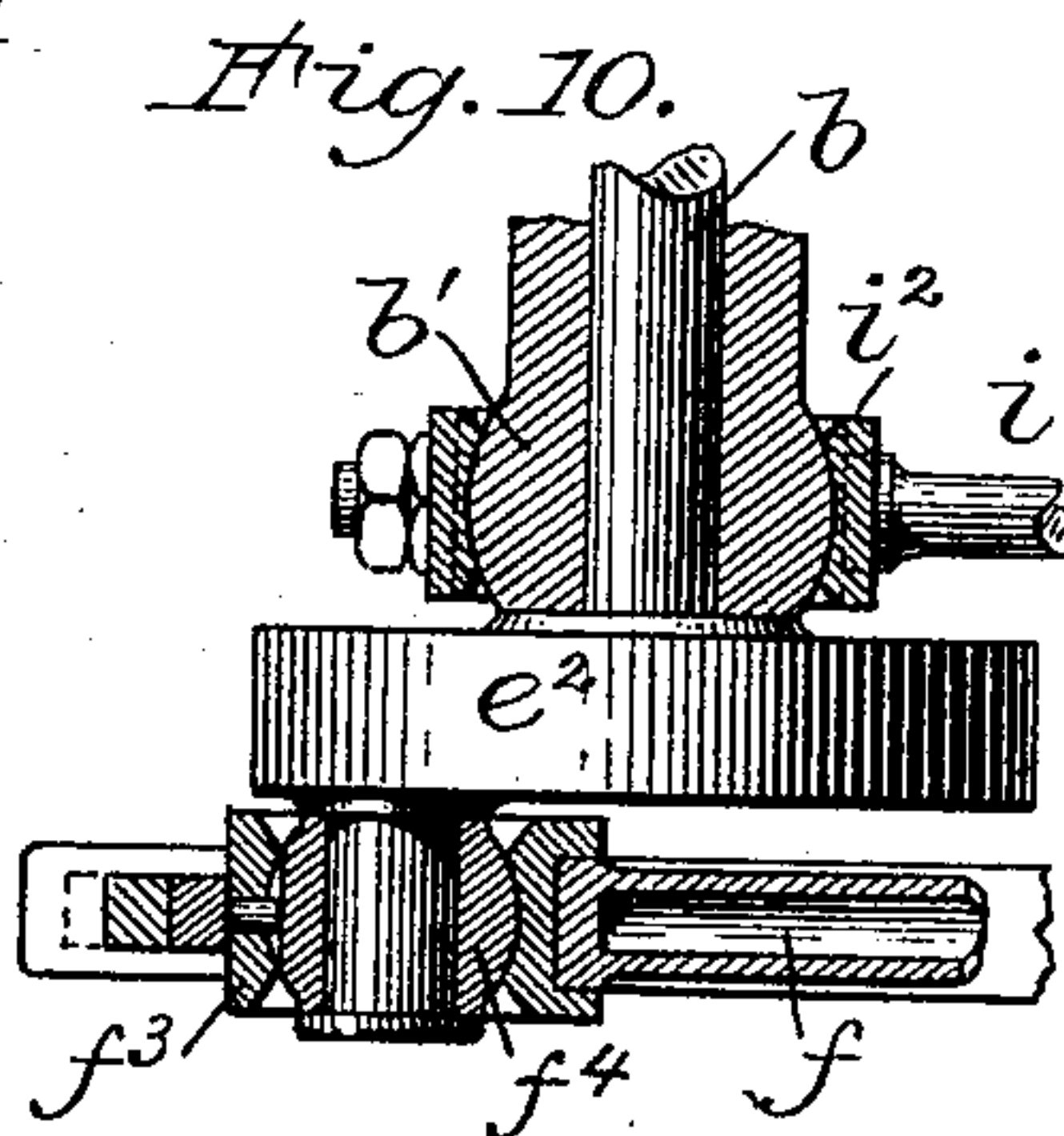
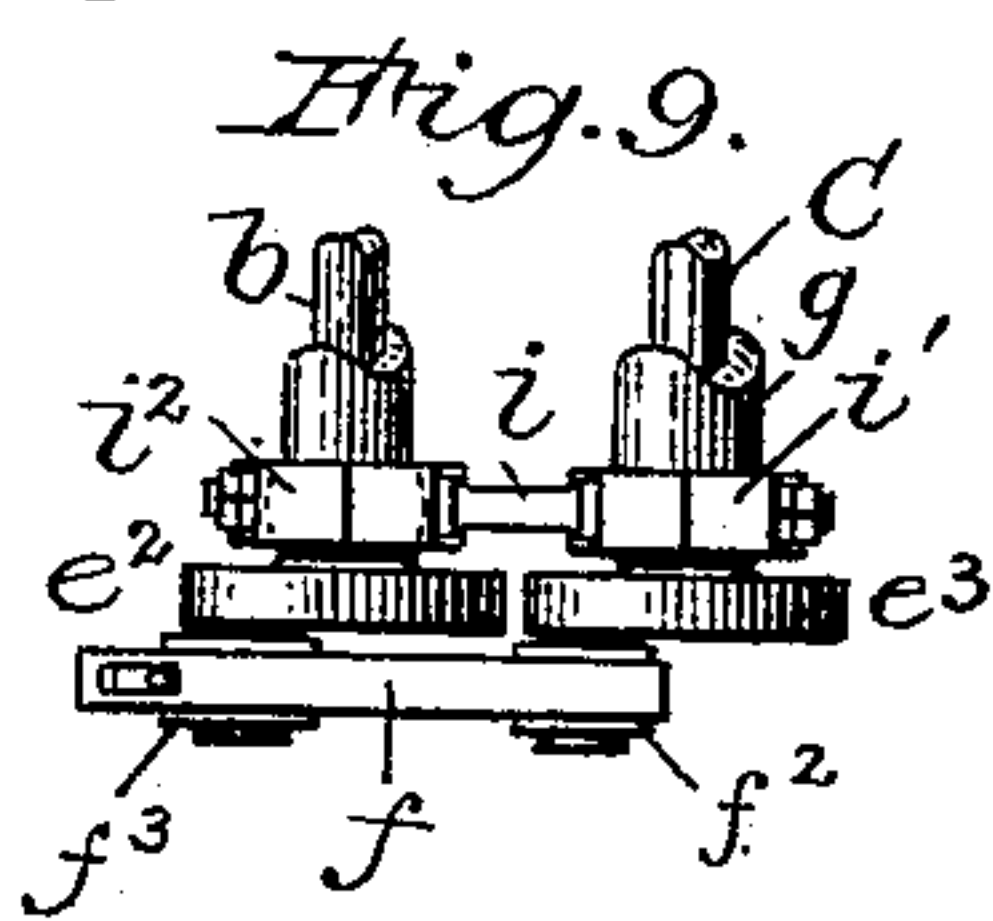
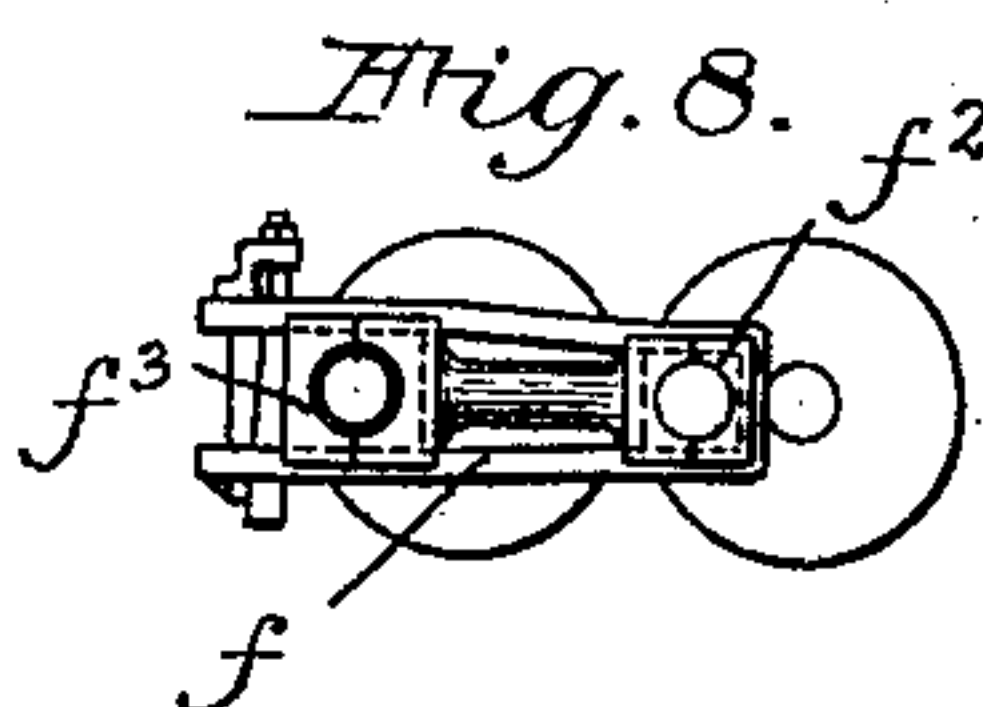
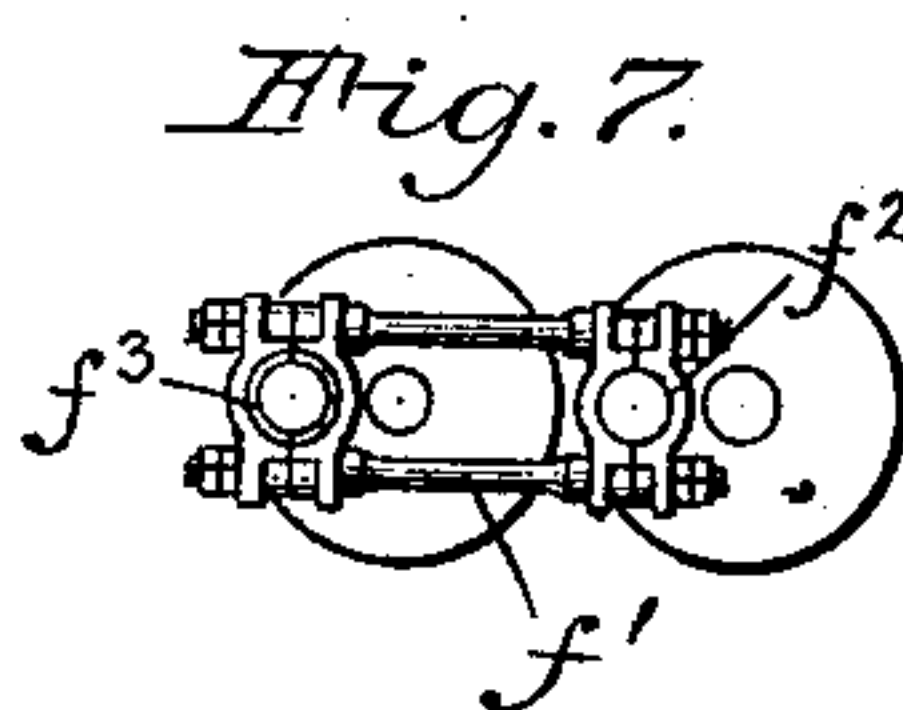
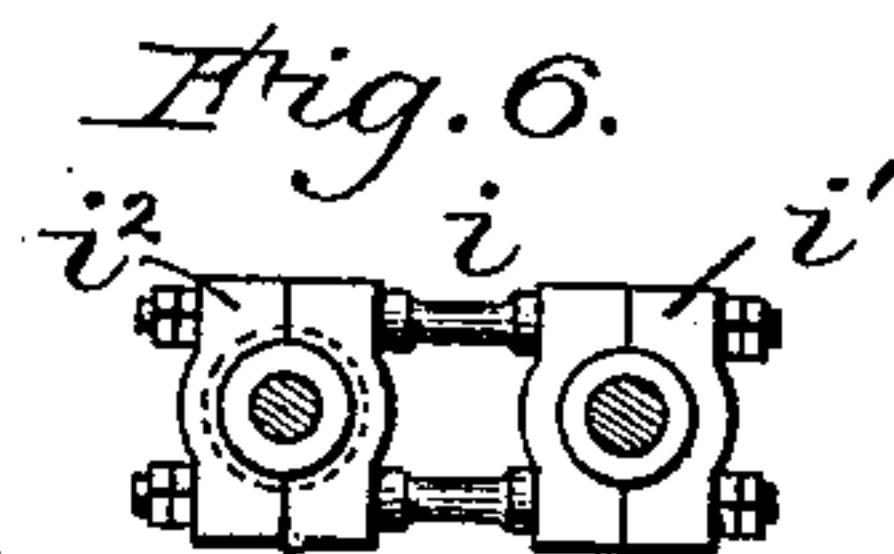
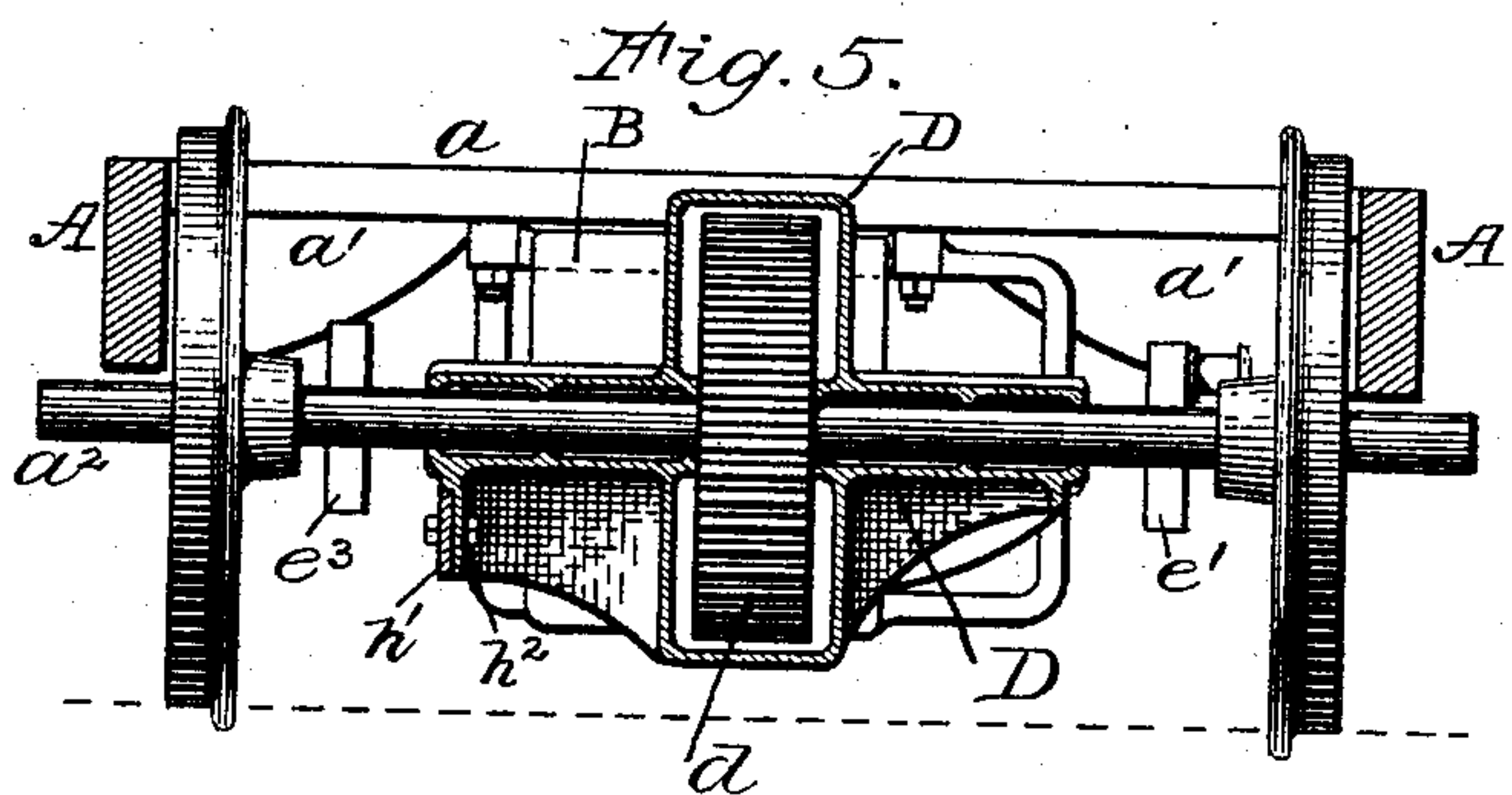
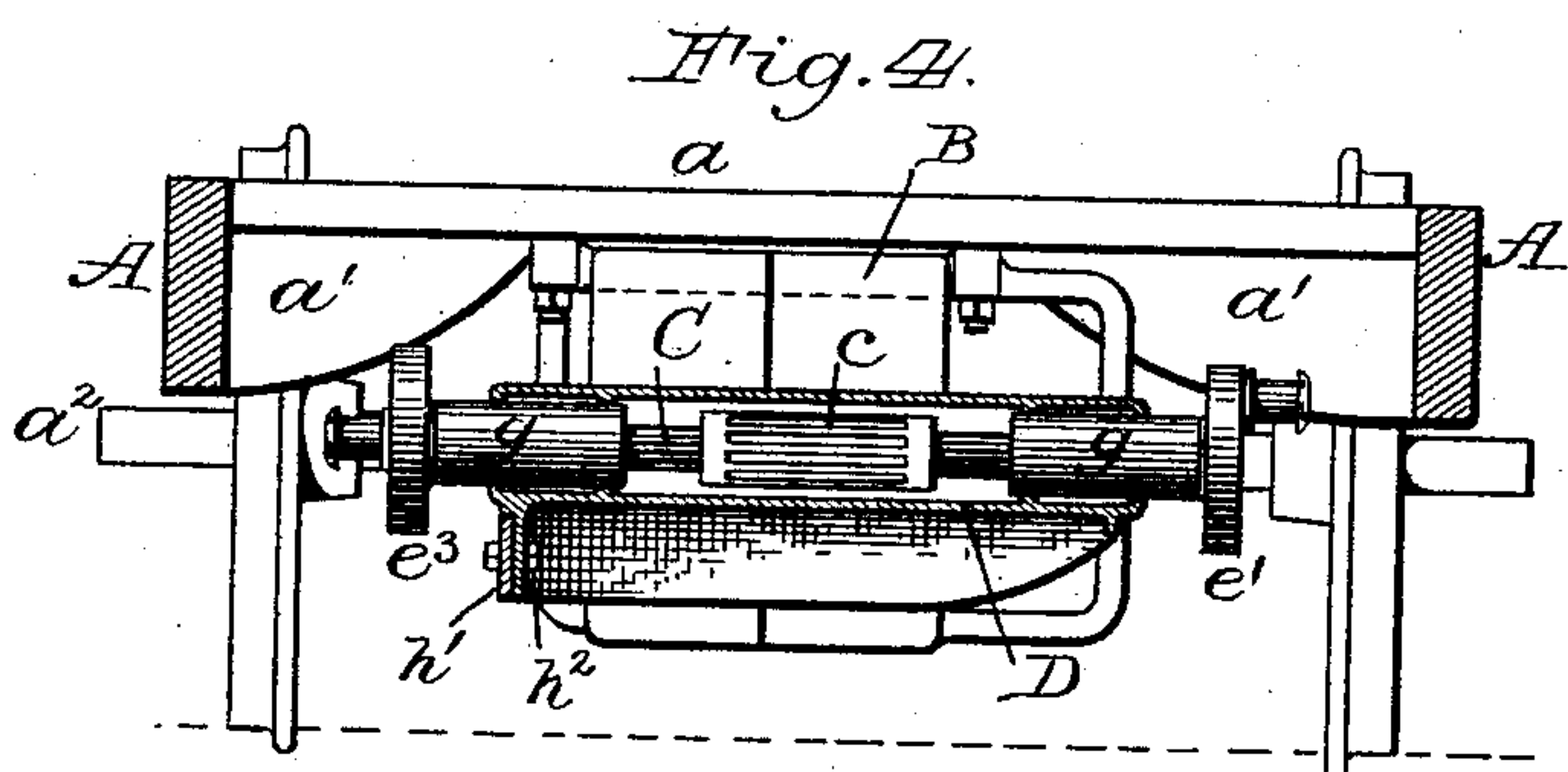
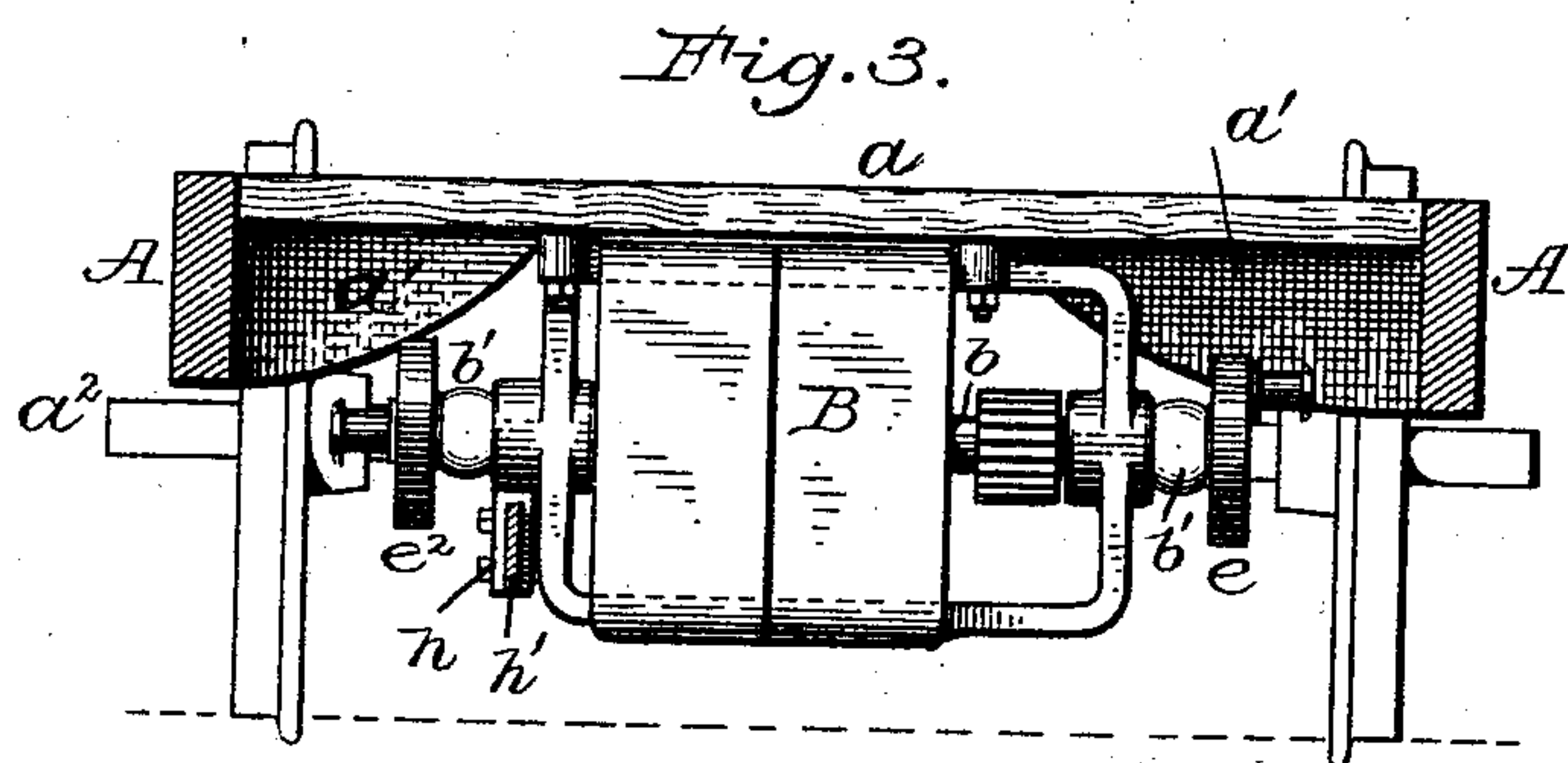
(No Model.)

R. EICKEMEYER.  
ELECTRIC LOCOMOTIVE.

2 Sheets—Sheet 2.

No. 480,918.

Patented Aug. 16, 1892.



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# UNITED STATES PATENT OFFICE.

RUDOLF EICKEMEYER, OF YONKERS, NEW YORK, ASSIGNOR TO THE EICKE-MEYER FIELD COMPANY, OF NEW YORK.

## ELECTRIC LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 480,918, dated August 16, 1892.

Application filed December 21, 1889. Serial No. 334,487. (No model.)

*To all whom it may concern:*

Be it known that I, RUDOLF EICKEMEYER, of Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Electric Locomotives; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear, true, and complete description of my invention.

In my pending application for patent filed January 28, 1889, Serial No. 297,775, I disclosed certain improvements in electric cars or locomotives involving the carrying of the electric motor beneath and by the sill-frame of the car, but the motor and gearing were so organized as to necessitate either small wheels on the driving-axle or an unduly-elevated car-floor.

My present improvements have been devised with a view to securing those advantages which accrue from mounting an electric motor so that it will be carried by and be suspended from the sill-framing of a truck or a car-body in connection with the use of car-wheels of the usual sizes on the driving-axle or even larger than usual without any need of having the bottom of the car located at any greater height from the rails than in ordinary cars. For accomplishing said ends I have so mounted or secured the electric motor to the under side of the car-body or sill-frame as to locate the armature-shaft substantially in the same horizontal plane as that occupied by the car-axles and connected one of said axles with the counter-shaft by means of gearing, the counter-shaft being located between the axle and the armature-shaft in the same horizontal plane. I have also organized the motor and gearing with special reference to smooth and easy operation, as well as to secure great strength and durability, and after describing my improvements in detail the features deemed novel will be specified in the several clauses of claim hereunto annexed.

Referring to the drawings, Figure 1 in plan view illustrates the sill-framing of a car or truck with my said improvements applied thereto, the latter being partially in top view

and partially in horizontal section. Fig. 2 illustrates the same in longitudinal vertical section on line *w*, Fig. 1. Figs. 3, 4, and 5 illustrate the same in cross-vertical section, respectively on lines *x*, *y*, and *z*. Figs. 6 to 10, inclusive, illustrate certain coupling arms and links employed for flexibly bracing the motor from a gear-frame and for connecting the cranks by which power is communicated from the motor-shaft to the counter-shaft and its gearing.

The sill or truck framing of a locomotive or car may be widely varied in its character so long as it affords a proper support for the electric motor. As here shown, said framing A consists of side pieces, end pieces, and a heavy centrally-located cross-piece *a*, braced at its ends, as at *a'*, to afford a suitable support for the electric motor. The truck-frame is mounted, as usual, on the car-axles and with springs applied in the ordinary manner, the wheels and axles *a*<sup>2</sup> differing from those of ordinary cars only so far as may be deemed proper in the matter of strength.

The electric motors preferably used by me are of the type disclosed in my Letters Patent No. 358,340, and they are also described in my said pending application for patent, Serial No. 297,775, said machines being so organized as to develop but little, if any, external magnetic field.

The electric motor B is firmly secured to and pendent from the heavy cross-piece *a*, with the armature-shaft *b* located in the same horizontal plane as that occupied by the car-axle *a*<sup>2</sup>, to which the power is applied by way of a counter-shaft C, a pinion *c* thereon, and a large gear *d*, carried centrally on the axle *a*<sup>2</sup>, the armature-shaft and the counter-shaft being operatively connected at one or both ends by crank-disks *e e' e*<sup>2</sup> *e*<sup>3</sup> and coupling-links *f f'*, of which two forms are shown in Figs. 7 and 8, the latter *f* being further shown in Figs. 1, 9, and 10, and these will be hereinafter more particularly described.

The counter-shaft C is supported upon the adjacent axle *a*<sup>2</sup> and is maintained parallel therewith by means of a strong frame or casting D, which incloses the large gear *d* and



also the counter-shaft, except its two ends, the bearings for said shaft being afforded by two bushings *g g*, which are clamped and held between the two halves of the casing, the latter being divided on a horizontal line and bolted together, as clearly indicated in Figs. 1 and 2.

For firmly maintaining the casing and the counter-shaft in their proper positions with relation to the axle and to the motor-shaft *b* said casing or gear-frame, being wholly supported by the geared axle, is well braced by means of pendent hanger *h* on the forward axle and a brace plate or beam *h'*, extended from the bottom of said hanger and rigidly bolted to the side of a pendent web *h<sup>2</sup>* on the gear frame or casing.

It will be seen that the electric motor is carried by the spring-supported truck-frame, and it is therefore free to rise and fall and to tilt wholly independently of the car-axles, and also that the counter-shaft is carried wholly by the adjacent axle *a<sup>2</sup>* and conforms thereto in such rising, falling, and tilting movements as are incident to uneven tracks, switch-frogs, and slight obstructions, any of said movements being liable to occur without a corresponding movement of the car-body and motor; but notwithstanding these independent capacities for movement the motor is flexibly braced from the casing and counter-shaft by means of coupling-arms *i i* near each end of said shaft. Each of these arms *i* has at one end a cylindrical box or sleeve *i'*, which is fitted to the exterior of a bushing *g* and at the other end a ball-socket box *i<sup>2</sup>*, which is fitted to a ball-bearing *b'*, sleeved upon the armature-shaft *b*, as specially illustrated in Fig. 10. These arms *i i* therefore serve as brace-arms, which prevent the electric motor from unduly straining at the bolts by which it is suspended and permit the motor to rise and fall or to tilt with the car-body, and they also relieve the coupling-links *f* from strains other than those involved in the transmission of power, and should toothed gearing be employed for driving the counter-shaft the importance of these flexibly-bracing arms would be still more apparent.

It will be seen that the coupling-brace arms can be subjected to no torsional strains, and as this is equally important with respect of the coupling-links *f* or *f'*, each at one end has a cylindrical box *f<sup>2</sup>* for the crank-pin on the crank-disk of the counter-shaft and at its other end a globular box *f<sup>3</sup>*, which engages with a ball-bearing sleeve *f<sup>4</sup>* on the crank-pin of the disk on the motor-shaft *b*, as clearly indicated in Fig. 10. With these parts thus organized the electric motor is not exposed to injury resulting from the shocks or jars necessarily borne by the wheels, axles, and gearing, and during the swaying or rocking of the car-body or truck-frame with the electric motor power is transmitted smoothly

and effectively to the counter-shaft, and thence to the car-axle.

Referring now to the frame or casing *D* it will be seen that its function as a casing for the gearing is quite subordinate to its function as a frame, inasmuch as if it be so constructed that it can perform its latter function only the proper inclosure of the gearing can be readily accomplished by mounting upon said frame suitable sheet-iron or even wooden casings. Considered purely as a gear-frame, carried wholly by the geared axle, those portions thereof are essential, by means of which the counter-shaft is held in a line parallel with the axle, and that pendent portion or web below the axle, (and also below the counter-shaft,) to which the brace plate or beam *h'* is bolted, for preventing the frame *D* from rotation on the axle and maintaining it in its proper position. This feature of suspending the motor from the truck-frame between the axles and bracing the gear-frame from the second axle is novel and of special value, although said gear-frame may be otherwise braced without departure from certain portions of my invention. In some cases two electric motors are employed, one for each axle, and then the brace *h'* is duplicated for the second gear-frame.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In an electric locomotive or car, the combination, substantially as hereinbefore described, of a car-axle, an electric motor secured to and pendent from the truck-frame or bottom of the car and having its armature-shaft substantially in the horizontal plane occupied by the axle, a counter-shaft driven by said motor and carried by the axle in the same plane and between the axle and motor, and gearing connecting the counter-shaft and axle.

2. In an electric locomotive or car, the combination of an electric motor secured to and pendent from the truck-frame, an axle, a counter-shaft driven by the motor and geared to said axle, a gear-frame which is carried by the axle and supports the counter-shaft and maintains it in the same horizontal plane and parallel with said axle, and hinged arms for flexibly bracing the motor from the gear-frame.

3. In an electric locomotive or car, the combination, substantially as hereinbefore described, of a truck-frame, a motor suspended from said truck-frame between the axles, a counter-shaft driven by the electric motor and geared to one of a pair of car-axles, and a gear-frame which is carried wholly by the geared axle and braced against rotation thereon by means of a brace extending to and connected with the second axle.

4. In an electric locomotive or car, the combination of a counter-shaft geared to an axle,



supported thereon and provided with a crank, | pin of the counter-shaft, substantially as de-  
an electric motor supported by a spring- | scribed.  
mounted frame and having on its armature-  
shaft a crank, and a connecting-link having  
5 at one end a ball-bearing sleeved upon the  
crank-pin of the armature-shaft and at the  
other end a cylindrical bearing for the crank-

RUDOLF EICKEMEYER.

Witnesses:

R. EICKEMEYER, Jr.,  
E. P. MOFFAT.