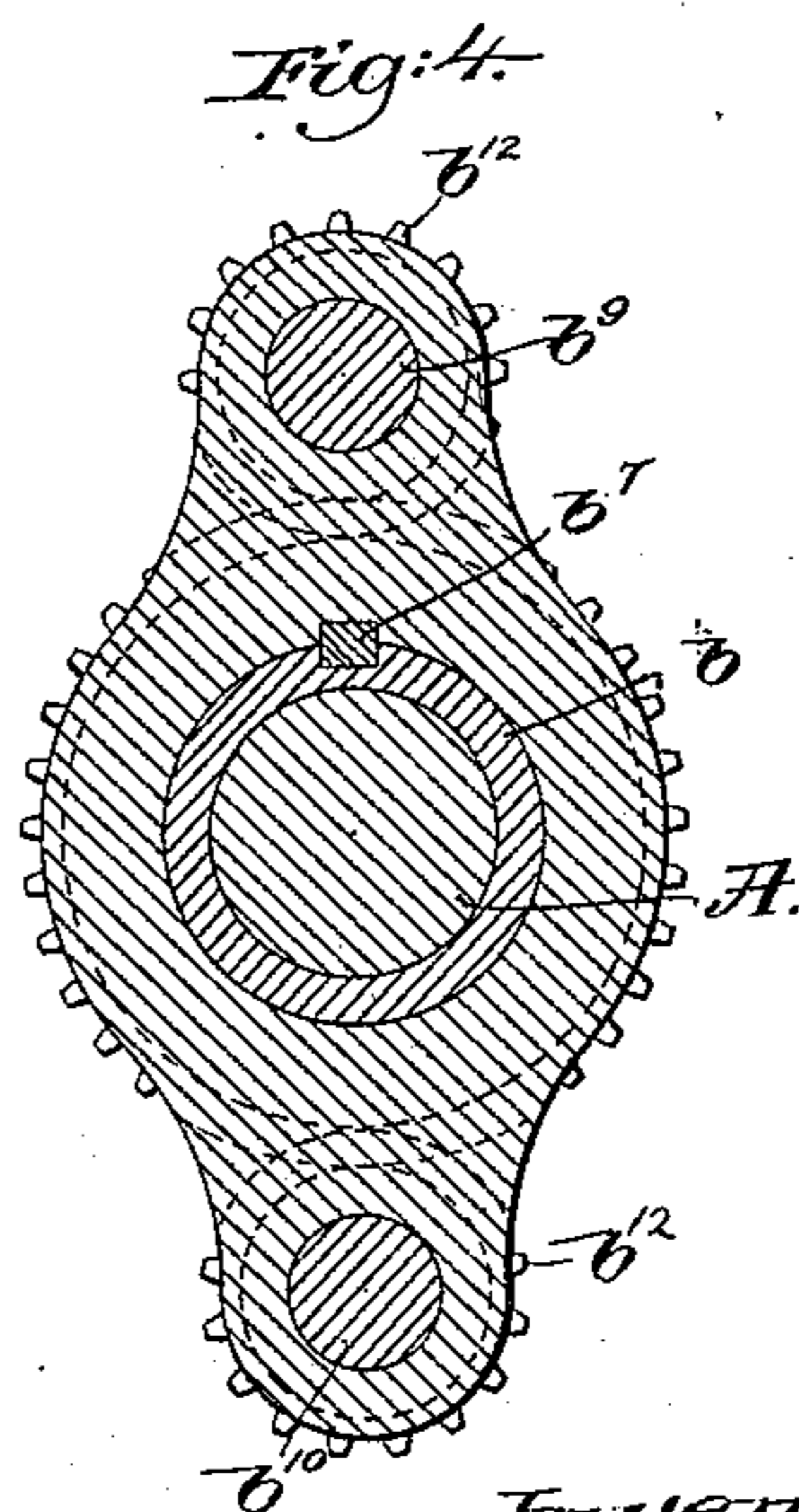
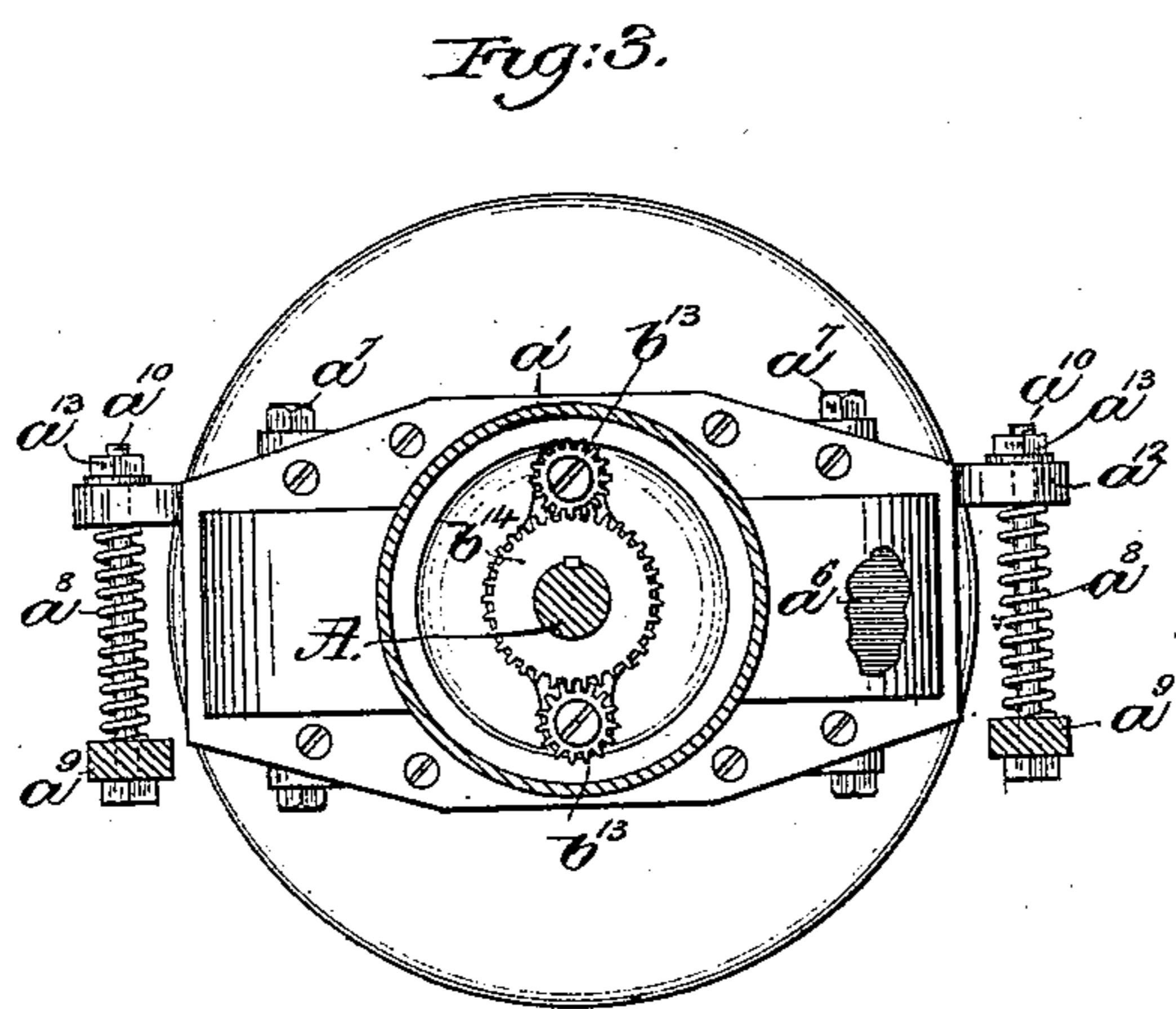
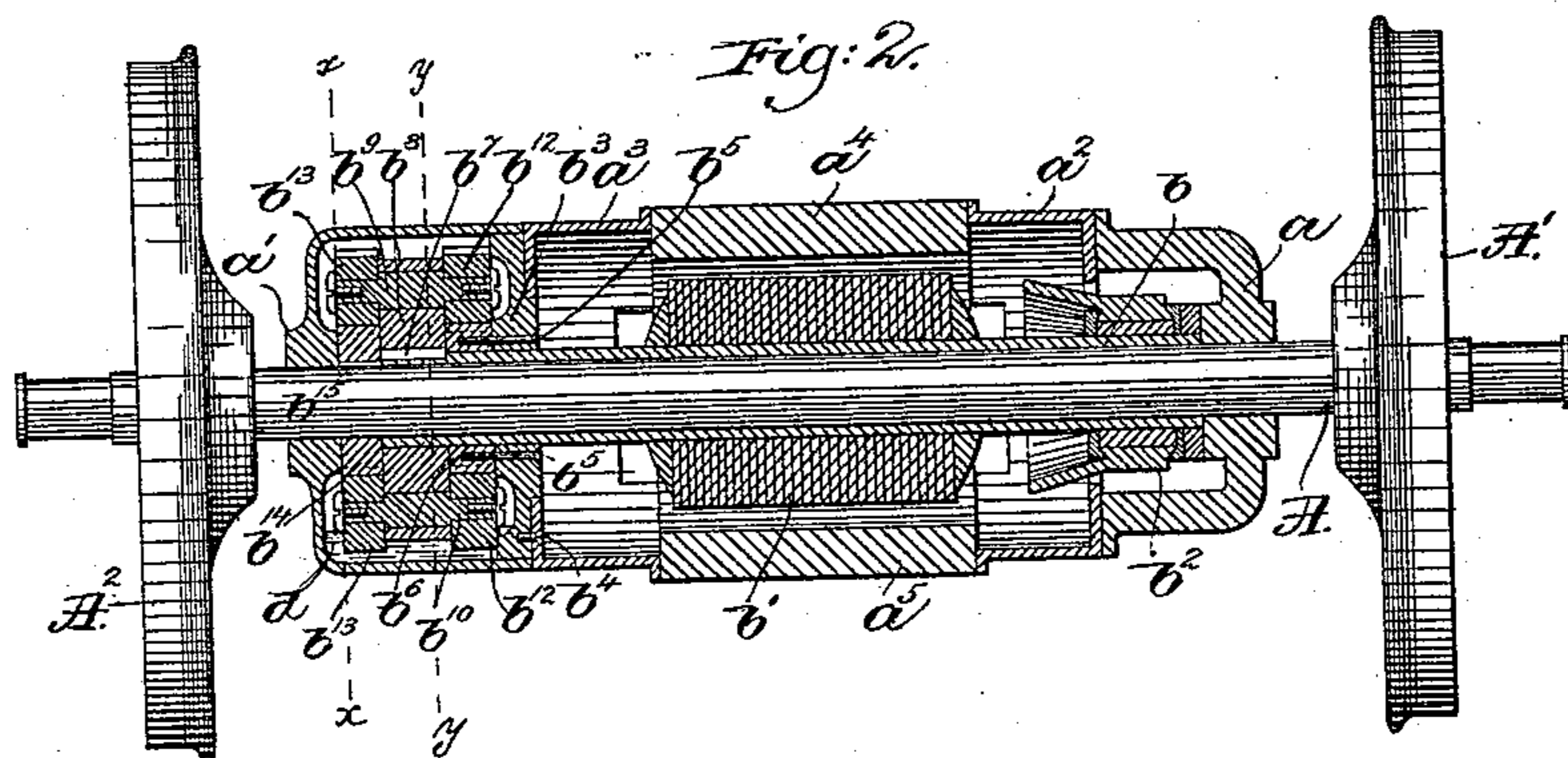
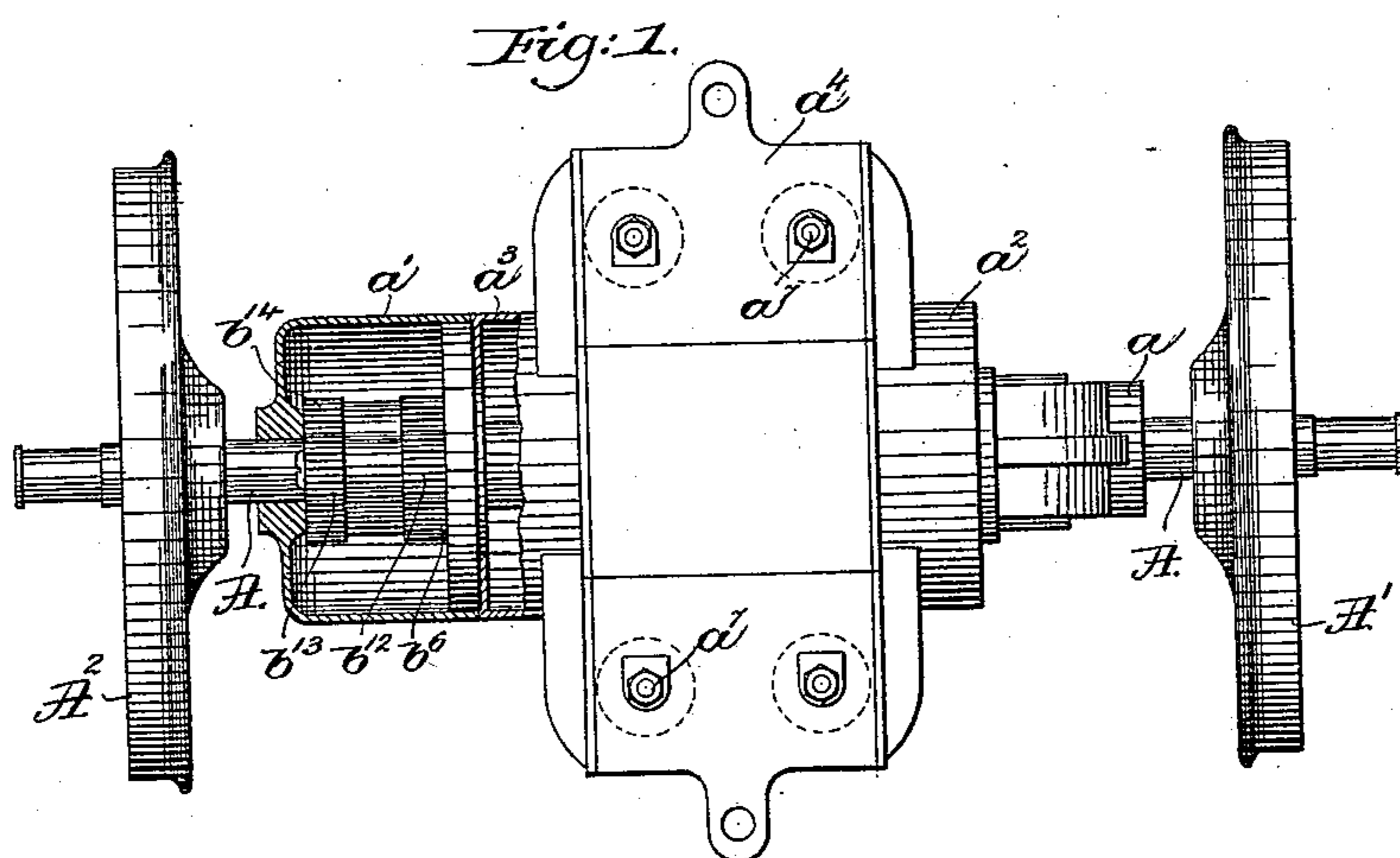


(No Model.)

S. E. MOWER.  
ELECTRIC MOTOR MECHANISM.

No. 433,903.

Patented Aug. 5, 1890.



*Witnesses.*

Francis L. Emery-  
Edgar A. Godkin

Inventor.  
Samuel E. Mower,  
by Lersey Gregory attys.

# UNITED STATES PATENT OFFICE.

SAMUEL E. MOWER, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO HENRY G. THOMPSON & SONS, OF SAME PLACE.

## ELECTRIC-MOTOR MECHANISM.

SPECIFICATION forming part of Letters Patent No. 433,903, dated August 5, 1890.

Application filed November 9, 1889. Serial No. 329,760. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL E. MOWER, of New Haven, county of New Haven, State of Connecticut, have invented an Improvement in Electric-Motor Mechanism, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 This invention relates to electric-motor mechanism, and has for its object to construct a motor mechanism so that the armature of the motor may be mounted directly upon an axle or shaft, and the latter rotated at a substantially slow speed while the said armature is revolving at a substantially high speed.

My invention is especially adapted to be employed on electric-railway cars for propelling the same.

20 In accordance with my invention, the motor is mounted directly upon the axle of the car-truck, whereby the maximum traction effect from the weight of the motor is obtained. The armature of the said motor is made to revolve on the car-axle, and is connected thereto by a speed-reducing mechanism, as will be described, so that the said armature, revolving at a high speed, produces revolution of the car-axle at a much slower speed—that is, 30 the said armature revolves a number of times to effect one revolution of the car-axle. The motor mechanism is preferably entirely covered and protected from external injury by a metallic shell or hood.

35 My invention therefore consists, in an electric-motor mechanism, of the combination, with a shaft or axle provided with wheels, of a motor having its armature mounted to run loosely on said shaft or axle, and a speed-reducing mechanism connected to the said armature and to the shaft or axle independent of the said wheels, substantially as will be described.

45 Other features of my invention will be pointed out in the claims at the end of this specification.

Figure 1 is a top or plan view, partially broken out, of my improved electric-motor mechanism applied to a car axle. Fig. 2 is a longitudinal section through the motor mechanism, the car-axle being shown in elevation;

Fig. 3, a transverse section on the line  $x x$ , Fig. 2, only a portion of the teeth of the gears being shown; and Fig. 4, a transverse section of Fig. 2 on line  $y y$ , on an enlarged scale. 55

The axle  $A$  is provided, as herein shown, with wheels  $A' A^2$ , and it may be of any usual or well-known construction, such as now commonly employed on electric-railway cars.

The car-axle  $A$  has mounted upon it, between the wheels  $A' A^2$ , a yoke  $a$ , and a hollow shell or drum  $a'$ , which may be secured to or form part of boxes or hoods  $a^2 a^3$ , bolted or otherwise secured to the pole-pieces  $a^4 a^5$  of an electric motor, which may be of any usual or well-known construction, it being herein shown as composed of substantially flat pole-pieces  $a^4 a^5$ , located above and below the axle  $A$  and connected by field-magnet cores  $a^6$ , only one of which is shown in Fig. 3, which are herein represented as fastened to the said pole-pieces by bolts  $a^7$ . 60 65 70

The sides of the field-magnets are journaled or supported directly upon the car-axle by the yoke  $a$  and hollow shell or drum  $a'$ , and the said field-magnets are supported at their ends, as herein shown, preferably by spiral springs  $a^8$ , each of which rests upon a cross-beam or support  $a^9$ , secured to or forming part of the car-truck, and through which is extended a bolt  $a^{10}$ , passed through an ear  $a^{12}$  of the pole-piece  $a^4$ , and provided above the said pole-piece with a nut  $a^{13}$ . 75 80

The car-axle  $A$ , between the yoke  $a$  and the hollow shell or drum  $a'$ , has loosely mounted upon it a sleeve  $b$ , to which the armature  $b'$  of the motor may be secured or form part thereof. The armature  $b'$  revolves between the pole-pieces  $a^4 a^5$ , and may be of any usual or well-known construction. 85 90

The sleeve  $b$  at one side of the armature is provided with a commutator  $b^2$ , of any usual or well-known construction, with which cooperate suitable brushes, (not herein shown,) the said commutator being connected in any usual or well-known manner with the armature. The opposite end of the sleeve  $b$ , as herein shown, is extended through a disk or frame  $b^3$ , herein shown as secured to the hood  $a^3$  by bolts  $b^4$ , and the said disk has fastened to it, as by bolts  $b^5$ , a gear-wheel  $b^6$ , forming part of a speed-reducing device. The sleeve 95 100

5  $b$ , beyond the gear  $b^6$ , has secured to it by a  
 key  $b^7$  a yoke or arm  $b^8$ , forming bearings at  
 the opposite ends for shafts  $b^9$   $b^{10}$ , provided  
 with pinions  $b^{12}$   $b^{13}$ , the pinions  $b^{12}$  meshing  
 10 with the stationary gear  $b^6$ , and the pinions  
 $b^{13}$  meshing with a gear  $b^{14}$ , secured to the  
 car-axle A by a key  $b^{15}$ . The gears  $b^6$   $b^{14}$  are  
 provided on their peripheries with an unlike  
 number of teeth—as, for instance, the gear  
 15  $b^6$  may be provided with thirty-two teeth and  
 the gear  $b^{14}$  with thirty-four teeth, so that as  
 the arm  $b^8$  with its shafts  $b^9$   $b^{10}$  are revolved  
 with the armature-sleeve  $b$  the pinion  $b^{12}$   
 travels around the stationary gear  $b^6$  of thirty-  
 20 two teeth, while the pinions  $b^{13}$  run around  
 the movable gear of thirty-four teeth, thus  
 turning the gear  $b^{14}$  two teeth for each revolu-  
 tion of the arm  $b^8$  and the armature-sleeve  
 $b$  to which it is attached. In this manner the  
 25 speed of the armature, which may be very  
 high, is reduced in such proportion as to pro-  
 duce a substantially slow-moving axle and  
 wheel.

The hollow shell or drum  $a'$  is preferably  
 30 made air and dust tight and is filled with oil  
 $d$  to such a depth that the pinions  $b^{12}$   $b^{13}$  re-  
 volve in the oil at each revolution of the ar-  
 mature-sleeve, the said pinions and gears be-  
 ing in this manner thoroughly lubricated and  
 35 protected from external injury. The drum  
 $a'$  also serves to muffle the noise caused by  
 the running of the pinions about the gears.

I prefer to employ two sets of pinions  $b^{12}$   
 $b^{13}$  on diametrically opposite sides of the gears  
 40  $b^6$   $b^{14}$ , as in this manner side thrust upon the  
 axle is obviated.

I do not desire to limit my invention to the  
 proportion of speed between the armature  
 and axle herein specified, as it is evident the  
 45 reducing mechanism described may be var-  
 ied to produce any desired proportionate  
 speed.

It will be noticed that the weight of the  
 armature and of the field-magnets and the  
 50 other parts of the running mechanism come  
 directly upon the axle, whereby a maximum  
 traction effect is obtained between the wheels  
 and the rails upon which they run.

I have herein shown my invention as ap-  
 55 plied to a car-axle; but I do not desire to  
 limit myself to this specific use, as the motor  
 may be applied to or used in connection with  
 other forms of mechanism, such as hoisting-  
 machines, elevators, and stationary motors.

I have shown one form of speed-reducing  
 gearing, a form capable of producing satis-  
 factory results; but I desire to be understood  
 that I may use any other usual or well-known  
 60 forms of speed-reducing gearing without de-  
 parting from my invention.

I claim—

1. In an electric-motor mechanism, the com-  
 bination, with an axle provided with wheels,  
 of a motor having its armature mounted to  
 run loosely on said axle, and a speed-reduc- 65  
 ing mechanism connected to the said arma-  
 ture and to the axle independent of the said  
 wheels, substantially as described.

2. In an electric-motor mechanism, the com-  
 bination, with an axle provided with wheels, 70  
 of a motor having its armature mounted  
 loosely on said axle and having its field-mag-  
 nets supported directly upon the axle, and a  
 speed-reducing mechanism connected to said  
 armature and to the axle independent of the 75  
 said wheels and supported directly by the  
 said axle, substantially as described.

3. In an electric-motor mechanism, the com-  
 bination, with an axle, of a motor having its  
 armature mounted to run loosely on said axle, 80  
 and a speed-reducing mechanism consisting  
 of a stationary gear  $b^6$ , a gear  $b^{14}$ , secured to  
 the said axle and having a different number  
 of teeth to those of gear  $b^6$ , and an arm  $b^8$ , se- 85  
 cured to the armature to revolve therewith,  
 shafts  $b^9$   $b^{10}$ , carried by said arm and pro-  
 vided with gears  $b^{12}$   $b^{13}$ , in mesh with gears  $b^6$   
 $b^{14}$ , substantially as and for the purpose speci-  
 fied.

4. In an electric-motor mechanism, the com- 90  
 bination, with an axle, of a motor having its  
 armature mounted to run loosely on said axle,  
 and a speed-reducing mechanism consisting  
 of a stationary gear  $b^6$ , a gear  $b^{14}$ , secured to  
 the said axle and having an unequal number 95  
 of teeth to those of the gear  $b^6$ , and an arm  $b^8$ ,  
 secured to the armature to revolve therewith,  
 and gears carried by said arm and in such  
 mesh with the gears  $b^6$   $b^{14}$ , substantially as  
 described. 100

5. In an electric-motor mechanism, the com-  
 bination, with an axle, of a motor having its  
 armature mounted to run loosely on said axle,  
 and a speed-reducing mechanism consisting 105  
 of a gear  $b^6$ , a gear  $b^{14}$ , secured to the said axle  
 and having a different number of teeth than  
 those of gear  $b^6$ , an arm  $b^8$ , secured to the  
 armature to revolve therewith, gears carried  
 by said arm in mesh with the gears  $b^6$   $b^{14}$ , the 110  
 hollow shell or drum  $a'$ , inclosing the said re-  
 ducing mechanism air and dust tight and con-  
 taining a lubricant by which to lubricate said  
 gears, substantially as described.

In testimony whereof I have signed my  
 name to this specification in the presence of 115  
 two subscribing witnesses.

SAMUEL E. MOWER.

Witnesses:

HENRY G. THOMPSON,  
L. H. DAYTON.