(No Model.) 2 Sheets—Sheet 1.

J. J. SPRAGUE.

ELECTRIC MOTOR GEARING.

No. 437,259. Patented Sept. 30, 1890.

Fig. 1.

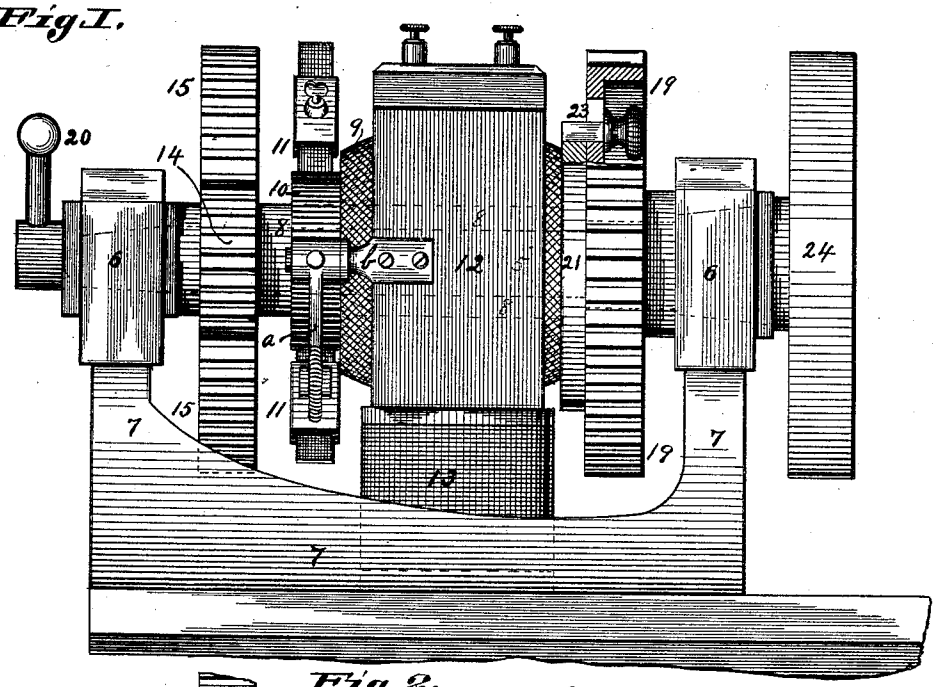
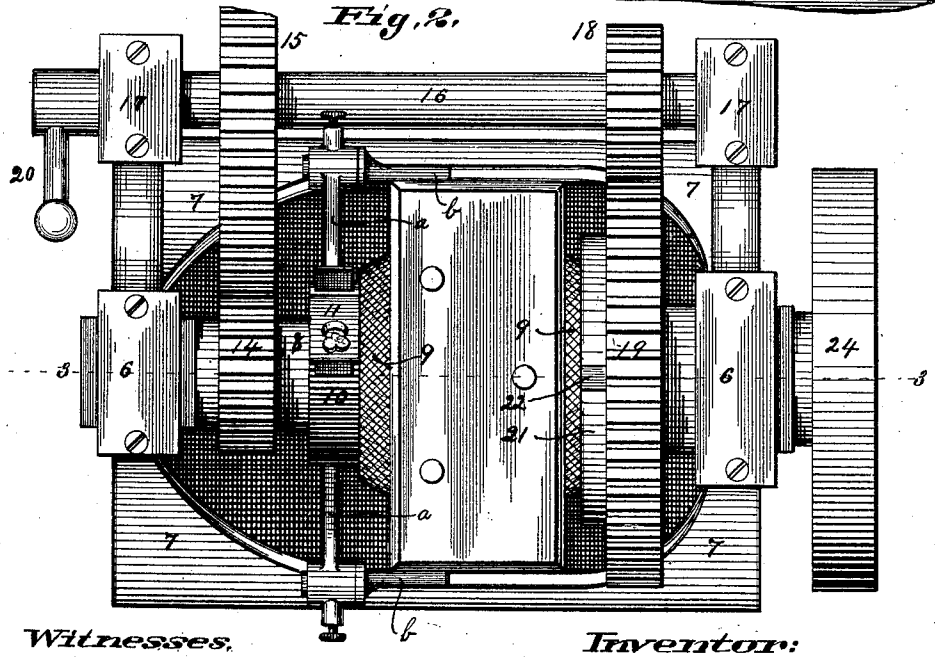


Fig. 2.



Witnesses.
Charles Pickles.
M. L. Reed.

Inventor:
Joseph J. Sprague,
By Fowler & Fowler
Attorneys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

J. J. SPRAGUE.

ELECTRIC MOTOR GEARING.

No. 437,259. Patented Sept. 30, 1890.

Fig. 3.

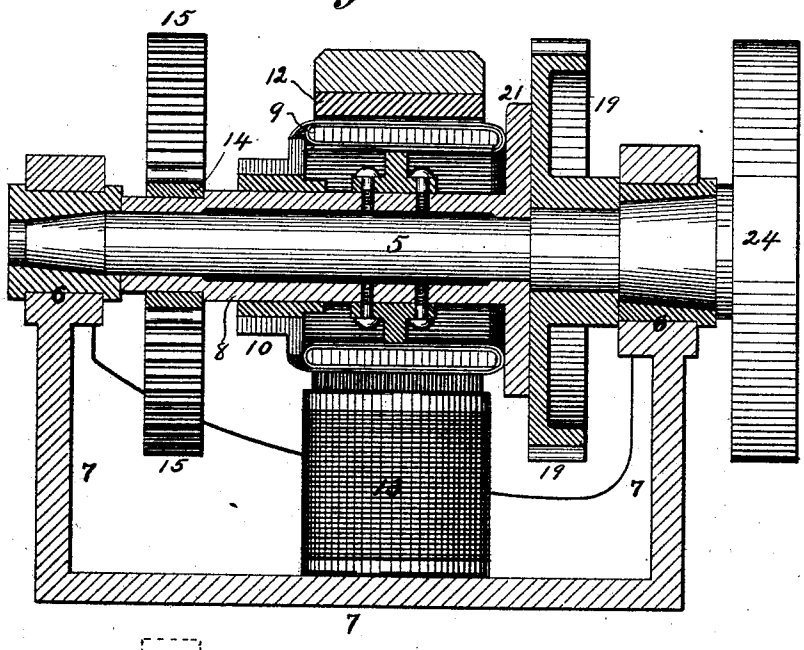
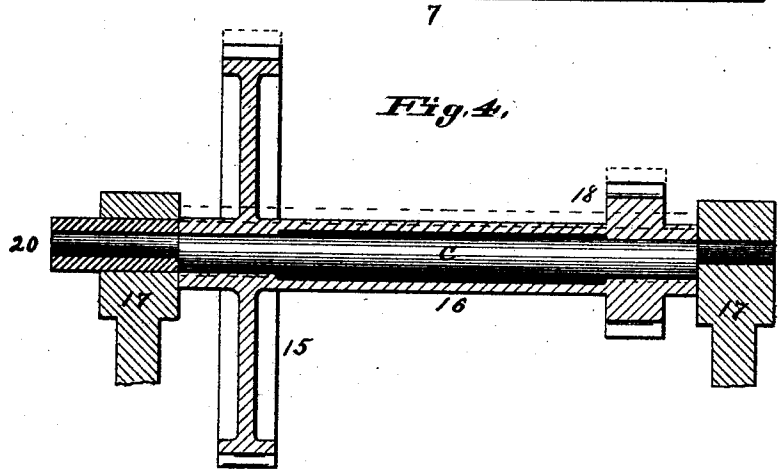


Fig. 4.



Witnesses;
Charles Pickles,
M. L. Reider.

Inventor;
Joseph J. Sprague,
By Fowler & Fowler
Attorneys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOSEPH J. SPRAGUE, OF CARTHAGE, MISSOURI.

ELECTRIC-MOTOR GEARING.

SPECIFICATION forming part of Letters Patent No. 437,259, dated September 30, 1890.

Application filed July 19, 1890. Serial No. 359,312. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH J. SPRAGUE, a citizen of the United States, residing at Carthage, county of Jasper, in the State of Missouri, have invented a new and Improved Electric-Motor Gearing, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

The object of my invention is to gear in a simple, effective, and compact manner an electric motor so that either speed or power can be obtained at will.

The invention consists of an armature carried by a loosely-mounted sleeve journaled about a rotary shaft, the parts being so arranged that the shaft upon which the sleeve carrying the armature is mounted may be driven directly by the rotation of the sleeve and armature to obtain speed or may be driven indirectly by suitable gearing intermediate the sleeve and rotary shaft to impart power to the shaft.

My invention will be best understood by referring to the accompanying drawings, in which—

Figure 1 is a side elevation of an electric-motor gearing made in accordance with my invention. Fig. 2 is a plan view of the same. Fig. 3 is a longitudinal section thereof on the line 3 3 of Fig. 2, and Fig. 4 is a sectional view of a detail.

The same figures and letters of reference indicate the same parts throughout the several views.

5 is a rotary shaft journaled in bearings 6 6 at each side of the apparatus, which may be supported by a bed-piece 7. Surrounding this rotary shaft is a hollow sleeve 8, upon which the armature 9 is mounted. 10 is the commutator carried by said sleeve, and 11 11 the brushes therefor, which are suitably supported from the pole-pieces 12 of the field-magnet 13 by rods *a*, journaled upon projecting pieces *b*, secured to said pole-pieces. The sleeve 8 also carries a spur-pinion 14. This pinion is adapted to mesh with a spur-wheel 15, carried by a counter-sleeve 16, parallel with the main sleeve and shaft, which counter-sleeve is supported by an eccentrically-mounted stationary shaft *c*, (see Fig. 4,) sustained by bearings 17 17 at each end. The counter-sleeve 16 carries also a spur-pinion 18, which is adapted to mesh with a large spur-wheel 19, keyed rigidly to the main rotary shaft 5. One end of the shaft *c* is provided with a handle 20, which, when suitably manipulated, throws the spur-wheel 15 into gear with the pinion-wheel 14 and the pinion 18 into engagement with the spur-wheel 19. Any other way of arranging the spur-wheel 15 and pinion 18 whereby they may be readily brought into requisition to increase the power and reduce the speed may be adopted without departing from my invention. Upon the sleeve 8, intermediate of the armature and spur-wheel 19 and rigidly connected to said sleeve, is preferably a disk 21, having one or more notches 22 therein. These notches are adapted to be engaged by the nose of a sliding button 23 or other locking device carried by the spur-wheel 19. When the handle 20 is manipulated so as to throw the spur-wheel 15 and pinion 18 out of engagement with the pinion-wheel 14 and spur-wheel 19, respectively, and the finger-button 23, carried by the spur-wheel 19, is made to engage one of the notches in the disk 21, as clearly shown in Fig. 1, the power of the armature will be applied to the main shaft 5 direct by means of said disk, finger-button, and spur-wheel 19. The main shaft 5 will therefore be driven at the same speed that the armature rotates. By disengaging the finger-button 23 from the disk 21 and manipulating the handle 20 so as to throw the spur-wheel 15 and pinion 18 into engagement with the pinion-wheel 14 and spur-wheel 19, respectively, as clearly shown in Fig. 2, the speed of the rotating armature and sleeve will be transmitted to the main shaft 5 with an increase of power. The said main shaft 5 may be any suitable shaft to which it is desired to transmit power. This shaft carries a wheel or pulley 24, which furnishes power for any desired object. By cutting out or interposing resistance in circuit of the electric motor to vary the strength and electromotive force of the current the armature may be made to rotate with varying speed (as is well known) in addition to having the change in power secured by the mechanical arrangement herein described. When the power-

gear is brought into requisition, the speed of the motor may be increased by cutting resistance out of the circuit in order to compensate for the reduction of speed due to the gearing which would otherwise occur, and thus the shaft can be driven at the same speed with an increase of power, and thus be useful for driving various kinds of machinery. If, however, the motor be revolved at the same speed as before, when the power-gearing is put in use the speed of rotation of the shaft will be very much reduced. This way of gearing an electric motor may therefore be used for propelling street-cars where power is required to start the car slowly and speed of rotation only necessary to propel the car after it is put in motion. Thus when the electric motor is rotated at the same speed as before and the power-gear is brought into requisition the car will be started slowly and the motor will by this gearing have sufficient power to start the car. After the car has been started, the power-gearing being thrown out of use, the shaft 5 may be coupled directly to the armature for speed.

The arrangement is simple and very compact, and not liable to get out of order, and the parts easily adjusted for speed and power.

Having fully set forth my invention, what I desire to claim and secure by Letters Patent of the United States is—

1. A gearing for electric motors, consisting of a rotary shaft to which power is to be applied, a loosely-mounted sleeve carried by said shaft, an armature thereupon with suitable electrical connections, a spur-wheel keyed to said shaft, means for coupling and uncoupling said spur-wheel to and from said sleeve and armature, a pinion-wheel carried by said sleeve, gearing intermediate of said spur-wheel and pinion for transmitting the rotation of said sleeve and pinion to said spur-wheel and rotary shaft with an increase of power, and means for throwing said gear into and out of engagement with said spur-wheel and pinion.

2. The combination, as hereinbefore set forth, of the rotary shaft 5, the loosely-mounted sleeve 8 carried thereby, an armature 9 upon said sleeve with suitable electrical connections, a disk 21, rigidly secured to said sleeve, a spur-wheel 19, keyed to said shaft, having a locking device for engaging and disengaging said disk, a spur-pinion 14, carried at the other end of said sleeve, a suitably-supported spur-wheel 15 and pinion 18, and means for throwing the latter into and out of engagement with said pinion 14 and spur-wheel 19, respectively, substantially as and for the purpose described.

In testimony whereof I have hereunto set my hand and affixed my seal, this 12th day of July, 1890, in the presence of the two subscribing witnesses.

JOSEPH J. SPRAGUE. [L. S.]

Witnesses:

L. W. CAMPBELL,

GEO. P. CUNNINGHAM.