(No Model.)

J. A. WILLIAMS.

ELECTRIC MOTOR REGULATOR.

No. 491,829. Patented Feb. 14, 1893.

Fig. 1.

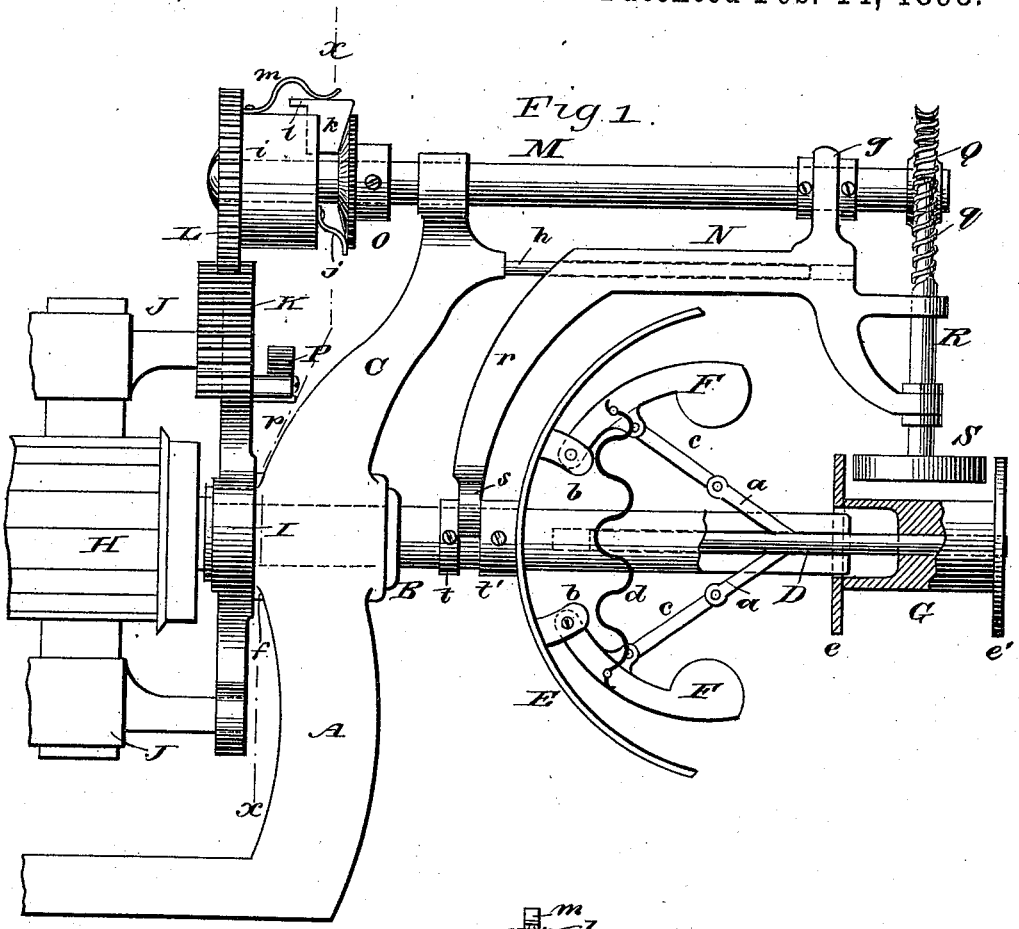
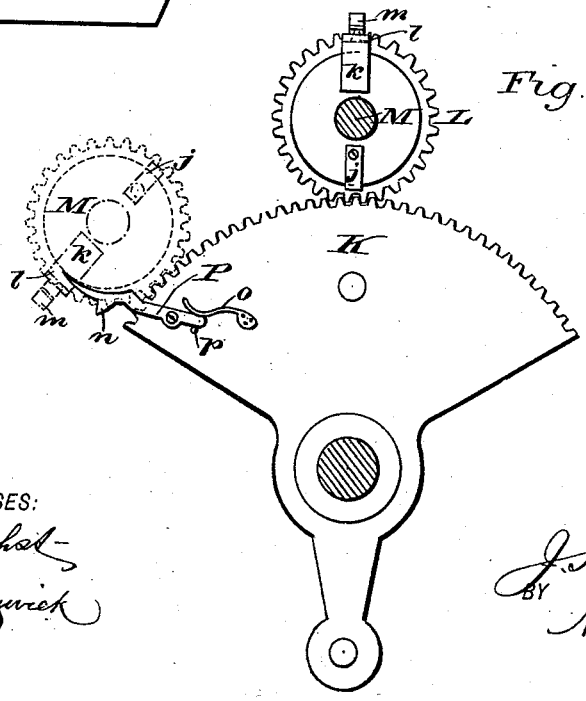


Fig. 2.



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JOSEPH A. WILLIAMS, OF CANAL DOVER, OHIO.

ELECTRIC-MOTOR REGULATOR.

SPECIFICATION forming part of Letters Patent No. 491,829, dated February 14, 1893.

Application filed February 11, 1892. Serial No. 421,137. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH A. WILLIAMS, of Canal Dover, in the county of Tuscarawas and State of Ohio, have invented a new and Improved Electric-Motor Regulator, of which the following is a specification, reference being had to the annexed drawings, forming a part thereof, in which—

Figure 1 is a side elevation of my improved electric motor regulator, showing a portion of the electric motor; and Fig. 2 is a vertical transverse section taken on line *x*—*x* in Fig. 1, showing the position of the brush moving toothed sector.

Similar letters of reference indicate corresponding parts in both views.

The object of my invention is to construct a simple and effective regulator for electric motors, which will maintain a uniform speed under varying load.

My invention consists in the construction and combinations hereinafter described and claimed.

The pedestal A, on which is journaled the armature shaft B of the electric motor, is provided with an arm C for supporting the various parts of the electric regulator. The armature shaft B is prolonged beyond the pedestal, and bored axially to receive a rod D, which slides freely in the bore of the shaft, and is provided with oblique arms *a* projecting through slots in opposite sides of the armature shaft. To the shaft B is secured a curved bar E, provided with ears *b* on diametrically opposite sides of the armature shaft, and in the said ears are pivoted weighted arms F, which are connected with the arms *a* by links *c*. The said weighted arms F are also engaged by a spring *d*, which tends to draw the said weighted arms toward each other, in opposition to centrifugal force. Upon the end of the rod D is secured a sleeve G, having on opposite ends friction disks *e*, *e'*, and the said sleeve is chambered in the end adjoining the armature shaft so that it may slide over the said shaft.

Upon the armature shaft B, within the pedestal A, is mounted the commutator cylinder H, which is of ordinary construction, and upon a boss *f* projecting inwardly from the pedestal and concentric with the shaft B, is mounted a brush arm I, provided with brush holders J of the usual description, carrying brushes which contact with the commutator cylinder H. One end of the brush arm I, is provided with a toothed sector K, which engages a pinion L, placed loosely on the shaft M journaled in the arm C and in the journal box *g* carried by the frame N, supported by a rod *h* projecting from the arm C. The pinion L is provided with a boss *i*, and upon the shaft M, between the said boss and the arm C, is placed a toothed collar O. The boss *i* carries a spring *j*, which presses against the collar O, and keeps the pinion L in contact with a flange on the end of the shaft M. In the boss *i*, is made a radial slot in which is placed a wedge *k*, the said wedge being provided with an arm *l* which extends over the boss. The spring *m* secured to the boss extends over and presses upon the outer end of the wedge *k*, forcing the said wedge downward, bringing it into frictional contact with the toothed collar O.

To the outer face of the toothed sector K, is pivoted a curved wedge P, provided with a tooth *n*. The said curved wedge is prolonged beyond its pivot, and is held by a spring *o* normally in contact with the pin *p* projecting from the face of the toothed sector K.

The outer end of the shaft M carries a worm wheel Q, which is engaged by a worm *q* formed on the shaft R, the said shaft being journaled in the frame N. The lower end of the shaft R carries a friction wheel S, which is supported in the space between the friction disks *e*, *e'* on the ends of the sleeve G. The frame N is provided with an arm *r*, which extends down to the armature shaft B, and has a forked end *s* for embracing the armature shaft, but the said fork is without frictional contact with the shaft.

Upon the armature shaft B, on opposite sides of the fork *s*, are secured collars *t*, *t'*, by changing the position of which, the fork *s* and consequently the frame N may be adjusted, thereby bringing the friction wheel S into proper relation with the friction disks *e*, *e'*. When the speed of the motor is normal, the weighted arms F occupy a middle position, and the disks *e*, *e'* are held out of contact with the friction wheel S. When the speed of the motor increases, the weighted arms F are thrown outwardly by centrifugal

force thereby drawing the sleeve G and the friction disks *e*, *e'* attached thereto toward the motor, bringing the friction disk *e'* into engagement with the friction wheel S, thereby causing the shaft R to turn, imparting a rotary motion to the shaft M, moving the arm I through the medium of the pinion L and toothed sector K, and moving the brushes J away from the point of maximum electromotive force, thereby diminishing the speed of the motor. When the speed of the motor diminishes, the weighted arms F are drawn inwardly toward the armature shaft B by the spring *d*, thereby forcing the sleeve G and friction disks *e*, *e'* outwardly, bringing the disk *e* into frictional contact with the wheel S, thereby revolving the shafts R, M in the opposite direction, and moving the brushes J toward the point of maximum electromotive force.

In stopping the motor the tendency would be to turn the pinion L so as to move the toothed sector K forward so far as to carry the brushes J beyond the point of maximum electromotive force. The curved wedge P is provided for preventing this action. As the toothed sector K nears the limit of its movement as the motor slows down, the arm *l* projecting from the wedge *k* is engaged by the curved wedge P, which enters between said arm *l* and the boss *i*, and forces the wedge *k* outwardly, thereby disengaging the pinion L and allowing the shaft M to continue its motion without moving the pinion L or toothed sector K.

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

1. The combination with the armature shaft, a centrifugal governor having a spindle provided with a pair of friction disks or gears, and the brush carrying arm having a toothed sector, of a shaft parallel with the drive shaft and geared to the said sector, a sliding frame in which one end of said shaft is mounted, a transverse shaft mounted in said sliding frame, geared to the shaft carried thereby and provided at its lower end with a friction disk or gear between said parallel disks or gears, substantially as set forth.

2. The combination with the armature shaft, its pedestal A having an upward projecting arm C provided with a horizontal rod *h* parallel with the said shaft, a centrifugal governor on the armature shaft beneath said rod, and a pair of friction disks or gears *e e'* carried by the spindle of said governor, of a brush carrying arm I having a toothed sector K on its upper end, a sliding frame N mounted on said rod and provided with a forked lower end *s*, collars *t t'* on the armature shaft at opposite sides of said fork, a shaft M journaled in the upper end of arm C and journaled at its other end in a bearing *g* of the frame N, a pinion on the inner end of shaft M meshing with the toothed sector, and the transverse shaft R mounted in the frame N, geared at its upper end to shaft M and provided at its lower end with a friction disk or gear S between the two disks *e e'*, substantially as set forth.

3. The combination, with the toothed sector K, and the shaft M provided with the beveled collar O, of the pinion L mounted loosely on the shaft M, and furnished with the spring-pressed wedge *k* having the arm *l*, and the curved wedge P carried by the toothed sector, substantially as specified.

4. The combination with the armature shaft and its brush-carrying arm provided with a sector, and a releasing device near one end thereof, of a governor shaft operated therefrom and provided with a loose pinion, and a locking device connecting the said shaft and pinion; said locking device being in the path of the said releasing device to be released thereby and render the said pinion inactive, substantially as set forth.

5. The combination with the armature shaft provided with a governor, a parallel shaft driven from the governor and having a loose pinion and a locking device connecting the pinion with its shaft, of the brush carrying arm provided with a toothed sector meshing with said pinion and a pivoted spring pressed wedge at one end of said sector to engage said locking device and release it, substantially as set forth.

6. The combination with the armature shaft provided with a governor, a parallel shaft driven from the governor and having a loose pinion at one end, a beveled toothed disk, a spring *j* pressing the pinion and disk apart, and a spring pressed locking wedge *k* connecting the pinion and disk and having a projection *l*, of the brush carrying arm provided with a toothed sector meshing with said pinion and having a pivoted spring pressed wedge P to pass under the projection *l* and move the wedge outward, substantially as set forth.

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