

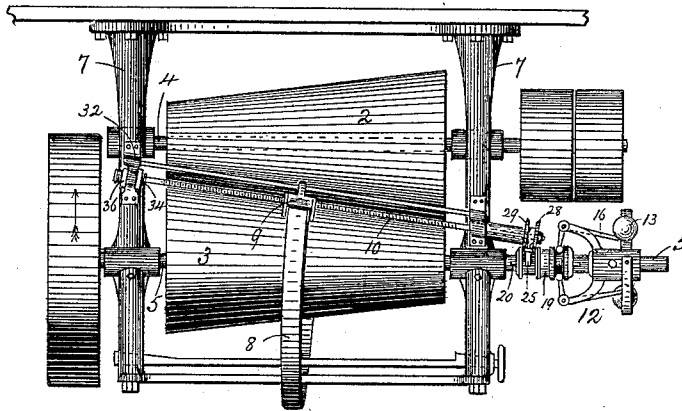
(No Model.)

G. F. EVANS.  
SPEED REGULATING DEVICE.

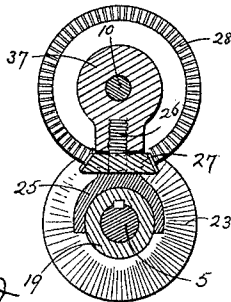
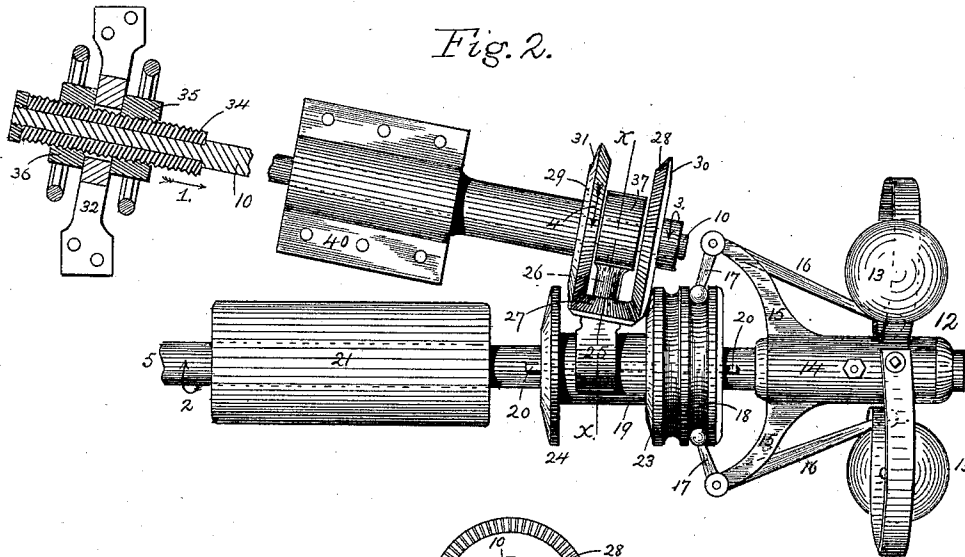
No. 390,216.

Patented Oct. 2, 1888.

*Fig. 1.*



*Fig. 2.*



*Witnesses.*

*Francis C. Stanwood*  
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*Fig. 3.*

*Inventor.*

*G. Frank Evans.*  
*by H. C. Lodge, Atty.*

# UNITED STATES PATENT OFFICE.

G. FRANK EVANS, OF SOMERVILLE, MASSACHUSETTS.

## SPEED-REGULATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 390,216, dated October 2, 1888.

Application filed April 23, 1888. Serial No. 271,495. (No model.)

*To all whom it may concern:*

Be it known that I, G. FRANK EVANS, a citizen of the United States, residing at Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Speed-Regulating Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to mechanism by which the rotary movements of counter-shafts are to be maintained constant or nearly uniform.

This invention is particularly adapted for dynamos or other machines for generating or supplying electricity, and may be considered as relating to an invention patented by me and described in Letters Patent No. 374,296, of December 6, 1887, in which two reversely-conical pulleys mounted upon parallel shafts co-operate with an endless band loosely encircling one pulley, said band passing between said pulleys and adapted to be gripped by them; further, in a screw-actuated rod by which the belt is adjusted lengthwise of the pulleys to vary the speed of the driven pulley and the shaft upon which it is mounted.

The object of this invention is to obtain from the variable speed of the main shaft a uniform and constant speed of the counter or actuated shaft.

The primary features consist, in connection with an endless band which passes between two reversely-conical pulleys, of a band-guide which travels upon a screw-threaded shaft extending lengthwise of the pulleys. Said shaft is actuated by means of a speed-regulator upon the end of the counter-shaft and operates mechanism, more fully hereinafter described, which connects said regulator with the screw-threaded shaft.

The drawings represent, in Figure 1, in elevation a set of hanging pulleys provided with a speed-regulating device embodying my invention. Fig. 2 is an enlarged view, in sectional elevation, of the speed-regulator, showing a portion of the driven cone-pulley shaft,

the screw threaded rod, and the parts which interconnect the latter with the regulator. Fig. 3 is a vertical section on line *xx* in Fig. 2.

In the drawings accompanying this specification I have shown the driving cone-pulley at 2 and the driven at 3. Said pulleys are reversely conical and fixed upon parallel shafts, respectively, 4 5, mounted in twin hangers 7, and with an endless band, 8, loosely encircling the lower pulley. The position of this band lengthwise of said pulleys is regulated by means of a band guide, 9, through which it passes. The latter is actuated by a screw-threaded rod, 10, with which it engages and by which it is supported. Said rod extends lengthwise of the pulleys and parallel with their active surfaces.

The end of driven shaft 5 adjacent to the lower end of the rod 10 is furnished with a speed-regulator, 12, of any desirable construction, composed, in the present instance, primarily, of the spring-actuated balls 13, a standard, 14, with arms 15, in which are pivoted bell-crank levers 16, the short arms 17 of which are surmounted at their extremities preferably with balls which engage in a semicircular groove, 18, formed in one end of a spool, 19. The latter is affixed to the shaft 5 by a spline-and-groove connection, 20, whereby it is capable of endwise reciprocations upon said shaft, but is compelled to rotate in unison therewith.

The end of the spool adjacent to the journal-box 21 is fitted with twin beveled friction disks or plates 23 24. To connect the screw-threaded shaft 10 with the regulator, to cause the latter to actuate said shaft and thereby shift the endless band to maintain the speed of the driven pulley 3 uniform, I have mounted upon the spool between the friction-plates 23 24 a yoke, 25, which straddles said spool. Said yoke is provided with a short stud or pin, 26, screw-threaded at its end, by which it is united with a collar, 37, the shaft 10 revolving loosely in the latter. Freely rotating upon the stud 26 is a beveled gear, 27, which meshes with oppositely-disposed twin gears 28 29, both mounted upon the shaft 10 on either side of the collar 37, the gear 28 being fastened to said shaft, while the other, 29, is loose thereon. The outer face portions, 30 31, respectively, of said gears are adapted to co-operate with the beveled friction-plates 23 24.

The shaft 10 is mounted in a journal-box, 40, located in proximity to and above the journal-box of the driven shaft 5. Since the regulator is constantly in motion, I have adopted the following arrangement as an expedient to avoid stopping of the shaft 5 should circumstances require the speed of said shaft to be increased or diminished: Secured upon one of the hangers is a journal-box, 32, in which is mounted a sleeve, 34, screw-threaded exteriorly to engage two adjusting-nuts, 35 36, located on opposite sides of said journal-box. The interior of said sleeve is tubular and receives the end of the shaft 10, upon which it is held by a fastening-nut. Moreover, said sleeve is capable of endwise movement through the box 32. Thus advance of said nuts 35 36 in direction of arrow 1 thrusts the shaft 10 endwise and forces the spool 19 away from the regulator, whereby the tension of the springs on the balls 13 is increased and greater speed of the driven shaft is obtained. Reverse movement reduces the speed, since the balls are more easily actuated, the tension of the springs being diminished.

The operation of the various co-operating parts is as follows, presuming their relative positions are as indicated in Fig. 2: Rotation of the shaft 5 is from the observer. (See arrow 2.) The friction-plate 23 is in contact with surface 30 on the gear 28, affixed to the screw-shaft 10, and said gear is moved as indicated by arrow 3. This rotation of the gear 28 likewise revolves the screw-shaft 10, and the band-guide 9 advances the band toward the small end of the driven cone-pulley 3, to increase the speed of the shaft 5, which carries the regulator. Excessive speed of the shaft 5, by means of the balls 13, moves the spool 19 upon the shaft toward the regulator, and the friction-plate 23 is removed from contact with the gear 28. Simultaneously the friction-plate 24 has advanced toward and is now in contact with the surface 31 upon the gear 29, loose upon the shaft 10. Rotation of said gear is shown by arrow 4; but by means of the pinion 27 the motion of the gear 28 is reversed, as likewise that of the screw-threaded shaft 10; hence the band is impelled toward the large end of the driven pulley 3 and the speed of the driven shaft 5 is reduced. In this way intermittent reciprocations of the band-guide are produced along the screw-shaft 10, and the latter is actuated more or less frequently by the gears and mechanism connecting with the governor. The latter having been previously adjusted for a certain speed, variations more or less will be counteracted by said governor, as above described,

and the speed of the driven shaft is rendered constant irrespective of the variations from the main shaft.

What I desire to claim is—

1. The combination, with a main shaft, the cone-shaped pulley thereon, a driven shaft with its reversely-shaped cone-pulley, and the endless band operating the latter, of the speed-regulator secured upon said driven shaft, and means, substantially as described, whereby travel of the band lengthwise of the pulleys is effected, substantially as described.

2. In mechanism by which a constant speed is produced from a variable speed, the combination, with the driven shaft and its operating mechanism, the regulator affixed on said shaft, and the continuously-rotating spool, of a screw-threaded shaft having endwise adjustment and connected with and operated by said spool, substantially as stated.

3. The reversely-conical pulleys, their operating shafts, the endless band loosely encircling one of said pulleys and gripped by both, the band-guide, and the actuating screw-threaded shaft adjustable endwise, combined with the regulator and spool upon the driven shaft, and the fast and loose gears upon the screw-shaft co-operating with said spool, substantially as herein specified.

4. In mechanism whereby rotation from one shaft to another is effected by an endless band which is gripped between two reversely-conical pulleys not in contact, the combination, with the driven shaft, the fixed regulator, and a reciprocating spool, of the screw-threaded shaft, the fast and loose gears, the band-guide, and the regulating-nuts, as and for the purposes stated.

5. In combination with operating shafts 4 5, their pulleys 2 3, the endless band 8 and its band-guide 9, the screw-shaft 10, loose sleeve 34, stationary nuts 35 36, fast and loose gears 28 29, pinion 27, and the co-operating regulator 12, and spool 19, affixed upon the shaft 5, substantially as herein set forth.

6. The combination, with the revolving screw-shaft 10, supported at one end by the collar 37 and yoke 25, its fast and loose gears 28 29, the pinion 27, and the regulator 12, affixed to the shaft 5, of the continuously-rotating spool 19, reciprocating upon said shaft 5 and having the frictional plates 23 24, all operating as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

G. FRANK EVANS.

Witnesses:

H. E. LODGE,

E. K. BOYNTON.