A. L. PARKER.

DEVICE FOR REGULATING THE SPEED OF GENERATORS TO SECURE CONSTANT POTENTIAL.

APPLICATION FILED NOV. 9, 1908.

935,051. **Patented Sept. 28, 1909.**

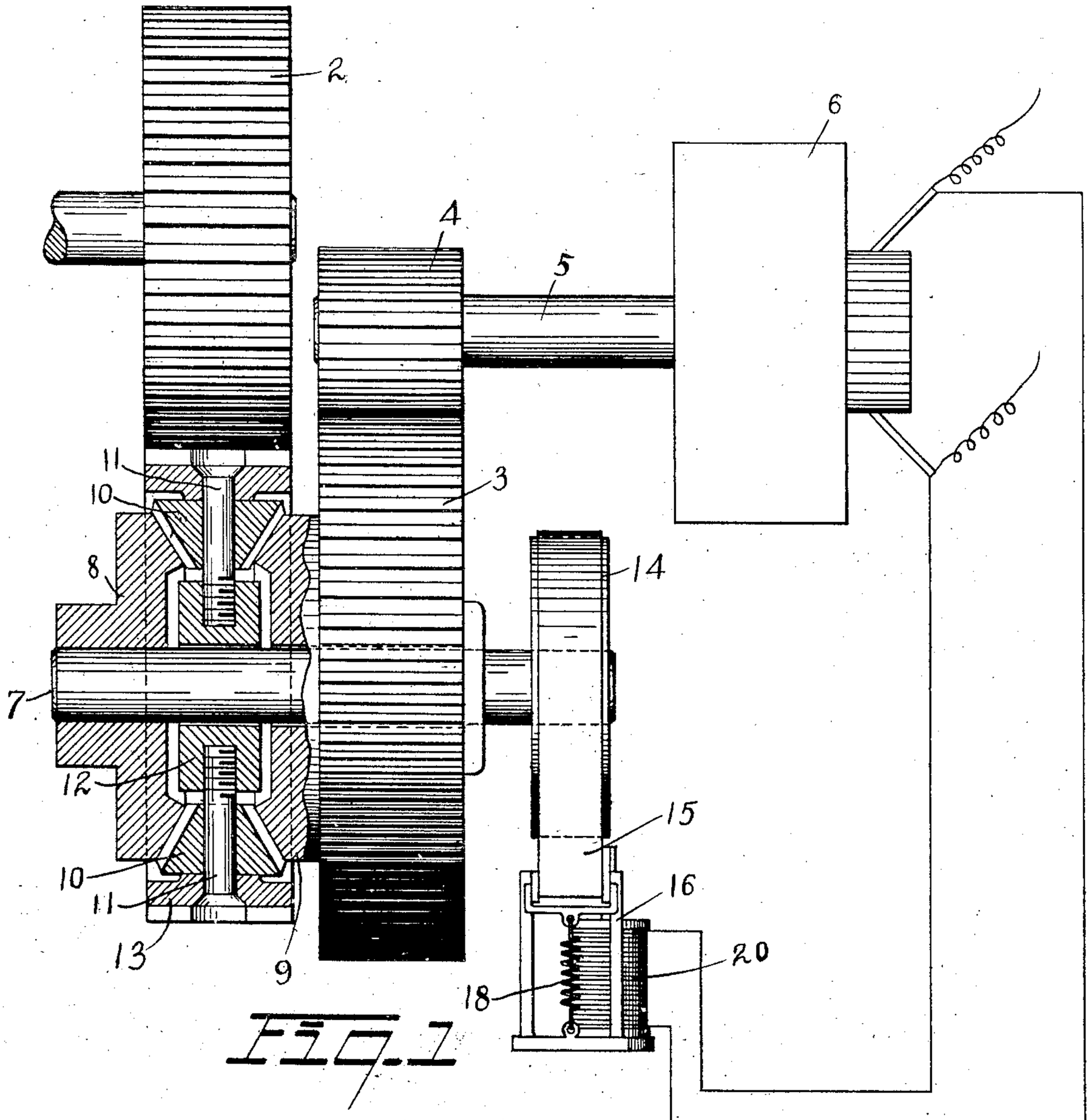

FIG. 1

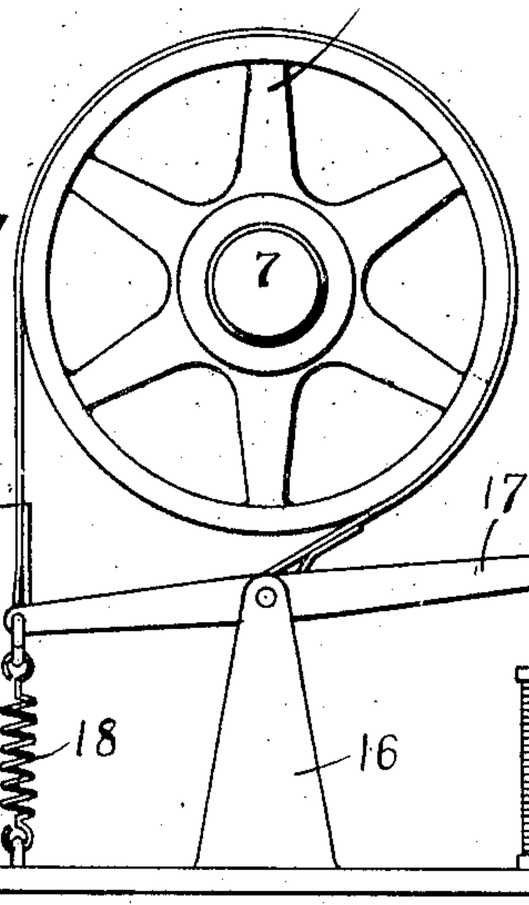

FIG. 2

Witnesses:
Nathan F. Fretter.
M. E. Tait.

Inventor
Arthur L. Parker
By Bates, Fouts & Hull
Attys

UNITED STATES PATENT OFFICE.

ARTHUR L. PARKER, OF CLEVELAND, OHIO.

DEVICE FOR REGULATING THE SPEED OF GENERATORS TO SECURE CONSTANT POTENTIAL.

935,051. Specification of Letters Patent. Patented Sept. 28, 1909.

Application filed November 9, 1908. Serial No. 461,621.

To all whom it may concern:

Be it known that I, ARTHUR L. PARKER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Devices for Regulating the Speed of Generators to Secure Constant Potential, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention relates to a device for regulating the speed at which an electrical generator is driven, so that the potential across the brushes of the generator may be kept constant and prevent any appreciable increase in voltage at the generator brushes.

Generally speaking, the invention comprises the elements and combinations thereof, set forth in the accompanying claims.

Reference should be had to the accompanying drawings forming a part of this specification, in which—

Figure 1 is a diagrammatic representation in plan of the equalizing device and the generator; Fig. 2 is an end elevation of a brake and solenoid for operating the same.

It frequently happens that a generator is driven by a prime mover, the speed of which will vary, sometimes within narrow limits, and again between very wide limits.

Where a generator is run by the ordinary engine, it frequently happens that the speed is increased covering short periods of time and at such times the voltage across the generator brushes will increase. If a generator adapted to electrically light a train be operatively connected to the axle upon a railway car, it is quite evident that due to the great variations in speed at which a railway train runs, it would cause the greatest range of variations in potential of the generator.

As shown in the drawing, the shaft 1 represents a shaft which is directly connected with the prime mover. Upon the end of this shaft is a gear 2, this gear meshing with a differential mechanism which is operatively connected with the gear 3. This last named gear meshes with a gear 4 upon the shaft 5, which shaft operates the generator 6.

The differential mechanism which operatively connects the gears 2 and 3 comprises the following parts. Upon the shaft 7 is secured a bevel gear 8 and opposite this gear is a second bevel gear 9 which is secured to the gear 3. Both the gears 9 and 3 are supported upon the shaft 7, but have no driving connection therewith.

Between the gears 8 and 9 are a number of conical spur wheels 10 which mesh with both the first mentioned gears. The gears 10 are loosely mounted upon pins 11, which pins are secured at their inner ends to a collar 12, which freely rotates upon the shaft 7. The outer ends of the pins 11 are secured in an annular member 13, which is provided with gear teeth upon its outer periphery, the said teeth meshing with the gear 2.

The shaft 7 extends beyond the gear 3 and has a drum or pulley 14 secured thereon, which drum is engaged by a brake strap 15. This strap is secured at one of its ends to a fixed upright 16, and at its opposite end to a lever 17. The proper tension upon the brake strap 15 is maintained by means of a spring 18, secured to the end of the lever 17, the strength of the spring 18 being just sufficient to hold the strap to allow no movement of the shaft 7.

The opposite end of the lever 17, is operatively connected to the core member 19 of a solenoid 20. The solenoid is connected in shunt across the brushes of the generator and a suitable resistance is placed in this shunt circuit, so that when the generator is operating at the desired voltage, no current will flow through the solenoid.

It will be apparent that when the generator is driven at a speed by the prime mover so as to give the proper voltage, across the brushes, at such times, the solenoid will be inactive and the brake 15 will prevent the shaft 7 from rotating. Therefore gear 2 will rotate member 13, which will carry with it the spurs 10. These spurs will rotate about their own axes due to the fact that the gear 8 is held stationary, and the rotation of the spurs 10 will cause gear 9 to rotate, which, in turn, rotates gear 3, causing the rotation of gear 4 and generator shaft 5.

The various gears 2, 13, 3 and 4 are selected of such a ratio so that at the low speed of the prime mover, the generator will be driven at a speed to give the desired voltage.

Any increase of voltage across the generator brushes will cause a current to actuate the solenoid 20 and to release the brake band 15 by an amount proportional to the rise in

voltage at the brushes. The release of the brake band will allow the drum 14 to slip and so allow the shaft 7 and gear 8 to be rotated to a certain extent. This will destroy the previously described relation between gears 8 and 9 and the speed of gear 9 will be reduced by an amount equal to the speed of rotation of gear 8. Consequently, the speed of gears 3 and 4 and generator shaft 5 will be reduced.

As the generator speed is reduced and the voltage becomes normal, the solenoid ceases to act and the mechanism resumes its former operating relations as before described.

While I have shown and described a particular form of differential mechanism as well as a particular form of brake, it will be obvious that other forms of these devices may be used without departing from the spirit of the invention.

Wherever in the specification and claims, I have used the term, prime mover, this term is intended to include any shaft, engine or motor which causes the generator to run.

It will be apparent that the construction herein set forth provides an efficient means for operating a generator at a constant potential, and accomplishes this result whatever may be the range of speed of the prime mover.

Having thus described my invention, what I claim is:

1. The combination with a generator, of a prime mover, a differential mechanism operatively connecting the prime mover and generator, means for holding said differential mechanism normally from compensating, and means for causing said differential to compensate to reduce the speed of the generator when the voltage across the generator brushes exceeds a predetermined voltage.

2. The combination of a generator, of a prime mover, a differential mechanism operatively connecting the same, a brake normally holding the differential mechanism from compensating, and means automatically and proportionately releasing said brake to allow said differential mechanism to compensate to reduce the speed of the generator when the voltage across the generator brushes exceeds a predetermined voltage.

3. The combination, with a generator, of a prime mover, differential mechanism operatively connecting the prime mover and generator, a brake for normally holding the differential mechanism from compensating, and a solenoid electrically connected with the generator and operatively secured to the brake to automatically and proportionately allow said differential mechanism to compensate to reduce the speed of the generator when the voltage of the current generated by the generator exceeds a predetermined voltage.

4. The combination of a driving shaft, and a generator shaft, a generator operated by said shaft, a countershaft, a differential mechanism upon said counter shaft, gears connecting the differential mechanism with the first mentioned shafts, a brake normally holding the counter shaft against rotation whereby said differential mechanism will be held from compensation, and means for releasing said brake and allowing the counter shaft to rotate, whereby the differential mechanism will compensate to reduce the speed of the generator when the voltage of the current generated by the generator exceeds a predetermined voltage.

5. The combination of a driving shaft and a generator shaft, a generator operated by said shaft, a counter shaft, a gear fast upon said shaft, a gear loose upon said shaft, a spur gear operatively connecting the said gears at the counter shaft, operative connections between said spur gear and the driving shaft, operative connections between the loose gear upon the countershaft and generator shaft, means for normally holding the countershaft against rotation, and means for releasing the countershaft holding means to permit rotation of the countershaft, whereby the gear fast on the countershaft may rotate relative to the gear loose on the countershaft thereby reducing the speed of the loose gear and the generator when the voltage of the current generated by the generator exceeds a predetermined voltage.

6. The combination of a driving shaft, and a generator shaft, a generator operated by said shaft, a countershaft, a gear fast upon the countershaft, a gear loosely mounted upon said countershaft, a spur gear operatively connecting the two gears, means for rotating said spur gear about the axis of the countershaft, said means being operatively connected to the driving shaft, operative connections between the loose gear on the countershaft and the generator shaft, a brake normally holding the countershaft and the gear fast thereon against rotation, a solenoid electrically connected with the generator and operatively connected with the brake, said solenoid being adapted to operate the brake to release the same when the voltage of the current generated by the generator exceeds a predetermined voltage, and means for resetting the brake.

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

ARTHUR L. PARKER.

Witnesses:
CURT B. MUELLER,
A. J. HUDSON.