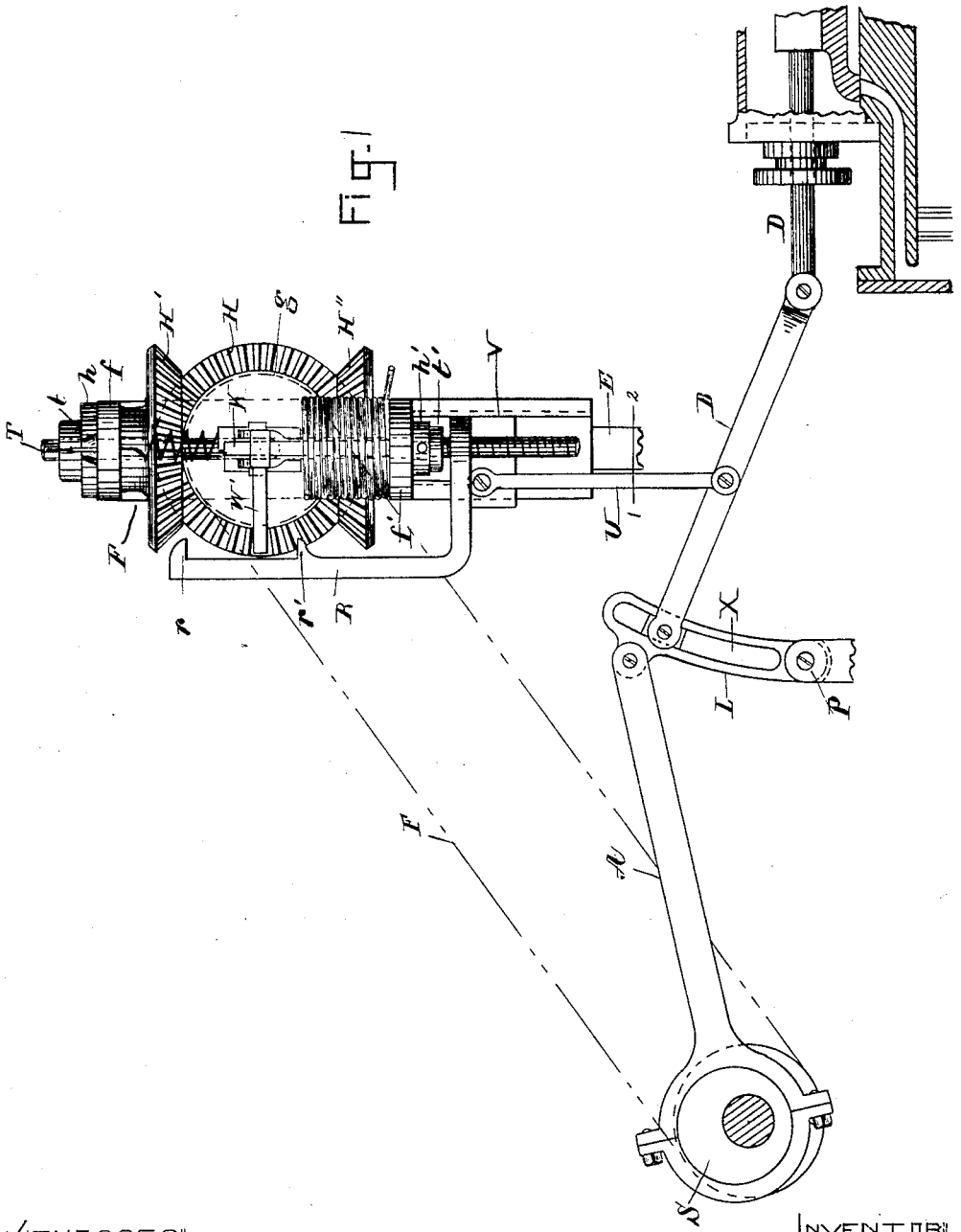
(No Model.) 3 Sheets—Sheet 1.

E. E. WINKLEY.

SPEED REGULATOR FOR DYNAMO ELECTRIC MACHINES.

No. 454,541. Patented June 23, 1891.

Fig. 1



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(No Model.) 3 Sheets—Sheet 2.

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Fig. II

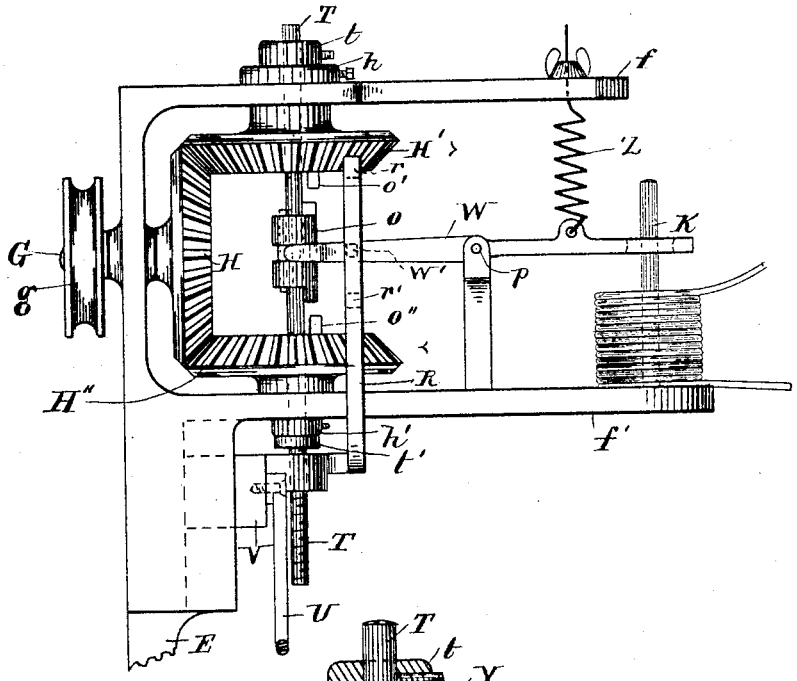
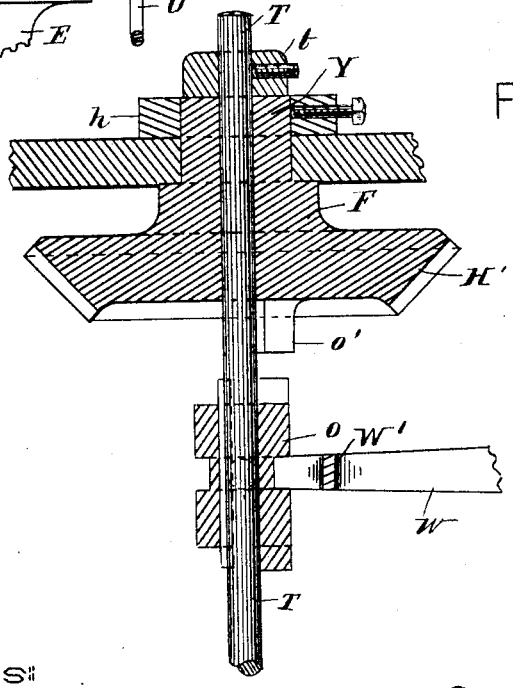


Fig. III



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(No Model.) 3 Sheets—Sheet 3.

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SPEED REGULATOR FOR DYNAMO ELECTRIC MACHINES.

No. 454,541. Patented June 23, 1891.

Fig. 1111

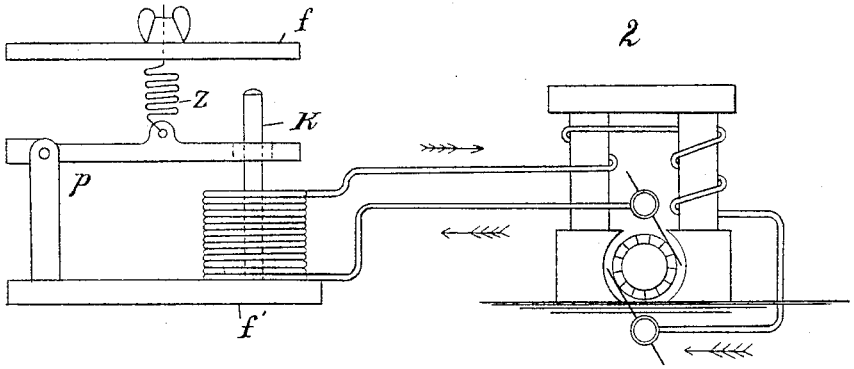
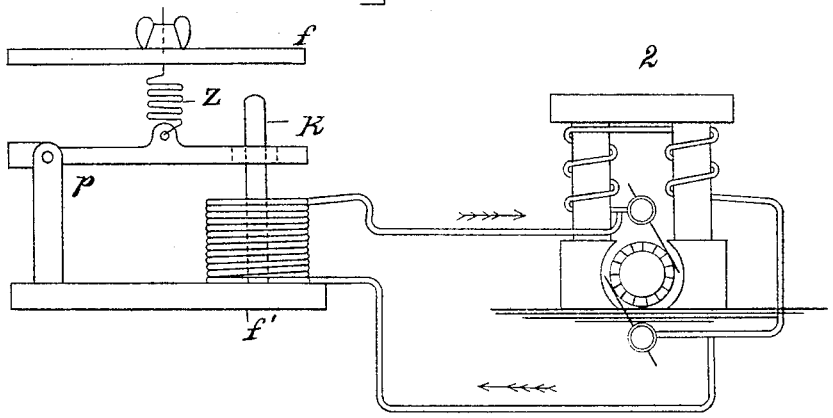


Fig. V



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UNITED STATES PATENT OFFICE.

ERASTUS E. WINKLEY, OF LYNN, MASSACHUSETTS.

SPEED-REGULATOR FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 454,541, dated June 23, 1891.

Application filed April 15, 1890. Serial No. 347,956. (No model.)

To all whom it may concern:

Be it known that I, ERASTUS E. WINKLEY, a citizen of the United States, residing at Lynn, in the county of Essex and Commonwealth of Massachusetts, have invented a new and useful Speed-Regulator for Dynamo-Electric Machines, of which the following is a specification.

My invention relates to improvements in speed-regulators for dynamo-electric machines in which the variation in the amount of electro-magnetic force developed in an electro-magnet in direct or shunt circuit of the machine is utilized to control the valve action of the original motor supplying power to the dynamo.

In devices heretofore used for regulating the amount of electro-motive power generated by machines of the above class, allowing the speed at which said machines were run to remain constant, there has been great waste of original motive power.

The object of my invention is to accomplish similar results by varying the speed of said machines by increasing or diminishing the amount of original motive force received thereby and preventing the waste of said force, and consequently of fuel consumed in running original motor.

The accompanying drawings are illustrations of my invention.

Figure I is a side elevation of my invention, showing connection of same with valve action of original motor. Fig. II is an end elevation of my invention above the line 1 2, Fig. I. Fig. III is an enlarged view of part of my invention, showing mechanical arrangement of same. Fig. IV shows electro-magnet in duct-circuit with dynamo. Fig. V shows same in shunt-circuit therewith.

Similar letters refer to similar parts in the several views.

A is a rod or bar connected at one extremity with the eccentric S, which is revolved by original motor, said connection being similar to that in use in common valve-regulators. The other extremity of the rod A is revolubly connected with link L at or near its upper extremity, the link L being revolubly attached at or near its lower extremity to some permanent point P. The rod B is also revolubly connected with the link L and adapted to be moved up or down in the same. The rod B is also revolubly connected with the rod D, which is connected with the valve of the original motor.

The above-described device or its equivalent constitutes the regulating apparatus of the motor, and is operated by raising or lowering rod B in link L, the valve-stroke of the motor being thereby increased or diminished.

The frame F is held at a convenient distance above the rod B by the standard E. The vertical part of the frame F, opposite to and between the horizontal arms f and f', supports a pulley G, rigidly attached to and adapted to move with the short shaft g, to which the vertical cog H is also rigidly attached and adapted to move therewith. The pulley G is revolved by belt F, connected with shaft turned by original motor or other convenient source. The vertical cog H engages with the horizontal cogs H′ and H″. The cogs H′ and H″ are adapted to revolve about the central shaft T, but are entirely independent thereof, each being given a bearing on the arms f and f', respectively, by means of a short sleeve made part thereof or rigidly attached thereto, (see Y, Fig. III,) extending through arms f and f', respectively, and secured by collars h and h'. The cogs H′ and H″ carry the notched sleeves o' and o'', (see Figs. II and III,) rigidly attached thereto or made part thereof. The notched sleeve o is splined to shaft T between the cogs H′ and H″, the notches on said sleeve being adapted to engage with the notches on sleeves o' and o'', respectively. The shaft T is held in position by collars t and t'. Below the collar t' the shaft T is threaded, said threads engaging in grooves in sleeve V, so that sleeve V will be raised or depressed by revolution of shaft T. The rod U is revolubly connected with sleeve V, and in same manner connected with rod B.

Connected with sleeve o in such manner as not to interfere with its revolution with shaft T is the lever W, having its fulcrum at the point p. Toward the end of the arm f' the electro-magnet K is fixed, being connected with the main or a shunt circuit of the dynamo Z. (See Figs. IV and V.)

In lever W, just above magnet K, there is an annulus or other suitable device, which

will allow the core of magnet K to pass through same and prevent absolute contact therewith. (See Fig. II.) The spring *z* is connected with the lever W and secured to the arm *f*, said spring being so adjusted that when the amount of electro-magnetism in magnet K is that which would be developed by a normal current the lever W will be held in such position as to bring sleeve *o* midway between the cogs H′ and H″. The pulley G, connected by belt F with shaft running at same speed as dynamo, turns the vertical cog H, which revolves the horizontal cogs H′ and H″ with which it engages in opposite directions. The cogs H′ and H″, as has been already stated, revolve independently of shaft T, and continue to do so as long as the lever W and sleeve *o* remain in position above described, or, in other words, as long as normal current passes through electro-magnet K; but if the electro-magnetic force developed in K be increased the resistance of spring *z* will be overcome and the lever W depressed beyond the fulcrum *p*, thereby raising sleeve *o* and causing it to engage with sleeve *o′*, thereby locking shaft T to cog H′, so that it will revolve therewith. The direction of the revolution of shaft T with cog H′ is such that the sleeve V on threaded portion thereof will be depressed and the rod B forced down in link L, thus shortening the stroke of rod D, connected with valve of original motor, causing the same to slow down and decreasing the amount of the original motor force received by the dynamo. If the amount of electro-magnetic force in K is less than that which would be generated by normal current, it will not be sufficient to counterbalance action of spring *z*, and the extremity of lever W will be drawn up and sleeve *o* made to engage with sleeve *o″*, thereby locking shaft to cog H″ and causing it to revolve therewith, the operation just described will be reversed and speed of dynamo increased.

As a safety device to prevent accident to apparatus in case of failure of spring *z* or magnet K to act at the proper time to unlock shaft T, the sleeve V carries the L-piece R, provided with projections *r* and *r′*, which are adapted to catch on bar W′, rigidly connected to or made part of the connection of lever W to sleeve *o*, (see Fig. I,) and raising or lowering sleeve *o* unlock the shaft T.

I do not consider my invention limited to the mechanism above described, for it is evident that there are other devices which might be substituted for various parts thereof and substantially the same results produced.

I claim as my invention, and desire to secure by Letters Patent, in a speed-regulator for dynamo-electro machines—

1. The combination, with a dynamo and its motor, of a system of gears driven by the motor or other convenient source, having gear-wheels H′ and H″, adapted to revolve in opposite directions, a threaded shaft T, adapted to be locked to either of said gear-wheels H′ or H″ and to revolve therewith, an electro-magnet K, in circuit with dynamo and acting to lock shaft T to either of gear-wheels H′ or H″, and a sleeve or collar V, interiorly grooved to engage with threaded shaft T and adapted to be moved along the same by the revolution thereof, the link L, vibratory about the fixed point *p* and driven by motor or other convenient source, the rod B, free to slide in link L and connecting same with the valve-rod D of the original motor, the valve-rod D, operating the admission-valve of the original motor and driven by rod B, and a device connecting sleeve V with rod B and adapted to impart the motion of said sleeve to said rod, all substantially as described, and for the purposes specified.

2. The combination, with a dynamo and its motor, of a system of gears driven by the motor or other convenient source, having the gear-wheels H′ and H″, adapted to revolve in opposite directions, a threaded shaft T, adapted to be locked to either of said gear-wheels H′ or H″ and to revolve therewith, an electro-magnet K, in circuit with the dynamo and acting to lock shaft T to either of gear-wheels H′ or H″, a sleeve or collar V, interiorly grooved to engage with threaded shaft T and adapted to be moved along the same by the revolution thereof, the link L, vibratory about the fixed point *p* and driven by motor or other convenient source, the rod B, free to slide in link L and connecting same with the valve-rod D of the original motor, the valve-rod D, operating the admission-valve of the original motor and driven by the rod B, and the rod U, connecting the sleeve V with the rod B and adapted to impart the motion of said sleeve to said rod, all substantially as described, and for purposes specified.

3. The combination, with a dynamo and its motor, of a system of gears driven by the motor or other convenient source, having the gear-wheels H′ and H″, adapted to revolve in opposite directions, a threaded shaft T, adapted to be locked to either of said gear-wheels H′ or H″ and to revolve therewith, an electro-magnet K, in circuit with the dynamo and acting to lock shaft T to either of said gear-wheels H′ or H″, a rod R, connected with sleeve or collar V and movable therewith, operating through lever W′ to unlock shaft T from either of said gear-wheels H′ or H″, and a sleeve or collar V, interiorly grooved to engage with threaded shaft T and adapted to be moved along said shaft by the revolution thereof, said sleeve or collar V operating the regulating apparatus of the original motor, all substantially as described, and for the purposes specified.

ERASTUS E. WINKLEY.

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