

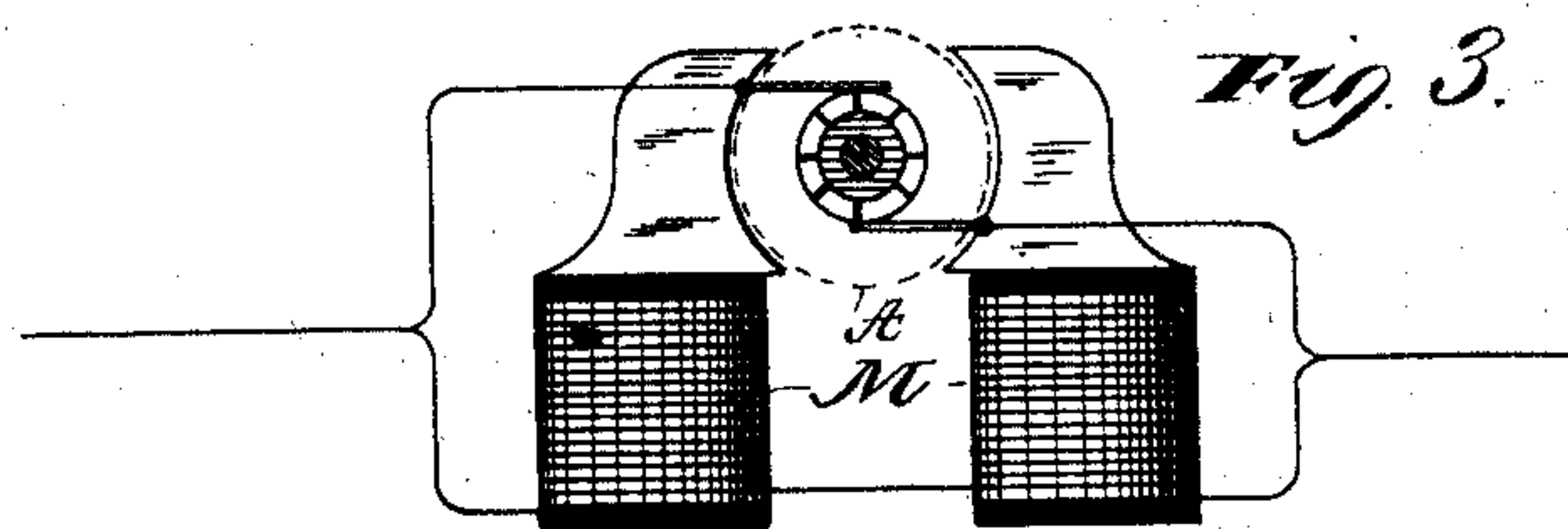
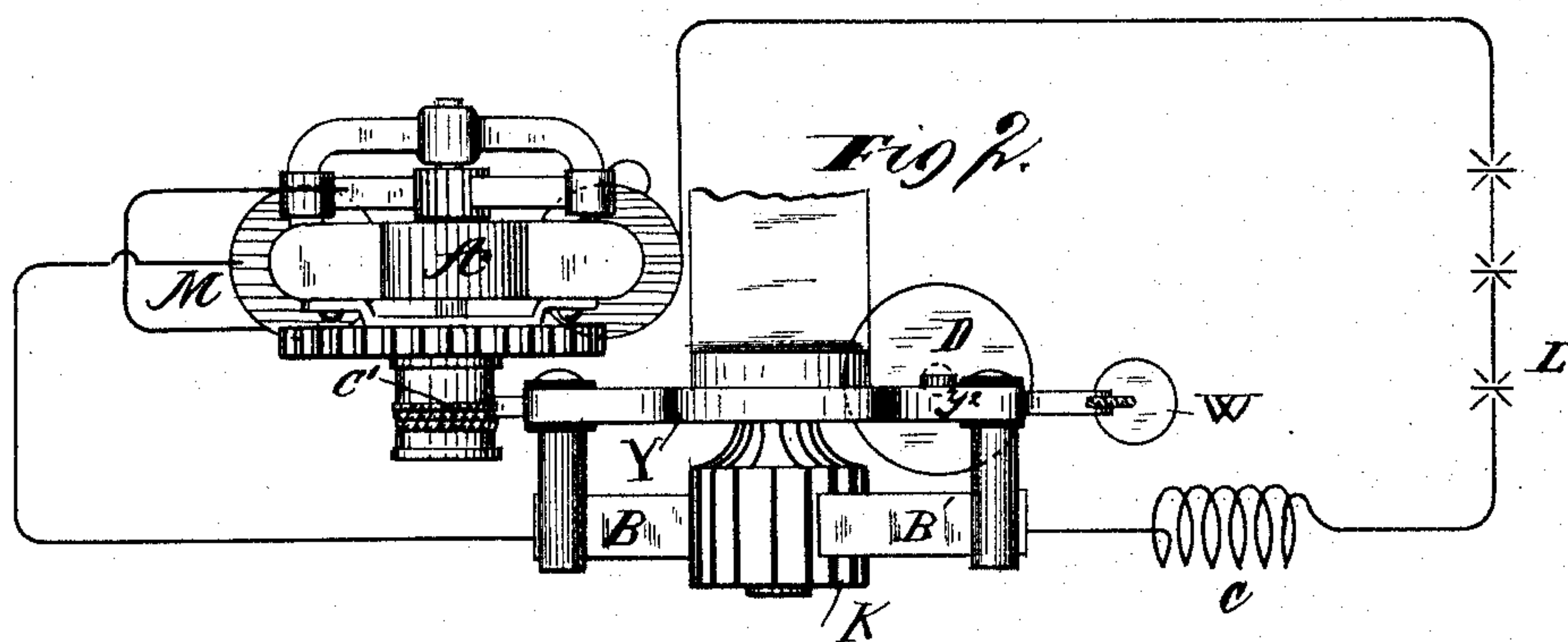
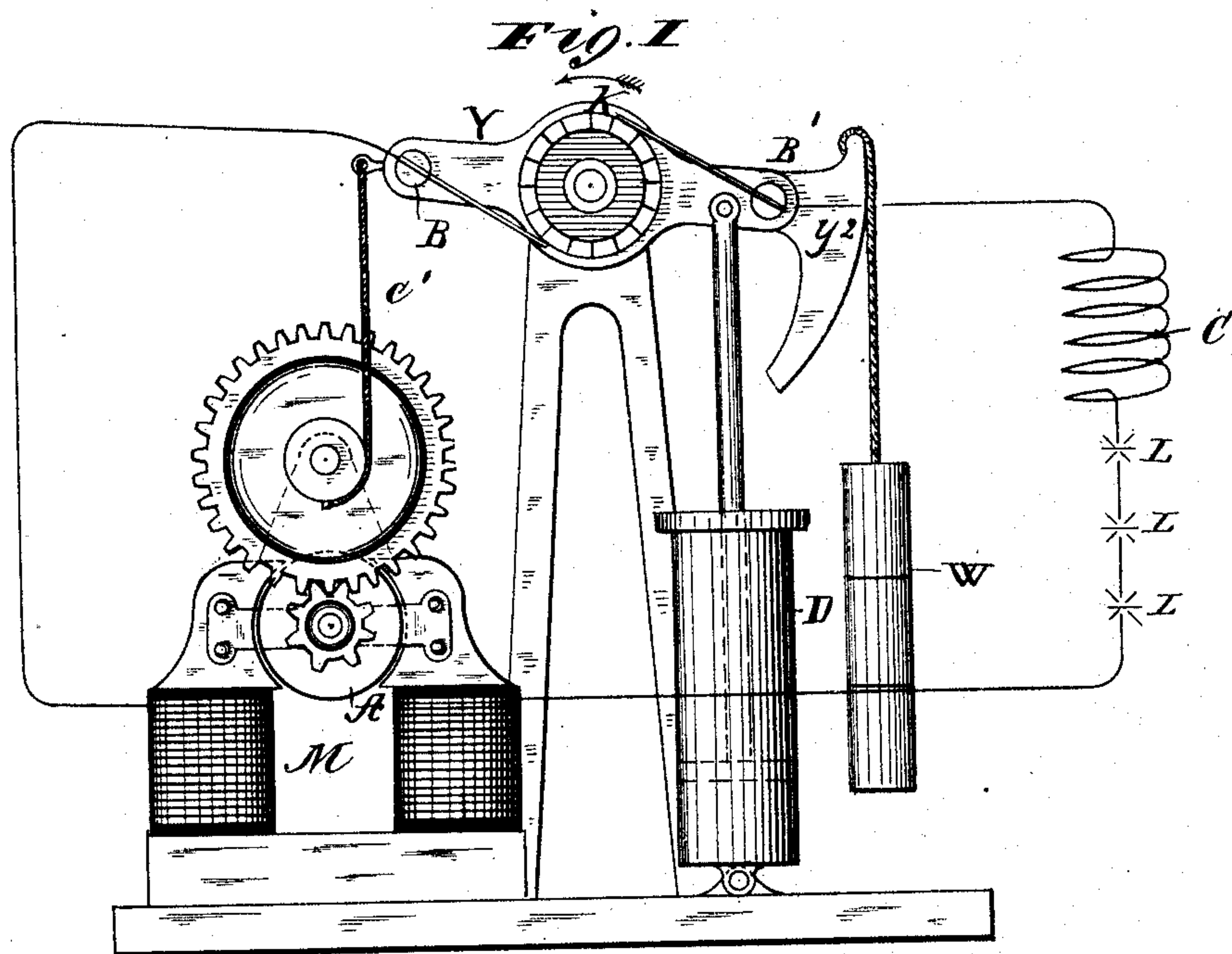
(No Model.)

E. THOMSON.

REGULATOR FOR DYNAMO ELECTRIC MACHINES.

No. 428,705.

Patented May 27, 1890.



WITNESSES:

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ELIHU THOMSON, OF LYNN, MASSACHUSETTS.

REGULATOR FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 428,705, dated May 27, 1890.

Application filed August 27, 1887. Serial No. 248,086. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Regulator for Dynamo-Electric Machines, of which the following is a specification.

The object of my invention is to produce a simple and effective regulator for dynamo-electric machines; and to this end it consists in the combination, with the dynamo-machine commutator suitably constructed to be adjusted so that it may take off currents at points of different electro-motive force, of a rotary electric motor geared to or connected with said adjustable commutator in any proper manner and driven by the current supplied from said commutator so as to vary in power with any variation in the current of the machine due to variations of driving-power or changes of external resistance arising from the turning off of lights or other translating devices. In combination with said motor and commutator or motor I employ a suitable retracting or counteracting device of constant effect which shall operate to reverse the motion of the parts when the power of the motor falls below normal. I prefer, also, to connect the motor with the movable or adjustable commutator through a reducing-gear, whereby a large movement of the motor shall effect a comparatively small movement of the commutator.

My invention consists, also, in certain additional features of improvement and combinations of parts that will be described in connection with the accompanying drawings, and then specifically indicated in the claims.

In the accompanying drawings, Figure 1 is a side elevation of an apparatus embodying my invention, and Fig. 2 is a plan of the same. Fig. 3 illustrates a modification in the connections.

In the drawings, K indicates any dynamo-machine commutator suitably constructed to cause variations of electro-motive force when adjusted or moved. In the present instance the commutator is made adjustable by mounting the commutator-brushes B B' upon a movable yoke or arm Y, after the manner well known in the art. A curved arm or exten-

sion Y² from said yoke carries the supporting cord or chain for a depending retracting-weight W. The cord bears on the curved outer surface, made such that the weight shall exert a uniform retracting effect upon the yoke in all positions of adjustment of the same.

D indicates a dash-pot connected with the yoke for preventing the too sudden moving of the parts.

C represents a coil, which may be the field-coil of a dynamo, the circuit being completed through the coil, the commutator, and through the lights or other devices, after the well-known manner, while interposed in the circuit is a small electric motor M, of any desired construction, whose armature A is geared or otherwise connected, so that during its revolution by the current it may pull upon a cord C', attached to the end of the commutator-brush yoke Y, opposite that which carries the weight W. The weight W may of course be replaced by a uniformly-pulling string or other retracting device.

It is best to gear up the motor through at least one change of wheels or equivalent mechanical device, so that it may be made small and may move freely, and yet be sufficiently powerful to exert a positive force in overcoming the weight W. The current of the dynamo is passed directly through the motor's field and armature in series connection by means of the commutator-brushes or in multiple-arc connection, the armature and field being in such case in branches of the circuit, as indicated in Fig. 3.

The action of the apparatus is as follows: Assuming a condition of equilibrium to exist between the power or torque of the motor-armature and the opposing action of the weight W with a given number of lights L, or other resistance in circuit, the extinguishing or cutting out of a light or resistance will cause an increase of current in the circuit, which current will also increase the power of the motor or its tendency to rotate its armature, tending thereby to wind up the cord C', so that that arm Y² of the yoke Y, to which the cord is attached, will be pulled downward and the weight W will be raised, while the piston of the dash-pot D will be moved through its liquid or opposing fluid so as to

steady the action. By this movement so imparted the brushes B B' will be moved forward in the direction of motion of the commutator of the dynamo, or in a direction in which the electro-motive force is less, the motor losing its power to further raise the weight W when the normal current is restored. In this new position of the parts there is a stable equilibrium, because the influence of the weight is the same as in the first position. The condition of an increase in the resistance of the circuit will produce a reverse action to that just described—that is, upon a weakening of the current the weight W will overcome the tendency to rotation of the armature A of the motor M, which armature will then revolve backward until the current is again increased by the backward movement of the brushes B B' and brought again to the normal, at which moment the equilibrium will be again restored.

It is of course to be understood that the brushes of the motor M are so constructed that a movement of the armature A may take place in either direction, forward or backward. Such brushes could be made of flat springs lying on the commutator. The commutator itself should have a sufficient number of sections, and the armature should be wound with a sufficient number of coils to practically produce a uniform torque in all cases, or, in other words, have no dead-point and no approach to a dead-point. This can be accomplished by means of either a Gramme or Siemens winding with, say, twenty-four or more sections in the commutator and a corresponding number of coils on the armature. Any form of motor having the action described might be employed.

I have herein, for the sake of simplicity, described my invention as applied to that form of adjustable commutator in which the brushes are adjustable circumferentially around the commutator-cylinder; but it will

be understood that my invention may be carried out by suitably connecting the motor to the movable or adjustable portion of any dynamo-machine commutator where such commutator is constructed to be adjusted so as to change the electro-motive force of the current by movement of some portion of the commutating or current-collecting devices.

What I claim as my invention is—

1. The combination, with the adjustable commutator for a dynamo-machine, of a rotary electric motor having a constant torque for a given current traversing its coils and driven by the current from the machine, and a counteracting or retracting device of constant effect in the various positions of adjustment.

2. The combination, with a commutator for a dynamo-machine, of an electric motor adapted to produce continuous movement so long as traversed by a current and mechanically connected to said commutator and driven by the current collected thereby, a retractor of substantially constant effect, and a dash-pot, as and for the purpose described.

3. The combination, with the adjustable commutator, of the electric motor, the intermediate reducing-gear, and the substantially constant retractor.

4. The combination, with the adjustable commutator for a dynamo-machine, of an electric motor driven by the current of the machine, an intermediate reducing-gear between said motor and the adjustable commutator, and a counteracting or retracting device of constant effect in the various positions of adjustment.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 18th day of August, A. D. 1887.

ELIHU THOMSON.

Witnesses:

GEORGE STUART,
OTIS K. STUART.