

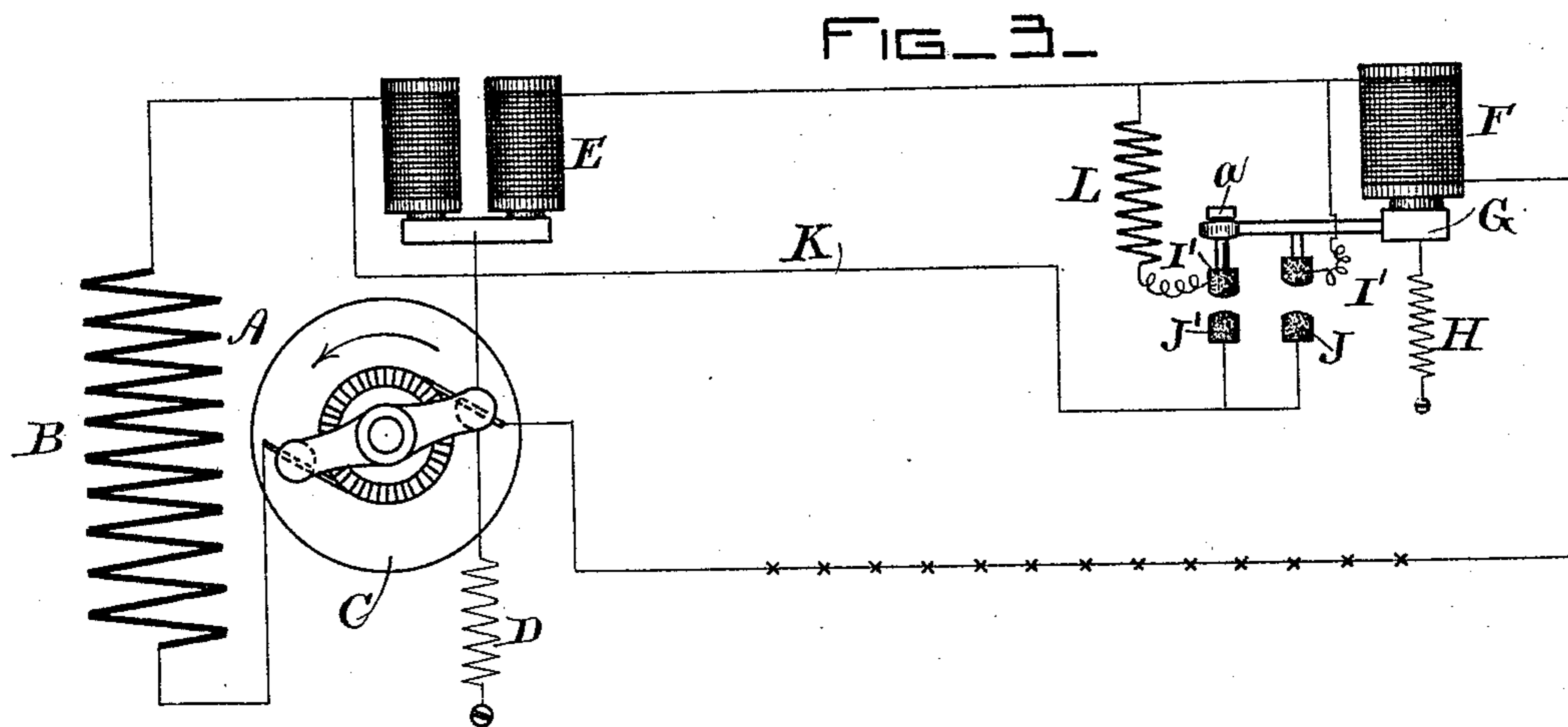
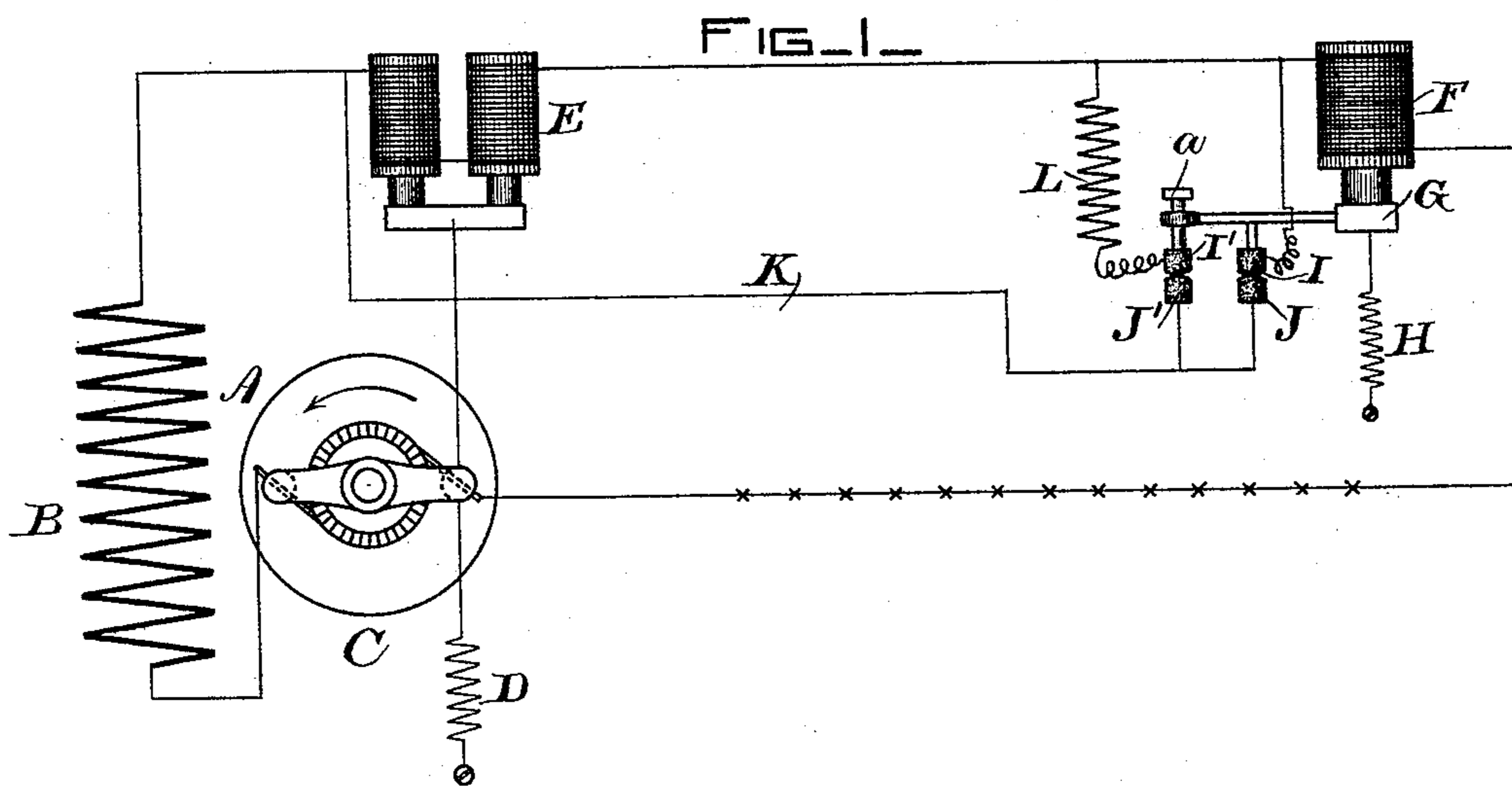
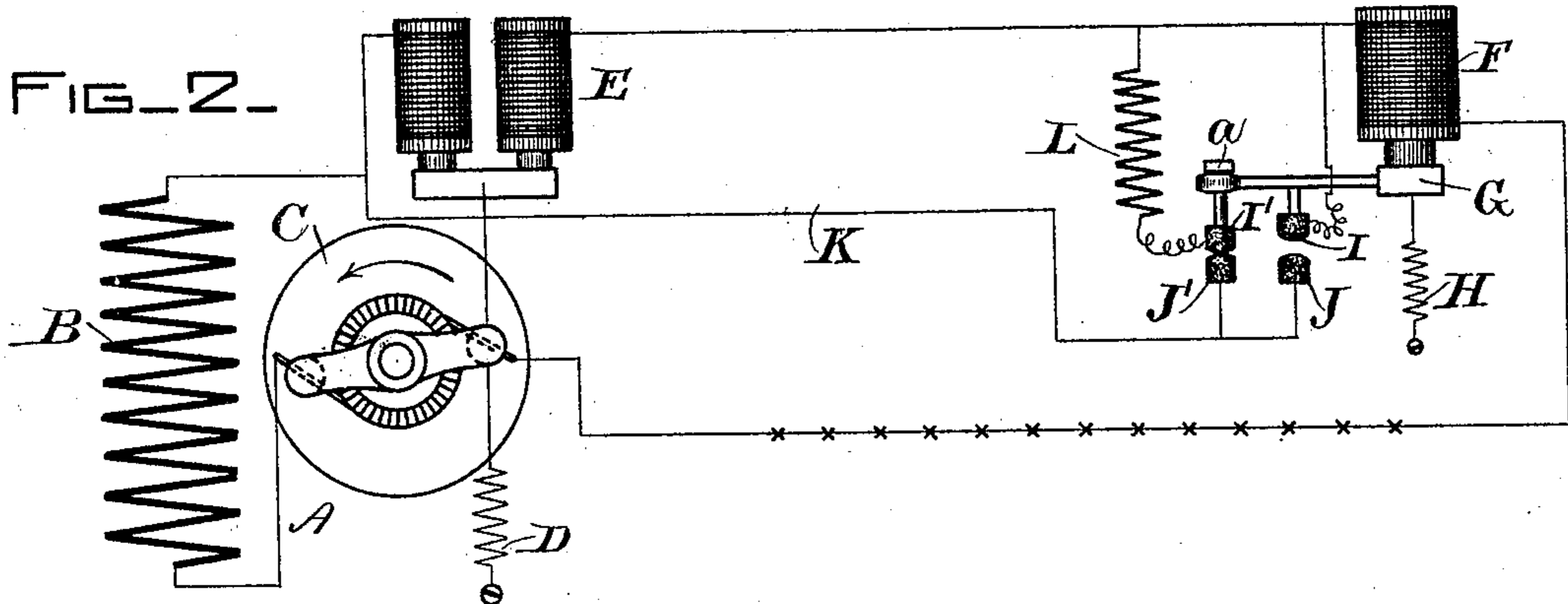
(No Model.)

W. H. ELKINS.

REGULATOR FOR DYNAMO ELECTRIC MACHINES.

No. 518,232.

Patented Apr. 17, 1894.



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM H. ELKINS, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR TO THE
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REGULATOR FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 518,232, dated April 17, 1894.

Application filed January 3, 1893. Serial No. 457,022. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. ELKINS, a citizen of the United States, residing at Cambridge, county of Middlesex, State of Massachusetts, have invented a certain new and useful Improvement in Regulators for Dynamo-Electric Machines, of which the following is a specification.

My present invention relates to an improvement in automatic brush shifting regulators for dynamo electric machines such as have been extensively used in arc light dynamos, and may be found described in Letters Patent, granted Elihu Thomson, March 1, 1881, No. 238,315.

In my regulator I provide, as has heretofore been the custom, a motor magnet connected to the commutator brushes by any suitable means so as to cause their adjustment around the commutators, also a controlling magnet in the main circuit, or a shunted portion of the same, so that the current passing through the controlling magnet is directly responsive to the amount of current flowing through the translating devices. The controlling magnet controls the operation of the motor magnet, and to that end the armature of the controlling magnet opens and closes a shunt around the motor magnet. Heretofore it has been customary to shunt the motor magnet permanently through a resistance and to shunt both magnet and resistance through a single pair of contacts actuated by the armature of the controlling magnet.

My invention consists in providing double pairs of contacts for the armature of the controlling magnet, preferably of carbon, the circuit through one of which shunts the motor magnet with very small resistance, while the others likewise shunt the motor magnet, but through a considerably greater resistance. The armature of the controlling magnet in its movement opens and closes the two pairs of contacts successively. The shunt circuit is first opened at the contacts of small resistance and then, if the movement of the armature be continued far enough, at the contacts in the high resistance connection.

By this invention the motor magnet is eventually left directly in the main circuit so that the necessary magnetic pole can be se-

cured with magnets of smaller size than is the case when a portion of the current is permanently shunted around the magnet through a resistance as has heretofore been done. Sparking at the contacts also is almost entirely avoided.

In the accompanying drawings Figures 1, 2 and 3 are diagrams showing respectively my regulator, especially the armature of the controlling magnet, in the three principal positions it assumes during operation.

The dynamo, seen at A, is represented as a series machine with the field winding B in series with the armature C, since this is the type of machine commonly used on arc light circuits. The armature is supposed to revolve from right to left in the direction indicated by the arrow. The brushes are mounted in the usual manner on a yoke free to revolve around the armature shaft. A spring D is connected to the yoke so as to move the brushes toward the maximum position, and the yoke is connected to the armature of the motor magnet E in such a way that, when this armature is attracted, the brushes are moved to various positions on the commutator at such distances from the maximum point as give the desired potential and current for any given load.

The action of the motor magnet is controlled by a second magnet F placed in the main circuit in series with the translating devices, whose armature G is retracted by a spring H, and carries or operates two carbon contacts I, I' which open and close through adjacent contacts J, J' a shunt circuit K around the motor magnet. A resistance L is connected to contact I' in such manner that it is in series with the shunt connection there through, so that the shunt path through contacts I', J', is of considerable resistance while the path through contacts I, J, when closed is of slight resistance. Contact J' is also so arranged that the armature may move through a distance sufficiently great to break the circuit at I, J, without doing so at I', J', an additional movement being required to break this last circuit. In this way the motor magnet is at one time shunted through a low resistance connection, and when upon an increase of the current the armature of the

controlling magnet is attracted the low resistance shunted path is first broken sending some of the current through the motor magnet, but without the manifestation of any serious spark at I because the shunt circuit is still closed through the resistance and contacts I', J'. If it proves necessary in order to secure the desired regulation for armature G to move farther, contact I' is raised and the motor magnet is then left directly in the main circuit.

In Fig. 2 the low resistance shunt is shown broken, and the high resistance connection still closed. In Fig. 3 the shunt circuit is broken altogether and the entire current is forced through the motor magnet.

Many means may be employed for causing the movement of the armature of the controlling magnet to operate the two sets of contacts successively rather than simultaneously. In the apparatus illustrated this is accomplished by mounting contact I' upon a pin having an enlarged head *a* so that while the pin passes freely through an opening in the end of the armature, its head strikes against the armature and the pin is then lifted.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination in a current regulator comprising shifting commutator brushes, of a motor magnet, with a controlling magnet and

two or more sets of contacts controlled by the controlling magnet, one of which controls a shunt of small resistance around the motor magnet and the other comprises a similar shunt with considerably higher resistance as set forth.

2. The combination in a regulator of the brush shifting type, of a motor magnet connected to the brushes, a controlling magnet whose armature has connected with it two or more contacts in such a way that upon movement of the armature the circuit through these contacts is opened or closed successively, and shunt circuits of relatively high and low resistance controlled by said contacts.

3. The combination in a regulator of the brush shifting type of a motor magnet connected to the commutator brushes, a controlling magnet connected in circuit so that the current through it is responsive to the main current, shunt paths around the motor magnet one of which contains an artificial resistance, and means for opening and closing said paths successively by the movement of the armature of the controlling magnet.

In witness whereof I have hereunto set my hand this 27th day of December, 1892.

WILLIAM H. ELKINS.

Witnesses:

N. F. HAYES,
A. O. ORNE.