

No. 652,875.

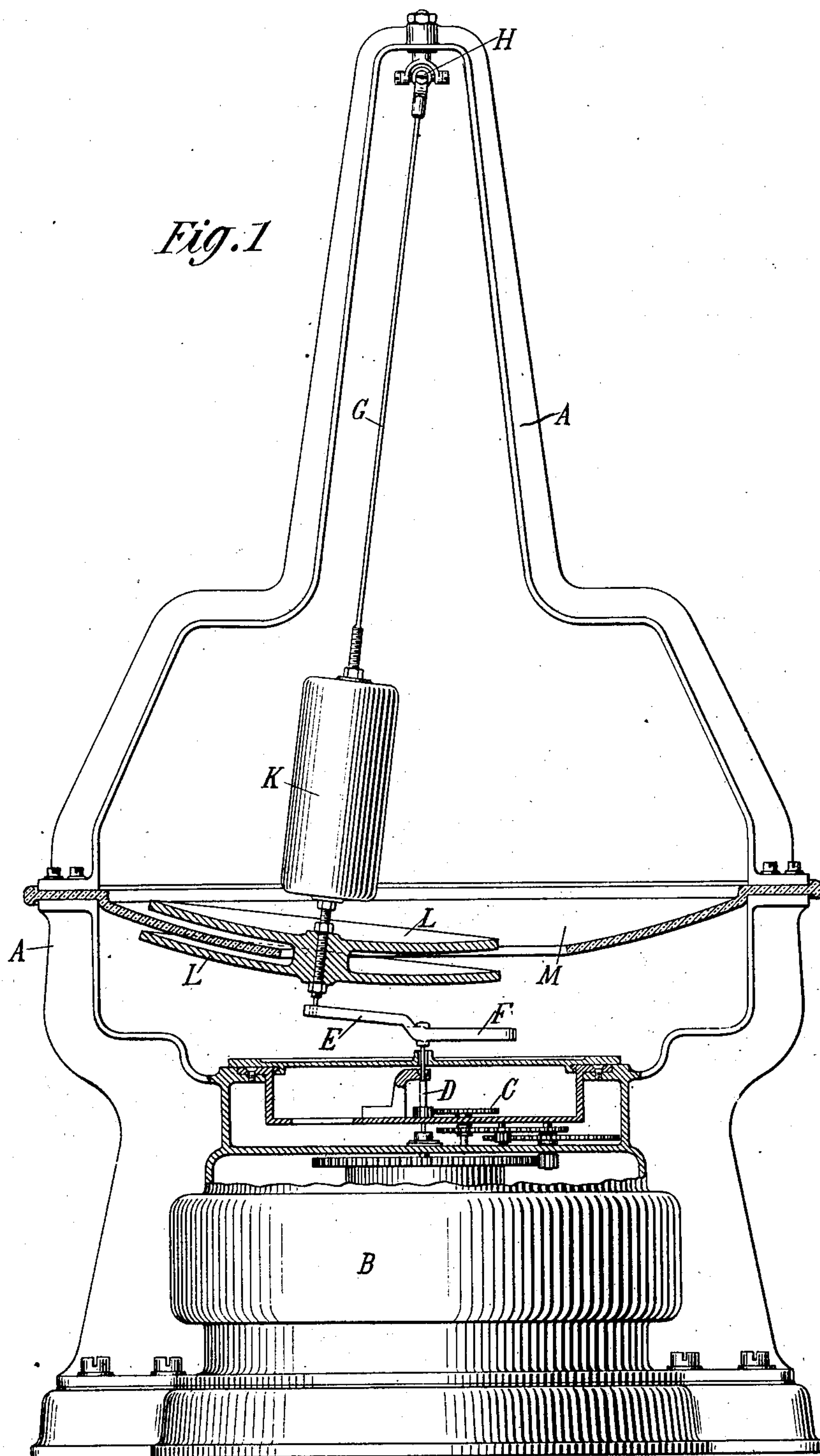
Patented July 3, 1900.

E. K. ADAMS.
ELECTRIC CLOCK PENDULUM.

(Application filed Nov. 7, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
Raphtael Jetter
Benjamin Miller

Ernest K. Adams, Inventor
by Ken. Page & Cooper Att'ys

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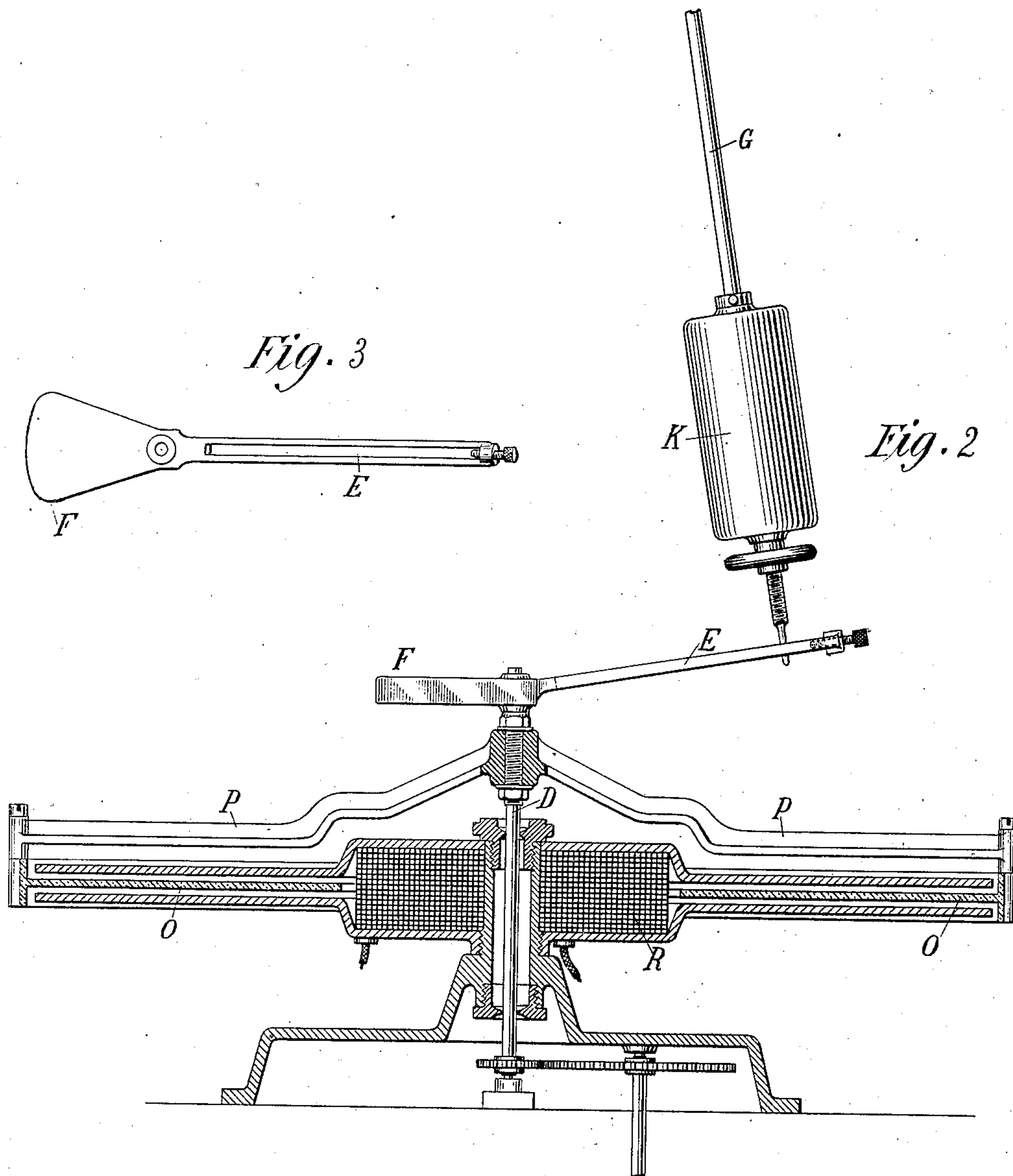
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UNITED STATES PATENT OFFICE.

ERNEST K. ADAMS, OF NEW YORK, N. Y.

ELECTRIC-CLOCK PENDULUM.

SPECIFICATION forming part of Letters Patent No. 652,875, dated July 3, 1900.

Application filed November 7, 1899. Serial No. 736,207. (No model.)

To all whom it may concern:

Be it known that I, ERNEST K. ADAMS, a citizen of the United States, residing in the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Conical Pendulum Apparatus, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

The invention to which my present application pertains is an improvement applicable to a conical pendulum—that is to say, one which moves in a circle under the influence of gravitation, its cord or rod describing a cone, of which the point of suspension is the apex. Pendulums of this character, as is well known, are used in connection with various forms of rotating apparatus—such as clocks, the motors of equatorial telescopes, and the like—as the means of controlling the rate of rotation, and for such purposes when the driving force is uniform or subject to only slight variations they constitute a most efficient means of control.

The object of my present invention, however, is to render the action of such devices more accurate and to provide a means which will secure a more uniform rate of rotation of the pendulum, particularly in cases where the driving power may be subject to variations.

My invention, broadly stated, consists in the combination, with a conical pendulum, of a magnet and a closed conductor in such manner that the relative motion between the conductor and magnet produced by the motion of the pendulum will operate as a retarding force that tends to maintain a uniform rotation of said pendulum.

The manner in which this improvement is or may be carried out is illustrated in the accompanying drawings, which show modified forms of apparatus embodying the general plan of the invention.

Figure 1 is a view, partly in elevation and partly in section, of a clock to which in one form the invention is applied. Fig. 2 is a vertical central section of a portion of a clock mechanism, illustrating a modified application of the principle. Fig. 3 is a plan view of a portion detached from the apparatus of Fig. 2.

In Fig. 1 I have shown the frame A and exterior of the case B of a clock mechanism controlled by a conical pendulum. A portion of the driving-train is shown at C, one member of the latter being a spindle D, extending vertically up through the cone and carrying an arm E. This arm is counterbalanced by a short weighted arm F and contains a slot into which projects the end of an extension of the pendulum G. The construction of the arm is shown in detail in Fig. 3.

The pendulum is composed of a rod G, suspended by a universal joint H, its point of suspension being vertically over the axis of the spindle D. It carries a weight or bob K, which is adjustable upon the rod. The rod extends below the bottom of the weight, and passes through a plate or pair of plates L, slightly dished in form, and composed of magnetized steel. As above stated, the extreme end of the rod G extends into or through the groove in the arm E, and the pendulum is maintained in rotation by the force which tends to rotate the spindle D and the said arm E.

Secured to the frame A in any suitable manner is an annular conducting-plate M of such form as to be embraced by the magnetized plate or plates L when the pendulum is swung away from its normal vertical position.

It will be understood that when the pendulum is at rest the magnetized plate L will be concentric with the annular conductor M; but as the pendulum is rotated and swings farther away from the vertical the plate L embraces more or less of the inner edge of the plate M, according to the angular position of the pendulum.

Since the plate L maintains a magnetic field, its movement relatively to the conducting-plate is retarded by the well-understood inductive action between the field and the conductor. This retarding effect increases not only with the speed at which the plate sweeps over the conductor, but also with the amount of conductor embraced by the plate as the pendulum swings away from the vertical and may be applied to the regulation or control of the pendulum with very beneficial results.

In such a device as is shown in Fig. 1 the means of suspension of the pendulum do not permit the latter to rotate about its own axis,

and hence the retarder if carried by the pendulum must be arranged with special reference to this fact; but a similar retarder may be applied in other ways and to conical pendulums generally in the manner illustrated in Fig. 2. In this latter device the spindle D, which rotates the pendulum, carries an annular conducting-disk O, which is supported by a spider P and rotates with the spindle. On one or both sides of the disk O are placed magnetic poles, which are preferably composed of iron or steel disks magnetized by a coil R, placed between them and in circuit with a suitable battery. The disks and coil may be supported in any proper manner, but are preferably concentric with the spindle D, as shown. It is understood that in such a device the tendency of the disk O to rotate is opposed by the inductive action or drag of the magnetic field, so that by maintaining the strength of the field approximately uniform the proper retarding effect for the pendulum may be secured.

It is obvious from the above description of the nature and purpose of the invention that

it may be carried out in many other ways, which differ only in details of construction and arrangement from those illustrated.

What I claim is—

1. The combination with a conical pendulum, of a retarder consisting of a closed conductor and a magnet, one being stationary and the other adapted to be rotated by the pendulum, as and for the purpose set forth.

2. The combination with a conical pendulum of a magnetic disk carried thereby, and an annular conducting-plate embraced by the disk when the pendulum is in motion, as set forth.

3. The combination with a conical pendulum of a circular magnetic disk having two flanges and carried by the pendulum, and an annular conducting-plate, the inner edge of which is embraced by the flanges of the magnetic disk when the pendulum swings from the vertical position, as set forth.

ERNEST K. ADAMS.

Witnesses:

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