

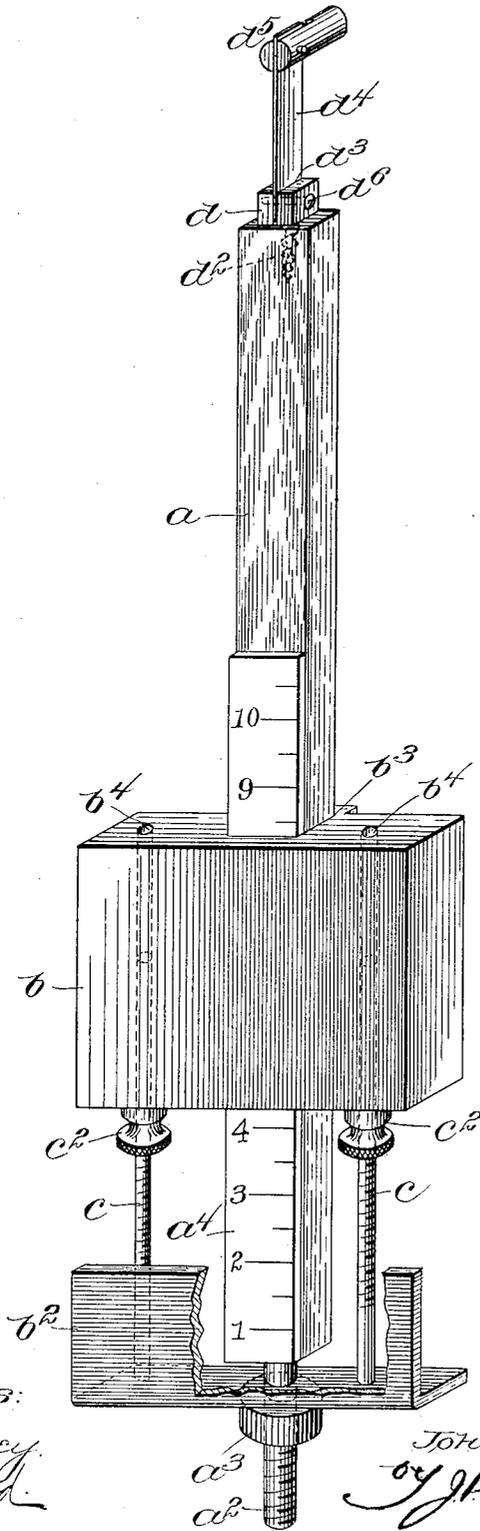
No. 753,475.

PATENTED MAR. 1, 1904.

J. W. DAILY.
PENDULUM.

APPLICATION FILED MAR. 23, 1903.

NO MODEL.



Witnesses:
Jas. J. Maloney
Nancy P. Ford

Inventor:
John W. Daily,
by J. P. and H. J. Livermore
Attys.

UNITED STATES PATENT OFFICE.

JOHN W. DAILY, OF BOSTON, MASSACHUSETTS.

PENDULUM.

SPECIFICATION forming part of Letters Patent No. 753,475, dated March 1, 1904.

Application filed March 23, 1903. Serial No. 149,155. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. DAILY, of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Pendulums, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

The present invention relates to a compensating pendulum for chronometers, and is embodied in a pendulum in which the pendulum-rod and the pendulum-bob are made of different materials having different coefficients of expansion, the rod being shown as of wood and the bob as of metal, the said bob being supported by the rod at its lower end, so that as it expands its center of gravity will be raised with relation to the pivotal axis of the rod to compensate for the increase in length of the rod due to the same influence of temperature.

It is the purpose of the present invention to construct the pendulum in such a manner that a practically perfect adjustment can be made of the relation between the rod and the bob, so as to obtain perfect compensation, without, however, varying the effective length of the pendulum, which of course would make the clock run faster or slower, as the case might be. To these ends the bob is supported upon adjusting-nuts threaded upon supporting-rods extending upward from a secondary member, which is supported from below upon an adjusting-nut connected with the rod, so that the position of the center of gravity of the bob and its secondary supporting member as a whole may be varied with relation to the axis of the pendulum by means of the adjustable supports. Such adjustment, however, will also vary the effective length of the pendulum, and to correct the variations the secondary member may then be adjusted with relation to the rod until the desired result is attained. In order to facilitate this final adjustment, the pendulum-rod is provided with a scale, so that by observing the said scale before the compensating adjustment is made the other adjustment is easily made approximately by raising or lowering the supporting mem-

ber until the bob stands at approximately its original position with relation to the scale.

A further feature of the invention consists in a pivotal support for the pendulum, which consists of a slotted block to receive a thin strip of metal, which extends into the slot and is held therein by a transverse pin, the said block being screwed into the top of the wooden pendulum-rod, so that the said rod can be turned slightly in either direction until the pendulum-bob swings parallel to the face of the clock and parallel to its own plane of oscillation.

The drawing is a perspective view, partly in section, of a clock-pendulum embodying the invention.

The pendulum-rod a , which is preferably of wood, is pivotally supported, as will be hereinafter described, and provided at its lower end with a screw-threaded portion a^2 , adapted to receive an adjusting-nut a^3 , upon which the support for the pendulum-bob rests.

In accordance with the invention the pendulum-bob b , which is of a material different from that of the rod, being preferably of metal is directly supported by a member b^2 , and the part b is provided with an opening b^3 through the middle for the pendulum-rod a , so that it is longitudinally movable with relation to the rod. As herein shown, the supporting member b^2 is preferably L-shaped in cross-section, as shown, in order that the front part may hide the screw portion of the pendulum-rod, and thereby improve the appearance of the pendulum as a whole.

The bob b is shown as supported upon adjusting-nuts c^2 , screw-threaded upon vertical rods c , which project upward from the supporting member b^2 and through openings b^4 in the bob b , so that one of said parts may be adjusted with relation to the other by turning the nuts c^2 , thus producing a greater or less amount of effective expansion and contraction in the bob and its support as a whole, so that exactly the right conditions may be secured to cause such expansion or contraction of the bob as will exactly compensate for that of the rod. The proper adjustment can be very nearly determined by calculation; but after the parts

are assembled substantially perfect adjustment can be subsequently attained by experiment when the clock is subjected to variations in temperature. It is obvious, however, that
 5 the adjustments for compensation will vary to some extent the effective length of the pendulum by shifting the position of the center of gravity of the bob with relation to the pivotal support or axis of the pendulum, and in
 10 order to correct this the bob and its support as a whole are adjustable with relation to the rod by means of the nut a^3 . In order to facilitate this final adjustment, the rod is shown as provided with a scale a^4 , so that by observ-
 15 ing said scale before the compensating adjustment is made the other adjustment can be approximately attained at once by turning the nut a^3 until the member b of the bob is returned approximately to the position relative
 20 to the scale from which it started.

As herein shown, the pendulum is provided with a novel fastening device for the pivotal support, the purpose of which is to easily arrange the pendulum so that the bob, which is
 25 ordinarily comparatively thin, may hang parallel to the plane of its oscillation and to the clock-case.

As herein shown, the pivotal supporting member consists of a block d , provided with
 30 a screw d^2 to enter the top of the pendulum-rod a , the said block d being provided with a slot d^3 to receive a thin spring d^4 , supported at d^5 , the said spring being secured in the block by means of a transverse pin d^6 . With
 35 this construction it is obvious that the pendulum-rod can be turned with relation to its support upon the screw d^2 until it swings exactly parallel to the plane of its oscillation, as is desired.

40 It is not intended to limit the invention to

the specific construction and arrangement herein shown and described, since modifications may be made without departing from the invention.

I claim—

1. A compensating pendulum comprising a pendulum-rod provided at its lower end with an adjusting-nut, a support for the pendulum-bob resting upon said adjusting-nut, support-
 50 ing-rods for said bob connected with said support, and adjusting-nuts upon said supporting-rods to vary the position of the bob relative to its support.

2. A compensating pendulum comprising a pendulum-rod of wood provided at its lower
 55 end with an adjusting-nut, a pendulum-bob, a support for said bob which in turn is supported upon said adjusting-nut and provided with vertical members which enter openings with which said pendulum-bob is provided, ad-
 60 justing-nuts upon said supporting members upon which nuts said bob directly rests, and a scale upon the face of the pendulum-rod, as set forth.

3. A pendulum comprising a wooden pen-
 65 dulum-rod, and a metallic compensating bob; a slotted block, screw-threaded into the upper end of said pendulum; a strip of thin metal secured to the clockwork-frame and project-
 70 ing into the slot in said block; and a transverse pin to secure said thin metal strip in said block.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN W. DAILY.

Witnesses:

HENRY J. LIVERMORE,
 NANCY P. FORD.