(No Model.)

C. A. MAHONY.

PENDULUM.

No. 334,958. Patented Jan. 26, 1886.

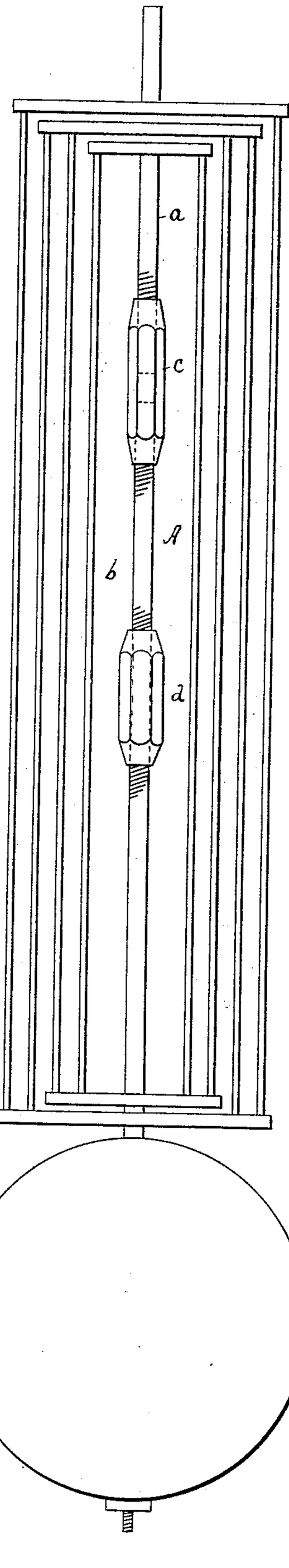

Fig. 1.

Fig. 2.

WITNESSES:

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PENDULUM.

SPECIFICATION forming part of Letters Patent No. 334,958, dated January 26, 1886.

Application filed May 13, 1885. Serial No. 165,329. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. MAHONY, a citizen of the United States, and a resident of the city and county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Pendulums, of which the following is a specification.

The object of my invention is to furnish a means whereby the compensation of a pendulum can be varied or adjusted with ease and precision. To accomplish this, I make one of the rods of the pendulum (or more than one, if requirements of design make it preferable) of two metals or other substances of different expansibility. Such rod or rods I call the "adjusting" rod (or rods.) One piece of which the adjusting-rod is composed forms the upper part of the adjusting-rod, and the other piece the lower part, and these two pieces do not meet, but, on the contrary, they must be some little distance apart—at least enough to allow to both pieces their fullest degree of expansion. The two pieces are held together by a swivel having a screw-thread on its inside, the ends of the two pieces being likewise threaded. There is a sufficient length of thread on both pieces to enable the swivel to be screwed for such a distance toward or from the axis of the pendulum as may be required. The part of the swivel that engages with the upper piece may be made of the same material as the upper piece, or of material of the same expansibility, and the lower part of the swivel may likewise be made of the same material as the lower piece, or of a material of the same expansibility; but, owing to the shortness of the parts which engage together, and consequent extreme minuteness of expansion of those parts, it will probably be found that a swivel composed entirely of one material will answer sufficiently well. The screw-threads are all of the same direction, diameter, and pitch, or if for any reason they should be made to differ in any of these particulars, yet their action should be made the same in the following respect as it would be if there were no such difference: I mean in respect to this that the extreme length of the adjusting-rod will not be increased or diminished by the turning of the swivel in either direction. The linear expansibility due to temperature will, however, vary, owing to that cause, because by a change of the position of the swivel more length of one of the two differently-expanding pieces would be brought into play to lengthen or shorten the rod and less length of the other, and thus with suitable proportions and design a range of variation in the susceptibilities of the rod to temperature could be attained that, comparatively speaking, would be considerable.

In the accompanying drawings, Figure 1 shows the adjusting-rod applied to a gridiron pendulum; and Fig. 2, a section through the swivel, showing the ends of the adjusting-rod.

The middle rod, A, is the adjusting-rod, and is shown as having the pendulum-bob on its lower end. The upper piece, *a*, of the adjusting-rod is supposed to be of the more expansible material—say brass—and the lower one, *b*, of the less expansible material—say of steel.

The pendulum being set to work, if the time-piece runs faster at a high temperature than at a low one, it indicates that there is not a sufficient length of the brass piece *a* of the adjusting-rod brought into play, and therefore the adjusting-swivel *c* should be screwed downward, thereby virtually lengthening the brass piece *a* and bringing into play less of the less expansible steel piece *b*. If, on the contrary, the time-piece runs slower at a high temperature than at a low one, just the contrary should be done.

When the motion has been made as nearly isochronous as possible, the pendulum can be regulated to ordinary time, in the usual manner, by raising or lowering the bob in the usual manner.

The raising or lowering of the adjusting-rod necessarily causes some alteration of the axis of oscillation, which can be overcome by means of a counterpoise, *d*, if desired, of which an illustration is shown in Fig. 1. This counterpoise is a body which can be screwed upward or downward to such degree as the case may require, the weight of the body and the degree that it ought to be moved for corresponding movements of the swivel to be determined as nearly as possible by calculation or experiment; but any device for this purpose is quite needless so far as obtaining correct compensation is concerned. The use of the adjusting-rod is not confined to the gridiron pendulum, but it could also be applied to the mercurial

pendulum, to Reid's pendulum, and to other forms.

I have spoken of the adjusting-rod as not being altered in length by the position of the adjusting-swivel; but I so expressed myself for lucidity and to avoid confusion in that place, for it is obvious that correct compensation could be effected despite such alterations, providing they were not in excess of the adjusting capacity of the combination; yet, as such alterations would introduce an element of uncertainty, they would make correct compensation more tedious and difficult to be attained.

Having thus described my invention, I claim—

An adjustable compensating pendulum rod or rods consisting of the rod or rods A, formed of substances, *a b*, of different expansibility, having their ends threaded, and connected together by a swivel-screw, *c*, by means of which the length of one of the pieces *a b* can be increased or diminished while the other is diminished or increased without altering the length of A, substantially as set forth.

CHARLES A. MAHONY.

Witnesses:
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