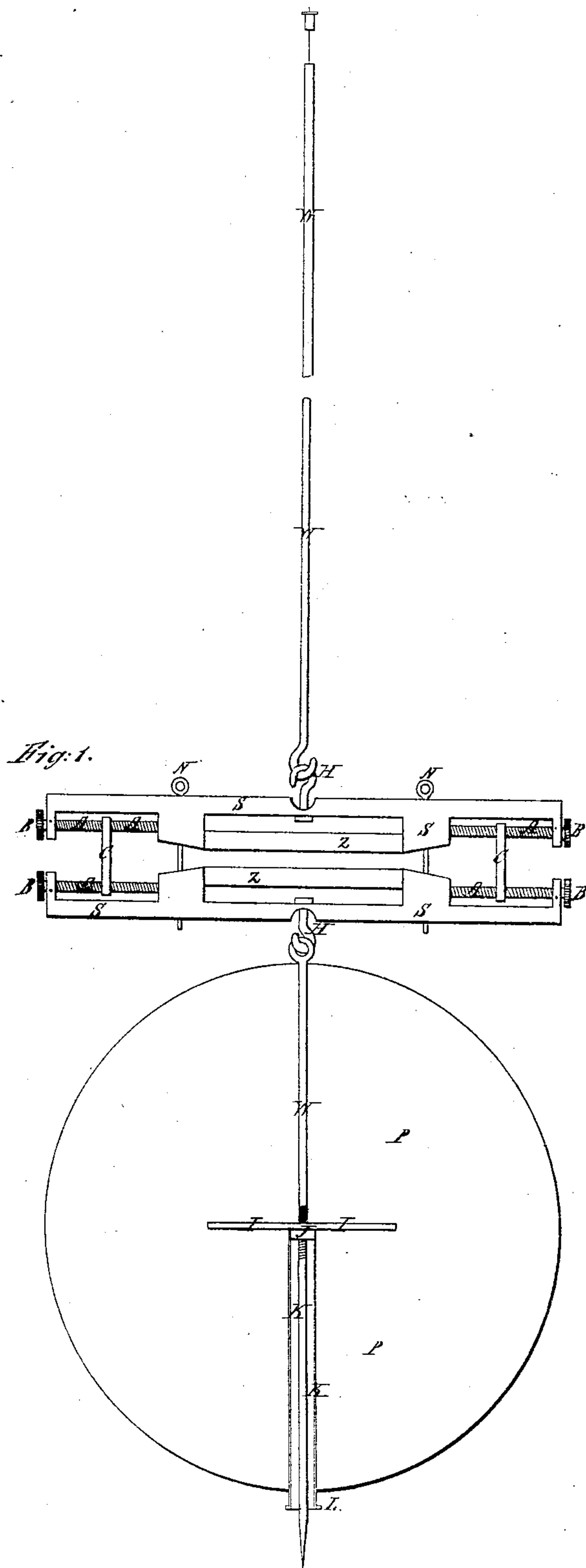


*W. L. Coffinberry.*

*Clock Pendulum.*

*N<sup>o</sup> 22,413.*

*Patented Dec. 28, 1858.*



*Witnesses.*

*Daniel Burnett.*  
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*Inventor:*

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# UNITED STATES PATENT OFFICE.

WRIGHT L. COFFINBERRY, OF GRAND RAPIDS, MICHIGAN.

## COMPENSATING PENDULUM FOR CLOCKS.

Specification of Letters Patent No. 22,413 dated December 28, 1858.

*To all whom it may concern:*

Be it known that I, WRIGHT L. COFFINBERRY, of Grand Rapids, in the county of Kent and State of Michigan, have invented  
5 a new and Improved Apparatus for Compensating for the Expansion and Contraction of Pendulum-Rods; and I do hereby declare that the following is a full and exact description thereof, reference being had  
10 to the accompanying drawings and to the letters of reference marked thereon.

The nature of my invention consists in the combination of two metals of different degrees of expansibility, so arranged and  
15 adapted, as to completely overcome all the expansion and contraction of any simple pendulum rod, and can be used in any pendulum clock.

One very important advantage which it  
20 possesses over all other apparatus for the same purpose, is, that it is perfectly adjustable, and can be altered so as to compensate more, or less, by simply turning the screws arranged for that purpose.

25 To enable others skilled in the art, to make and use my invention, I will proceed to describe its construction and operation.

In the construction of my compensating apparatus, I have used two pieces of good,  
30 hammered steel, about  $\frac{1}{2}$  of an inch thick, and six inches long shaped as s, s, s, s, in the drawings, filed and dressed about square, filed away at the center about  $\frac{3}{4}$  of its thickness, so as to be slightly flexible at that  
35 point, with an angle turned at each end, corresponding with shoulders toward the center; between which a bar of zinc, corresponding in size with the steel bars, is placed, and fixed permanently by soldering, or pinning,  
40 or both.

The adjusting screws A, A, A, A, pass through the arm at the end of the steel bars, running to the shoulder, and entering it far enough to hold the end of the screws securely; with a pin through the arm, passing  
45 through a groove in the neck of the screw, to keep it from withdrawing, when turned by the milled head, for adjusting the apparatus. On the adjusting screws are hung  
50 two suspenders C, C, made of brass, through these suspenders are cut screw threads fitting the screws on which they hang.

N, N, in the drawings, are only steady-pins, which pass entirely through the appa-

ratus, having no effect upon it, except to 55 keep it parallel.

H, H, are hooks, or ring and hook for connecting the apparatus with the rod and ball.

In the foregoing description of the construction of my compensating apparatus; I 60 have described, the apparatus which I have in my clock but the size of the apparatus, and the construction may be varied to suit the circumstances. A zinc bar of  $\frac{1}{2}$  an inch long, placed in the same way between two 65 shoulders of the steel bars; will produce the same effect, and in that case, the apparatus would have the same length of range for the adjusting screws and suspenders, and be only about  $\frac{1}{4}$  inches in length. 70

A manufacturer, of my apparatus, should have a pyrometer upon which he can place every apparatus when completed, and adjust each one, and mark upon the steel bars where the suspenders should hang, for the 75 different lengths of pendulum rod, for which each apparatus is adapted.

The length of my apparatus hangs at right angles with the pendulum rod, and oscillates with it, as shown in the drawings. 80

The pendulum ball should rest at its center, as shown in the drawings; so as to have its center of gravity always at the same distance from the center of its oscillations.

For large, city clocks, where a heavy pendulum ball, and rod are necessary my apparatus should be heavy in proportion; the power, or force, of expansion or contraction, is only limited by the strength of the metals of which the apparatus is composed; 85 therefore there can be no doubt about the power, to accomplish the desired object, so long as the elements are governed by natural laws. 90

The operation of my apparatus, is as follows: Suppose, when first hung into a clock, 95 the weather to be temperate, and the steel bars to be straight; when the temperature is raised, the zinc expanding three times as much as the steel, the bars would not be 100 straight, but the ends of the upper bar would be raised above the level of its center, and the ends of the lower bar, would be depressed below a level of its center; the ends of the steel bars, or nearly the ends, being 105 confined by the suspenders C, C, could not separate, consequently, the centers of the two bars, must have approached each other, and



the same change of temperature which brought the centers nearer together, would also elongate the pendulum rod, and vice versa, when the temperature is falling. The  
5 nearer the center of the apparatus the suspenders C, C, are placed, the less the compensation, and the farther from the center the greater; hence by revolving the screws  
10 feet adjustment can be effected.

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

The combination of two metals of different expansibility in the manner and for the purposes set forth in the foregoing specifications. 15

WRIGHT L. COFFINBERRY.

Signed in presence of—

I. S. CROSBY,

JAMES BENTHAN.