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Twiss

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(54) **PENDULUM, BALANCE**

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Hiram Ives of Meriden Connecticut

Letters Patent

The Schedule referred to in these Letters Patent and making part of the Same containing a description in the words of the said Hiram Ives himself of his improvement called "Ives's" improved balance pendulum.

To whom these presents shall come, Be it known that I Hiram Ives of Meriden in the County of New Haven in the State of Connecticut have invented constructed made and applied to use a new and useful improvement in the balance pendulum whereby the same may be adapted to regulate the movements of any clock or time piece either of wood brass or other metal, called "Ives's" improved balance pendulum. My improved balance pendulum consists in a bar of wood or metal armed with weights at each end and falling about half an inch below the centre of motion either by screwing in the bar or attaching the weight to the under side of it. The bar may be thirteen inches in length more or less for common use armed with a ball of about six ounces weight at each end. This bar thus armed with weights is nicely and accurately balanced on an axis about three inches long crossing the bar in the centre at right angles. This axis may be supported at each end on its fine edges on the under side playing in angular sockets or notches of brass in points passing perpendicularly thro the axis near each end or otherwise inserted into the under side near the ends and projecting about one eighth of an inch. These edges or points should be of steel well tempered, and I have found on trial that the point of a needle made steaming needle passed through the axis at each end to answer the purpose well.

These points are each to play in a female cup or hollow one sixteenth of an inch deep, one eighth of an inch broad at the top and having a flat surface one thirtieth of an inch diameter at the bottom also well tempered. The ends of the pendulum thus balanced, vibrate up and down with the least possible friction, and the balance pendulum thus improved is well adapted to regulate

the movements of any kind of clock or time pieces and may be connected in the following manner. This pendulum is supported on a stand or shelf near the bottom of the clock case. From the axis of the pendulum a wire rises perpendicularly about three inches long and passing through a loop at the lower end of a pendulum rod, which passes thro' the crutch wire of the verge, thereby allows the time wheels of the clock to move when the balance pendulum vibrates. A spring of rolled wire or other suitable material is also inserted into the axle and descends perpendicularly about two inches into a regulator. The regulator consists of an angular socket of metal resembling the space between two large teeth of a saw inverted, about one sixteenth of an inch thick, this socket opens on the top about three fourths of an inch and is supported on a stud of metal about two inches long rising from the bottom of the clock case directly under the axle of the balance and so as to permit the descending spring to touch the sides of the socket at each vibration of the balance. The lower end of the stud is a screw passing through a nut resting on the bottom of the clock case and prevented from rising by a loop or bridge made fast to the bottom of the case through which the stud also passes. So that by turning the nut fast to its place by the bridge, the stud will rise or fall and carry with it upon or down the regulator which is guided by a mortise thro which it moves in a plate of metal attached to the shelf which supports the pendulum. raising or lowering the regulator will accelerate or retard the vibrations. This improved pendulum will also regulate itself as to the effects of heat and cold. viz, as much as the expansion and contraction of this pendulum is counteracted by the corresponding contraction or expansion of the regulator. The balance pendulum above above described is calculated for and so regulate it do as to give forty five strokes in a minute, whereas the suspended pendulums in common use usually give ninety. This invention will lead to useful improvements in the construction of all time pieces regulated

by the vibrations of pendulums. I do not claim as my invention a balance pendulum as such, but I do claim as my invention and improvement the mode of suspending the same as above described whereby. First the weight is placed on a single bar below the centre of motion thereby producing a rectifying action on the balance. Second. In vibrating on knife edges or pivots whereby the friction is greatly reduced. Third in connecting it with a regulator by means of which the effects of heat and cold on the metal is counteracted, and also by means of which the spring of the balance pressing on the sides of the socket of the regulator assists the recoil of the balance when at the highest point of vibration and most disposed to remain at rest. In testimony that the foregoing is a true and full Specification of my improvement I subscribe these presents this twelfth day of Dec.r 1833

Witness
Simeon Baldwin
Ebenezer Baldwin

Miriam Hurst

Enl. 1836

(948 Words)