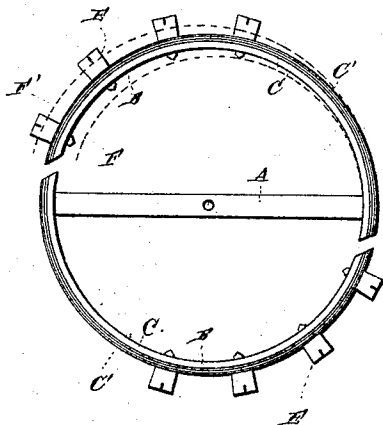


(No Model.)

C. F. CARPENTER.
NON MAGNETIC WATCH BALANCE.

No. 487,550.

Patented Dec. 6, 1892.



WITNESSES:

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NON-MAGNETIC WATCH-BALANCE.

SPECIFICATION forming part of Letters Patent No. 487,550, dated December 6, 1892.

Application filed February 6, 1891. Serial No. 380,429. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. CARPENTER, a citizen of the United States, and a resident of Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Compensating Balances for Watches; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to letters of reference marked thereon, which forms a part of this specification.

The figure of the drawing is a representation of the invention and is a plan view.

This invention relates to certain improvements in compensating balances for watches, the object being to construct a device of this character which will not be subject to electric or magnetizing influences.

Heretofore compensating balances have been made of steel and brass, the arm A and inside rim and segments B B' being made of steel, and the outside rim and segments C C' being made of brass. When such a balance is exposed to heat, the segments of the rim make a curve toward the center of the balance and approach a position marked by the dotted line F, thus carrying the compensating screws or weights E E, &c., toward the center of the balance, making the watch run faster, which compensates for the slow running caused by the increased length of the hair-spring under the same temperature. When exposed to cold the hair-spring will become shorter, causing the watch to run fast, the same temperature causing the two segments of the rim of the balance to curve outward and approach a curve like the dotted line F', carrying the weights E E, &c., outward and causing the watch to run slower, thus compensating for the hair-spring. Thus the action of the two segments in carrying the weights or screws toward and from the center of the balance compensates the effect of variations of temperature upon the hair-spring. This change in the curve of the segments of the balance is caused by the unequal expansion of steel and brass under varying temperatures. When a balance so constructed is exposed to

magnetizing influences, it becomes magnetized, causing the watch to be unreliable and to run very irregularly.

The object of my invention is to construct a compensating balance which cannot be influenced or affected in any way by ordinary electric or magnetic forces.

I have constructed a "non-magnetic balance" which will have the same compensating effect as the brass or steel balance and not be affected in the least by magnetic influences.

To carry my invention into effect, I construct the arm A and inside rim B B' of the segments of aluminium-bronze and the outside rim of the segments of cadmium. To harden the cadmium and somewhat reduce its coefficient of expansion, I add to five (5) parts of cadmium about one (1) part of silver. The difference in the linear expansion qualities of the inside rim of the segments and the outside rim of the segments of a balance thus constructed will be about the same as that between a steel and brass balance, and thus cause the same compensating effect.

I am aware that non-magnetic materials of different expansive powers have heretofore been used in the construction of compensating balances, and I do not therefore claim, broadly, a compensating balance constructed of such materials; but I am not aware that aluminium-bronze and cadmium alloyed with silver have been employed for this purpose. These substances I have found to be especially adapted for the purpose for the following reasons:

First. The tensile strength and rigidity of aluminium-bronze is as great as that of steel, a quality which is very desirable for a balance for the reason that it is liable to be handled in cleaning, &c., and that the least distortion of the balance after adjustment greatly injures its time-keeping qualities. The size and weight of a balance must be within very small limits, and consequently the metal of which it is composed, particularly the arm and inner rim, should have the greatest rigidity or transverse strength and tenacity possible, so that it will retain permanently the delicate but indispensable adjustments for position and temperature that are made on it. Steel was and is now used generally for that

purpose. Aluminium-bronze equals steel in tenacity and rigidity or transverse strength, while palladium alloy and other metals which have been employed for this purpose have far less of these qualities.

Second. These materials possess the right coefficients of expansion to compensate for the balance-spring—that is, the difference between their coefficients of expansion is about the same as the difference between the coefficients of expansion of the brass and steel commonly employed.

Third. They are less expensive than other non-magnetic materials which have been used for the purpose.

These, together with the other known properties of these materials, render them especially adapted for the purpose.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The non-magnetic compensating balance for watches, having the inner rim of its segments made of aluminium-bronze and its outer rim of cadmium alloyed with silver, substantially as specified.

2. The combination of the arm A and inside rim B B', of aluminium-bronze, and the outside rim C C' of the segments, of cadmium alloyed with silver, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHAS. F. CARPENTER.

Witnesses:

WM. P. LEE,

EDWD. S. PORTER.