(No Model.)

E. OSGOOD.

COMPENSATING BALANCE FOR TIME PIECES.

No. 278,173. Patented May 22, 1883.

Fig. 1.

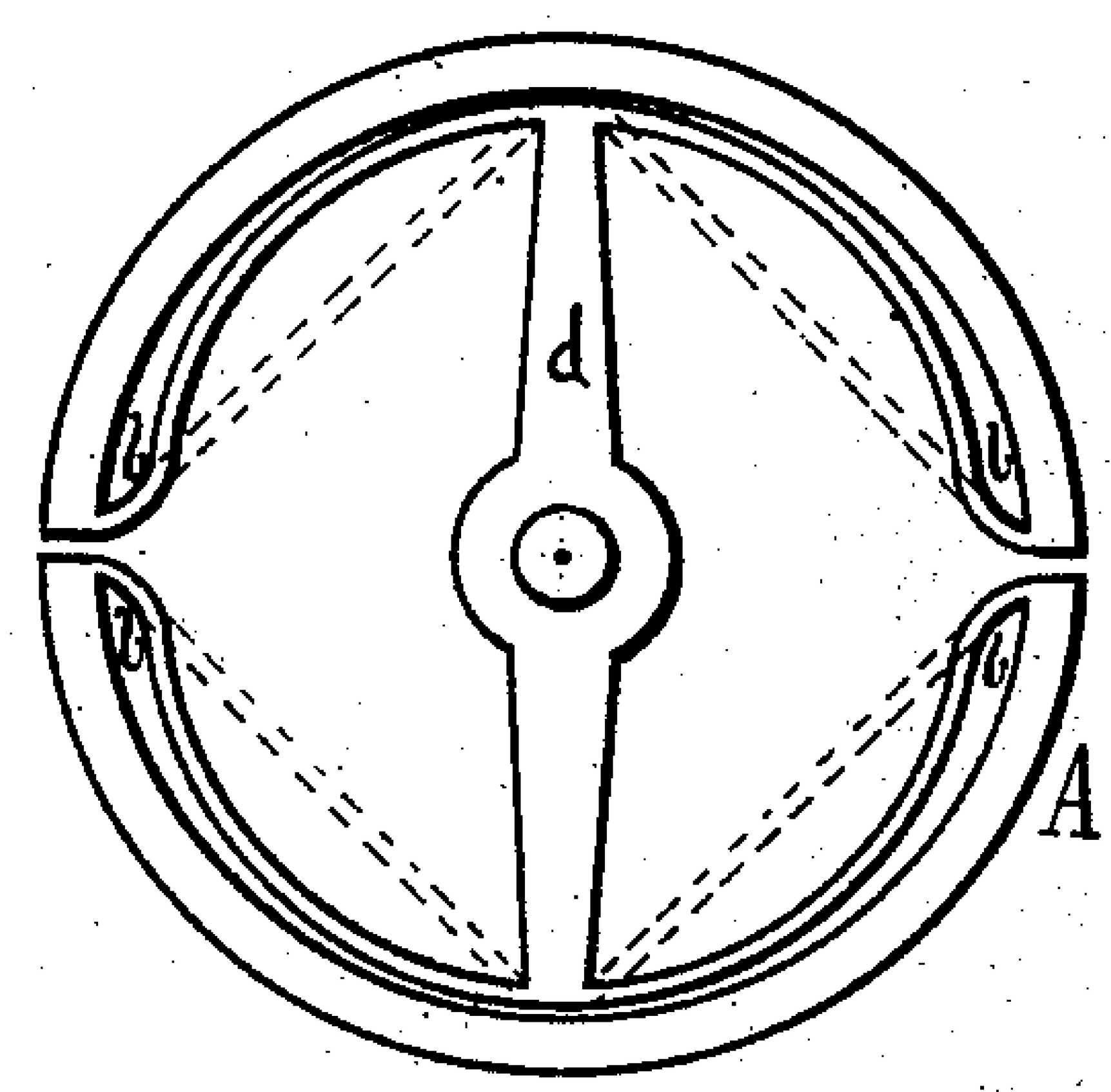


Fig. 2.

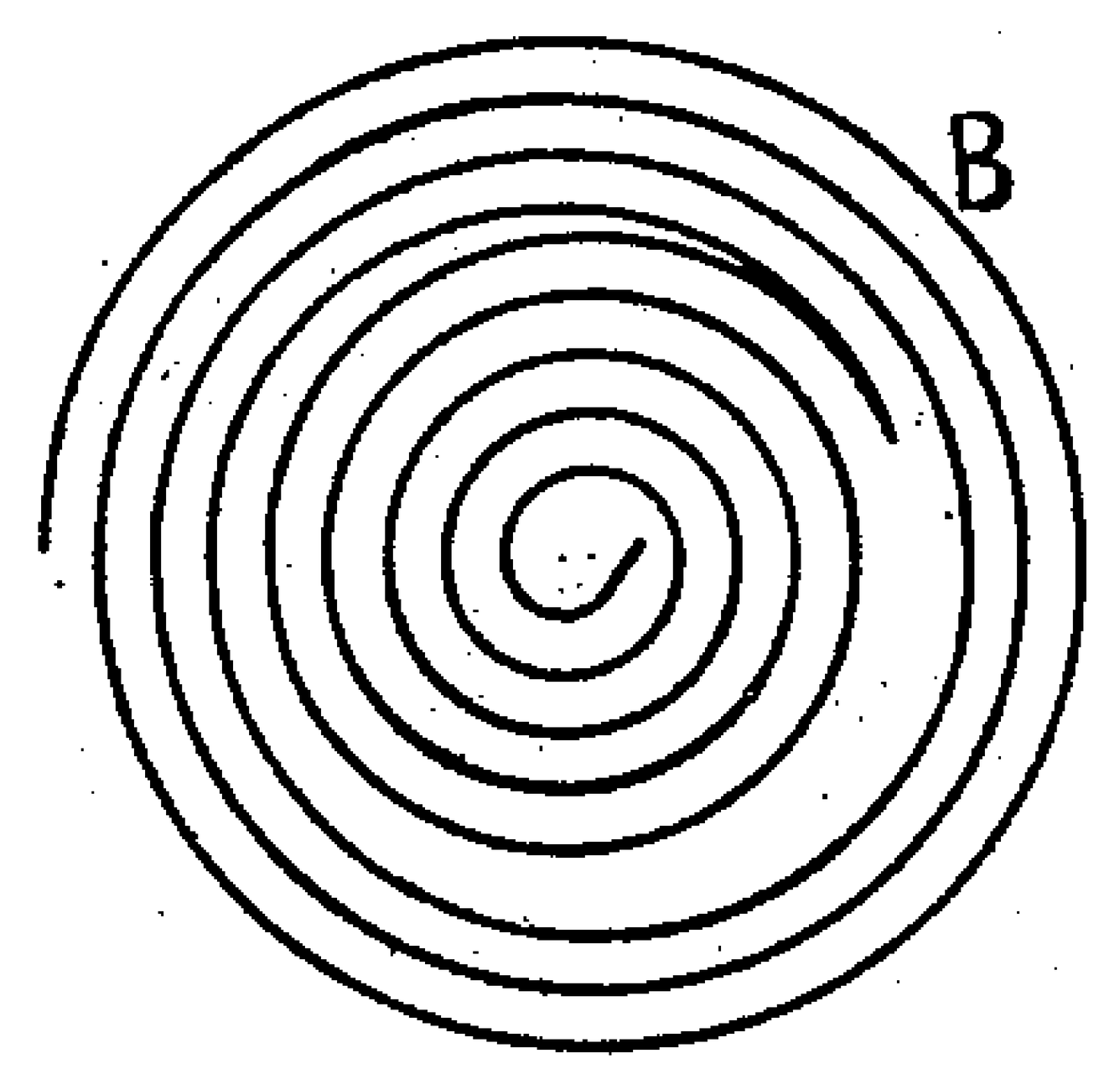
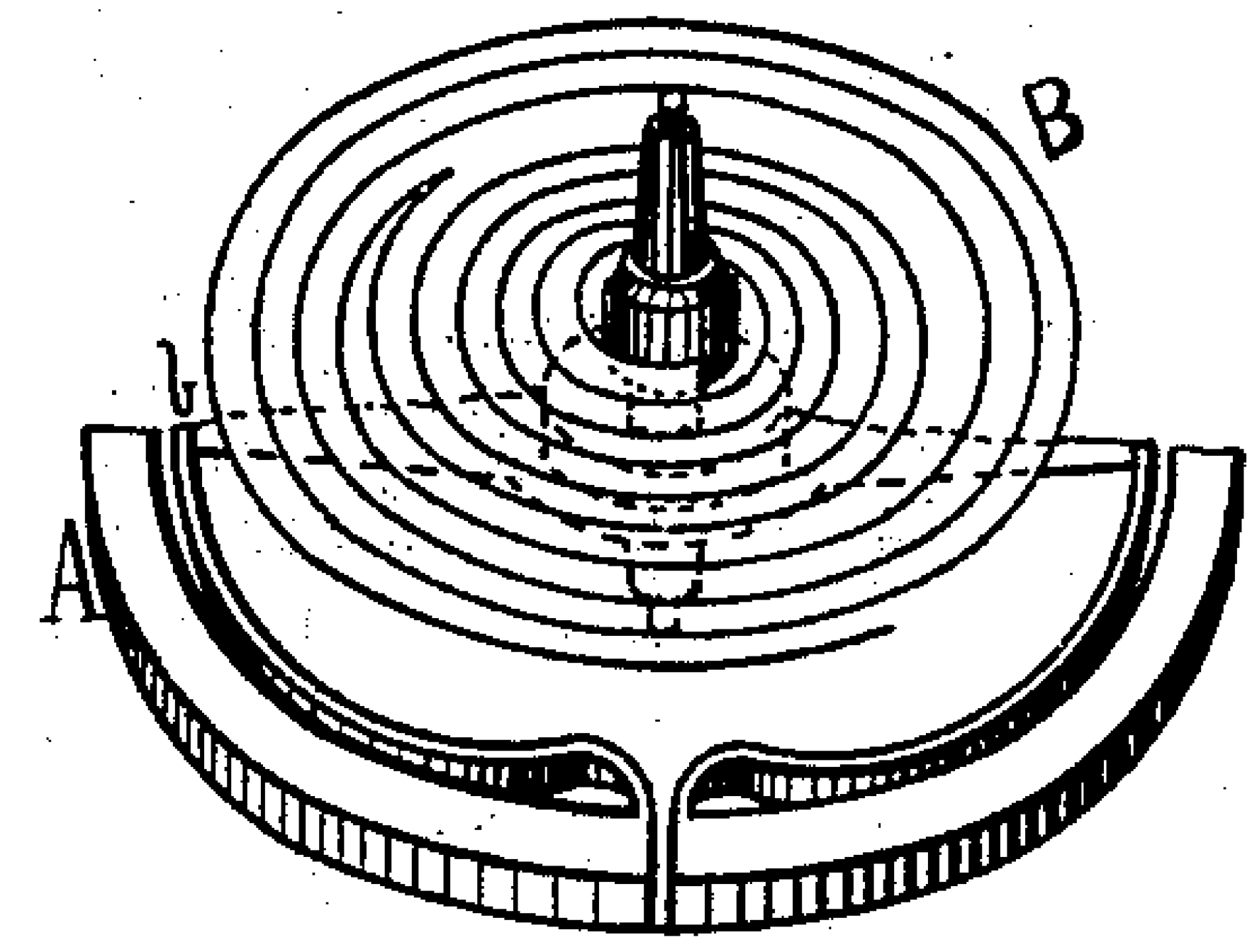


Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

ENOCH OSGOOD, OF BOSTON, MASSACHUSETTS.

COMPENSATING-BALANCE FOR TIME-PIECES.

SPECIFICATION forming part of Letters Patent No. 278,173, dated May 22, 1883.

Application filed October 25, 1882. (No model.)

To all whom it may concern:

Be it known that I, ENOCH OSGOOD, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful improvements by which the balance-wheels and hair-springs to watches or clocks are compensated; and I do hereby 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 drawings, and to the letters or figures of reference marked thereon, which form a part of this specification.

My invention consists in counterbalancing the expansion or contraction by heat or cold of the balance-wheels and hair-springs of watches or clocks.

Figure 1 is a front view of the balance-wheel. Fig. 2 is a front view of the hair-spring. Fig. 3 is a perspective view of balance-wheel and hair-spring connected.

My invention consists of two parts, which I will describe separately, as follows:

Upon the extremities of the main radial arms *d d* of the balance-wheel I attach compensating-arms *b b*, curved as shown, or otherwise, the ends of them being attached rigidly to the ends of the divided periphery of the wheel A A. These small compensating-arms *b b b b* must be made sufficiently small that they will not spring the periphery of the balance-wheel A A, and sufficiently curved to give the desired length to exactly counterbalance the expansion or contraction of the periphery of the balance-wheel A A and the main arms *d d*, which form a part of the hub, thus counterbalancing the expansion or contraction of both at one and the same time successfully.

Second. To counterbalance the expansion or contraction of the hair or balance spring, I cut it in two parts, then cut out a piece to give it spring room, turn one part over to make it spring in the opposite direction, as shown in Fig. 2, letter A, solder or fasten them together again, and the expansion or contraction of one part will exactly compensate for the expansion or contraction of the other. This hair-spring is attached in the usual way to the balance-staff, and operates, in connection with the before-described balance-wheel, to neutralize the effect of change of temperature in time-movements in the most effectual manner. It is evident that the peculiar form of curvature of the parts *b b* shown in the drawings may be varied from. They may be angular or straight, or may be of metal of a different coefficient of expansion from the other parts of the structure, or they may be separately attached without departing from the spirit of my invention.

What I claim is—

1. In a balance-wheel for time-pieces, the combination of the radial arms *d d*, the compensating-arms *b b*, attached to the outer ends thereof, and the divided periphery of the wheel A, to which the compensating-arms are secured, substantially as herein set forth, to counterbalance the contraction or expansion by variation of temperature.

2. A balance-spring for time-pieces, composed of two parts, the inner end of one part attached to the outer or reversed end of the other in such manner as to cause the parts to spring in opposite directions, and to mutually correct their expansion or contraction by heat or cold.

3. The combination, in balances for time-pieces, of the balance-wheel, constructed to automatically equalize for variations of temperature, with the balance-spring, constructed as shown, both being attached to the same staff, as described.

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

ENOCH OSGOOD.

Witnesses:

GEO. R. TABER,

CHARLES LARNED.