

UNITED STATES PATENT OFFICE.

FERD. ADOLPH LANGE, OF GLASHUTTE, SAXONY.

IMPROVEMENT IN THE MANUFACTURE OF SPRINGS FOR WATCHES AND OTHER TIME-PIECES OF ALUMINIUM COMPOUNDS.

Specification forming part of Letters Patent No. **139,678**, dated June 10, 1873; application filed October 25, 1872.

To all whom it may concern:

Be it known that I, F. A. LANGE, of Glashutte, near Dresden, in Saxony, Europe, have invented an Improvement in the Manufacture of Hair-Springs for Watches and other Time-Pieces from Aluminium and Aluminium Composition, to be used instead of any other alloys or metals for such purposes, of which the following is a specification:

The nature of my invention consists in making hair-springs for watches and other time-pieces of aluminium, and the discovery of the peculiar adaptability of aluminium for that purpose, and in combining it with other metals for such purposes.

The difficulty to be overcome in making hair-springs of aluminium consists as much in the delicate and artful manipulation of that metal as it does in the quality of the alloy—in drawing, rolling, and making it thin enough for hair-springs without destroying their elasticity. All attempts to reduce the band or springs in the process of making to that degree of thinness absolutely required for the perfect action and reaction of the spring, and have it retain sufficient elasticity and pliability without becoming brittle, prior to my invention or discovery, proved to be failures. But, after long and patient experiments, and a series of systematic tests with different metals and alloys, I discovered that aluminium possessed the exact, absolute, and paramount qualities I was searching for and required for the manufacture of perfect hair-springs for watches and other time-pieces.

I have used an alloy of one hundred and nine aluminium with five silver; also, ten aluminium and ninety copper; and, also, intermediate alloys of the same metals; and, in all cases, I have succeeded, by using my system of manipulating the same, in reducing the

wire, bands, or springs; but I have found that the larger the proportion of aluminium used in the alloy the better. After the wire or band has been handled and worked in the usual way, by drawing and rolling, I submit it to the action of a peculiar kind of plane, and then, by stoning it, reduce it to any required size. The wire or bands thus reduced are wound and pressed, two or three together, into forms of hard steel, and heated until the steel is of a light-blue color. The forms are then allowed to cool off, and the springs are taken out and are ready to be finished and adjusted.

By the above-described process all difficulties and seeming impossibilities can be surmounted in making hair-springs of the above-described alloys and of aluminium—a metal of such extremely low specific gravity, (much lower than that of gold or steel,) and possessing such superior qualities, never rusting, free from magnetism, very elastic, hard, and not brittle, as to make it essential for the use to which I apply it, superseding all other metals in the manufacture of hair-springs for watches and other time-pieces.

I claim as my invention—

1. The alloys of aluminium herein described, forming hair-springs for watches and other time-pieces.

2. The new manufacture herein described—that is to say, springs suitable for watches and other time-pieces made of compounds of aluminium tempered, annealed, and treated substantially as described.

In testimony whereof I have hereunto set my hand and seal this 2d day of September, A. D. 1872.

FERD. ADOLPH LANGE. [L. s.]

Witnesses:

W. KNOOP,
O. ARNOUR.