

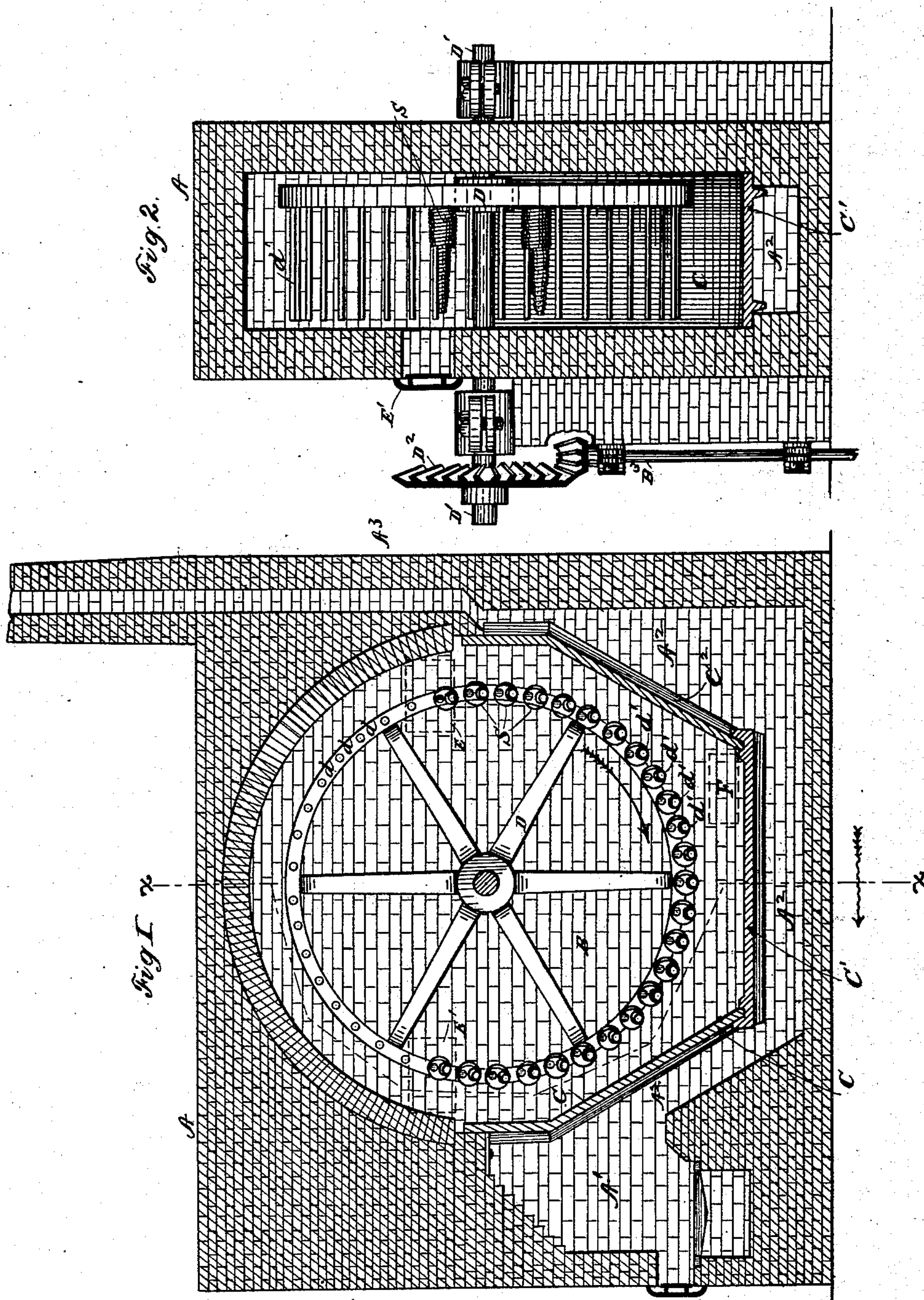
(No Model.)

M. N. LOVELL.

PROCESS OF TEMPERING WIRE SPRINGS, &c.

No. 315,424.

Patented Apr. 7, 1885.



Witnesses.

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UNITED STATES PATENT OFFICE.

MELVIN NEWTON LOVELL, OF ERIE, PENNSYLVANIA, ASSIGNOR TO THE LOVELL MANUFACTURING COMPANY, (LIMITED,) OF SAME PLACE.

PROCESS OF TEMPERING WIRE SPRINGS, &c.

SPECIFICATION forming part of Letters Patent No. 315,424, dated April 7, 1885.

Application filed April 17, 1884. (No model.)

To all whom it may concern:

Be it known that I, MELVIN N. LOVELL, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Process of Tempering Wire Springs and other Small Articles; 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.

This invention consists in improvements in the process of tempering wire springs—such, for example, as furniture-springs—and also other small objects, whether made of wire or not.

I shall in the following description first describe an apparatus by means of which my process is carried out, and then clearly point out the essential features of the process.

My apparatus consists of an oven, which is so constructed that the plates on one side of it are much hotter than on the other side, and a revolving wheel within said oven conveys the article to be tempered in front of the said plates from the coolest to the hottest points, thus exposing the article to a gradually-increasing temperature until it has become sufficiently heated. This apparatus is shown in the accompanying drawings, as follows:

Figure 1 is a longitudinal vertical section through the oven and its furnace. Fig. 2 is a transverse vertical section through the same parts.

A is the masonry forming the oven and furnace. A' is the combustion-chamber or fire-box. A² is a diving-flue which passes around the under side of the oven. A³ is the chimney-flue. B is the oven-chamber, which is formed on top by an arch in the masonry and on the bottom and sides of iron plates C C' C², which rest on a ledge in the masonry. D is the conveyer-wheel, which is rotated in the oven in the direction indicated by an arrow thereon. *d d d*, &c., are holes in the side of said wheel. *d' d' d'*, are rods which are set into said holes, and on which the articles to be tempered are hung. S S represent bed-springs nested together and hung on said rods. E E' (shown only in dotted lines in Fig. 1, as they are in the wall which is removed by the section) are

the openings through which the articles enter and are removed from the oven. F is an opening with a door, by which access may be had to the bottom of the oven, if required. This, too, is in the wall removed, and is shown by dotted lines. D' is the shaft of the wheel D, and D² D³ is the gearing by which the wheel is rotated.

This device was designed and so far has only been used for tempering furniture-springs; but it is obvious that it need not be limited to that use, but may be employed for tempering almost any article that is made of light metal which will become thoroughly heated by the exposure here obtained. If the articles are not of such a form as to hang on the rods *d'*, they can be provided with means for hanging them on. In the drawings I have shown furniture-springs as the articles being operated upon, and as the operation would be the same with any other article I shall hereinafter speak only of springs.

The fire as it is applied to the plates heats the plate C, which is next to and forms the back of the fire-box, the hottest. The plate C' will not be so hot as C, and the plate C² will be still cooler. There will be several hundred degrees difference between the temperature of the plates C and C²; hence, of course, the oven will be cooler on the side next the plate C², and its hottest point will be directly opposite the fire-box.

The springs are nested together, about a dozen in each nest, and are strung onto a rod, *d'*, which the attendant grasps with a pair of tongs and inserts it into the oven endwise through the door E, on the right of Fig. 1, and sticks the end of the rod into one of the holes *d* in the wheel D. As will be seen by the arrow, the wheel rotates from the door E downward, and the springs are conveyed toward the hottest part of the oven. The wheel revolves slowly. I have generally had it revolve once in about twenty minutes; but its rapidity of movement should be made to depend upon the size of the wire used. If I were using a smaller wire for my springs than I am—viz., No. 10½—I should revolve the wheel faster, and if a larger wire, slower. At the rate I have named it takes about thirteen minutes for the springs to pass from the door

E down and up to the door E', when they are removed by the attendant grasping the rod *d'* with his tongs and drawing it out. The wheel moves so slowly that holes *d* can be placed quite near together, and the attendant who puts in will be able to place a rod in each hole, and the attendant who takes out will have no difficulty in removing all the rods as they come opposite door E'. Thus it will be seen the work goes on continuously. The springs enter at the coolest point and are removed in a few minutes at the hottest point.

For furniture-springs I have found that I obtained the best results by keeping the fire so that the plate C is kept at a cherry-red heat. This gives about 1,200° Fahrenheit at the hottest point in the furnace, so that the springs are heated to nearly that temperature when they are removed.

It should be observed, for it is an essential feature, that the springs are so held by the wheel and the rods that each nest of springs obtains precisely the same exposure to the heat as the others do.

I am aware that springs have been heated before in an oven by being conveyed by a conveyer-wheel, or, rather, an upright shaft with arms; but the furnace was below the oven, and the springs which were placed on the lowest arms of the conveyer were heated more than those placed on the upper arms, and the springs when put in were exposed at once to the same degree of heat that they were exposed to during all their stay in the oven.

It is not necessary to obtain the result I do that the wheel and flues have the same position I show. The wheel might be made so as to revolve horizontally, and the flues made so as to pass around one side of the oven; but such a change would gain nothing in effect, but would lose in convenience. The form I show is exceedingly convenient to operate, and the flues are so disposed as to get the best application of the fire to the plates.

When the springs are removed from the oven, they are plunged at once into cold water or other cooling-bath. My process, therefore, is as follows: Placing the springs in an oven from which the products of combustion are

excluded at a point having a less degree of heat than other parts of the oven, progressing them gradually through points having greater heat than where they entered, and when they have reached the highest degree of heat remove them and plunge them at once into a cooling-bath.

It is obvious that various other means could be used for carrying out my improved process; for example, a horizontal chamber having a traveling car or endless carrier might be substituted for the means shown; but for coiled springs I prefer the means herein shown, as I have found in practice the best results are thereby obtained.

I do not claim in this application the apparatus for tempering springs and other articles as herein described, as that forms the subject-matter of an application filed March 16, 1885, Serial No. 159,071.

I am aware that it is old to subject articles to be tempered to a gradually-increasing heat in a flue or chamber through which the products of combustion are passed; but articles so subjected absorb sulphur and other impurities from the products of combustion, and thus depreciate their value. By my process these defects are obviated, as the articles are treated in a chamber from which the products of combustion are excluded.

What I claim as new is—

The process herein described for tempering springs and other light articles—viz., inserting said articles in an oven—from which the products of combustion are excluded—at a part of the oven where the heat is considerably below the final heat required, advancing them gradually by a conveyer to that part of the oven where the heat is brought to the degree specified, and then immediately withdrawing and plunging them into a cooling-bath, substantially as set forth.

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

MELVIN NEWTON LOVELL.

Witnesses:

FRANK GUNNISON,
ROBERT H. PORTER.