W. E. ELLIS.

MEANS FOR TYING SHOE UPPERS.

APPLICATION FILED OCT. 11, 1906. RENEWED DEC. 3, 1908.

920,293. **Patented May 4, 1909.**

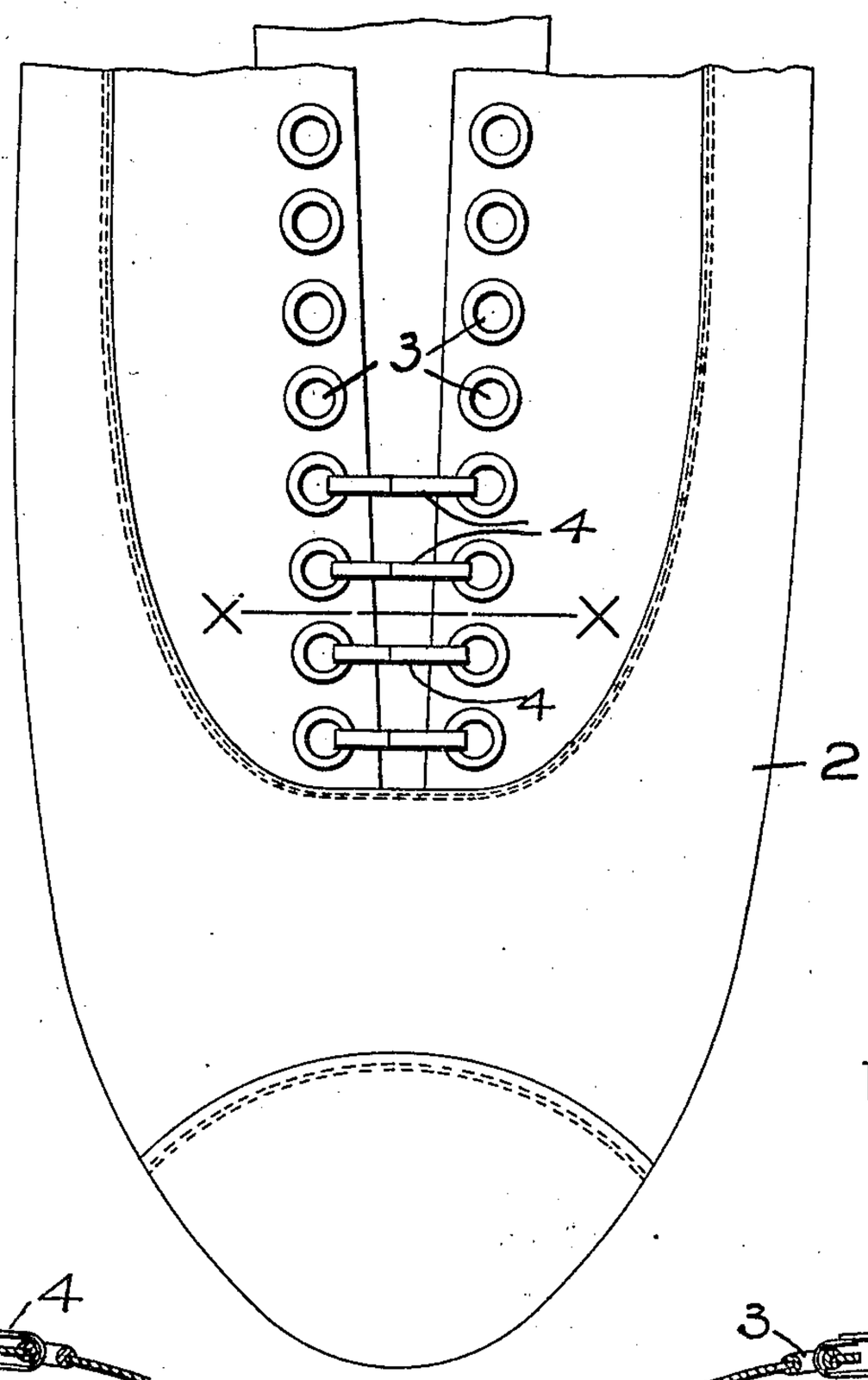

FIG. 1.

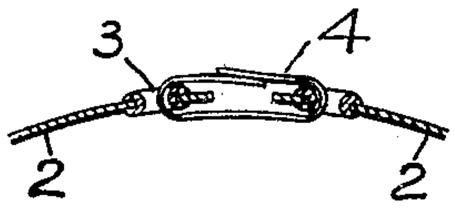

FIG. 3.

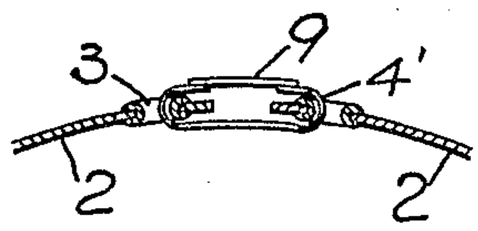

FIG. 4.

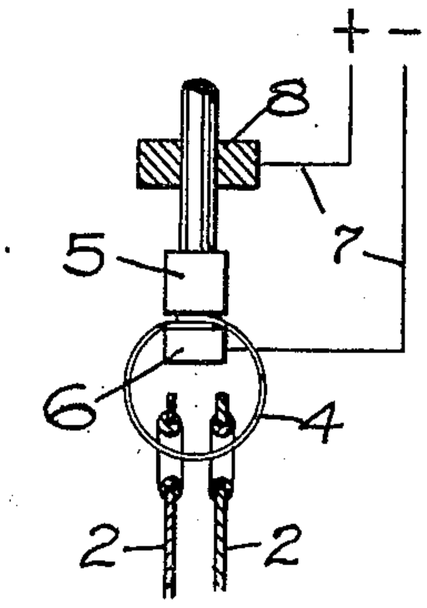

FIG. 2.

WITNESSES:

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UNITED STATES PATENT OFFICE.

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MEANS FOR TYING SHOE-UPPERS.

No. 920,293. Specification of Letters Patent. Patented May 4, 1909.

Application filed October 11, 1906, Serial No. 338,399. Renewed December 3, 1908. Serial No. 465,845.

To all whom it may concern:

Be it known that I, WARREN E. ELLIS, a citizen of the United States, and resident of Haverhill, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Means for Tying Shoe-Uppers, of which the following is a specification.

This invention is intended to provide for the securing of the eyeleted edges of the uppers of lace shoes during the process of lasting in such manner that any desired number of pairs of opposite eyelets may be independently connected and held at a suitable distance apart without possibility of varying this distance under the strain imposed by the lasting process. To this end I pass through each pair of eyelets which it is desired to secure a thin, flexible metallic strip, as many of these strips being employed as there are pairs of eyelets to be connected, and I then connect the free ends of each strip to form a closed loop by welding them together or by welding a supplementary strip thereto, the ends of the strip or strips being preferably overlapped in either case so as to cover their sharp edges and thus prevent defacement of the upper thereby. The loops thus formed are given such dimensions that when the upper is drawn over the last its eyeleted edges will separate to the desired distance and be held by the connecting strips in the position thus assumed, which strips, being readily flexible, will conform to the shape of the last and permit the upper to hug the same closely.

In the accompanying drawings, Figure 1 is a plan view of a portion of a shoe upper having several pairs of its eyelets connected in accordance with my invention; Fig. 2 is a transverse section through the upper, illustrating my method and also showing diagrammatically an apparatus for welding the strips; Fig. 3 is a section on the line *x*—*x* in Fig. 1, and Fig. 4 is a similar section illustrating a slight modification.

In Fig. 1 of the drawings 2 represents a shoe upper the edges of which are provided with the usual eyelets 3, and 4—4 represent connecting strips preferably made of thin, flat, soft steel wire, each of these strips being passed through a pair of opposite eyelets and having its ends welded together and thus permanently united to form a closed loop. This welding of the ends of the strips may conveniently be accomplished by the employment of an electric welding apparatus such as is indicated in Fig. 2, in which 5 and 6 respectively represent upper and lower metallic clamps which are insulated from each other and are adapted to receive the overlapped ends of a strip 4 between them, and 7—7 represent circuit wires leading to these clamps respectively from a source of electric current suitable for the intended purpose. The upper clamp 5 is mounted to slide in a suitable bearing 8 or otherwise made capable of movement from and toward the lower clamp 6 to permit the insertion and removal of the ends of a strip 4, and when it is forced downward and caused to confine said ends between itself and the lower clamp the electric circuit is completed through the clamps and the ends of the strip, whereupon the heat generated by the current effects the welding of said ends in a well known manner. The upper clamp is then raised and the strip removed, and when the upper has been thus provided with the desired number of strips its eyeleted edges are drawn apart and the loops elongated as shown in Fig. 3. As a modification, a supplementary strip 9 may be welded in like manner to the ends of the connecting strip 4′, as shown in Fig. 4, with the same result. In either case the length of the loop formed by the welded strip is such as to hold the corresponding pair of eyelets at the desired distance apart when said loop is straightened out to the maximum extent under the tension of the lasting process, and by suitably varying the size of these loops the eyeleted edges of the upper may be held at a slight angle to each other, as shown in Fig. 1, this being desirable in many cases. The ends of the strips may be butt-welded, if desired, although I prefer to overlap them, as above described.

After an upper has been lasted the strips are severed and withdrawn from the corresponding eyelets, or, if desired, one or more strips may be left in the upper during subsequent processes.

It will be seen that my invention provides a fastening device for the purpose described in which the strain is divided between the two transversely-extending portions of the loop, so that the fastening may be made of very thin and inexpensive wire, and by reason of the inextensibility of the wire, in connection with the fact that the ends of the

strip are permanently secured in fixed relation, there is no possibility of stretching the fastening, in use, the desired relation between the eyeleted edges of the upper being thus perfectly preserved.

I claim as my invention:

1. The combination with a shoe upper having eyeleted edges, of one or more flexible metallic strips passed through one or more pairs of opposite eyelets, the ends of each strip being permanently united by a welded connection.

2. The combination with a shoe upper having eyeleted edges, of one or more flexible metallic strips passed through one or more pairs of opposite eyelets, the end portions of each strip being overlapped and welded together.

In testimony whereof, I have hereunto subscribed my name this tenth day of October, 1906.

WARREN E. ELLIS.

Witnesses:
E. D. CHADWICK,
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