

PATENT SPECIFICATION

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(54) SUSPENSION FOR A FLEXURAL QUARTZ BAR RESONATOR

(71) We SOCIETE SUISSE POUR L'INDUSTRIE HORLOGERE MANAGEMENT SERVICES S.A. of 96 Staempflistrasse, CH-2500 Bienne, Switzerland; a Swiss body corporate do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention concerns the provision of a suspension for a flexural quartz bar resonator, and a method of making the suspension.

The present invention aims to remedy drawbacks of known suspensions by providing a suspension and a method of making it which is easy to manufacture with accuracy, and which prevents interference with the resonance of a flexural quartz bar resonator carried by the suspension.

According to the present invention there is therefore provided a flexural quartz bar resonator suspension having a pair of supports each electrically connectable to an electrode on a node of the bar, comprising a pair of fork-shaped supports and a base, the supports being attached to the base and to the electrodes at a distance apart corresponding to the distance between the nodes on the bar.

According to an embodiment of the invention there is provided a method of fabrication of a flexural quartz bar resonator suspension including the steps of cutting or forming the supports from flat sheet metal integrally with a central part and legs, folding the supports and legs at right angles to the central part, locating the folded body on a base by means of the legs, passing a part of each support through the base to act as a terminal, securing the supports to the base, and cutting the supports and legs from the central part.

[Price 33p]

Reference is now directed to the accompanying drawings, in which:—

Figs. 1 to 3 show steps in the fabrication of one embodiment of the suspension;

Fig. 4 shows a partial longitudinal section 50 of the mounted quartz resonator in a case;

Fig. 5 is a transverse section of the quartz resonator with its case; and

Fig. 6 is a transverse section of a second embodiment of the suspension.

In a first embodiment of the suspension a cut-out metal sheet as shown in Fig. 1 is used, the cutting being made either by stamping or by chemical etching. This metal sheet has a central rectangular part 1 and legs 2 at each end. The sheet also has forked supports 3. The sheet shown in Fig. 1 is then folded along the dash-dotted line to form the bridge-shape shown in Fig. 2. It can be seen that the legs 2 and the supports 3 are in planes which are perpendicular to the plane of the central part 1. The bent sheet bridge is now attached to a metal base 5 (Fig. 3) in such a way that the legs 2 rest without play on a ledge 6 of the base 5. This locates the bridge relatively to the base 5. The lower extremity of each support passes through and is fastened to a glass bead 7 located in an opening of the base 5, to form the terminals 8 of a resonator assembly.

The central part 1 and the upper parts of the supports 3 and the legs 2 are now separated by cuts made along the dash-dotted lines and are removed, so that a separated pair of supports 3 is obtained.

A bar of quartz 9 (Fig. 4) oscillating in flexure with two nodes, is then introduced from above between inwardly pointing projections 11 of the supports, which are then connected to metallised electrodes on the quartz bar by soft soldering. The positioning of the two supports was exactly determined by the central part 1 when embedding the electrodes in the beads 7. The distance

between the projections 11 on the supports is exactly equal to the distance between the nodal points of the quartz bar when operating in flexure. Thus, a highly precise but simplified quartz mounting is obtained.

Figures 4 and 5 show the quartz bar mounted in a case consisting of a cover 10 and base 5.

Fig. 6 shows a second embodiment differing from the first embodiment in that the supports 3a have two terminals 8a. Instead of using a metal base 5 and embedding the supports in glass beads located in holes in the base, the base is made of an insulating material such as glass or ceramics. These materials can be metallised at the spots where the terminals pass through, and at the places where the cover is to be fixed. The supports and the cover are then fixed 20 by soft soldering to the base.

WHAT WE CLAIM IS:—

1. A flexural quartz bar resonator suspension having a pair of supports each 25 electrically connectable to an electrode on a node of the bar, comprising a pair of fork-shaped supports and a base, the supports being attached to the base and to the electrodes at a distance apart corresponding 30 to the distance between the nodes on the bar.

2. A suspension according to claim 1, wherein the supports are flat and located in planes which are perpendicular to a longitudinal axis of the bar.

3. A method of fabrication of a flexural quartz bar resonator suspension according to claim 1, including the steps of cutting or forming the supports from flat sheet metal integrally with a central part and 40 legs, folding the supports and legs at right angles to the central part, locating the folded body on a base by means of the legs, passing a part of each support through the base to act as a terminal, securing the sup- 45 ports to the base, and cutting the supports and legs from the central part.

4. A method according to claim 3, including the step of embedding glass beads in openings of the base, the beads acting as 50 insulators for the terminals.

5. A method according to claim 3, wherein the base is made of insulating material, including the steps of metallising 55 holes in the base through which the terminals are passed, and soldering the terminals to the metallised surfaces.

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WHAT WE CLAIM IS:—

1. A flexural quartz bar resonator suspension having a pair of supports each electrically connectable to an electrode on a node of the bar, comprising a pair of fork-shaped supports and a base, the supports being attached to the base and to the electrodes at a distance apart corresponding to the distance between the nodes on the bar.

2. A suspension according to claim 1, wherein the supports are flat and located in planes which are perpendicular to a longitudinal axis of the bar.

3. A method of fabrication of a flexural quartz bar resonator suspension according to claim 1, including the steps of cutting or forming the supports from flat sheet metal integrally with a central part and legs, folding the supports and legs at right angles to the central part, locating the folded body on a base by means of the legs, passing a part of each support through the base to act as a terminal, securing the supports to the base, and cutting the supports and legs from the central part.

4. A method according to claim 3, including the step of embedding glass beads in openings of the base, the beads acting as insulators for the terminals.

5. A method according to claim 3, wherein the base is made of insulating material, including the steps of metallising holes in the base through which the terminals are passed, and soldering the terminals to the metallised surfaces.

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