

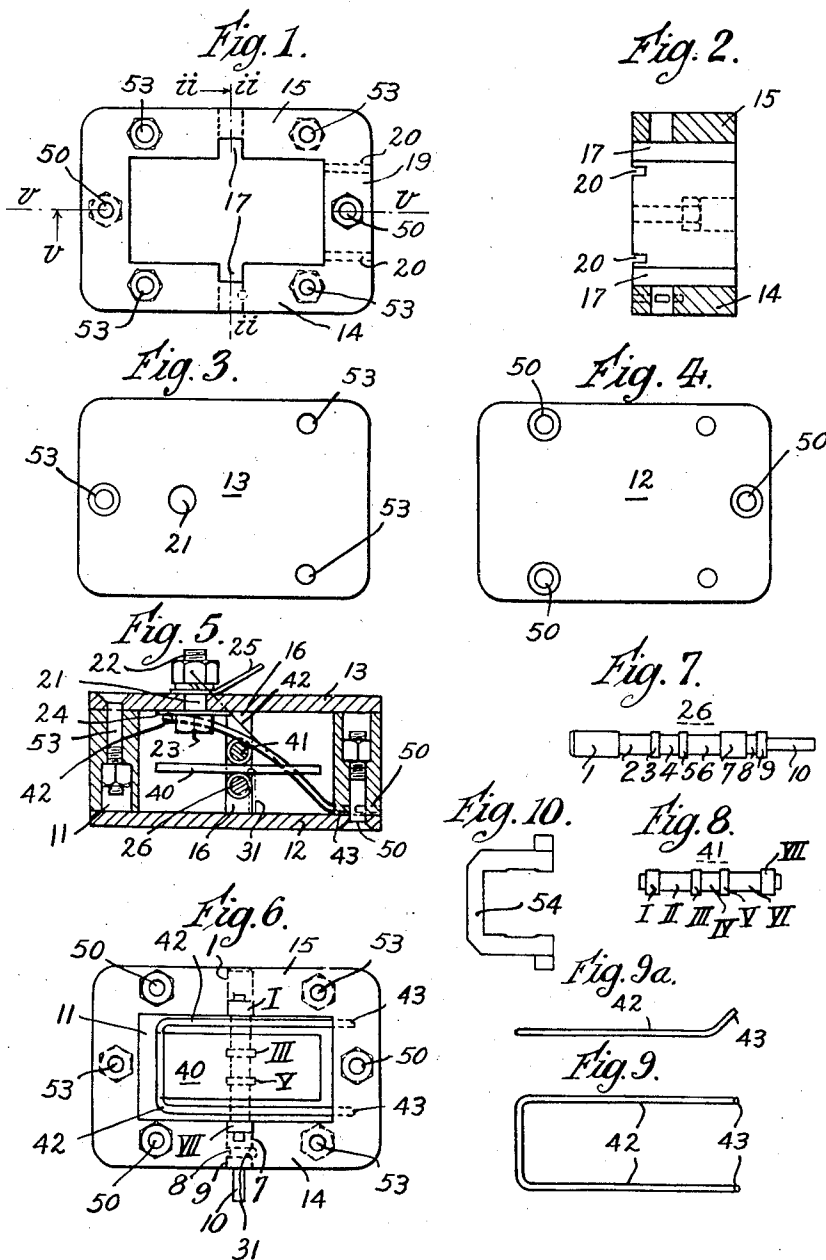
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HOLDER FOR PIEZO-ELECTRIC CRYSTAL

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HOLDER FOR PIEZOELECTRIC CRYSTALS

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The present invention relates to holders for piezo-electric crystals. It provides such a holder which is particularly useful for use in mobile radio stations, such as aircraft and so forth, where the crystal may be subjected to considerable vibration.

According to the invention, a holder for a piezo-electric crystal includes at least one pair of rollers adapted to hold between them a piezo-electric crystal in such manner that one roller engages the crystal on its one face and the other roller engages the crystal on its other face, said one roller being rigidly fixed to a support and the other being spring urged towards said one roller so as to grip the piezo-electric crystal between the rollers on its nodal line of electric pressure.

There may be more than one pair of rollers, a roller of each pair engaging one face of the piezo-electric crystal and another roller of each pair engaging the other face of the piezo-electric crystal, the rollers on either face engaging the said face where parallel longitudinal lines intersect said nodal line.

The roller or rollers engaging one face of the piezo-electric crystal may be unitary with or fixed upon a pin extending between and fixed at each end to supporting members, while the roller or rollers engaging the other face may be unitary with or fixed upon a pin extending between said supporting members, the ends of this last mentioned pin being accommodated in slots or grooves in said supporting member.

The spring is preferably so arranged as to bear down on the roller or rollers engaging the said other face at such an angle to the slots as to urge the roller both downwards and towards one face of the slots thus providing a rigid holding without a too exacting width of slot.

Preferably the supporting members are attached to or are unitary with a base, from which springs an end wall between which, and the end of the crystal a gauge may be interposed so as to set the crystal relatively to the roller or rollers.

An exemplary embodiment of the invention is illustrated by the accompanying drawing. Of the drawing,

Fig. 1 is a plan of the holder,

Fig. 2 is a section, seen in the direction of the arrow *ii* on line *ii*—*ii* Fig. 1,

Fig. 3 is a view of a top cover of the holder, and

Fig. 4 is a view of a bottom cover,

Fig. 5 is a section, seen in the direction of arrow *v* on line *V*—*V* of Fig. 1,

Fig. 6 is a plan view of the assembled holder,

Fig. 7 shows a lower pin,

Fig. 8 shows an upper pin,

Fig. 9 is a plan view of a retaining spring,

Fig. 9A is a side elevation of Fig. 9, and

Fig. 10 shows an adjusting gauge.

In this embodiment, the holder for a piezo-electric crystal consists of a box 11, made from insulating material, for example one of the materials known under the general name of plastics, having a removable bottom cover 12, Fig. 4, and a removable lid or top cover 13, Fig. 3. The lower part of the front and back walls 14 and 15, of the box, at about half-way along the lengths of these side-walls are provided with holes 16, one hole in each wall, the holes being exactly opposite to each other and in line.

From top to bottom of each side-wall, on the inside, and also about half way along the length of the side wall, a slot 17 is cut (or moulded), the slots in the two walls being exactly opposite to each other and in line with holes 16.

One of the end walls 19, for convenience of description called the right hand end wall, has two narrow, shallow, slots like saw-cuts 20, although they might, and generally would be otherwise produced, cut in the base of it across the thickness. These slots are situated as far from each other as may be required by the width of the crystal.

The lid 13 is pierced with a hole 21 which is situated somewhat nearer to the left hand end (using the same convention as above indicated) than to the right hand end, and half-way from the front to the back. Through this hole is passed a screw 22, Fig. 5, held in place by means of a nut 23, and holding in place, on the inside of the lid, a metal washer 24, and on the outside a connecting tag, 25.

A lower pin, 16, Fig. 5, also shown separately in Fig. 7, preferably ground from stock, extends across from the front to the back wall of the box. This pin is, preferably, of this shape, namely, first, a short length 1 of full diameter to fit in the hole in the back wall 15 of the box, then in succession a first short length 2 of slightly reduced diameter, a shorter length 3 of full diameter, a medial length 4 of reduced diameter, a second shorter length 5 of full diameter, a second short length 6 of reduced diameter, a second length 7 of full diameter, a short length 8 of greater reduced diameter, a short length 9 of full diameter, lengths 7, 8 and 9 being long enough to fit into the hole in the front wall 14 of the box, a length 10 of still greater reduced diameter protruding from the box and constituting a con-

necting pin. The lower pin 16 is fixed tightly in the holes 16 with part 1 in the hole in the back wall, and parts 7, 8 and 9 in the hole in the front wall. They are sealed in their respective holes 16 against the entry of damp or dust. A pin 31, Fig. 5, driven into a hole in the front wall 14, registering with part 8 of lower pin 26, serves to hold the latter against lateral movement. The two shorter lengths 3 and 5 of full diameter, the rollers referred to above, are situated equidistantly from the lengthwise medial line, V—V of Fig. 1, of the box, and are situated sufficiently closely together to constitute seats for the crystal as can be seen in Fig. 6.

The crystal 40 is placed loosely upon the lower pin and sits upon the full-diameter shorter lengths 3 and 5 which engage, approximately, its medial nodal line of electrical pressure.

An upper pin, 41, Fig. 5, also shown separately in Fig. 7, preferably ground from stock, extends across from the front to the back wall of the box. This pin is, preferably, of this shape, namely; first, a short length I of full diameter to fit loosely in the slot 17 in the back wall 15 of the box, then in succession a first short length II of slightly reduced diameter, a shorter length III of full diameter, a medial length IV of reduced diameter, a second shorter length V of full diameter, a second short length VI of reduced diameter, a second length VII of full diameter to fit loosely in the slot 17 in the front wall 14 of the box. The two shorter lengths III and V of full diameter, the rollers referred to above, are situated equidistantly from the lengthwise medial line of the box, and are situated sufficiently closely together to be opposite those, 3 and 5, on the lower pin. This upper pin is placed loosely upon the crystal, the rollers engaging approximately the medial nodal line of electrical pressure of the crystal.

A hair-pin shaped spring 42, Figs. 5, 6 and 9, of piano wire, has its two ends 43 inserted into the two slots 20 in the right hand end wall (the bottom of the box having been previously fixed in place by means of screws 50), and rests across the upper pin, 41, one leg resting on the first short length II and the other on the second short length VI of reduced diameter of this pin. The head of the spring extends somewhat above the height of the walls of the box as indicated in Fig. 5 of the broken line 42.

All the elements being in place, the lid of the box is placed in position, with the washer on the left hand under side in contact with the head of the spring, and is screwed down by screws 53. The crystal is now spring held between the rollers, the spring having a downward and (conventionally) a left-hand component of pressure.

To make sure that the crystal is in proper position, that is with the rollers engaging the nodal line of electrical pressure, the bottom cover 12 of the box is now removed, and the crystal is centered by means of a gauge 54, Fig. 10, which is inserted between the crystal and the end wall of the box. After this adjustment, the bottom of the box is replaced and all joints sealed.

The invention provides a holder for a piezo-electric crystal adapted to hold the crystal firmly and to set it on its exact nodal line easily without fine tolerances on the holder.

What I claim is:

1. A holder for a piezo-electric crystal including at least one pair of rollers adapted to hold between them a piezo-electric crystal in such manner that one roller engages the crystal on its

one face and the other roller engages the crystal on its other face, said one roller being rigidly fixed to a support and the other being spring urged towards said one roller so as to grip the piezo-electric crystal between the rollers on its nodal line of electric pressure.

2. A holder as claimed in claim 1, wherein there are a plurality of rollers, one roller engaging one face of the piezo-electric crystal and another roller engaging the other face of the piezo-electric crystal, the rollers on either face engaging the said face where parallel longitudinal lines intersect said nodal line.

3. A holder as claimed in claim 1, wherein one roller engaging one face of the piezo-electric crystal is unitary with a pin extending between and fixed at each end to supporting members, while the other roller engaging the other face is unitary with a pin extending between said supporting members, the ends of this last mentioned pin being accommodated in slots in said supporting member.

4. A holder as claimed in claim 1, wherein one roller engaging one face of the piezo-electric crystal is fixed upon a pin extending between and fixed at each end to supporting members, while the other roller engaging the other face is fixed upon a pin extending between said supporting members, the ends of this last mentioned pin being accommodated in grooves in said supporting member.

5. A holder as claimed in claim 1, wherein the urging spring is so arranged as to bear down on the roller engaging the said other face at such an angle to slots so as to urge the roller down and towards one face of the slots thus providing a rigid holding without a too exacting width of slot.

6. A holder as claimed in claim 1, wherein the support is attached to and is unitary with a base, from which rises an end wall between which and the end of the crystal a gauge may be interposed so as to set the crystal relatively to the rollers.

7. A piezo-electric crystal and holder, comprising said crystal and a holder including a rectangular box of insulating material having two end walls, front and back walls, and removable top and bottom covers, a metal pin extending across said box from the front to the back walls said pin having roller portions of enlarged diameter which serve as seats for said crystal, a second pin extending across said box from the front to the back walls said pin having roller portions of enlarged diameter which rest lightly upon said crystal, the first metal pin being rigidly fixed in holes in said walls and the second metal pin being freely held in slots extending from the top of said walls, and a hair pin spring having its ends accommodated in slots in one end wall and its legs extending, one on each side of the crystal and resting on the upper pin, the spring being of such a length that its bridging piece is above the tops of the walls and is pressed down by the top cover when in place so as to provide downward and lateral components of pressure on said upper pin.

8. A piezo-electric crystal and holder as claimed in claim 7, wherein said top cover is provided with a metallic terminal connection member extending therethrough and making electrical connection with said spring which is in electrical connection with one electrode of said crystal through said second mentioned pin.

9. A piezo-electric crystal and holder as claimed

in claim 7, wherein said first mentioned pin is provided with a metallic extension, extending through a side wall other than an end wall and constituting an electrical connection with the other electrode of said crystal.

10. A piezo-electric crystal and holder as claimed in claim 7, wherein the length of the

crystal and of the box are such that the crystal may be accurately situated with its line of pressure gripped between said rollers on said pins by means of a gauge of suitable thickness inserted between an end of said crystal and an end of said box.

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