

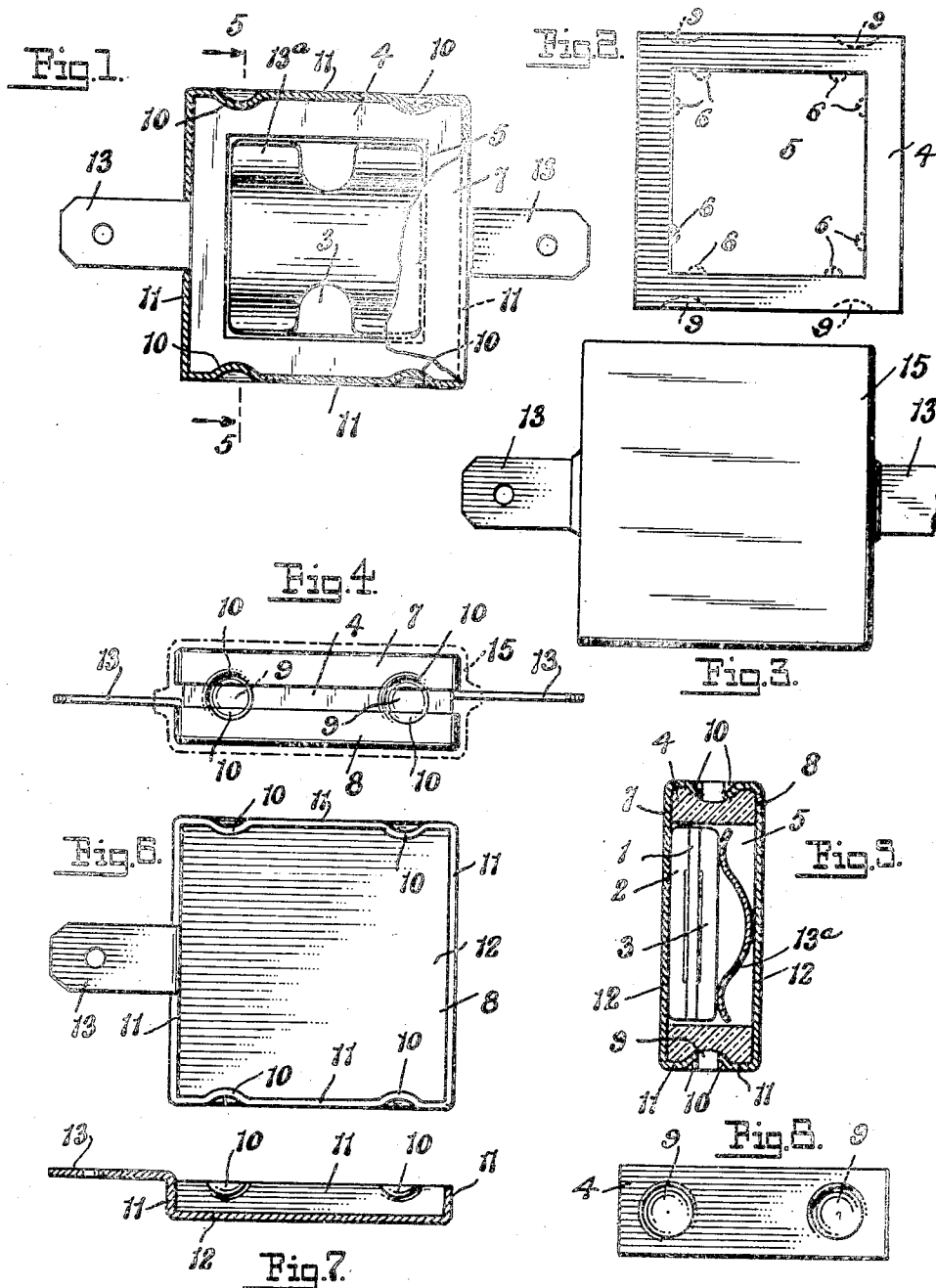
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CRYSTAL HOLDER

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CRYSTAL HOLDER

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13 Claims. (Cl. 171-327)

1 This invention relates to crystals of the character used for radio purposes, such as crystals of quartz, tourmaline, or other piezo-electric mineral, and one of the objects of the invention is to provide an improved enclosing and mounting means for crystals of this character.

The mounting and enclosing of crystals, as practiced at the present time, is often such that the crystal is subjected to the effects of vibration, dust and dirt, climatic conditions including dampness and other factors, all of which tend to create deficiencies in operation, raise or lower the natural frequencies of the crystals, and in some cases, render the crystals completely inoperative.

The present invention contemplates the provision of means for mounting and housing a crystal, wherein the crystal and its associated parts may be quickly and accurately assembled and may be permanently enclosed or encased in a protective moulded material, the latter constituting an enclosing covering completely and effectively protecting the crystal and its connections, whereby permanence of relationship of the enclosed parts is assured as well as complete and lasting protection against climatic conditions, moisture, vibration and other factors normally injurious or destructive to crystals of conventional construction.

These and other objects are attained by the structure hereinafter described and more particularly set forth in the claims appended hereto.

In the accompanying drawing, wherein an illustrative embodiment of the invention is disclosed, Fig. 1 is a horizontal sectional view through the crystal casing, with a portion of one of the cover members shown fragmentarily; Fig. 2 is a face view of the frame of insulating material extending around the edges of the crystal and electrodes; Fig. 3 is a face view of the complete crystal and holder enclosed in an insulating covering; Fig. 4 is an edge view of the crystal and its enclosing means, the insulating covering thereover being indicated in dot-and-dash lines; Fig. 5 is a sectional view on the line 5-5 of Fig. 1, looking in the direction of the arrows; Fig. 6 is a view looking at the open side of one of the metallic cover members; Fig. 7 is a transverse sectional view through the cover member shown in Fig. 6, and Fig. 8 is an end view of the frame of Fig. 2.

In the embodiment of the invention shown in the drawing, the crystal is shown at 1, the same being of the conventional wafer type, sandwiched between the two metallic electrodes indicated re-

2 spectively at 2 and 3. The crystal can also be of the so-called "plated" type, wherein metallic electrode surfaces are provided on the opposite faces of the crystal by means of a thin metallic coating or plating applied to each of said faces. Thus, when herein referring to "electrodes" I wish to be understood as meaning either the plated coatings applied to the faces of the crystal, or to the separate metallic plates between which the crystal is positioned, as indicated in Fig. 5.

The crystal and its electrodes, of either the plated type or the metallic separate plate type, are located within the central aperture 5 of a frame 4 of insulating material. If desired, the inner wall surfaces of the frame surrounding the aperture 5, may be provided with the projecting ribs 6, shown dotted in Fig. 2, for holding the crystal and electrodes centered and properly spaced from the sides of the aperture 5.

The frame 4, within which the crystal and electrodes are contained, is sandwiched between a pair of plate-like metallic cover members 7 and 8 with which the electrodes 2 and 3 respectively, establish electrical contact. The two cover members 7 and 8 are of like shape and construction, each being of cup-shape formation, and being provided with the base wall 12 and the upstanding side walls 11. One of the side walls 10 of each of the cover members is provided with an integrally-formed, laterally-extending lug 13. When the two cover members are placed in position with the frame 4 located between them, the two lugs extend in opposite directions, as clearly seen in Fig. 4, for soldering or other attachment to suitable terminals in the circuit of which the crystal forms a part.

Frame 4 is of such thickness that when it is positioned between the two cover members 7 and 8, it holds said cover members apart or in spaced relation and acts as an insulating separator between said cover members. As will be observed in Figs. 2 and 8, the opposite side walls of the frame 4 are each provided with a pair of depressions or indentations 9 into which wall portions 10 on the walls 11 of the cover members 7 and 8 are indented or depressed, thereby forming a locking engagement between the cover members 7 and 8 and the frame 4. This arrangement is such as to provide a casing consisting of two spaced metallic cover members 7 and 8, between which is secured the frame 4, the latter constituting a separator between the cover members and providing an aperture 5 in which the crystal and electrodes are located.

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Located within the enclosure thus constructed, is an arched plate spring 13a, that is situated between the cover member 8 and the electrode 3, said plate spring 13a acting to urge the crystal and electrodes toward the cover member 7 to cause the electrode 2 to be pressed against the wall 12 of the cover member 7 to thereby establish electrical contact therewith. Said spring 13a also serves to establish electrical contact between the wall 12 of the cover member 8 and the electrode 3. Thus, in the arrangement shown, electrical contact will be established between the electrodes and the cover members 7 and 8. If desired, the crystal and electrodes may be sandwiched between two plates by springs of the type shown at 13a, each of the springs in such a case, establishing contact with one of the cover members.

After the parts are assembled in the manner described, the resultant structure may then be encased in a suitable protective coating or enclosing layer of insulating material, such as any one of the many plastic materials having the desired characteristics. In the drawing, this applied coating is indicated at 15. The coating or covering 15 may be applied by being moulded about the assembly, or the assembly might be dipped while the coating material is in plastic or fluid form, or a suitable coating might be sprayed over the assembly, the method of application of the coating being largely dependent upon the nature of the material of which the coating is composed. The result will be that the crystal assembly, consisting of the crystal and electrodes, the frame 4 and the cover members 7 and 8, will be encased or embedded in an enclosure of moulded insulation which will protect the crystal against climatic conditions and other factors tending to render the crystal inefficient or inoperative. It will, of course, be understood that the contact lugs 13 remain uncoated, or in other words, protrude out of the insulating coating 15 so that these lugs can be soldered or otherwise secured to suitable connections in the circuit.

While the lugs 13 are shown as an integral part of the cover members 7 and 8 and as projecting substantially parallel to the plane of each of the cover members, it will be understood that said lugs might be attached in any other suitable way to the cover members and they might be positioned to project at an angle to the plane of said members, such changes being readily made without departing from the spirit of the invention.

In herein referring to the separate metallic plates 2 and 3 as "electrodes" I wish to be understood as meaning either such separate metallic plates or the plated surfaces or other metallic or conducting media disposed against or connected to the opposite faces of the crystal. It will also be understood that the container or casing herein disclosed may be made in many different sizes and shapes, such changes being comprehended within the scope of the invention.

What I claim is:

1. A crystal holder comprising, a frame of insulating material provided with a central aperture, a crystal located within said aperture, a cupped metallic cover member extending over each face of the crystal whereby the frame and the crystal within the same are sandwiched between the cover members, said cover members constituting contact means by which the crystal may be connected into a circuit being maintained in spaced relation by means of the frame interposed between them, one of the cover members

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being in electrical contact with a face of the crystal, and the second cover member being in electrical contact with the second face of the crystal.

2. A crystal holder comprising, a substantially rectangular frame having a central aperture extending through it, plates fitted over the open sides of the aperture, a crystal and electrodes confined in the aperture between the plates, one of the electrodes being in electrical contact with one of the plates, the second electrode being in electrical contact with the second plate and flanges on the plates overlying parts of the frame and being attached to the frame to hold the plates in spaced relation with the frame interposed between them.

3. A crystal holder as provided for in claim 2, wherein the plates have side flanges extending completely around the sides of the frame, the frame having recesses in its sides and the plates having their side flanges indented to engage in said recesses.

4. A crystal holder having a pair of cup-shaped metal plates, each having a laterally extended lug, a frame interposed between the plates and holding them in spaced relation, means on the plates for engaging the sides of the frame to hold the plates against displacement, the frame having a central aperture, and a crystal and electrodes in the aperture and confined between the plates, one electrode being electrically connected to one of the plates and the other electrode being electrically connected to the second plate.

5. In a crystal holder, an open-sided frame of insulating material surrounding the edges of a crystal, the open sides of the frame being covered by a pair of metallic plates between which the frame is sandwiched, said plates having side walls extending around the frame and enclosing the frame within them, the side walls of one plate being held spaced from those on the other plate by the thickness of the frame located between the plates.

6. In a crystal holder as provided for in claim 5, wherein at least some of the side walls of each plate has indentations, and the frame has indentations with which those on the walls engage to thereby secure the plates to the frame in a spaced-apart-relationship.

7. A crystal holder comprising, a frame of insulating material provided with an aperture extending through it, a crystal located in said aperture, a cupped metallic cover member extending over each face of the frame whereby the frame and the crystal within the same are sandwiched between the cover members, the frame being indented and the cover members having indented portions engaging with the indentations in the frame to thereby secure the cover members to the frame, said cover members being maintained in spaced relation by means of the frame interposed between them, one of the cover members being electrically connected to a face of the crystal and the second cover member being electrically connected to the second face of the crystal.

8. A crystal holder having a pair of cup-shaped metal cover members, a frame of insulating material located between said members and holding them in spaced relation, each cover member being provided with a projecting contact member, the frame having a central aperture, a crystal and electrodes located in said aperture between the cover members, one electrode being electrically connected with one of the cover members and

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the second electrode being electrically connected with the second cover member.

9. A crystal holder having a pair of cup-shaped metal cover members, a frame of insulating material located between said members and holding them in spaced relation, said cover member being provided with a projecting contact member, the frame having a central aperture, a crystal and electrodes located in said aperture between the cover members, one electrode being electrically connected with one of the cover members and the second electrode being electrically connected with the second cover member, and an insulating coating applied completely about the cover members and the frame, the contact members protruding out of the insulating coating.

10. A crystal holder comprising, a crystal and electrodes, a frame of insulating material extending around the edges of the crystal and electrodes, a pair of spaced metallic plates between which the frame is sandwiched, means for urging the crystal and electrodes in a direction to cause an electrical contact between one of the electrodes and one of the plates, said means establishing an electrical contact between the second electrode and the second plate, and means on the plates constituting contact members by which the crystal can be connected in a circuit.

11. A crystal holder comprising, a crystal and electrodes, a frame of insulating material extending around the edges of the crystal and electrodes, a pair of spaced metallic plates constituting contact members by which the crystal can be connected in a circuit, the frame being sandwiched between said plates whereby the crystal and electrodes are confined between the plates, means for urging the crystal and electrodes in a direction to cause an electrical contact between one of the electrodes and one of the plates, said means establishing an electrical contact between the second electrode and the second plate, and means for securing the plates to the frame, the frame acting as a spacer between the plates and holding the same in spaced relation.

12. A crystal holder comprising, a crystal and electrodes, a frame of insulating material extending around the edges of the crystal and electrodes, a pair of spaced metallic plates having projections constituting contact members by

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which the crystal can be connected into a circuit, the frame being sandwiched between said plates whereby the crystal and electrodes are confined between the plates, means for urging the crystal and electrodes in a direction to cause an electrical contact between one of the electrodes and one of the plates, said means establishing an electrical contact between the second electrode and the second plate, and means for securing the plates to the frame, the frame acting as a spacer between the plates and holding the same in spaced relation, the projections on the plates being in the form of tongues extending laterally from the plates.

13. A crystal holder comprising, a crystal and electrodes, a frame of insulating material extending around the edges of the crystal and electrodes, a pair of spaced metallic plates constituting contact members by which the crystal can be connected into a circuit, the frame being sandwiched between said plates whereby the crystal and electrodes are confined between the plates, means for urging the crystal and electrodes in a direction to cause an electrical contact between one of the electrodes and one of the plates, said means establishing an electrical contact between the second electrode and the second plate, means for securing the plates to the frame, the frame acting as a spacer between the plates and holding the same in spaced relation, each of the plates being substantially cup-shaped, the frame fitting within the plates, each of the plates being provided with a lateral extension constituting a contact member, and an insulating coating enclosing the plates and frame, the contact members protruding through and out of the insulating coating.

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