Nov 1, 1949. H. M. BACH 2,486,547

HOLDER FOR PIEZOELECTRIC CRYSTALS AND THE LIKE

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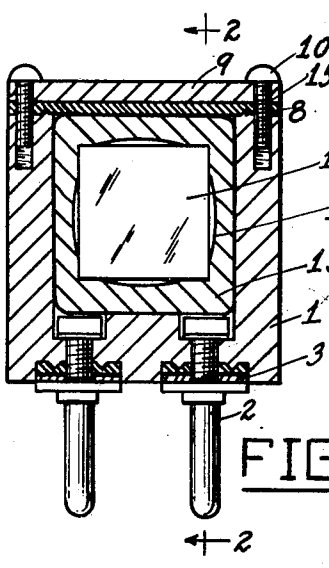


FIG. 1

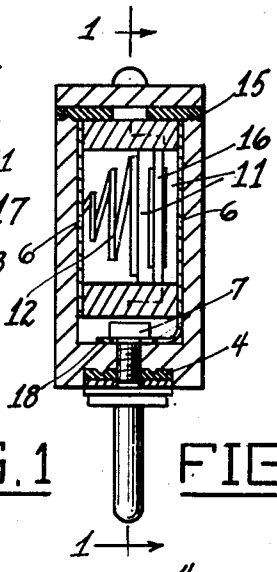


FIG. 2

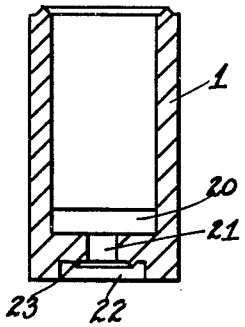


FIG. 4

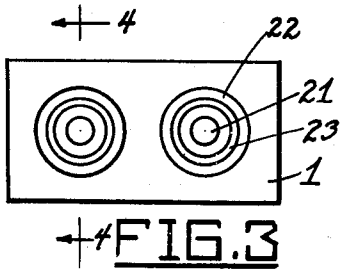


FIG. 3

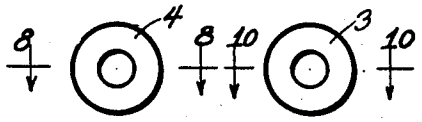


FIG. 7 FIG. 9



FIG. 8 FIG. 10

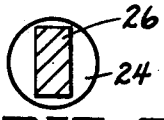
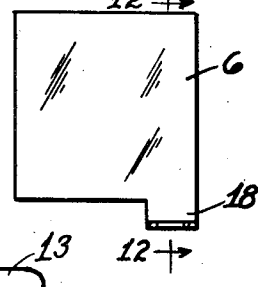


FIG. 6



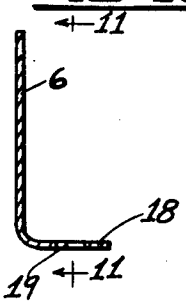


FIG. 11 FIG. 12

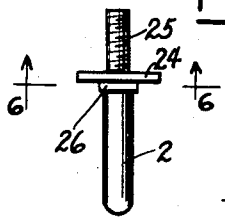


FIG. 5

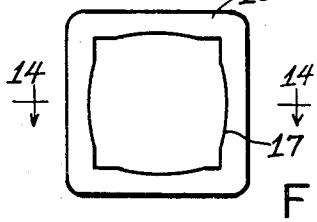


FIG 13

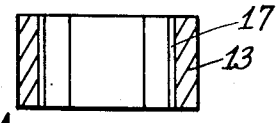


FIG. 14

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HOLDER FOR PIEZOELECTRIC CRYSTALS AND THE LIKE

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Application September 2, 1944, Serial No. 552,435

1 Claim. (Cl. 171—327)

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This invention relates to piezo-electric crystal apparatus and more particularly to a method and apparatus for mounting piezo-electric crystals.

This invention further relates to certain novel features in crystal holder structure whereby improved operation of the crystal may be obtained.

This invention further relates to a novel contact pin structure for providing a conductive connection between an external element and an internal element of a device in improved moisture-sealing relation to the housing of the device.

An object of this invention is to provide an improved structure for mounting a piezo-electric crystal.

A further object of this invention is to provide a moisture-tight housing for an electrical device wherein removable contact pins are used to conduct electrical currents through the housing of the device.

A still further object of the invention is to provide an improved gasket seating structure for effectively sealing an opening through a housing around the shank of a member which extends from the inside of the housing to the outside thereof.

Further objects of the invention will be apparent from the following description of the invention and the drawings illustrating a preferred embodiment thereof, wherein:

Figure 1 is a cross-sectional elevational view of an assembly of a crystal holder embodying the structure of this invention, taken on line 1—1 of Figure 2.

Figure 2 is a cross-sectional view taken on line 2—2 of Figure 1.

Figure 3 is a bottom view of the housing body member.

Figure 4 is a sectional view taken on line 4—4 of Figure 3.

Figure 5 is an elevational view of a pin used with the housing body member of Figure 3.

Figure 6 is a sectional view taken on line 6—6 of Figure 3.

Figure 7 is a plan view of a deformable washer used with the holder of this invention.

Figure 8 is a sectional view taken on line 8—8 of Figure 7.

Figure 9 is a plan view of a rigid washer used with the holder of this invention.

Figure 10 is a sectional view taken on line 10—10 of Figure 9.

Figure 11 is an elevational view of a contact plate used with the holder of this invention, taken on line 11—11 of Figure 12.

Figure 12 is a sectional view taken on line 12—12 of Figure 11.

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Figure 13 is an elevational view of a removable spacer member used with the holder of this invention.

Figure 14 is a sectional view taken on line 14—14 of Figure 13.

In the mounting of a piezo-electric crystal in a holder it is a common practice to employ a holder body portion, usually of a suitable dielectric material such as Bakelite or other phenolic composition. The body portion is provided with a cavity in which the crystal, electrodes, pressure springs, etc., are placed and means are provided for electrically connecting each of the electrodes to an external contact lug or pin. If the holder is of the so-called "end-loader" type the cavity is sealed by a top plate and gasket arrangement. The contact pins, in a usual design of "end-loader" holder, extend into the cavity through openings provided therefor in the bottom of the holder body portion. One of the common sources of trouble with a holder of this type is the leakage into the cavity of moisture up along the shank portion of the inwardly extending part of the contact pin. To exclude moisture it has been the practice to provide some sort of deformable washer arrangement between the contact pin shank portion and the holder body. None of the heretofore known arrangements have been entirely successful in providing a positive seal with respect to said shank portion so as to successfully exclude moisture from entering the holder.

In one embodiment of the present invention, as shown in Figures 1 to 14 of the drawings, the holder comprises a body portion 1, a cover plate 9 suitably secured to body portion 1 by screws 10, and a gasket 8 between cover plate 10 and body portion 1, held in positive sealing relation by virtue of a sealing rib 15 provided integrally with body portion 1 on its upper surface. The contents of the holder consists of a crystal 16, electrodes 11 and spring 12 in conventional assembled relationship bearing on contact plates 6. The electrode and crystal assembly is maintained in proper position by a rectangular frame element 13 provided with recessed portions 17 on the inner surfaces thereof to provide only limited areas of contact with the electrode and crystal assembly so as to provide minimum frictional damping of the crystal.

The contact plates 6 are provided with depending tab portions 18 provided with perforations 19. The tab portions fit into rectangular recess portions 20 provided in the floor of the cavity of holder body 1 in vertical alignment with the shanks of the respective pin members 2. Also in

vertical alignment therewith are openings 21 in body member 1 provided with external countersunk recesses 22, each recess being provided with a circular sealing rib 23 extending around the periphery of opening 21.

The pin member 2 is provided with an integral flange element 24 and a threaded shank portion 25. Also provided on pin member 2 is an integral lug portion 26 formed for engagement by a suitable wrench for turning the pin member 2 for tightening it during assembly of the holder by rotation with respect to a nut 7, the nut 7 being held against rotation by engagement with the walls of recess 20. To assemble the pin to the holder in conductive relationship to contact plate 6, a rigid washer 3 and a resilient washer 4, of rubber, neoprene, or other suitable deformable material, are mounted on the threaded shank 25, and said shank is inserted through opening 21 and through perforation 19 of member 18 into threaded engagement with nut 7 which has been previously deposited in recess 20 in overlying relation to tab 18. A suitable wrench is then engaged with lug 26 and the pin is screwed tight. During the tightening process the rigid washer 3 exerts an upward thrust on deformable washer 4, clamping the outer peripheral portions of washer 4 against the rib 23 and causing the inner portion of washer 4 to flow inwardly into tight sealing relationship with member 25. The opening in the rigid washer 3 in a preferred embodiment may be made substantially larger than shank 25 whereas the normal opening in the deformable washer 4 is made just large enough to receive said shank. This results in flow of the deformable washer into the space between the wall of the opening in the rigid washer and the shank, as well as between the peripheral rib 23 and the shank when the pin is tightened, and tightly seals the threads on the shank against the entrance of moisture.

While a particular embodiment of this invention has been shown as applied to a crystal holder it will be understood that various modifications may be made within the spirit of the invention, and that the invention may be applied to other structures than crystal holders, such as, for example, relay housings, transformer housings, capacitor housings, etc., where it is desired to hermetically seal off the shank of a connector member extending into a housing. Therefore no limitations upon the invention are intended other than are imposed by the scope of the appended claim.

What is claimed is:

In a holder of the character described, a housing, means extending from the inside of the housing to the outside of the housing through an opening therein, said means comprising a shank member provided with an intermediate flange portion, the shank member being formed with threads inwardly from said flange portion, the inner end of said shank member being in threaded engagement with means in the housing whereby said flange portion may be urged inwardly toward said housing, the outside of the housing being formed with a counterbore adapted to receive said flange portion, a rigid washer loosely mounted on the shank member in said counterbore inwardly adjacent said flange portion, and a deformable washer in said counterbore snugly mounted on the threads of said shank member between said rigid washer and the bottom surface of the counterbore, said bottom surface being formed with a continuous rib spaced outwardly from and extending around said opening against which said deformable washer is pressed when said flange portion is urged toward said housing, whereby the pressure on said deformable washer coacts with said rib to produce flow of the deformable washer into the opening of the rigid washer against the threads on the shank member.

HENRY M. BACH.

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