Dec. 17, 1946. C. F. DAUSMANN 2,412,719

PIEZO-CRYSTAL DEVICE OF THE SEALED TYPE

Filed May 5, 1944

Fig. 1.

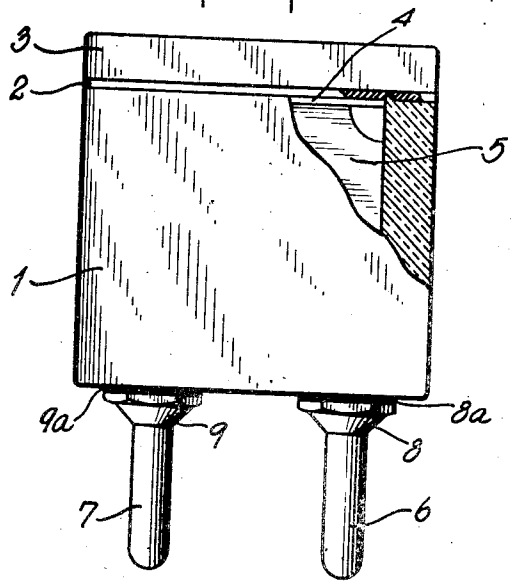


Fig. 2.

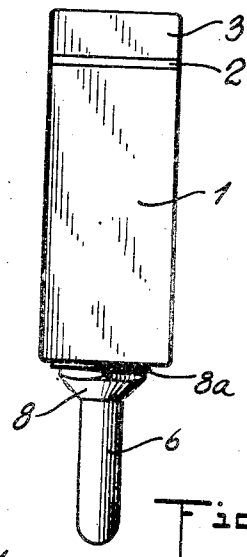
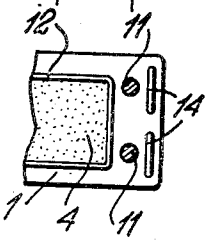


Fig. 6.



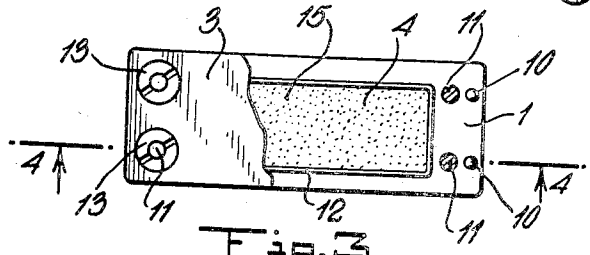


Fig. 3.

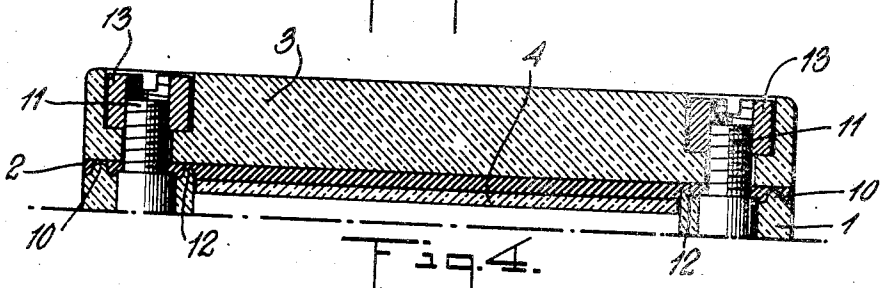


Fig. 4.

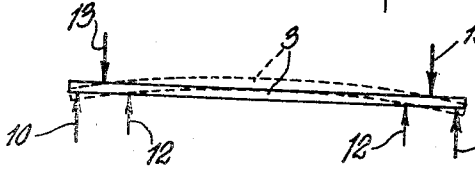


Fig. 5.

CHARLES F. DAUSMANN
INVENTOR

BY John J. Regan
ATTORNEY

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PIEZOCRYSTAL DEVICE OF THE SEALED TYPE

Charles F. Dausmann, New Hyde Park, N. Y., assignor to Premier Crystal Laboratories, Inc., New York, N. Y., a corporation of New York

Application May 5, 1944, Serial No. 534,190

6 Claims. (Cl. 171—327)

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This invention relates to piezo-electric devices, and more particularly to piezo-crystal holders of the dust-proof and moisture-proof type.

Under the severe conditions to which piezo-crystal devices are necessarily subjected under certain kinds of use, it has been found that a sealing gasket tightly clamped between the cover plate and the sealing rib formed on the surface of the end wall of the housing, does not always produce the desired protection against moisture and dust, and may not in all cases effect the desired gas-tight seal.

One of the principal objects of this invention is a piezo-crystal holder which is so constructed as to enhance the sealing effect of the cover plate and its associated gasket.

The invention is in the nature of an improvement in the sealing arrangements disclosed in prior Patent No. 2,329,321.

In accordance with this invention, means, molded or otherwise formed on the surface of the wall of the housing, through which the crystal is loaded into the housing, and arranged in spaced relation to the normal sealing edge formed on the said surface, is provided, so that the more tightly the cover plate and gasket are bolted against the said wall, the more the said means will enhance the seal formed between the sealing edge, the gasket, and the cover plate. This is particularly true in the case of so-called end-loaded crystal housings where the cover plate is elongated and fastened only at opposite ends.

In the drawing comprising Figs. 1 to 6, certain embodiments of the invention are shown by way of example.

Fig. 1 is a front view of one form of piezo-crystal device embodying the invention, with a portion of the housing broken away, to show the interior of the housing, and the sealing ribs and gasket;

Fig. 2 is a side view of the device of Fig. 1;

Fig. 3 is a top view of the loading end of the device, with the cover plate and sealing gasket partially broken away;

Fig. 4 is an enlarged vertical section of the loading end gasket and cover plate, taken along the line 4—4 of Fig. 3 looking in the direction of the arrows;

Fig. 5 is a diagrammatic view illustrating the direction of the several forces applied to the cover plate, when it is clamped in place against the end wall of the housing; and

Fig. 6 is a top view of the loading end of another form of the auxiliary sealing projections.

Like reference characters designate corresponding parts throughout the several figures of the drawing.

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The housing 1 may be made of any suitable insulating and moldable material such as "Bakelite," ceramic, etc. It is preferably molded in one piece out of a suitable thermoplastic insulation material such as "Bakelite." The housing is provided at one end with a closed end wall having two through openings formed therein to receive the shanks of a pair of metal plug-in prongs 6 and 7, of any desired shape and construction. Each prong is provided with a threaded nut or flange 8 or 9, for tightening the prongs 6 and 7 respectively against the end wall of the housing and with intervening sealing washers 8a, 9a, to insure a dust-proof and moisture-proof fit. If desired, the surface of the housing around each prong may have a sealing rib or recess for purposes described in said patent.

The metal shanks of the prongs 6 and 7 extend inside the housing to establish electrical contact with the electrodes of the piezo-crystal unit 5 (Fig. 1) which can be of any well-known type. The piezo-crystal unit 5 is loaded into the cavity 15 (Fig. 3) of the housing 1. Cavity 15 conforms to the shape of the piezo-crystal unit 5, said cavity being large enough to house the piezo-crystal unit, and the spacer 4 made of glass or other suitable insulation material which abuts against the unit, as described in detail in application Serial No. 533,316, filed April 29, 1944.

A sealing edge 12, preferably molded as an integral part of the structure, is formed on the surface of the end wall of the housing 1. The sealing edge 12 surrounds the open end of the cavity 15 preferably immediately adjacent the inner lip or edge. The threaded bolts 11 or other devices for clamping the gasket 2 and cover plate 3 in sealing position, are located outside the boundary of the sealing edge 12, so that the sealing edge 12 excludes the threaded bolts 11, for purposes described in said United States patent.

A series of beads or embossed protuberances 10 are molded as an integral part of the surface of the end wall of the housing 1. These beads which project above the surface of the end wall may be arranged in spaced relation to each other and to the threaded bolts 11 and the sealing edge 12. The threaded bolts 11 are therefore located between the beads 10 and the sealing edge 12, thus defining auxiliary sealing means separate and distinct from sealing edge 12. The threaded bolts 11 may be embedded or otherwise anchored in the walls of the housing 1, preferably during the molding of said housing.

Cover plate 3 may be recessed to seat the nuts 13 which engage the threaded bolts 11. The nuts 13 may be so formed that they can only be tightened or loosened with a special tool, thus preventing the removal of the cover plate 3 with an ordinary screw-driver or other common tool.

The piezo-electric-crystal unit having been loaded into the cavity 15, and the spacer 4 placed above it, the gasket 2 which may be of any suitable material such as neoprene, or rubber, is placed in proper position, and the openings in the metal cover plate 3 are then brought into registry with the threaded bolts 11 and the nuts 13 are drawn tight, it being understood that gasket 2 has openings to accommodate bolts 11.

The sealing edge 12 "bites" into the gasket 2, as the nuts 13 are tightened against the "Bakelite" cover plate 3. I have found that in some cases where the sealing rib 12 only is used, that the pressure on plate 3 by nuts 13 necessary to effect sealing may cause the said plate 3 to bow upwardly as indicated by the dotted line (Fig. 5), thus reducing the effectiveness of the seal. However by using the auxiliary members 10 the more tightly the cover plate 3 is bolted down against the surface of the end wall of the housing 1 the tendency of plate 3 to bow is obviated and the more efficient will be the seal formed between the sealing edge 12, the gasket 2, and the cover plate 3.

Fig. 5 diagrammatically illustrates the location and direction of the several forces acting upon the cover plate 3, from which it will be seen that the beads 10 act as fulcrums to prevent upward bowing of plate 3, as the nuts 13 are tightened.

The protuberances 10 may be arranged at suitably spaced intervals, or they may be so spaced as to define the rib sections 14—14 (Fig. 6), arranged in spaced relation to the sealing edge 12 and the threaded bolts 11. The beads 10 or the rib sections 14—14 may be slightly higher than the sealing edge 12. This particular construction enhances the efficiency of the seal, and produces a very efficient dust-proof and moisture-proof housing. Various changes and modifications may be made in the illustrated embodiments without departing from the spirit and scope of the invention thus instead of providing the continuous sealing rib 12 on the housing it may be provided on plate 3, and likewise for the members 10 and 14. If desired, the auxiliary rib may completely surround rib 12 in spaced relation thereto, to provide space for the bolts 11.

What is claimed is:

1. A piezo-crystal device comprising a housing having a cavity to receive a piezo-crystal unit, a sealing edge for the open end of said cavity, a projection adjacent to said sealing edge, a sealing closure for said cavity, means for fastening said closure against said sealing edge, said projection co-operating with said fastening means to increase the efficiency of the seal between the closure and the sealing edge.

2. A piezo-crystal device comprising a housing having a cavity to receive a piezo-crystal unit, the open end of said cavity forming a seat for a cavity closure member, a rib projecting above the surface of said seat and surrounding said cavity to form a sealing edge, a projection formed on said seat adjacent to said rib, a closure adapted to register with said seat and to engage said projection, and means for forcing said closure against said rib, said projection engaging the rim of the closure to increase the efficiency of the seal between the rib and the closure.

3. A piezo-crystal device comprising a housing having a cavity to receive a piezo-crystal unit, the open end of said cavity forming a seat for a gasket, a sealing edge formed in and adjacent the inner edge of said seat, a projection formed in said seat outside said sealing edge, a closure operable under pressure to press a gasket against said seat, and means for applying pressure to said closure whereby said projection engages the rim of said closure to increase the efficiency of the seal formed between said sealing edge, a gasket, and said closure.

4. A piezo-crystal device comprising a housing having a cavity to receive a piezo-crystal unit, the open end of said cavity forming a seat for a closure for said cavity, a rib projecting above the surface of said seat to form a sealing edge, a projection formed in said seat adjacent to said rib, said projection extending above the crown of said rib, a closure adapted to register with said seat and to engage said projection, and means for applying pressure to said closure against increasing counter-pressure exerted upon the edge of said closure by said projection, to increase the efficiency of the seal formed by said sealing edge of said closure.

5. A piezo-crystal device comprising a housing having a cavity to receive a piezo-crystal unit, the open end of said cavity forming a seat for a gasket, a rib projecting above the surface of said seat to form a sealing edge, a projection formed in said seat adjacent to said rib, said projection extending above the crown of said rib, a gasket for said seat, a closure adapted to register with said gasket and said projection, and means for applying pressure to said closure against increasing counter-pressure exerted upon the edge of said closure by said projection, to increase the efficiency of the seal formed by said sealing edge, said gasket, and said closure.

6. A housing for a piezo-crystal unit having at least one end open to receive a crystal unit said one end having an integrally formed sealing edge surrounding the open end adjacent the inner periphery, and a plurality of auxiliary sealing edges in spaced relation to the first edge for the purpose set forth.

CHARLES F. DAUSMANN.