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PIEZOELECTRIC CRYSTAL HOLDER

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Fig. 1

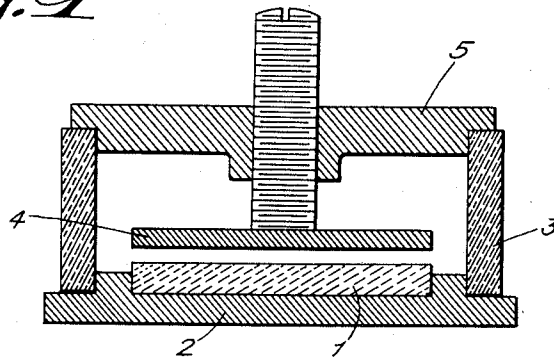


Fig. 2

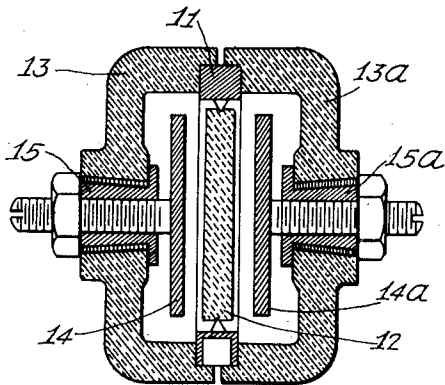
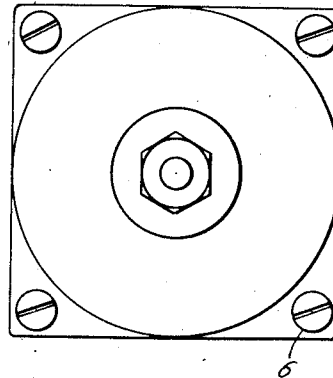


Fig. 3



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PIEZOELECTRIC CRYSTAL HOLDER

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6 Claims. (Cl. 171—327)

This invention relates to an improved method in the construction of the setting or holder for piezo-electric crystals.

An object of the invention is to simplify and improve piezo-electric crystal holders.

In the production of oscillations of stable frequency by means of piezo-electric crystal plates, the means of holding the oscillable plates plays an important part. What is essential in the supporting means for the crystal is that the position of the oscillable plates should be absolutely fixed; moreover, that additional damping which will always arise if the supporting means engages at points partaking of the oscillations, should be avoided. It is known in the prior art to support for this purpose the plates in the median zone by means of peaks or slots. It is also advantageous to so dispose the electrodes that they will not touch the surface of the oscillating plates. However, in the practical embodiments of these schemes as known in the prior art difficulties arise which reside in that, with the use of metallic holding means the inter-electrode capacity becomes high. Another fact is that in the known arrangements the influence of thermal expansion is mostly not negligible. As a result of the thermal expansion of the parts governing the distance between the electrodes and the oscillatory crystal there occurs a change in this distance which results in a change of the electrical natural period of the oscillatory system.

In what follows a novel support for the oscillatory crystal is disclosed which is the object of the present invention. As the material which serves as the support of the electrodes there is used a ceramic material, say, porcelain or other ceramic product known in technology under various names such as steatite, frequentite, calan, calite, sinterkorond, etc., which contain a mixture of soapstone and kaolin or magnesium silicates free from iron. Suitable ceramic materials have a very low temperature coefficient and small dielectric losses, but, on the other hand, a very high insulation strength combined with high mechanical strength, all of which properties that are essential for a high-grade and efficient holder for piezo-electric oscillators.

This invention will be more clearly understood by referring to the accompanying drawing, in which,

Fig. 1 is a sectional view of a simple crystal holder or support;

Fig. 2 is a sectional view of another form of crystal holder or support;

Fig. 3 is a plan view of Fig. 2.

Referring now to Fig. 1. The piezo-electric quartz crystal 1 bears on the electrode 2, the spacer ring 3 made of ceramic material, governs and maintains the distance of the electrode 4 which is fastened in the cover plate 5. Where special forms of construction designed to insure particularly great frequency stability are concerned it is advantageous to have the crystal oscillation plate perfectly free and untouched by the electrode. An embodiment of this kind is illustrated in Fig. 2. In the central ring 11 the piezo-electric crystal oscillator plate 12 is supported in its median plane by centering peaks or slots. The said centering ring is clamped fast on both sides by parts of ceramic material 13, 13a, by means of the screws 6 (Fig. 3). The electrodes 14 and 14a which are shiftable in relation to the surface of the oscillable plate are adjustable inside the bushes 15 and 15a having a tapered shoulder which are embedded by means of a suitable binder in the ceramic material and furnished with a fine-pitch screw-thread. The advantages of this holder device reside in a very low temperature coefficient, very great mechanical stability, and very low inter-electrode capacity. Another merit of this holder is that the same, contrasted with earlier holders, is of very low weight. A holder of this kind is particularly valuable when used with piezo-electric oscillators with a very low temperature coefficient.

We claim:

1. A piezo-electric crystal holder comprising an insulating enclosing chamber formed in two parts and joined together at substantially the center, two metallic threaded bushings secured to the ends of said enclosing chamber, a piezo-electric crystal secured within said chamber, adjustable electrodes located each side of said crystal, said adjustable electrodes having a threaded stud cooperating with said threaded bushings to change the spacing between the crystal and said electrodes.

2. A piezo-electric crystal holder comprising an insulating enclosing chamber formed in two parts and joined together at substantially the center, two threaded tapered bushings embedded in the ends of said enclosing chamber, a piezo-electric crystal secured within said chamber, adjustable electrodes located each side of said crystal, said adjustable electrodes having a threaded stud cooperating with said threaded tapered bushings to change the spacing between the crystal and said electrodes.

3. A piezo-electric crystal holder comprising an insulating enclosing chamber having substan-

tially zero temperature coefficient, said enclosing chamber being separated in two parts and joined together at substantially the center, a tapered aperture at each end of each part of said chamber, two metallic threaded bushings embedded in
 5 said enclosing chamber, a piezo-electric crystal secured within said chamber, adjustable electrodes located each side of said crystal, said adjustable electrodes having a threaded stud co-
 10 operating with said threaded bushings to change the spacing between the crystal and said electrodes.

4. A piezo-electric crystal holder comprising an enclosing chamber formed of complementary
 15 sections, a threaded bushing located at one end of each complementary section, securing means for binding said complementary sections together, a piezo-electric crystal secured within said chamber, said crystal supported at its periphery
 20 by a ring-like member clamped between said complementary sections, adjustable electrodes located each side of said crystal, said adjustable electrodes having a threaded stud cooperating with said threaded bushings to change the spac-
 25 ing between the crystal and said electrodes.

5. A piezo-electric crystal holder comprising an enclosing chamber formed of complementary sections, a threaded bushing located at one end of each complementary section, securing means

for binding said complementary sections together, a piezo-electric crystal supported by a ring like member, said ring like member being secured by said complementary sections, adjustable electrodes located each side of said crystal, said adjustable electrodes having a threaded stud cooperating with said threaded bushings to change the spacing between the crystal and said electrodes.

6. A piezo-electric crystal holder comprising
 10 an enclosing chamber formed of complementary sections, a threaded bushing located at one end of each complementary section, securing means for binding said complementary sections to-
 15 gether, a piezo-electric crystal secured within said chamber, said crystal having an annular groove, a ring-like member having centering peaks to secure said crystal, said ring-like member being clamped by said complementary sec-
 20 tions, adjustable electrodes located each side of said crystal, said adjustable electrodes having a threaded stud cooperating with said threaded bushings to change the spacing between the crystal and said electrodes, each one of said com-
 25plementary sections and said electrodes being symmetrically arranged with respect to each other.

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