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H. O. PETERSON
ELECTROMECHANICAL VIBRATOR
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Fig. 1

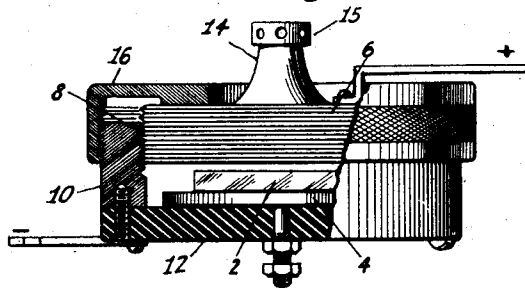


Fig. 2

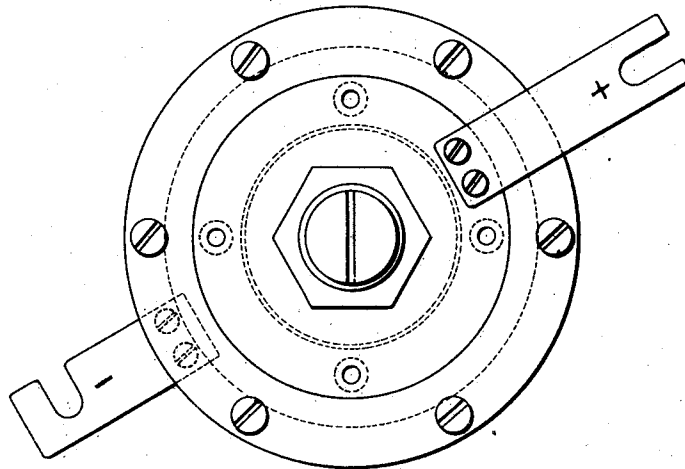
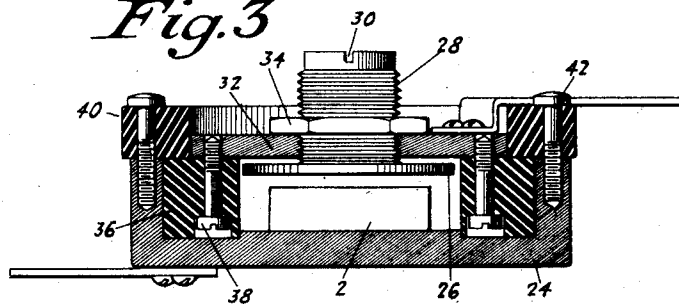


Fig. 3



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ELECTROMECHANICAL VIBRATOR

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This invention relates to a novel method and means for varying the resonance frequency of a piezo-electric crystal of specified dimensions.

It has heretofore been thought that the resonance frequency of a piezo-electric crystal depends solely upon the dimensions to which it is ground, and to which pair of faces the electrodes are applied. Great precautions are taken to grind crystals exceedingly accurately to dimension, and to obtain even slightly different frequencies, crystals are carefully ground to slightly different dimensions.

I have found that to some extent the precautions taken are needless, for the frequency of a crystal is not fixed by its dimensions but varies within a small range according to the spacing of the electrodes between which it is situated. According to my invention the resonance frequency of a crystal is varied and adjusted to a desired frequency by simply varying the air gap in the crystal holder.

The reason for the change of frequency is uncertain, and it probably is the result of a complex combination of influences. One of these probably is the change of capacitance of the crystal and crystal holder, considered as a condenser in its circuit. Another probably is the change in the frictional loading of the crystal, for some energy is dissipated in vibrating the crystal thru the surrounding air medium. Furthermore, a certain amount of air is kept in vibration with the crystal, and the amount of this air loading may depend to some extent on the air gap.

It is not essential that a tightly closed holder be used, for I find that my method of frequency control may be applied to even an open air gap.

The invention is more fully described in connection with the accompanying drawing in which

Figure 1 is a cross section through one form of crystal holder;

Figure 2 is a plan, and

Figure 3 is a cross section of another suitable form.

Referring to Figure 1, the crystal 2 is situated between a stationary electrode 4 and a movable electrode 6. The movable electrode is provided with a thread 8, and screws into a threaded casing 10. The casing 10 and the stationary electrode 4 are relatively fixed by an insulation disk 12, as shown in the drawing. The movable electrode 6 is provided with a capstan 14, the head of which contains holes 15, in which a pin is inserted when adjusting the air gap. The electrode is locked in position by lock screw 16.

In the modification shown in Figure 2 the crystal 2 is located between a stationary electrode 24 and a movable electrode 26. The latter is formed integrally with the screw 28, which is turned, by means of a screw slot 30, in a disk nut 32. A jam nut 34 is provided to lock the screw 28 in proper position. The disk nut 32 is fixed to an insulation ring 36 by means of screws 38. The upper assembly is fixed within the casing 24 by another insulating ring 40 and screws 42.

The foregoing modifications are disclosed only by way of illustration, and not limitation, of my invention, which I claim is:

1. A piezo-electric crystal holder comprising an internally and externally threaded casing, a first electrode mounted upon the bottom of said casing, a second electrode having its periphery screw-threaded and cooperating with the internally threaded portion of said casing, the position of said second electrode being adjustable through the cooperation of the threaded portions on said electrode and the interior of said casing, a removable cover having a threaded portion adapted to cooperate with said external threads on said casing, said cover being adjustable to lock said second electrode in position, and means to connect said electrodes to an electric circuit.

2. A piezo-electric crystal holder compris-

ing a casing, having an internally threaded portion, a first electrode mounted on the bottom of said casing, a second electrode having a threaded portion and cooperating with said threaded portion of the casing whereby the position of said second electrode with respect to said first electrode may be adjusted, a removable cover carried by said casing, said cover being provided with an aperture, and means extending through said aperture and joined to said second electrode whereby said second electrode may be rotated in the casing without removal of the cover.

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