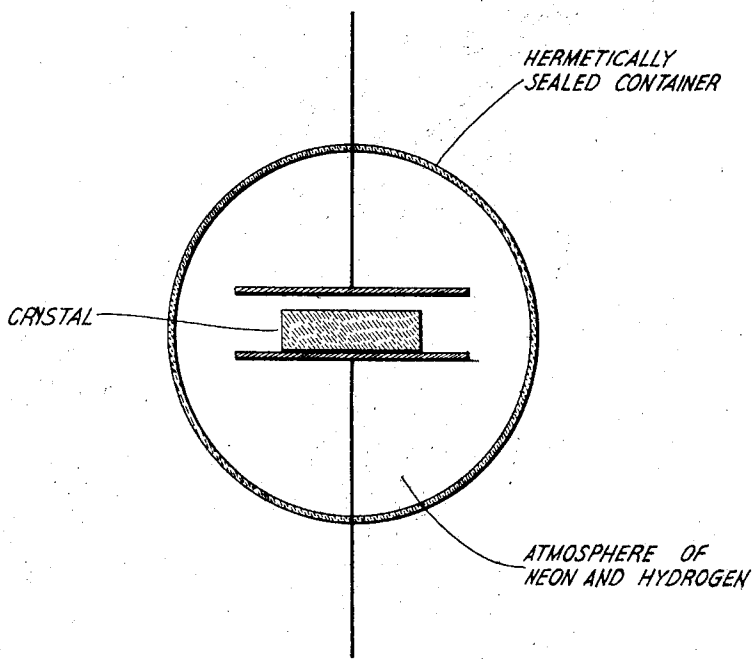
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PIEZO ELECTRIC OSCILLATING CRYSTAL IN A VACUUM VESSEL

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PIEZO-ELECTRIC OSCILLATING CRYSTAL IN A VACUUM VESSEL

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This invention pertains to piezo-electric oscillating crystals which are used as oscillators for the frequency control of transmitting tubes or as resonators for wave-measuring or regulating purposes. It is common practice to enclose such crystals, usually consisting of bars or plates of quartz held between exciting electrodes, in evacuated vessels or in containers filled with diluted gases, in order to eliminate as far as possible any external influences. For wave-measuring or controlling purposes the glass bulb is usually filled with neon-gas the luminescence of which serves as an indicator of the oscillation of the crystal. The light is very bright when the exciting frequency coincides with the natural frequency of the crystal or with its harmonics.

The drawback of such a piezo-crystal set operating in a rarefied atmosphere of neon or neon-helium gas consists in a gradual variation of the natural frequency of the crystal, caused primarily by metallic deposits due to the electrical disintegration of the electrodes. The use of such devices for frequency standards is therefore limited.

In order to obviate this drawback the invention provides an admixture of certain gases to the neon or neon-helium filling of the vacuum vessel, these admixtures being of such a nature as to reduce or practically to eliminate altogether the disintegration of the electrodes without impairing to any great extent the sensitiveness and the brightness of the luminous phenomena. A suitable admixture is, for instance, hydrogen which has the additional advantage of facilitating the glow discharge to produce luminescence. It is recommended to use a hydrogen admixture of 2 to 5%. Besides hydrogen the following admixtures may be used in small quantities: water vapor, hydrocarbons, carbon dioxide, argon, krypton and xenon. The admixture of argon, krypton, xenon or of their combinations produces another effect in that the gas filling flashes up when excited with a low piezo-voltage. The whole device is thus rendered more sensitive while the deterioration is reduced on account of the diminished cathode fall in potential caused by the presence of heavy gases.

The single drawing accompanying this application is merely illustrative of any crystal holder having an hermetically sealed container within which there is the desired admixture of gases.

Having thus described my invention, I claim:

1. A piezo-electric device comprising in combination, a hermetically sealed vessel, a body of piezo-electric material and electrodes to excite the same mounted within said vessel, said vessel being provided with an atmosphere of a mixture comprising 95–98 per cent neon and 2–5 per cent hydrogen.

2. A piezo-electric device comprising in combination, a hermetically sealed vessel, a body of piezo-electric material and electrodes to excite the same mounted within said vessel, said vessel being provided with an atmosphere of substantially 95–98 per cent neon, substantially 2–5 per cent hydrogen, and a small quantity of argon, krypton and xenon.

3. A piezo-electric device comprising in combination, a hermetically sealed vessel, a body of piezo-electric material and electrodes to excite the same mounted within said vessel, said vessel being provided with an atmosphere of substantially 95–98 per cent neon, substantially 2–5 per cent hydrogen, and a small quantity of any one of the class of substances including helium, water vapor, krypton, xenon, a gaseous hydro-carbon, carbon dioxide, and argon.

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