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A. D'HALLOY
PIEZOELECTRIC ELEMENT

2,511,624

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Fig. 1

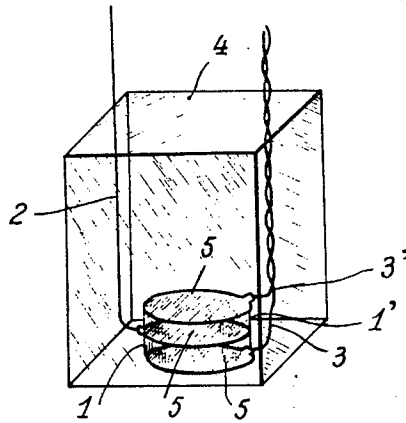


Fig. 2

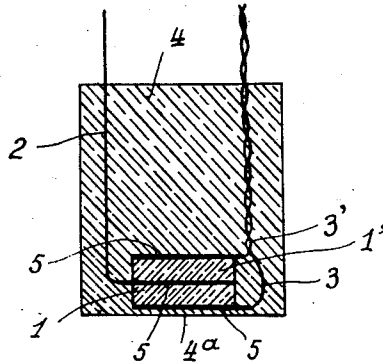
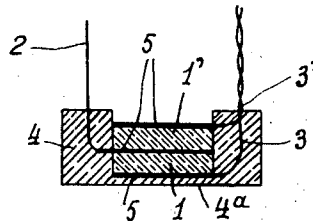


Fig. 3



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UNITED STATES PATENT OFFICE

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PIEZOELECTRIC ELEMENT

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Hamdi, widow and sole heir of said Audoïn
d'Halloy, deceased

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Section 1, Public Law 690, August 8, 1946
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7 Claims. (Cl. 171—327)

1

My invention relates to piezo-elements and has as one of its objects the provision of means for permanently protecting said element or elements against the action of the medium inside which they are used and chiefly against the effects of atmospheric moisture when the elements are exposed to the influence of climate and air; this protection of the piezo-electric elements leads moreover to the possibility of using them in other media, such as water for instance, whereby their field of application is widened.

My invention has also for its object the possibility of using for piezo-electric elements, piezo-electric crystals which are to-day unfit to be used for certain applications; this is the case, for instance, for crystals which are deliquescent under the action of moisture.

I realize these objects by enclosing the piezo-electric element with a dielectric substance selected so as to provide a perfect adherence of the enclosing substance with said piezo-electric element.

Preferably the improvement according to the invention may be executed by embedding the piezo-electric element within a dielectric substance such as, for instance and chiefly, a metacrylic resin of the type known under the registered trade name Plexiglas, the piezo-electric element being introduced inside the mass of plastic material before the polymerization of the latter.

In order to allow my invention to be better understood I will describe hereinafter by way of example and by no means in a limited sense, certain forms of execution thereof, the appended drawing illustrating such forms diagrammatically.

In said drawing:

Fig. 1 is a perspective view of a piezo-electric element made according to my invention.

Fig. 2 is a vertical cross-sectional view thereof.

Fig. 3 shows a vertical cross-sectional view of a modified form.

In said figures, 1 and 1' constitute quartz plates forming the piezo-electric element associated with electrodes or armatures 5 formed in a manner known per se by thin metallic deposits or metallic elements; 2, 3, and 3' are the leads or conductors adapted to connect the element with an amplifier; 4 designates a mass of dielectric substance constituted preferably by metacrylic resin of the type known as stated under the registered trade name Plexiglas. The piezo-electric element is inserted inside a mould filled with the

2

corresponding monomeric substance which is left to stand at a suitable temperature for producing its polymerization whereby finally said piezo-electric element is embedded inside the mass 4 of dielectric substance together with the leads 2, 3 and 3'.

In the form of execution of Figs. 1 and 2, the piezo-electric element is entirely embedded within the mass 4, the thickness 4a of dielectric substance underneath the surface of the element adapted to be submitted to the compression or to stressing being very thin, and being in fact if desired totally or partially removed in front of the outer armature 5.

In the modification of Fig. 3, the upper surface of the piezo-electric element is left bare.

Obviously, it is possible without widening the scope of my invention to modify and improve various details in the execution of said invention. For instance, not only the leads 2, 3 and 3' but also part of the amplifier may be embedded inside the mass 4.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. A piezo-electric block comprising a piezo-electric element, and a dielectric mass of metacrylic resin partly embedding therein said element.

2. The method for protecting a piezo-electric element against the action of atmospheric effects consisting in embedding said element within a dielectric resinous mass adapted to perfectly adhere to the piezo-electric element.

3. The method for protecting a piezo-electric element against the action of atmospheric and climatic media consisting in embedding said element within a mass of metacrylic resin.

4. The method for embedding a piezo-electric element at least partly within a protective mass consisting in placing said element within a mass of monomeric material adapted to form through polymerization a dielectric substance adhering to said piezo-electric element, and subjecting said mass containing said piezo-electric element to polymerization.

5. A piezo-electric element structure comprising piezo-electric means, conductors, respectively, connected to said piezo-electric means, and plastic means adapted to adhere to and substantially completely enclosing said piezo-electric means, said plastic means supporting said conductors leading from said piezo-electric means to without said plastic means and forming a dielectric mass,

3

6. A piezo-electric element structure comprising piezo-electric means including metallic elements in contact therewith, conductor means extending from said metallic elements, and a meta-crylic substance at least partly surrounding and encasing said piezo-electric means except for one of said metallic elements and supporting said conductor means at their connections and adjacent said piezo-electric means.

7. A piezo-electric element structure comprising piezo-electric means including metallic elements in contact therewith, conductor means extending from said metallic elements, and a meta-crylic substance completely surrounding and encasing said piezo-electric means and supporting

4

said conductor means at their connections and adjacent said piezo-electric means.

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