

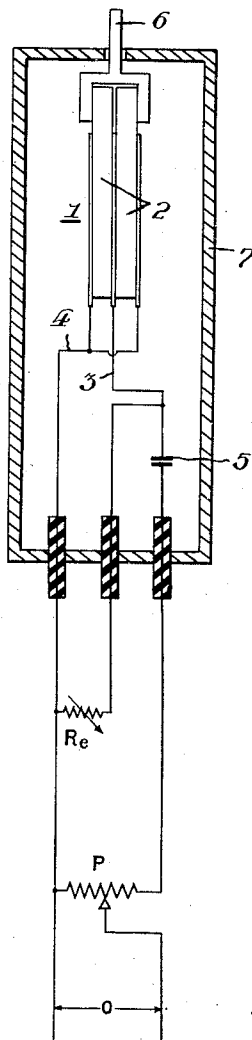
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PIEZOELECTRIC CONVERSION SYSTEM

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PIEZOELECTRIC CONVERSION SYSTEM

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2 Claims. (Cl. 171—327)

This invention relates to improvements in piezo-electric conversion systems, and has for its object to remove a heretofore unknown cause of the element of the piezo-electric conversion system becoming inoperative.

The accompanying drawing illustrates an embodiment of the invention wherein the circuits of the piezo-electric device are shown diagrammatically.

Heretofore, the use of Rochelle salt has been well known for a piezo-electric element. This kind of material has a piezo-electric character above a thousand times larger than that of chemically stable material, such as quartz and tourmaline, and the mechanical resonance produced therein is less sharp than that produced in quartz, or tourmaline. In these respects, the material, such as Rochelle salt, can be advantageously used for a piezo-electric transducer but has the following drawbacks:

1. There is unproportional relation between pressure and voltage like hysteresis in magnetic circuits.

2. The material per se is still too sharp in resonance.

3. The material effloresces or deliquesces.

4. There is a surface leakage on the material.

5. The mechanical impedance of the material is too high.

I have found that all of these drawbacks are removed by selecting Rochelle salt elements with regard to their special shape and the elasticity of electrode, and further by applying a special surface skin and special fillings to said elements. I have, however, found that some of such piezo-electric transducers become inoperative in a short period of time, and I have found that the inoperativeness is caused by the fall of the internal resistance of the transducer elements. For example, with the transducer element having an original internal resistance of 700,000 ohms, I experienced that the internal resistance is reduced several thousand ohms to 10,000 ohms when it has become degraded in its character and has become inoperative. There is no doubt that it is not due to the matters given in the afore-mentioned items 3 and 4 in view of the same phenomenon being observed when operating the transducer element in oil protected with a special surface skin and special fillings.

According to the present application, the electrodes of a Rochelle salt piezo-electric transducer are shunted by means of a high resistance for the dissipation of static charges thereof, and these electrodes are separated from the out-

put circuits thereof by means of a series condenser having a capacity not preventing low frequency output of said converter, instead of leading the electrodes direct to the output circuit, and the output side passed through said condenser is lead to the output circuit by means of a well known potentiometer, or by means of other means. The value of the high resistance for the static charge dissipation determines the low frequency characteristic and the high frequency characteristic, and the potentiometer regulates the output voltage.

Referring to the accompanying drawing, 1 represents a piezo-electric transducer and 2 Rochelle salt elements thereof. Two electrodes of the transducer are shunted by means of the high resistance R_e for the dissipation of static charge of said transducer. The high value of this resistance is favourable for low-frequency conversion, but unfavourable for high-frequency conversion, and the low value of this resistance is favourable for high-frequency conversion, but unfavourable for low-frequency conversion. A suitable value is, therefore, given to this resistance, and a series condenser 5 is inserted between the transducer and its output side O, which has a capacity not preventing low-frequency output of said transducer. For example, with the internal capacity of the converter of 0.01 microfarad, the capacity of said series condenser is preferably of the order of 0.03 microfarad. The output is lead through said condenser to the output side O and if necessary through a potentiometer P. The transmission member 6 for mechanical movement may be connected to a diaphragm, or stylus carrying device by suitable means, to constitute a microphone or pick-up. The transducer and the series condenser 5 may be conveniently mounted in a casing 7.

From the foregoing, it will be understood that the present invention provides a great advantage to the practical use of this kind of the piezo-electric transducer, the effect being brought about to remove heretofore unknown cause of a transducer becoming inoperative.

I claim:

1. A piezo-electric conversion system comprising, two Rochelle salt plates, an electrode between said plates, electrodes arranged along outer faces of the plates, means electrically connecting said outer electrodes, a relatively high resistor shunted across an outer electrode and the central electrode for dissipating static charges thereof, an

output circuit extending from the central electrode and one of the outer electrodes, and a condenser arranged in series circuit relation in said output circuit beyond the resistor shunt.

2. A piezo-electric conversion system comprising, two Rochelle salt plates, an electrode between said plates, electrodes arranged along outer faces of the plates, means electrically connecting said outer electrodes, a relatively high resistor connected across the outer electrodes and the 10

central electrode for dissipating static charges thereof, an output circuit extending from the central electrode and the outer electrodes, and a condenser arranged in series circuit relation in said output circuit beyond the resistor, and the capacity of said condenser in relation to the resistance of said resistor being such as to block only high frequency currents in said output circuit.

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