Oct. 5, 1954 J. D. HEIBEL 2,691,159

IMPACT TRANSDUCER

Filed March 13, 1952

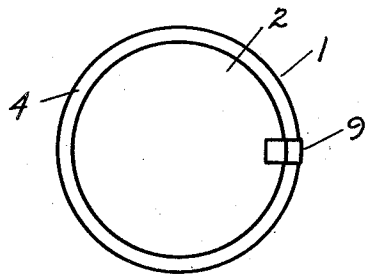


FIG. 1

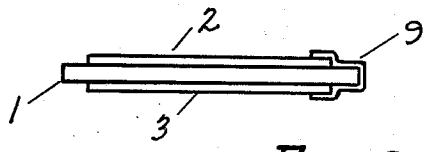


FIG. 2

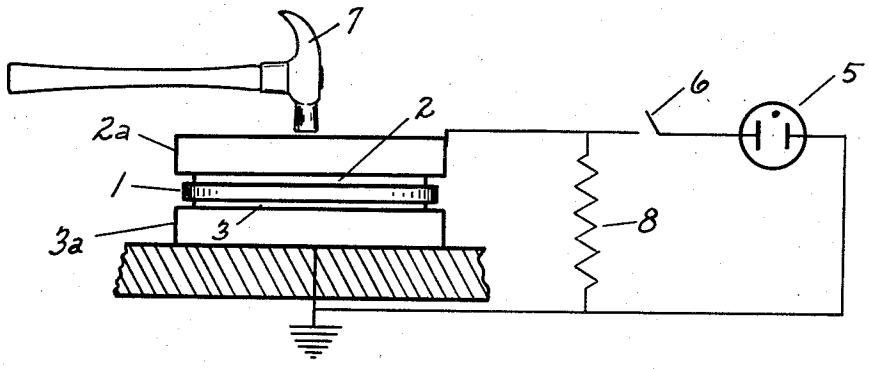


FIG. 3

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1 Claim. (Cl. 340—261)

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In piezo-electric devices responding to mechanical force, particularly impact, it is desirable that the effect of prior force or vibrations be eliminated, as otherwise the response would depend upon the past history rather than upon the impact. This invention is intended to provide such a device.

In the drawing, Fig. 1 is a top plan of a piezo-electric element; Fig. 2 is an edge view; and Fig. 3 is a circuit diagram.

The piezo-electric device comprises a barium titanate disk 1 having on opposite faces metalized electrodes 2 and 3 which terminate short of the periphery of the disk so as to provide an insulating band 4. The disk is activated or polarized by a voltage applied across electrodes by known techniques. See Patent No. 2,486,560, Gray.

When used under impact conditions, it is desirable that the ceramic disk be protected against fracture by metal covers 2*a* and 3*a* soldered to corresponding electrodes. The function of the covers is to prevent localized stress which might crush the ceramic. The shape of the covers 2*a* and 3*a* is not critical. The output of the piezo-electric device appears across the metal parts 2*a* and 3*a* which are connected across a neon lamp 5 through a switch 6. When the switch is closed, a blow striking the cover 2*a*, as indicated by the hammer 7, will generate enough voltage in the piezo-electric device to light the lamp.

Because the piezo-electric device is also a capacitor, if the switch 6 is open, any charge appearing across the parts 2*a*, 3*a* will be stored and upon closure of the switch 6, the lamp 5 may be lighted, because of casual vibration or other forces exerted on the device sometime prior to the closure of the switch. This, in effect, causes a false indication.

The false indication caused by casual vibratory or other forces exerted on the piezo-electric device, prior to the closure of the switch 6, is eliminated by a leakage resistance 8 in the form of a band 9 painted over the edge of the ceramic disk 1 and connecting the electrodes 2 and 3. Suitable

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paints for the band 9 are well known and may, for example, comprise a varnish loaded with carbon black. The painted resistance has the advantage that it is always present and does not in any way depend upon soldered connections.

No attempt has been made to illustrate the control for the switch 6, nor the actuating devices which may be substituted for the hammer 7, nor the utilization device which may be substituted for the lamp 5. The parts illustrated are sufficient to demonstrate the principle of operation.

What is claimed as new is:

In combination, a piezo-electric device having spaced electrodes across which a voltage appears when the device is subject to a mechanical force, metal caps on and electrically connected to said electrodes for protecting the piezo-electric device from fracture under impact, means supporting the device on one of said caps in position to receive an impact on the other of said caps, a resistance paint painted directly on the device beneath the caps in a path shunted across the electrodes providing a leak resistance, a voltage responsive device, a circuit connecting said device across said electrodes, a switch in said circuit closable whenever the device is to respond to a subsequently generated voltage, the leak resistance serving to discharge the voltage built up on the electrodes by casual impact or vibration prior to the closure of the switch whereby the voltage responsive device responds to voltage generated by impact subsequent to the closure of the switch rather than to voltage generated by prior casual impact or vibration.

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