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ELECTRICAL PROTECTIVE DEVICE

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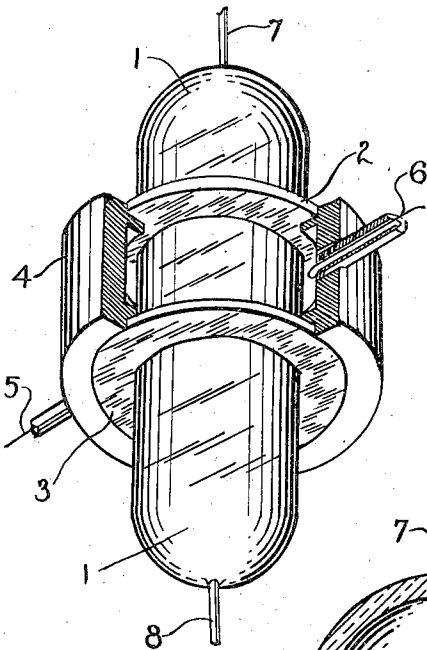


fig. 1

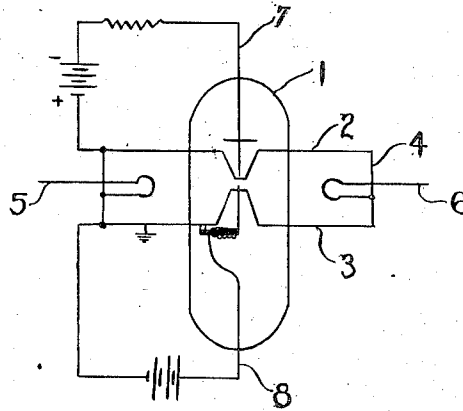


fig. 2

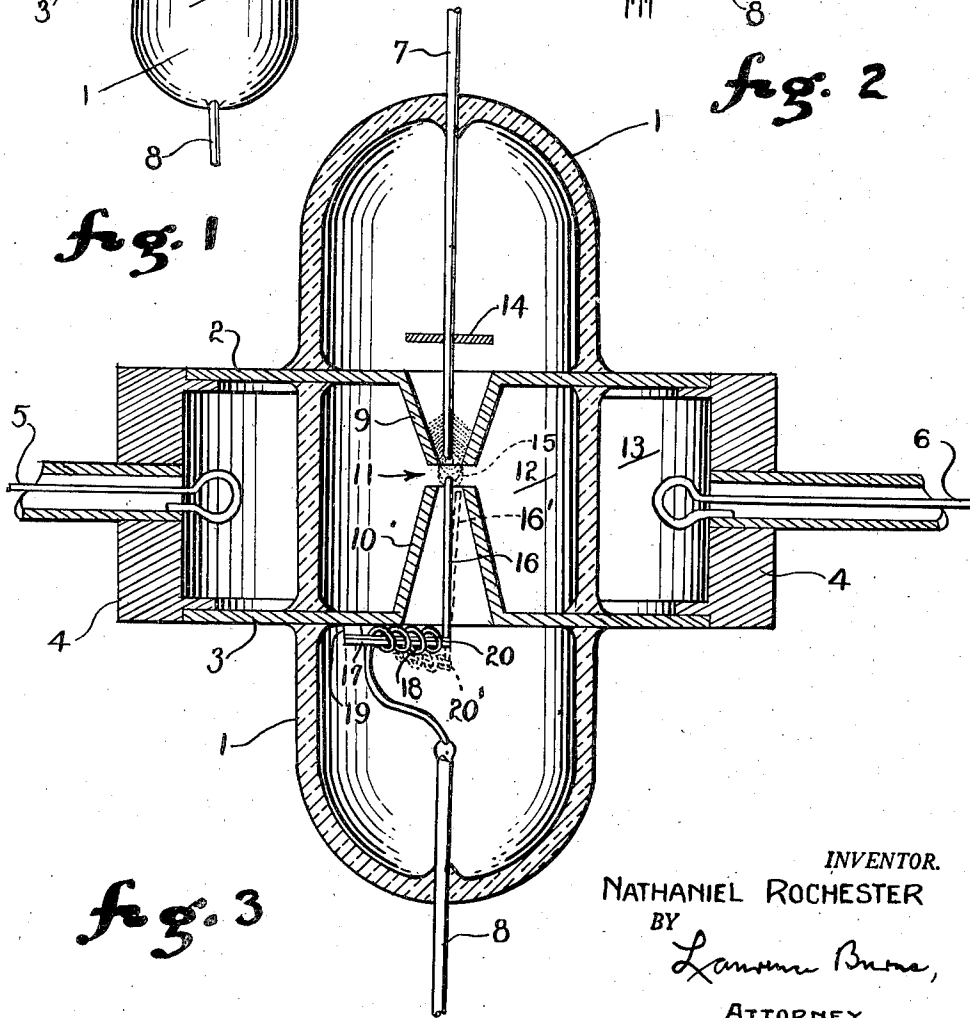


fig. 3

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ELECTRICAL PROTECTIVE DEVICE

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2 Claims. (Cl. 315—5)

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This invention relates to protective means for electrical devices.

An object of this invention is to provide detuning means for the protection of an electrical device.

A further object is to provide improved protective means for electrical devices containing crystal units.

A further object is to provide detuning means for an electrical switching tube.

Further objects, advantages and features will be apparent from the following specification and accompanying drawing, in which:

Figure 1 is a perspective view of an electrical tube embodying this invention, and shown partially in quarter section.

Figure 2 is a schematic diagram of the device of Figure 1, with illustrative circuit connections; and

Figure 3 is an enlargement of Figure 1, in vertical central section.

Many electrical devices are so delicate as to require protection against sudden electrical surges beyond their limits of safety. This is particularly true in electronic devices utilizing crystal units.

This invention is directed to an improvement in devices affording such protection, and while a particular type of electrical tube and circuit is shown and described by way of illustration, the scope of the invention is such as to readily encompass other tubes and circuits.

The tube and circuit shown and described herein are known as a gas switching tube and circuit for use as a protection for an associated electronic device having a crystal unit therein. The tube is an oscillator of the resonator type, in which a gas discharge destroys the resonance if the power gets too high. The tube has an arrangement known as the "keepalive" which provides ions so that the discharge will start promptly when an overload is applied.

The difficulty is that when the electronic device is not energized, the "keepalive" is also unenergized, and the electronic device and its crystal unit are vulnerable to any sudden electrical surge which may be applied to it since its protector tube is not working.

This invention provides means for automatically detuning the resonator tube when the electronic device is deenergized and automatically removing the detuning element in the resonator tube when the electronic device is energized. Since the possible sources of the expected electrical surges, or at least the wavelength of the

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possible sources, is or may be known, the detuning device may be arranged to detune the protective resonator beyond the wavelength range of these sources.

5 Figure 1 comprises a protective resonator switching tube with glass envelope 1, resonator plates 2 and 3, cavity cover 4 joining the resonator plates; input lead 5, output lead 6, "keep-alive" lead 7, and automatic tune and detune lead 8. This switching tube acts much like a governor or safety valve in that it allows a safe amount of current to pass and bypasses any excess or dangerous current. The envelope 1 is ordinarily filled with a special gas mixture.

15 Figure 3 shows the inside of the tube of Figure 1 and illustrates the operation of the detuning device. The resonator plates 2 and 3 have hollow truncated conical portions 9 and 10 respectively, formed in opposition and extending toward each other with their large bases at their respective resonator plates, and their small bases separated to form the resonator gap as at 11.

25 The resonator plates 2 and 3 are sealed in the wall of the envelope 1 to form an inner cavity 12 which contains the cones 9 and 10, and an outer cavity 13 which is completed by the annular cavity cover 4. Both the input lead 5 and the output lead 6 extend into the cavity 13 for their respective purposes of leading in the incoming signal and picking off the signal passed by the resonator for transference to the associated electronic device.

30 If the resonator did not have the "keepalive" unit including lead 7 and plate 14, with the lead 7 extending into the hollow resonator cone 9 to adjacency with the gap 11, the time lag necessary for the incoming signal to set up a safety-valve discharge across the gap 11 would make the electronic device vulnerable. The "keepalive" unit maintains a feeble path of ions in the gap 11, when the electronic device is energized, so that the incoming signal has a ready made path across the gap 11 and the switching tube functions promptly.

45 When the electronic device and consequently the switching tube and "keepalive" unit, are deenergized, the "keepalive" path, as at 15, no longer exists, and the electronic device is again vulnerable.

50 This invention, however, provides a detuner, as in Figure 3, comprising a metal rod 16, a bimetal arm 17, and a heater coil 18. The bimetal 17 is mounted on the resonator plate 3 as at 19, the coil 18 encloses the bimetal 17 and is electrically connected thereto adjacent the end 20 the bi-

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metal. Thus when the heater coil 18 is energized the current flows through the coil 18 and also the bimetal 17. The metal rod 16 is mounted on end 20 of the bimetal 17 and extends up into the hollow resonator cone 10. When the resonator is energized, the coil 20 is also energized and the bimetal 17 is so heated as to become distorted to the position shown in dotted lines in Figure 3, with its end 20 in the position 20'. Rod 16 is also moved and assumes position 16', shown in dotted lines. This movement of rod 16 brings its free outer end down within the resonator cone 10 so the resonator is tuned in accordance with the gap 11.

When the resonator is deenergized, the coil 18 is likewise deenergized, and the bimetal cools and moves to the position shown in full lines in Figure 3. This movement brings the rod 16 to the position shown in full lines in Figure 3. In this position the free end of the rod 16 extends into the gap 11 and detunes the resonator. The degree of the extent of the rod 16 into the gap 11 determines the amount of detuning accomplished.

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In some instances it is helpful to have the rod 16 contact either or both of the cones 9 and 10.

Figure 2 shows power supply circuits for the "keepalive" through lead 7 and for the heater coil 18.

The resonator oscillation circuit is between the plates 2 and 3 through the cavity cover 4, with the capacitive gap 11 between the resonator cones 9 and 10.

What I claim is:

1. An electrical protective device comprising a resonator having a resonator gap; means adjacent said gap providing an electron path thereacross a movable member mounted adjacent said gap for movement in and out of said gap to vary the frequency of said resonator; and a control unit comprising a bimetal and a heater therefor, connected to said member.

2. The combination of claim 1, in which the means for providing an electron path across the gap is a keep-alive electrode.

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