April 20, 1954 W. J. OESTREICHER 2,676,273

HIGH-VOLTAGE GENERATION

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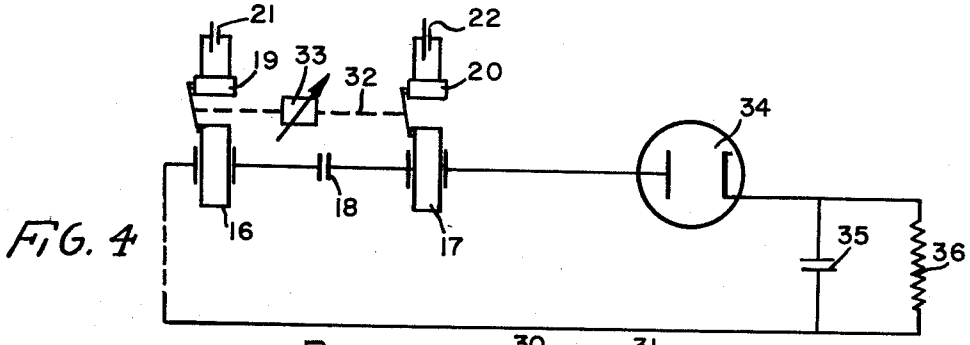


FIG. 4

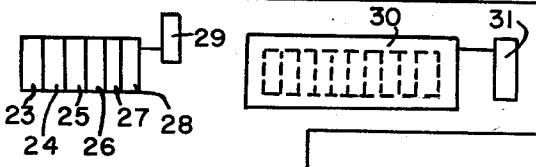


FIG. 5

FIG. 6

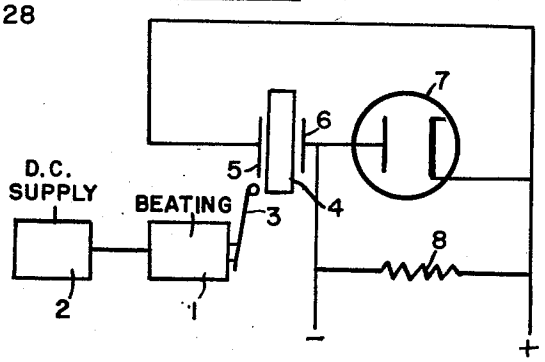


FIG. 1

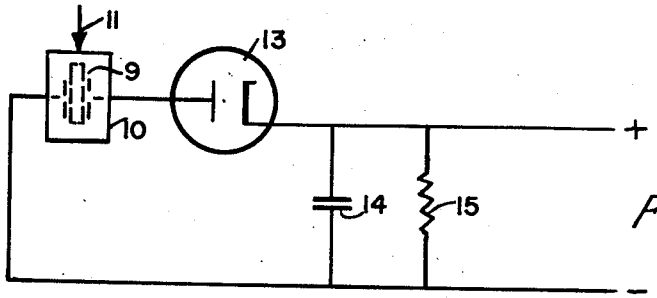


FIG. 2

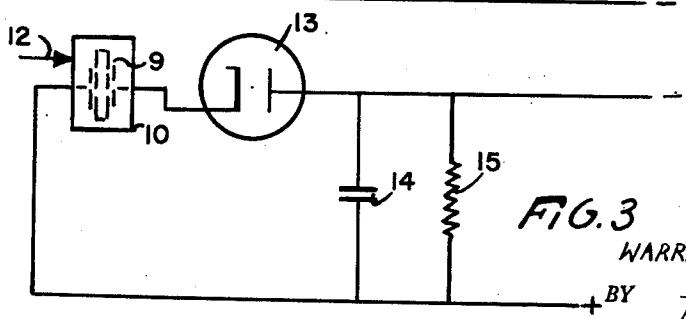


FIG. 3

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HIGH-VOLTAGE GENERATION

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9 Claims. (Cl. 307—150)

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This invention relates to an electromechanical voltage generator and more specifically to a compact and portable unit permitting production of relatively high A. C. and D. C. voltage from a low voltage source such as a battery.

One of the objects of the invention is a beating or buzzing mechanism operating against piezoelectrical material.

Another object of the invention is the combination of several of such beating mechanisms operating on a number of piezoelectric crystals, both beating mechanisms and crystal systems being interconnected mechanically and electrically respectively to obtain waves of predetermined amplitude and frequency ranges.

These and other objects of the invention will be more fully apparent from the drawing annexed herewith in which

Fig. 1 represents a rather simple form of realizing the invention.

Figs. 2 and 3 are modifications of Fig. 1.

Fig. 4 represents a more elaborate example of realizing the invention.

Figs. 5 and 6 show modifications of Fig. 4.

In Fig. 1, part 1 represents a beating or buzzing mechanism such as is used in a well known bell or ringer arrangement and supplied from a low voltage source such as a battery as schematically indicated in Fig. 1 at 2. The ringer or buzzer lever or hammer is schematically indicated as projecting at 3 and is shown to beat against one of the surfaces of a piezoelectric crystal 4, the electrodes of which are schematically indicated at 5, 6 respectively. Electrodes 5, 6 are connected in circuit with a diode rectifier 7 having an output circuit schematically indicated by impedance or resistor 8.

In this way depending upon the build up of voltage in circuit 4 through 8 a relatively high D. C. voltage will be generated from a relatively low voltage from battery 2 with a minimum of circuit elements and connections.

Such D. C. voltage may be used to operate portable receivers for radio or television receivers or also serve in the operation of other portable electric equipment such as airborne radio devices where a minimum of weight and maximum power supply are required.

The invention is, of course, not limited to the arrangement, mechanical and electrical shown and described.

Battery 2 may be replaced by any other source of D. C. or A. C.

Buzzer mechanism 3 and its manner of operation on crystal 4 may also be varied without exceeding the scope of the invention.

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More specifically the vibrations affecting crystal 4 may be applied thereto not only directly but also indirectly, i. e. over a liquid or solid coupling.

Figs. 2 and 3 show a crystal 9 enclosed or suspended in an oil filled vessel 10. The potential producing vibrations may be applied in one or another direction such as is shown in Figs. 2 and 3 at 11, 12, respectively to produce in the circuit including diode 13, condenser 14 and resistor 15, a potential of desired intensity and polarity.

The vibrations affecting the liquid in vessel 10 and therethrough crystal 11, may also be caused to operate effectively, by attaching the crystal and also if necessary, its associated apparatus to a vibrating mechanism such as an airplane or a ship. In this way the otherwise useless but continuous vibrations of a continuously moving mechanism are exploited in a very efficient manner to generate a predetermined high D. C. and A. C. voltage. In this way—especially in air borne equipment—battery or power requirement may be reduced to a minimum.

In Fig. 3 there are several crystals connected in series such as shown for example at 16, 17 intercoupled for example by a condenser such as shown at 18. Each crystal 16, 17 is operated upon by a separate beat or buzzer mechanism such as schematically shown at 19, 20 wherein each of the buzzer mechanisms is also shown to be fed from a separate battery or other supply source schematically indicated at 21, 22 respectively.

It is apparent if necessary that only a single common battery may be used to operate the different buzzers and that only one buzzer may be used coupled if necessary to a number of separate hammers to beat on the different crystal devices connected in the voltage generating circuit.

It is also possible without exceeding the scope of the invention to arrange all crystals not only in electrical contact but also in physical contact with each other, for example in the form of a crystal stack such as schematically indicated in Fig. 5. The stack consists of a number of crystal elements 23 to 28, one of which is beaten or excited to vibration by a buzzer shown at 29; in this way end crystal 28 will transfer by physical contact the received vibrations to the other crystals of the stack which if properly interconnected in an appropriate circuit will cause the generation of a predetermined high A. C. or D. C. potential.

Fig. 6 shows the arrangement of a number of crystals in an oil filled vessel schematically indi-

cated at **30**. Vessel **30** is operated upon by a suitable vibration generator **31**. In this way the operating vibrations are caused through the oil or another liquid, to be distributed substantially uniformly over the individual crystals, thus contributing to enhance efficiency of voltage generation.

In the circuit of Fig. 4 in addition to the known electric—preferably adjustable—delay device **18** coupling certain individual crystals to obtain maximum intensity and/or optimum wave form, there may also be arranged a mechanical coupling between the different buzzer mechanism or different hammers such as schematically indicated by dotted line **32** in Fig. 4. Into coupling line **32**, there may be inserted mechanical delay devices or filters such as springs and masses otherwise well known in the art and schematically indicated by a block **33**. The filter or filters may also be adjusted or adjustable to obtain a predetermined or optimum responsive characteristic in circuit **34, 35, 36**.

The invention is not limited to the particular crystals and crystal arrangements, mechanical devices and electron circuits shown and described but may be applied to any type of crystal beating mechanism and circuit without exceeding its scope.

I claim:

1. A source of high voltage supply comprising crystal means for translating mechanical vibration into electrical vibration, means for beating against said crystal, and an electrical circuit connected to said crystal means for deriving a high voltage therefrom.

2. Source according to claim 1, comprising rectifying means in circuit with said crystal means for producing a high D. C. voltage.

3. Source according to claim 1, comprising a source of low voltage controlling said beating means.

4. Source according to claim 1, comprising a number of crystal means electrically connected in series and a number of beating means mechanically intercoupled.

5. Source according to claim 4, comprising electric phase delaying means coupled between said different crystal means.

6. Source according to claim 4, comprising mechanical phase delay means coupled between said different beating means.

7. Source according to claim 1, comprising electrical means in circuit with said crystal means.

8. Source according to claim 1, comprising mechanical filter means coupled between said different beating means.

9. Source according to claim 1, comprising a stack of crystals mechanically intercoupled and means for beating against at least one of the crystals of said stack.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,152,184	Griscom	Mar. 28 1939