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W. A. MARRISON
OSCILLATION GENERATOR
Filed Dec. 30, 1927

1,785,036

FIG. 1.

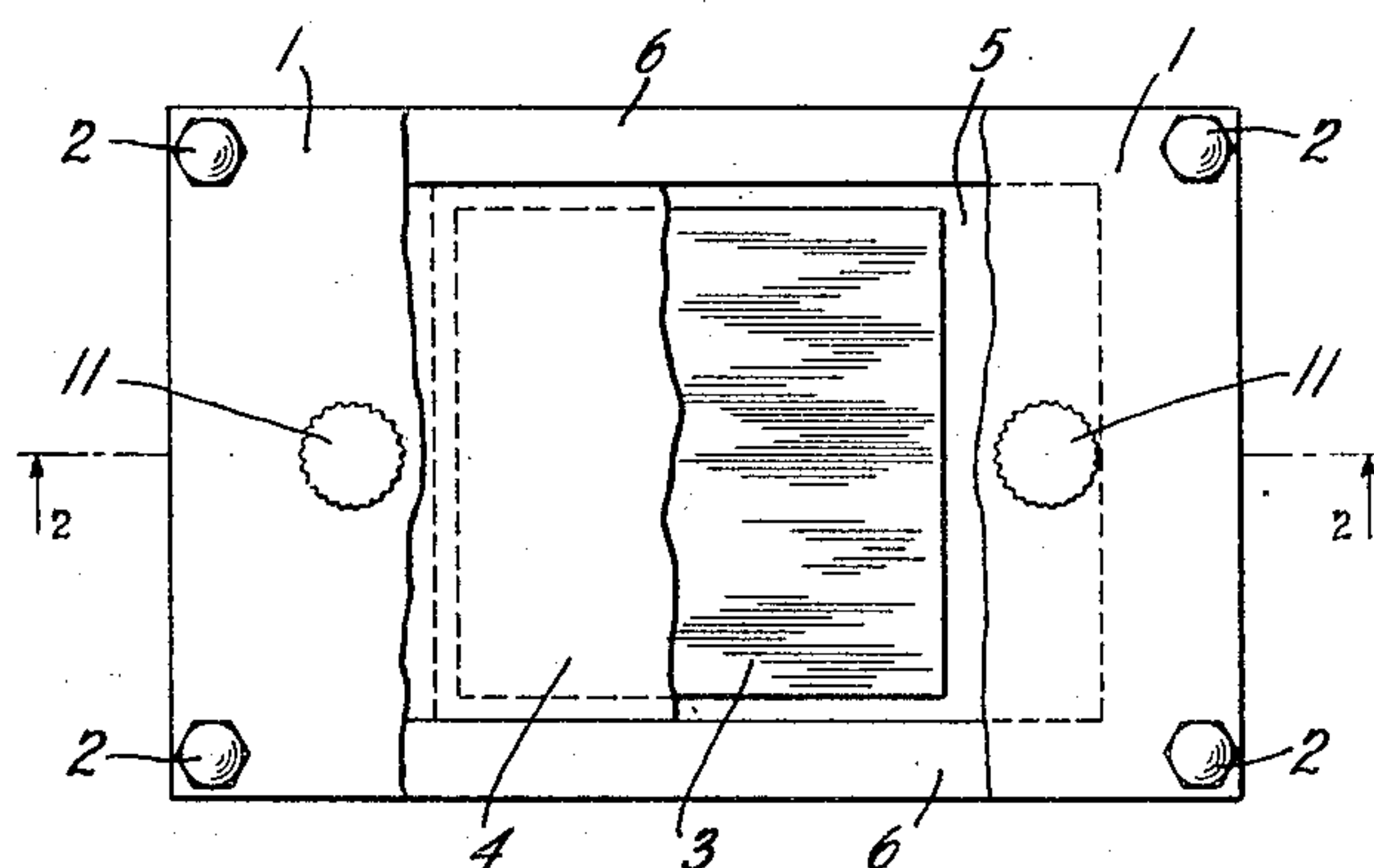


FIG. 2.

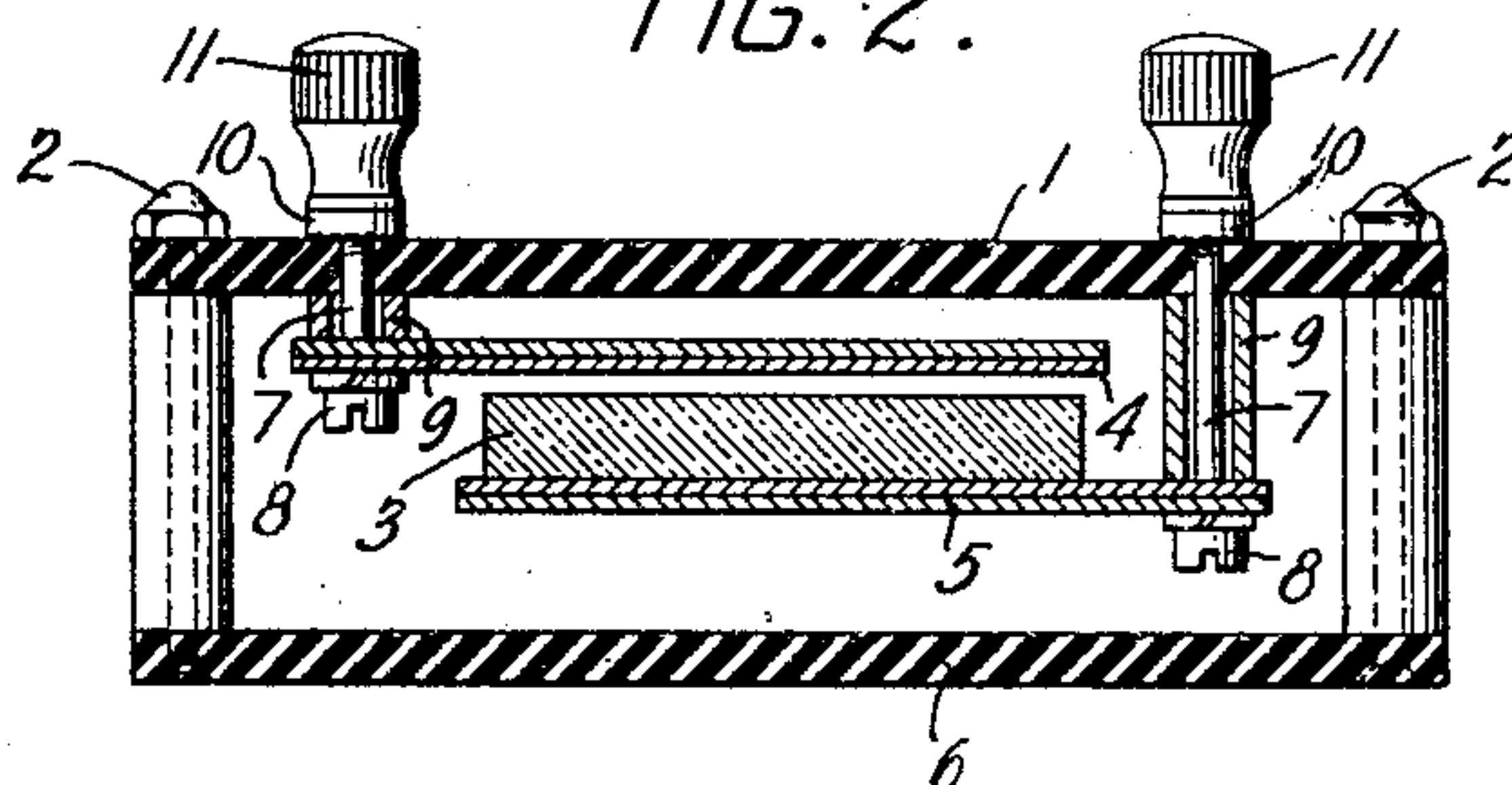
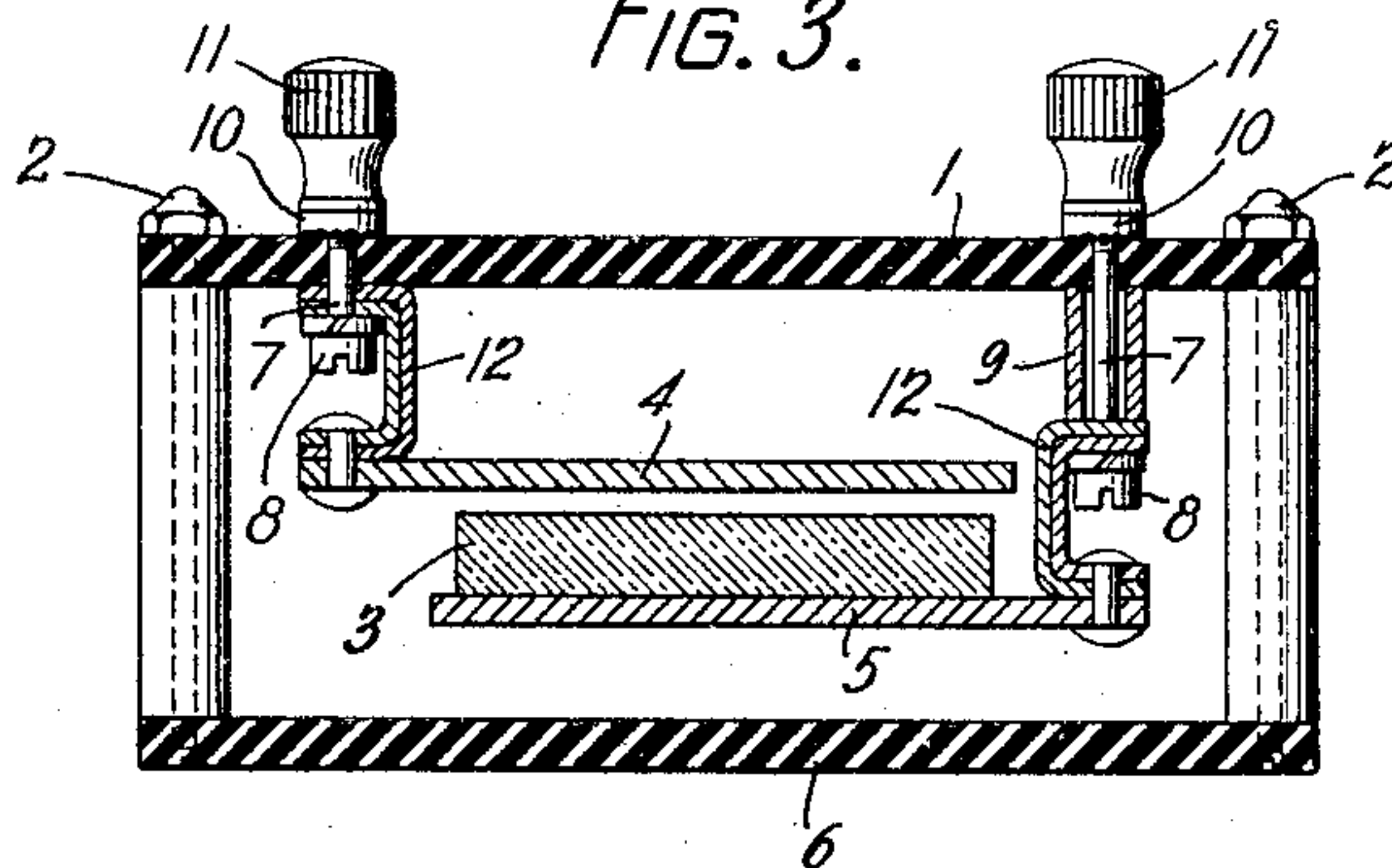


FIG. 3.



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OSCILLATION GENERATOR

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This invention relates to oscillators or generators employing mechanical vibratory systems, and more particularly to those including a piezo-electric crystal adapted to determine the frequency of the oscillations generated.

An object of the invention is to prevent variations in temperature from causing variations in the rate of vibration of such a system.

As is well known, the rate of vibration of a piezo-electric crystal, such as a quartz crystal, is dependent to some extent on its temperature. In order to maintain the vibrations at a frequency constant irrespective of temperature variations, it is necessary to provide means for compensating such variations.

It is also well known that the rate of vibration of a piezo-electric crystal is dependent to some extent upon the separation between the crystal and the electrodes associated with it. Thus, if one electrode is brought closer to the crystal a slight decrease in its rate of vibration occurs, and, vice versa, a slight increase in its rate of vibration occurs when the electrode is moved farther from the crystal.

In a specific embodiment, the object of this invention is accomplished by mounting on a fixed support or supports one or both electrodes, each consisting of two elements having different coefficients of expansion. Obviously, separate electrodes may be used and one or both may be carried by supporting members consisting of two elements having different coefficients of expansion, secured to the fixed supports. When a change in temperature occurs, which tends to cause a change in the rate of vibration of the crystal, the position of the electrode or electrodes with respect to the crystal will be changed to introduce a compensating effect adapted to maintain the crystal oscillating at a constant frequency.

In the drawings, Fig. 1 is a plan view, partly broken away, of one embodiment of the invention;

Fig. 2 is a side elevation, partly in section, taken along line 2—2 of Fig. 1; and

Fig. 3 is a side elevation, partly in section, of another embodiment.

In Figs. 1 and 2 there is shown a container 6 for enclosing a piezo-electric crystal 3. The container is provided with a lid or cover 1, secured in position by screws or bolts 2.

Mounted within the container 6 on cap screws 7, having heads 8, are two electrodes 4, 5, which are spaced from the cover, and relatively to each other, by sleeves 9. The cap screws are secured to the cover by means of nuts 10, and are surmounted by binding posts 11.

The electrodes 4 and 5 are each made of two metals having different coefficients of expansion. When the temperature changes the electrodes will expand unequally, and their positions with respect to the crystal will be changed.

The frequency at which the crystal oscillates depends upon temperature and also upon the separation between the crystal and its electrodes. By properly selecting and dimensioning the elements of which these electrodes are composed, any change in the frequency of the crystal, due to temperature variations, may be compensated by an equal but opposite change due to variation of the position of the electrodes with respect to the crystal.

The physical dimensions of the crystal also vary with changes in temperature. While this factor is so small as to be negligible for the purpose of this invention, it may be taken into account and the electrodes may be designed to compensate for it.

Another embodiment of the invention is illustrated in Fig. 3. A container 6 has a cover 1 secured thereto by bolts or screws 2. Mounted within the container 6 on bi-metallic elements 12 attached to cap screws 7, having heads 8, are two electrodes 4, 5, of which electrode 5 is spaced from the cover and relatively to the other electrode by a sleeve 9. A piezo-electric crystal 3 may be mounted on electrode 5. The cap screws are attached to the cover by nuts 10, and are surmounted by binding posts 11.

The operation of the device of Fig. 3 is substantially similar to that described above.

The bi-metallic members 12 are so selected and dimensioned that a change in temperature causes the position of the electrodes 4 and 5 to be varied to compensate the change in the resonant frequency of the crystal due to temperature variations, whereby the frequency at which the crystal oscillates remains constant despite variations in temperature.

What is claimed is:

1. In combination an oscillator, and means for mounting said oscillator for connection in an electrical circuit, said means comprising an electrode composed of metals having different coefficients of expansion.

2. A holder for piezo electric resonator comprising a mounting member, two bolts secured thereto, an electrode secured to each said bolt, said electrodes each consisting of bi-metallic elements.

3. A holder for a piezo electric resonator comprising a container, a cover therefor, a plurality of bolts extending inwardly of said cover and a bi-metallic electrode secured to each said bolt.

4. A holder for a piezo electric resonator comprising a container, a cover therefor, a plurality of mounting elements secured to said cover, and a bi-metallic element secured to each said element.

In witness whereof, I hereunto subscribe my name this 29th day of December, 1927.

WARREN A. MARRISON.