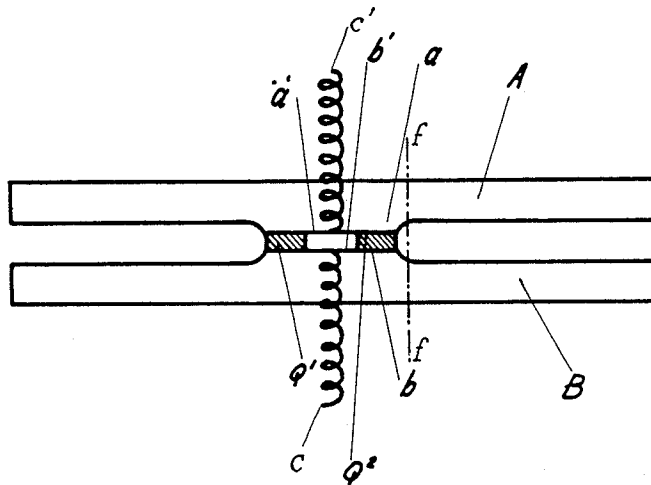


Nov. 11, 1930.

F. HOLWECK
ELECTRICAL TUNING FORK
Filed May 11, 1929

1,781,513



Inventor
Ferdinand Holweck

UNITED STATES PATENT OFFICE

FERNAND HOLWECK, OF PARIS, FRANCE, ASSIGNOR TO ETABLISSEMENTS EDOUARD
BELIN, OF PARIS, FRANCE, A CORPORATION OF FRANCE

ELECTRICAL TUNING FORK

Application filed May 11, 1929, Serial No. 362,415, and in France May 15, 1928.

My invention relates to improvements in electrical tuning forks and the general object of the invention is to provide a fork of this character which shall be independent of variations in temperature.

The properties of varying in volume under the influence of variations in potential which piezo-electric quartz crystal possesses is well known by those skilled in the electrical arts and it is a more specific object of my invention to utilize these properties in an electrical tuning fork.

My invention will be more readily understood by reference to the accompanying drawing in which the single view is a diagrammatic view partly in section of a fork constructed in accordance with my invention.

Referring to the drawing, A and B represent two identical strips of quartz of a length corresponding to the vibratory frequency sought to be attained and having plane surfaces preferably provided at the center with projections *a* and *b*. Said projections *a* and *b* have their surfaces *a'* and *b'* covered with a sheet of metal or metallic coating, or in other words the said surfaces are rendered conducting by any suitable known process in the art.

The strips A and B are brought together with the surfaces *a'* and *b'* opposite each other and glued to each other with two piezo-electric quartz crystals Q_1 Q_2 of inverse character with respect to each other interposed between said surfaces. Conductors *c* and *c'* are connected respectively with the metallic surfaces *a'* and *b'*.

To set the fork in operation it is merely necessary to apply a difference of potential from a source of alternating current to the metallic surfaces *a'* and *b'* by means of the conductors *c* and *c'* and due to the expanding and contracting of the quartz crystals Q_1 Q_2 there takes place a series of separations and drawing together transversely at the base of the arms of the strips A and B in such a way that they enter into vibration transversely and the sound thus produced is maintained as long as the current is maintained.

My improved tuning fork possesses among other things the property of being greatly

independent to differences in temperature and consequently possesses a frequency of vibration which is constant.

It is possible, when the last mentioned property is non-essential to construct the tuning fork members of metal, which also might be utilized if the atmospheric conditions are favorable.

I may prefer in some cases to construct the fork in a way that there are only a single set of arms by cutting the strips A and B along the line *f f*, that is at a point outside the projections *a b*.

My improved tuning fork is particularly adapted for use in the case where continuous vibrations are desired to be maintained such as in registering, chronography, radio work, phonetic wheels and the like.

While I have disclosed what I deem to be the preferred form of my device I do not wish to be limited thereto as there might be various changes made in the construction and arrangement of parts without departing from the spirit of my invention as comprehended within the scope of the appended claims.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. An electric tuning fork comprising in combination, a pair of spaced vibrating elements, and piezo-electric means interposed between said elements for setting said elements in vibration.

2. An electric tuning fork comprising in combination, a pair of divided vibrating elements, each thereof having a central projection and piezo-electric means, interposed between said projections for setting said elements in vibration.

3. An electric tuning fork comprising in combination, a pair of spaced vibrating elements of a material having a low coefficient of expansion, and piezo-electric means interposed between said elements for setting said elements in vibration.

4. An electric tuning fork comprising in combination, a pair of spaced vibrating elements of a material having a low coefficient of expansion, each thereof having a central

projection and piezo-electric means interposed between said projections for setting up increased vibrations in said elements.

5 5. An electric tuning fork comprising in combination, a pair of spaced vibrating quartz elements, a metallic layer deposited upon each of said vibrating elements, and piezo-electric means interposed between said metallic layers for setting said elements in vibration.

10 6. An electric tuning fork comprising in combination, a pair of spaced vibrating quartz elements, each thereof having a central projection, metallic layers superimposed on each projection, and piezo-electric means
15 interposed between said metallic layers for setting said elements in vibration.

7. An electric tuning fork comprising an H-shaped quartz member, the connecting
20 portion of which comprises integral projections having interposed layers of quartz crystals and metallic sheets, the crystals being spaced apart, and an electric connection for each metallic sheet.

25 In testimony whereof I hereunto affix my signature.

FERNAND HOLWECK.

30

35

40

45

50

55

60

65