United States Patent [19]

Tamura et al.

[11] **3,894,199**

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[54] **ELECTRET ELECTROSTATIC ELECTROACOUSTIC TRANSDUCER**

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[52] **U.S. Cl.** ..... **179/111 E**

[51] **Int. Cl.** **H04r 19/00**

[58] **Field of Search** ..... 179/111 R, 111 E

[56] **References Cited**

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[57] **ABSTRACT**

An electrostatic electroacoustic push-pull type transducer wherein a vibrating film is not connected to any signal terminal. One terminal of a step-up transformer is connected to one fixed electrode, and the other terminal of the transformer is connected to another fixed electrode.

4 Claims, 2 Drawing Figures

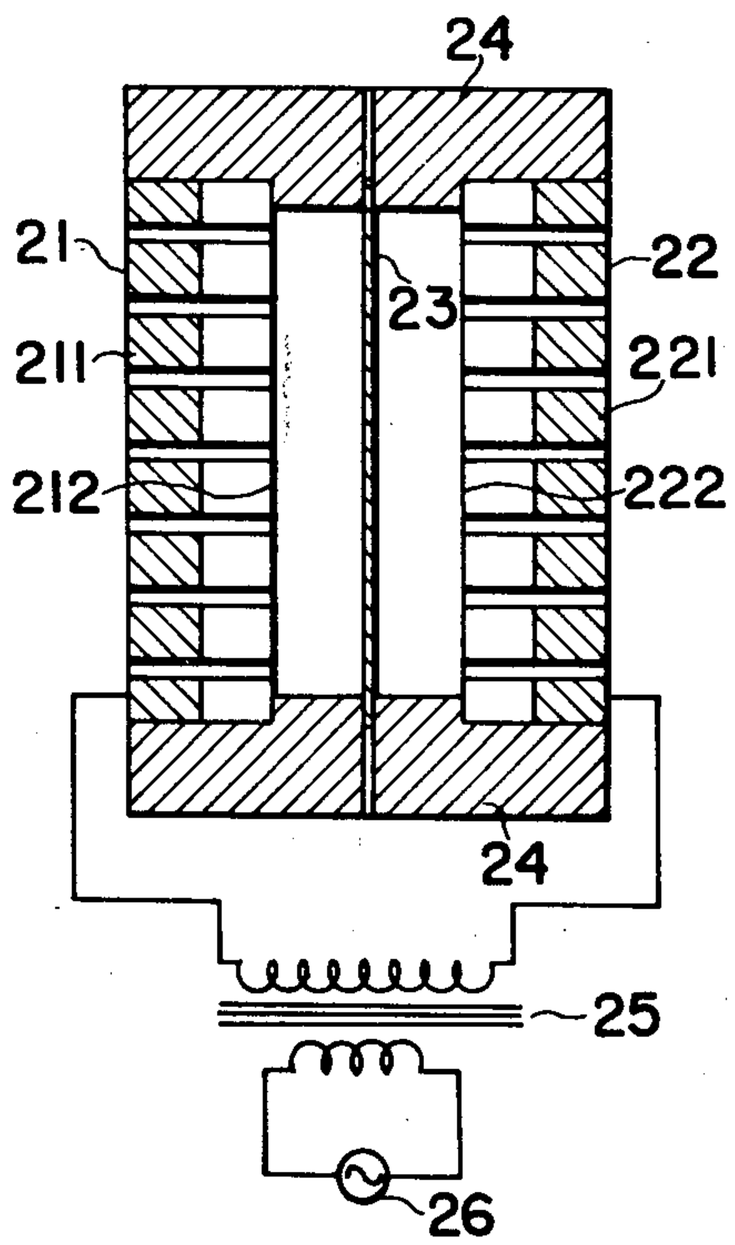


FIG. 1

PRIOR ART

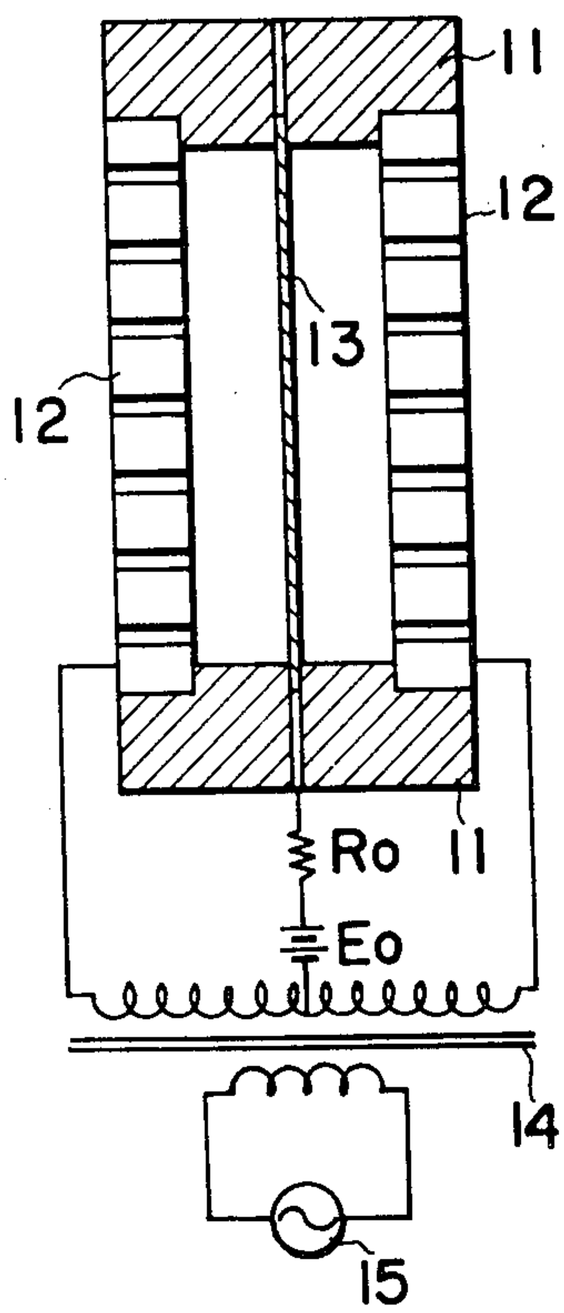
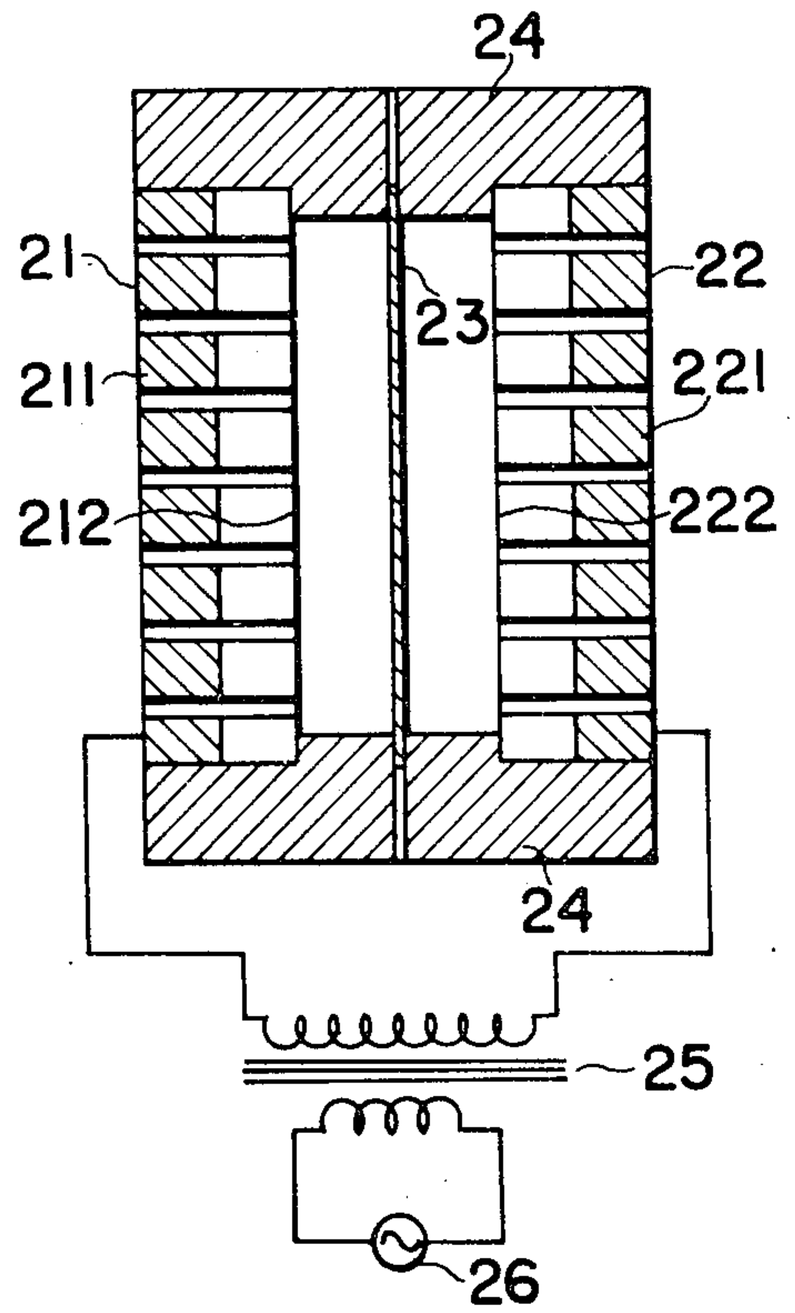


FIG. 2



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ELECTRET ELECTROSTATIC ELECTROACOUSTIC TRANSDUCER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to an electrostatic electroacoustic transducer, and more particularly to a novel and improved push-pull type transducer using an electret.

2. Description of the Prior Art

Prior art push-pull electrostatic electroacoustic transducers, such as a speaker, generally comprise a vibrating film, two electrodes and a holding member which holds the vibrating film between the two electrodes. A polarization voltage is applied to the film and a potential is applied across the electrodes through a step-up transformer.

The prior art devices have many disadvantages. First, the polarization voltage Eo is large and therefore a larger conductor for the polarizing voltage is required. Second, the step-up transformer must be provided with a center tap to boost and divide an input signal and to place opposing potentials on the fixed electrodes. Third, a vibrating film must be connected to the center tap of the step-up transformer.

SUMMARY OF THE INVENTION

It is therefore the primary object of this invention to provide a novel and improved electrostatic electroacoustic transducer in which above mentioned defects are overcome.

It is a further object of this invention to provide an electrostatic electroacoustic transducer, using an electret, which is simple in construction and inexpensive to produce.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a sectional plan view of a prior art push-pull electrostatic electroacoustic transducer showing its principle.

FIG. **2** is a sectional plan view of a push-pull electrostatic electroacoustic transducer of the preferred embodiment of the present invention.

Prior art push-pull type electrostatic electroacoustic transducers are constructed as shown in FIG. **1.** A holding member **11,** made of an insulating material, holds two fixed electrodes **12.** A vibrating film **13** is positioned between the electrodes. Fixed electrodes **12** have many holes which pass the acoustic radiation. A polarization voltage Eo is applied across the vibrating film **13** and each fixed electrode through a step-up transformer **14** and a resistor Ro. The primary winding of the step-up transformer **14** is connected to a signal source **15.** The potential of both fixed electrodes is supplied by an alternating signal of the signal source **15.** The potential of the two fixed electrodes is opposing. That is, when one is positive, the other is negative.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. **2,** fixed electrodes **21** and **22** face each other. They comprise back electrodes **211** and **221,** and electrets **212** and **222** which are affixed to the back electrodes. The fixed electrodes **21** and **22** have many holes which pass acoustic radiation. The potential of the facing surfaces of the two electrets is same. A vibrating film **23** is positioned between the fixed electrodes **21** and **22.** The vibrating film **23** is electroconductive at least at its surface. Holding member **24** is made of an insulated material, and holds the fixed electrodes **21** and **22** and the vibrating film **23.** One terminal of the secondary winding of step-up transformer **25** is connected to the fixed electrode **21,** and the other terminal is connected to the fixed electrode **22.** A signal source **26** is connected to the primary winding of step-up transformer **25.**

In operation, when facing surfaces of electrets **212** and **222** are positive, both surfaces of the vibrating film **23** are negative. The vibrating film **23** assumes a negative charge because it has an electroconductive surface and is positioned between the two positively charged electrets. When an alternating signal from signal source **26** is stepped-up by transformer **25** and applied to the fixed electrodes **21** and **22,** the positive potential of one electret, for example electret **212,** is increased and that of the other electret is decreased during a half cycle of the signal. Thereby, the vibrating film **23** is biased toward the electret **212.** Then during next half cycle of the signal, the vibrating film **23** is biased toward the other electret **222.** This process is cyclicly repeated, vibrating film **23.** As can be seen, the vibrating film **23** is not connected electrically to the electrets.

The present invention, as described hereinabove, gives many improvements over prior art devices. First, the vibrating film is not connected electrically, therefore the construction becomes simple and poor connections will not occur. Second, a polarization source and the center tap of the step-up transformer is unnecessary, therefore the transducer may be small in size, light in weight and inexpensive to produce.

While the invention has been particularly shown and described with reference to the preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention.

We claim:

1. An electrostatic electroacoustic transducer comprising first and second electrets positioned to face each other, said electrets having identical potentials on their facing surfaces, first and second back electrodes affixed to said first and second electrets, a vibrating film positioned between said electrets, said film being electroconductive on its surface, and a signal source wherein one terminal of said source is connected to said first back electrode and the other terminal is connected to said second back electrode.

2. An electrostatic electroacoustic transducer is set forth in claim **1,** further comprising a holding means for holding said electrets, said back electrodes and said vibrating film.

3. An electrostatic electroacoustic transducer comprising first and second electrets positioned to face each other, said electrets being identically charged on facing surfaces, first and second back electrodes affixed to said first and second electrets, a vibrating film positioned between said electrets, said film being electroconductive on its surface, a step-up transformer having a primary and secondary winding wherein one terminal of the secondary winding is connected to said first back electrode and the other terminal of said secondary winding is connected to said second back electrode, and a signal source connected to said primary winding of said step-up transformer.

4. An electrostatic electroacoustic transducer as set forth in claim **3,** further comprising a holding means for holding said electrets, said back electrodes and said vibrating film.

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