

May 20, 1930.

I. WOLFF

1,758,993

SOUND REPRODUCER

Filed Nov. 17, 1928

Fig. 1

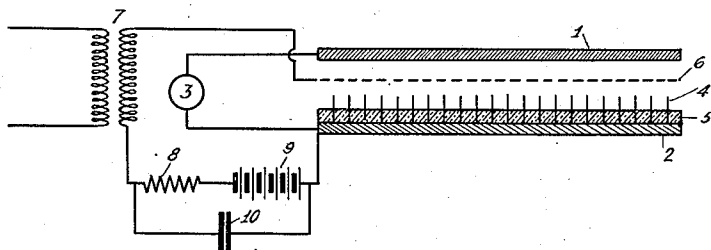


Fig. 2

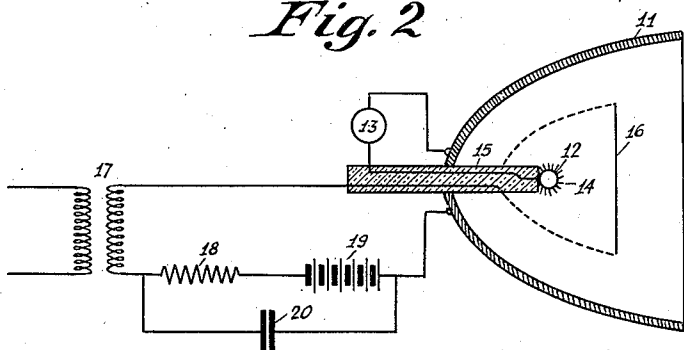
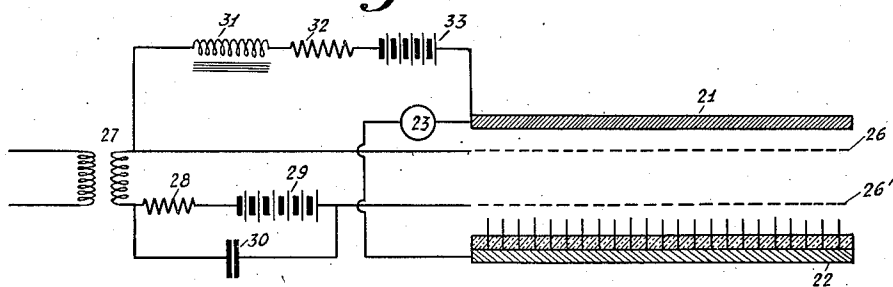


Fig. 3



Inventor
IRVING. WOLFF

By his Attorney *Edmund*

UNITED STATES PATENT OFFICE

IRVING WOLFF, OF NEW YORK, N. Y., ASSIGNOR TO RADIO CORPORATION OF AMERICA,
A CORPORATION OF DELAWARE

SOUND REPRODUCER

Application filed November 17, 1928. Serial No. 320,023.

This invention relates to an inertialess type of sound reproducers. More particularly it relates to sound reproducers in which a continuous corona discharge is provided, the discharge being modulated by a sound modulated current such as is obtained from a radio receiver.

It has been suggested in United States Patent No. 1,695,075, that a sound reproducer be formed by providing a continuous corona discharge and by modulating the discharge by applying a speech or sound modulated potential between the two discharge members. In the arrangement shown therein the source of high potential discharge energy is connected between the discharge members and the modulating potential is connected in parallel therewith. My invention relates to an improved method and construction for applying the modulating potential to the corona discharge of a sound reproducer of this type.

It is the object of this invention to provide an improved sound reproducer of the type described in which the modulating potential is not applied between the discharge members. According to one form of my invention, this object is attained by applying the modulating potential between one of the corona discharge members and a grid-like member interposed between the two discharge members. In another form of my invention the modulating potential is applied between two grid-like members which are interposed between the two discharge members.

Various other methods of carrying out my invention will become apparent upon reading the following description of my invention in connection with the accompanying drawing in which

Figure 1 illustrates an approved form of my invention:

Figure 2 illustrates a modification thereof; and

Figure 3 illustrates a still further modification thereof.

Referring more particularly to the drawing Figure 1 illustrates a modification of my invention in which members 1 and 2 are sup-

plied with energy from a source 3 having a sufficiently high potential to cause a corona discharge between the members. One of the members is preferably provided with a plurality of spikes 4 and a layer of insulating material 5 through which the spikes 4 protrude. With such an arrangement the corona discharge will take place between the points of the spikes 4 and the plain member 1.

The source 3 may be a direct current generator, an alternating current generator, or any other source of either alternating or direct current energy which has a sufficiently high potential to maintain a practically continuous corona discharge between the member 1 and the spikes 4. The discharge should take place at such a high frequency as to be practically inaudible.

In this form of my invention, a grid-like member 6 is interposed between members 1 and 2. The sound modulated current for modulating the corona discharge is applied between the grid-like or control member 6 and one of the corona discharge members. According to this particular modification the modulating potential is applied between the control member or grid 6 and the member 2 which is provided with the spikes 4. The circuit for applying the modulating potential can be traced from the grid 6 through the secondary of a transformer 7, a resistance 8 and a battery 9 to the discharge member 2. The resistance 8 and the battery 9 are provided to obtain the proper grid bias for the member 6 and a condenser 10 is connected to shunt the resistance 8 and battery 9 so as to form a path for the varying potential from transformer 7. The primary of transformer 7 may be connected to any source of sound modulated potential such as a microphone or the output of a radio receiver.

In the modification shown in Figure 2 the discharge member 11 is given the form of a paraboloid and the other discharge member 12 which is reduced to a small ball provided with a plurality of needle-like points 14, is positioned approximately at the focus of the paraboloid. The control member 16 is also given a parabolic shape and, as in Figure 1, is interposed between the corona discharge

members. An insulating member 15 is provided for insulating the leads connected to the discharge member 12 and the control member 16. In this modification the modulating potential is applied between the plane discharge member 11 and the grid member 16. The circuit connecting these members includes the elements 17, 18, 19 and 20 which correspond to the elements 7, 8, 9 and 10, of Figure 1. The power for energizing the corona discharge members is supplied from the source 13.

The modification illustrated by Figure 3 has members 21 and 22 corresponding to members 1 and 2 of Figure 1, which are energized from a source 23 to provide a corona discharge in the same manner as in the modification illustrated by Figure 1. The modulating potential in this modification is applied between two control or grid members 26 and 26' which are interposed between members 21 and 22. Members 26 and 26' are connected by a circuit including the secondary of transformer 27, resistance 28 and the battery 29. A by-pass condenser 30 is shunted around the resistance and the battery to provide a path for the alternating current component of the varying potential applied to transformer 27. As in Figure 1 the resistance 28 and battery 29 are provided to obtain the desired grid bias. It may also be advisable to connect one of the members 26 or 26' with one of the discharge members 21 and 22 through a circuit including a choke coil 31 and a resistance 32 or a battery 33 or both a resistance and a battery. By such a connection the proper potential relation may be maintained between the grid members 26 and 26' and the discharge members 21 and 22. The choke coil would prevent the alternating current component of the modulating potential from reaching the corona discharge members 21 and 22. The control members 26 and 26' may also be placed sufficiently near the discharge members 21 and 22 to affect the corona discharge without being located between the discharge members.

Various other means may be employed for modulating the corona discharge without applying the modulating potential to the two discharge members and accordingly I do not wish to be limited by the modifications shown but by the scope of the appended claims.

I claim:

1. The method of reproducing sound which consists in providing a corona discharge between two discharge members and in applying a modulating potential to said corona discharge independently of at least one of the discharge members.

2. A sound reproducer comprising means including a pair of discharge members for providing a corona discharge, and means for modulating the corona discharge independ-

ently of at least one of said discharge members.

3. A sound reproducer comprising a pair of corona discharge members, a source of energy for said members, and means for controlling the discharge of said corona discharge members interposed therebetween.

4. A sound reproducer comprising a pair of corona discharge members, means for supplying energy thereto, and means for modulating the corona discharge by a potential applied to a member interposed between said discharge members.

5. A sound reproducer comprising a pair of members, means for producing a corona discharge between said members, and means for applying a potential to modulate the corona discharge, said means being independent of one of said members.

6. A sound reproducer comprising a pair of members, a source of power for causing an electrostatic discharge between said members, means for applying a potential to modulate said electrostatic discharge, and a biasing connection between said means and one of said members, said means being otherwise independent of both of said members.

7. A loudspeaker comprising means for producing a continuous electrostatic discharge, and means separate from the first mentioned means except for a biasing connection for modulating said electrostatic discharge.

8. A sound reproducer comprising a pair of corona discharge members, a source of energy for said members, a control member interposed between said discharge members, and means for applying a modulating potential between said control member and one of said corona discharge members.

9. A loudspeaker comprising a plurality of members, means for producing a corona discharge between said members, and means interposed between said members for controlling said corona discharge.

10. A loudspeaker comprising a plurality of members, a source of power for causing a corona discharge between said members, controlling means interposed between said members for controlling said corona discharge, and means for supplying a sound modulated potential to said controlling means.

11. A sound reproducer comprising a pair of corona discharge members, a source of energy for said members, a grid member interposed between said discharge members, means for applying a modulating potential between said grid member and one of said corona discharge members, and means for maintaining a biasing potential between said grid member and one of said corona discharge members.

12. A sound reproducer comprising a pair of corona discharge members, a source of energy for said members, a third member po-

sitioned between said discharge members and a connection between said third member and one of said discharge members, said connection including a secondary of a modulating potential transformer, a resistance, and a battery.

13. A sound reproducer comprising a pair of corona discharge members, a source of energy for said members, a pair of control members interposed between said discharge members, and means for applying a modulating potential between said control members.

14. A sound reproducer comprising a pair of members, means for providing a corona discharge between said members, a plurality of control members, and means for applying potentials to said control members to modulate said corona discharge.

15. A sound reproducer comprising a pair of corona discharge members, a source of energy for said members, a pair of grid-like members interposed between said discharge members, means for applying a modulating potential between said grid-like members, and means for obtaining the desired potential relation between one of said grid-like members and one of said corona discharge members.

IRVING WOLFF.