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MICROPHONE JAMMING SYSTEM

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Fig. 1.

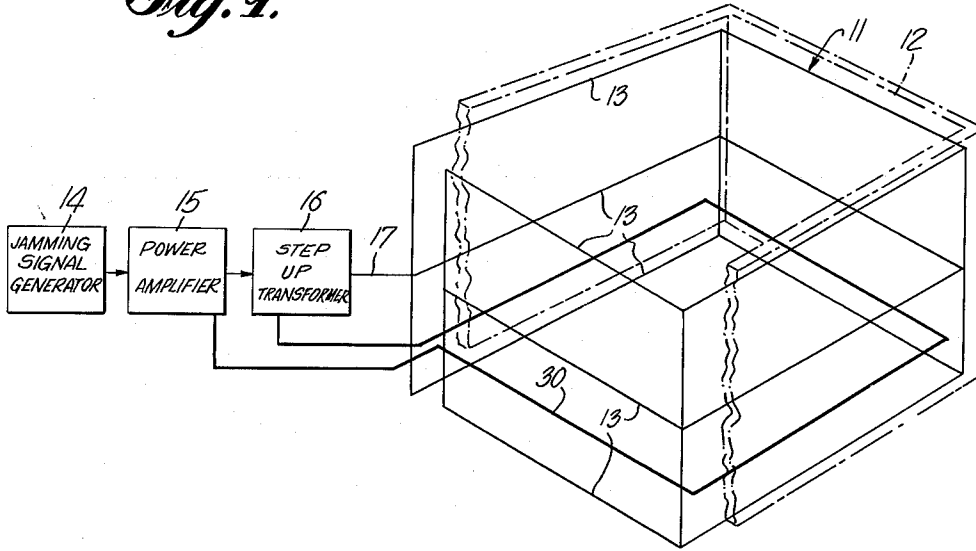
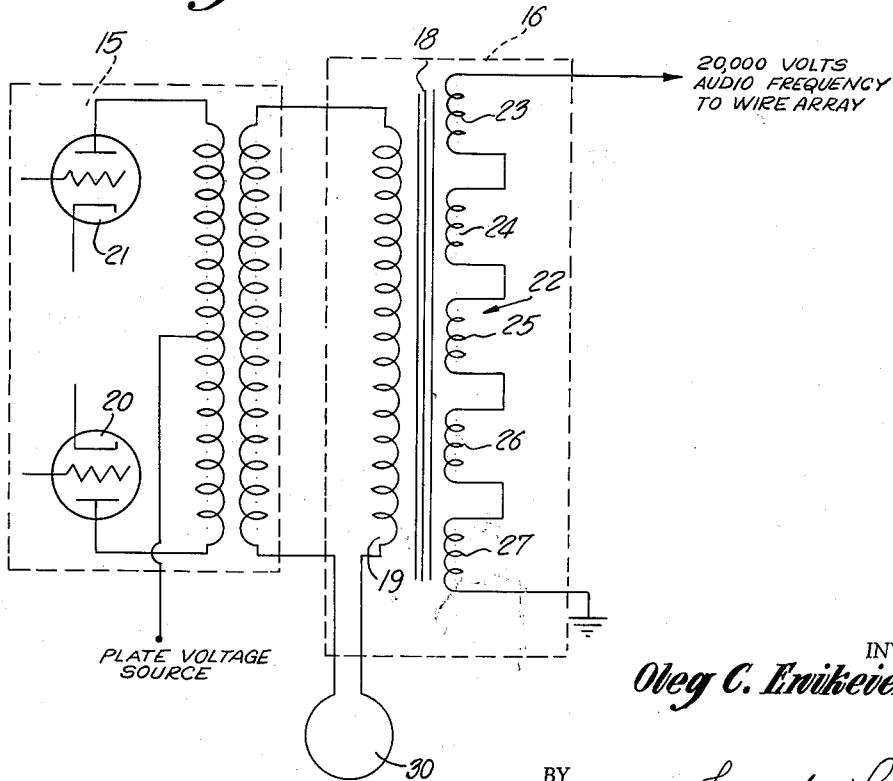


Fig. 2.



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MICROPHONE JAMMING SYSTEM

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The present invention relates to electrical signal generating systems for producing an electrical field in a security area for jamming sound transducers and thereby afford protection against unauthorized or surreptitious monitoring of sounds or conversation in the security area.

The present invention is particularly designed as a security device to protect conference areas and the like against pick-up by recording or remote listening devices through the medium of concealed microphones or other sound transducer devices. I have found that when piezoelectric, dielectric, electro-static and other similar transducers are exposed to a very strong external electric field, they produce audible sounds which are the acoustic replica of the electrical excitations. Such strong electric fields are capable of penetrating the shielding normally employed on commercial microphones and provides an effective means of rendering the transduced representations of the sounds monitored by the microphone unintelligible. While it is not here represented that specially designed microphones or transducers may not be provided with sufficiently sophisticated shielding to protect the microphone against disturbance by the jamming field, this jamming technique is nevertheless of considerable value as it causes the party seeking to monitor the conference or conversation to introduce such effective shielding in the transducer as to greatly increase its bulk and thereby drastically increase the difficulty of effectively concealing the transducer.

An additional advantage which stems from the use of a strong electric field, as distinguished from a magnetic field, to provide the jamming signal is that the jamming field becomes ineffective within only very short distances from the radiating elements and will not interfere with transmission and reception of radio signals beyond the confined area of the effective jamming field.

An object of the present invention, therefore, is the provision of a novel system for jamming sound transducers which might be located in a security area to afford protection against unauthorized or surreptitious monitoring of conversations in the security area.

Another object of the present invention is the provision of a novel system for jamming sound transducers in a restricted conference area and the like, which will effectively penetrate much transducer shielding and will minimize disturbance of radio communications signals beyond a highly confined jamming area.

Other objects, advantages and capabilities of the present invention will become apparent from the following detail description, taken in conjunction with the accompanying drawing illustrating one preferred embodiment of the invention.

In the drawing:

FIGURE 1 is a block diagram of a sound transducer jamming system embodying the present invention;

FIGURE 2 is a schematic diagram of an example of the type of power amplifier and step up transformer circuit which may be used to generate the jamming field in accordance with the present invention.

Referring to the drawing, wherein like reference characters designate corresponding parts throughout the several figures, the jamming system of the present invention employs electrostatic field generating means, generally designated by the reference character 11, arranged in some configuration of conductive wires, plates, or wire

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mesh screen, which form an electrical condenser whose geometry is selected for each installation to produce a strong electrical induction field in all areas where eavesdropping microphones could be concealed. The particular configuration illustrated in FIGURE 1 of the drawings is an exemplary form which may be used to protect, for example, a conference area generally outlined in dotted lines and indicated by the reference character 12.

This radiating scheme comprises a plurality of wires 13 strung about the walls of the conference room 12 in a plurality of vertically spaced rows to produce a strong electrical induction field over a sufficient area to encompass any microphones which might be concealed in the furniture or building walls adjacent the conference area.

The energy to be supplied to the group of wires 13 or other form of electrostatic field generating means 11 is produced by a suitable jamming signal generator 14, which may be any quality recorder, either a tape, wire, disc or photo electric recorder. I have found that the use of a Möbius loop tape cartridge in conjunction with a quality tape recorder of any reputable manufacture is most convenient and effective. The signal produced by the jamming signal generator 14 is applied to a power amplifier 15 which may be of the conventional vacuum tube type or of the transistor variety producing an output of about 150 watts power for a conference room or conference area of about twelve feet by twenty feet by eight feet. The output of the power amplifier 15 is then applied to an audio step up transformer 16 or other suitable amplifying means designed to produce a very high voltage audio frequency signal in excess of 10,000 volts, and in the preferred example herein described of the order of 20,000 volts on the wires 13. The transformer 16 should have a frequency response which is essentially flat from about 300 cycles to about 3,000 cycles, so as to avoid marked distortion of the audio frequency signal output of the jamming signal generator 14. The high tension lead 17 for coupling the output from the step up transformer 16 to the wires 13 must, of course, have special, heavy insulation to prevent shock hazard to personnel.

The step up transformer 16 is designed to increase the output signal from the power amplifier 15 of about 15 volts level to 20,000 volts or such higher voltage as may be required to provide a sufficient field to protect the conference area. This transformer 16 may, for example, comprise a Hypersil core of grain oriented, C core material, generally designated by the reference character 18 in FIGURE 2, a primary winding 19 whose opposite ends are inductively coupled to the plate circuit of output tubes 20, 21, for example, of a push-pull power amplifier 15, and a secondary winding 22 formed, for example, of five series-connected secondary winding segments 23-27. The turns ratio is selected in accordance with known engineering principles to provide the desired voltage step up and the entire transformer winding and core assembly may be suitably potted and immersed in transformer oil.

Various forms of audio transformer construction may be available to provide the desired voltage increase and frequency response characteristics as will be apparent to persons skilled in the appropriate art, so that the invention is obviously not limited to use of the particular transformer construction herein described.

The wires 13 forming the electrostatic field generating means 11 of the herein described example may be strung within the conference room by means of a variety of insulator posts or may be embedded inside the walls 12 in case of a permanent installation. To eliminate shock hazard, any large metal objects, such as a bank of filing cabinets or safes, should be grounded to prevent shocks from stray fields. The wires 13 may be fed from the transformer secondary 22 either as a grounded system,

as illustrated in the drawing, or as a balanced system wherein the opposite leads of the transformer secondary are coupled to independent arrays of wires, screen, or the like.

A really important feature of this concept is that the wires or other electrostatic field operating means be designed and arranged to form, in effect, a huge condenser which will produce a strong electrical induction field rather than a magnetic field. By this arrangement, either the concealed sound transducers are excited to produce audible sounds representing the electric excitations, which will dominate the weaker replicas produced by the transducers of the sound signals emanating from the personnel within the room and thereby preclude reception of an intelligible signal representation of the sounds or conversation, or the strong electric field thus generated penetrates the shielding covering the lead wires to the microphones and overrides the electrical signal generated by the microphones when they pick up conversation. This particular arrangement whereby an electrical induction field rather than a magnetic field is produced is also of significance because it minimizes the possibility of undesirable interference with normal radio communication transmission or reception. This is because such jamming fields become ineffective approximately twenty feet from the antenna wires and therefore can not interfere with radio transmission and reception beyond this distance.

While signals of various types can be used to accomplish the jamming, it has been found that a pre-recorded conversation of several individuals talking simultaneously, when converted to the high electrical level, is most effective in achieving the jamming. Such a recorded conversation on the magnetic tape, disc, or other recorded medium utilized by the jamming signal generator 14 provides a most convenient jamming signal source.

In the event special low impedance devices may be encountered, such as ribbon microphones or other low impedance microphones, which though not commercially available could be designed, they may be effectively jammed by installing one or a plurality of low impedance loops in the room to generate a magnetic field. Such a magnetic field generating jamming loop is indicated at 30 in FIGURE 1, and may conveniently be fed from the primary winding 19 of the transformer 16 to provide a jamming signal of about 15 volts at a high current of, for example, about 10 amps. Such an arrangement, which provides a convenient installation protecting the area against conventional eavesdropping microphones as well as special low impedance microphones, serves the additional function of improving the efficiency of the system by producing a desirable phase shift which has the effect of adjusting the phase to deliver more power to the array of wires 13 forming the field generating means.

While but one specific embodiment of the present invention has been particularly shown and described, it is apparent that various modifications can be made within the spirit and scope of the invention, and it is desired therefore, that only such limitations be placed on the in-

vention as are imposed by the prior art and are set forth in the appended claims.

I claim:

1. Apparatus for jamming sound transducer means in an area to be secured against monitoring of sounds generated in the area, comprising signal generating means for generating an audio frequency jamming signal of a character which, when entrained with intelligence bearing signals generated by the sound transducer means responsive to sounds in the area, renders the intelligence bearing signals unintelligible, means for amplifying said jamming signal to a high voltage level of at least 10,000 volts, a system of electrical conductors in said area arranged to produce an electric induction field in the area to excite the sound transducer means, and means applying the amplified high voltage jamming signal to said system of conductors to produce a responsive electric induction field in the area.

2. Apparatus for jamming sound transducer means such as concealed microphones or the like in an area to be secured against surreptitious monitoring of sounds generated in the area, comprising a system of electrical conductors in said area forming large electrical condenser means and arranged in a geometrical configuration to produce a strong electric induction field in the area to excite the sound transducers with an overriding signal responsive to the induction field, means for generating an audio frequency jamming signal, audio amplifier means for amplifying said jamming signal to a high voltage level of at least 10,000 volts, and means for applying the high voltage audio frequency jamming signal to said system of electrical conductors to generate a bearing electrical induction field in said area.

3. Apparatus for jamming sound transducer means such as concealed microphones or the like in an area to be secured against surreptitious monitoring of sounds generated in the area, comprising a system of electrical conductors in said area forming large electrical condenser means and arranged in a geometrical configuration to produce a strong electric induction field in the area to excite the sound transducers with an overriding signal responsive to the induction field, means for generating an audio frequency jamming signal to a high voltage level of at least 10,000 volts, means for applying the high voltage audio frequency jamming signal to said system of electrical conductors to generate a varying electric induction field in said area, a second system of electrical conductors forming a low impedance magnetic loop to produce a magnetic induction field in said area for jamming low impedance transducers in the area, and means for applying a low voltage signal from said means for generating an audio frequency jamming signal to said second system of conductors to generate a varying magnetic induction field in said area.

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