

April 6, 1926.

1,579,864

J. P. HOBART, JR

LOUD SPEAKER

Filed Jan. 8, 1923

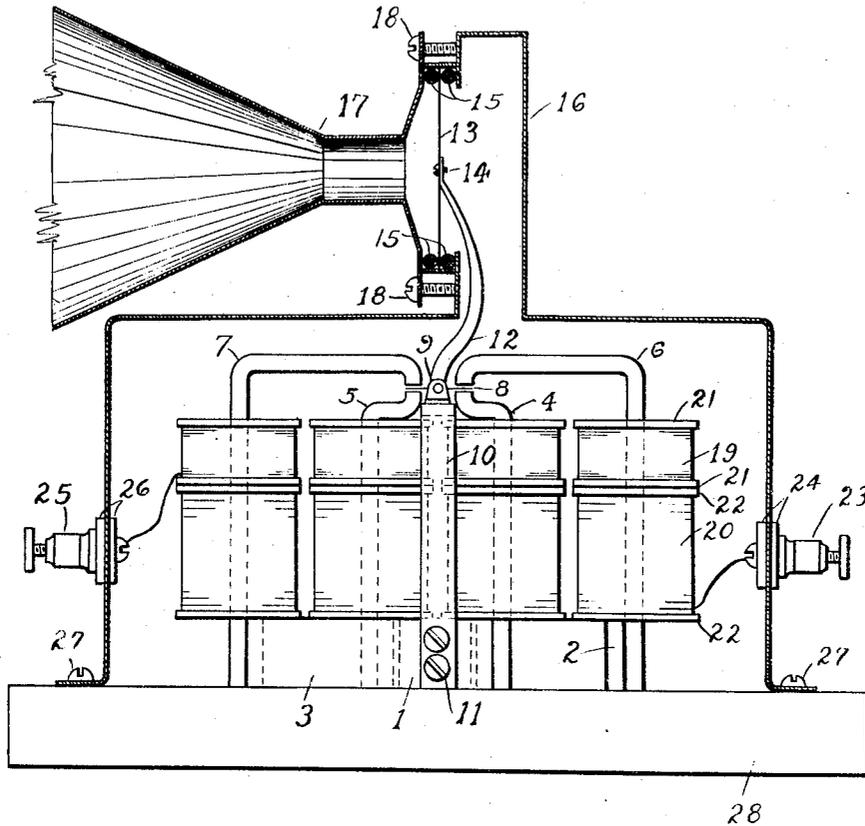


Fig. 1

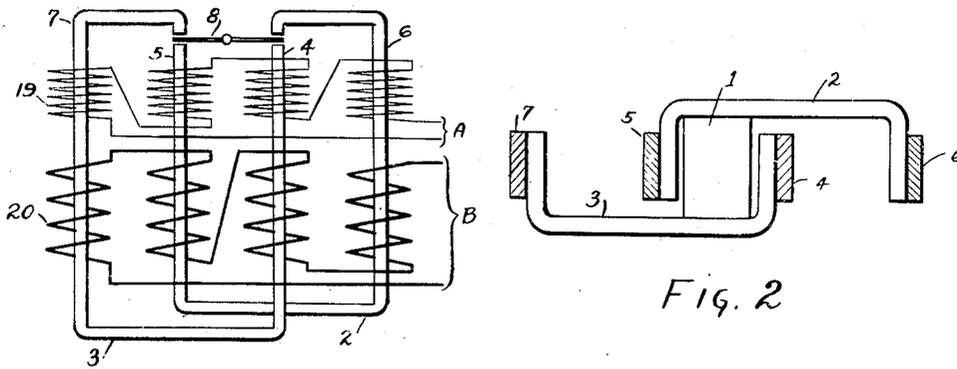


Fig. 2

Fig. 3

INVENTOR

John P. Hobart Jr.

UNITED STATES PATENT OFFICE.

JOHN P. HOBART, JR., OF BLUEFIELD, WEST VIRGINIA.

LOUD SPEAKER.

Application filed January 8, 1923. Serial No. 611,506.

To all whom it may concern:

Be it known that I, JOHN P. HOBART, Jr., a citizen of the United States, residing at Bluefield, in the county of Mercer and the State of West Virginia, have invented certain new and useful Improvements in Loud Speakers, of which the following is a full, clear, concise, and exact description.

This invention relates to loud speakers, such as are used with radio receiving outfits, and will clearly reproduce sounds and make them audible and intelligible to anyone in the same room or within a reasonable distance away.

This invention relates more particularly to the type of loud speaking horn, making use of an armature acted upon by four magnetic poles, the magnetic flux of two of which is increased while the magnetic flux of the remaining two is decreased, thus producing a differential action.

One of the features of this invention relates to the magnetic circuit. By means of magnetic suspension of the armature, by means of the magnetic circuits set up, I am able to avoid the use of springs and employ a highly vibrant armature.

Another feature of this invention relates to the location of the sound producing or modulating coils, whereby they may be made of unlimited size, thus securing any degree of sensitivity or loudness desired, and of any resistance desired and therefore no transformer coil is necessary.

Another feature of this invention relates to the fact that the magnetic circuit may be made of two permanent magnets or it may be made of two steel members properly formed with magnetizing coils mounted thereon, thus increasing or decreasing the volume of sound by varying the magnetizing current.

Another feature of this invention relates to the fact that the sound producing diaphragm may be made of any desirable material and be placed in a straight line with the fulcrum of its operating lever, thus eliminating distortion of sound. The armature may be made of very small size, thus reducing its inertia to a minimum.

In the drawings, Figure 1 is a vertical section, showing the entire assembly.

Figure 2 is a plan section taken just above the base showing the separation of the two

magnetic circuits when the spacing block is made of non-magnetic material.

Figure 3 shows a schematic wiring diagram with the magnetic circuit also shown in diagram.

One form of the invention embodies a spacing block 1, secured to the base 28. This block separates the two sections of the magnetic circuit. At each end of the spacing block is fastened the cross magnetic members 2 and 3. To each end of these cross magnetic members are connected upright poles 5 and 6, 4 and 7 respectively, all bent to form a continuous magnetic circuit as shown. Midway between the pole faces is the armature 8 adjusted to a very small but equal air gap between each pole face and armature. The armature is supported by bearing block 9, which is fastened to bearing support 10, the same being secured to cross magnetic members 2 and 3 by screws 11.

Rigidly attached to the armature 8 is the operating arm 12 which transmits the vibrations of the armature to the diaphragm 13, being held to the same by screw 14. Diaphragm 13 is securely held in place by two packing rings 15, which are clamped between the housing 16 and the sound box and horn 17 by clamping screws 18.

Mounted on one part of each of the upright poles 4, 5, 6 and 7 is an insulated spool 21 containing the desired number of turns and the correct size of wire 19. The coils are properly connected together and the ends are connected to terminal posts 25, the same being insulated from the housing 16 by insulating washers 26. These terminals are to be connected to the sound producing or modulating circuit.

Mounted upon another part of each of the upright poles 4, 5, 6 and 7 is an insulated spool 22, containing the desired number of turns and the correct size of wire 20. The coils are properly connected together and the ends are connected to terminal posts 23, the same being insulated from the housing 16 by insulating washers 24. These terminals are to be connected to the magnetizing current.

The housing 16 is fastened to the base 28 by holding down screws 27.

Figure 3 shows the schematic wiring diagram with the magnetic circuit also shown in diagram. Winding "A" represents the

modulating winding to be connected to the sound producing or modulating circuit. Winding "B" represents the magnetizing winding to be connected to the magnetizing circuit.

Winding "B" is wound and so connected so that when an electric current flows in one direction it will produce magnetic polarities as follows: Pole 6 is of one polarity (for example say a north pole). Then pole 4 is of opposite polarity (or south pole) compared to pole 6. Pole 5 is of same polarity compared to pole 4 (or south pole) and pole 7 is opposite polarity compared to pole 5 but the same polarity as pole 6 (or north pole). Thus the magnetizing winding produces poles of all like polarity on each side of the armature.

Winding "A" is wound and so connected so that when an electric current flows in one direction it produces magnetic polarities as follows: Pole 6 is of one polarity (for example a south pole). Then pole 4 is of the same polarity as pole 6 (or south pole). Pole 5 is of opposite polarity compared to pole 4 (or north pole), and pole 7 is of same polarity as pole 5 (or north pole). Thus, the modulating windings produce two poles of like polarity on one end of the armature, and two poles of like polarity at the other end of the armature, but of opposite polarity when compared with the first noted poles.

The magnetizing flux, which may be produced by permanent magnets properly located in the flux path or by magnetizing coils properly located in the flux path and receiving an electric current from an external source, has a single circuit from the upper right hand pole across the air gap and vertically through the armature suspended midway between, then through the lower right hand pole, then by a direct magnetic path through cross member to upper left hand pole, then across the air gap and vertically through the opposite end of the armature suspended midway between, then through lower left hand pole, then by a direct magnetic path through cross member to the upper right hand pole.

The modulating coils which are located in the flux path are connected in such a manner that the modulating flux (at a certain instant depending on the directions of current flow in the modulating coils) will add to or subtract from the magnetizing flux which will increase the magnetic flux in the circuit between the lower right hand pole and upper left hand pole, and decrease the magnetic flux in the circuit between the upper right hand pole and the lower left hand pole.

This difference of magnetic flux will tend to tilt the armature toward the two poles having the largest amount of flux.

The difference of magnetic flux between the two stronger poles and the two weaker poles passes lengthwise through the armature, thus completing the magnetic circuit.

When the current is reversed in the modulating coils, the above condition is reversed and the armature will tend to tilt in the opposite direction.

By making the spacing block of non-magnetic material, the two halves of the magnetic circuit are insulated from each other, being only connected together through the armature. A less efficient horn may be produced by making the spacing block of magnetic material, the magnetic circuit then reduces to a simple, four legged circuit.

I claim:

1. A loud speaker, comprising a diaphragm connection therefrom to an armature, so arranged that tilting of the armature will impart vibrations to the diaphragm, means for pivoting the armature, and means establishing a magnetic circuit about the armature so as to create a balance between its ends to hold the armature in neutral position, said circuit having two gaps at the effective ends of the armature in which the flux flows in the same direction, through the armature at right angles to its ends, only alternative poles at alternate ends of the armature having closed external paths, and a modulating circuit established with relation to said magnetic circuit, and acting to set up a flux lengthwise through the armature thereby deflecting it from neutral position.

2. A loud speaker comprising a diaphragm, a tiltable armature connected thereto, and adapted upon tilting to set up vibrations in the diaphragm, and a plurality of magnets arranged to present like polarities above and below the two ends of the armature with closed flux paths between alternate polarities at alternate ends of the armature only, and windings of a modulating circuit upon said magnets, adapted to alter upon excitation of said circuits the balance between said polarities and arranged to increase and decrease the flux at alternate poles at alternate ends of the armature respectively only.

3. A loud speaker comprising a diaphragm, a tiltable armature connected thereto, and adapted upon tilting to set up vibrations in the diaphragm, and a plurality of magnets arranged to present like polarities above and below the two ends of the armature with closed flux paths only between alternate polarities at alternate ends of the armature, and windings of a modulating circuit upon said magnets, adapted to alter upon excitation of said circuits the balance between said modulating circuit and polarities, said magnets being arranged to provide a single magnetic circuit only with two gaps at the armature.

4. In a loud speaker, an armature having a central pivot, a pair of magnets, one extending from the top right hand face, to the bottom left hand face of the armature, and the other from the top left hand face, to the bottom right hand face of the armature and a modulating winding on said magnets with the turns so arranged as to oppose the flux of one of the magnets and increase the flux of the other. 10

In witness whereof I have hereunto subscribed my name on this 30th day of December A. D. 1922.

JOHN P. HOBART, JR.