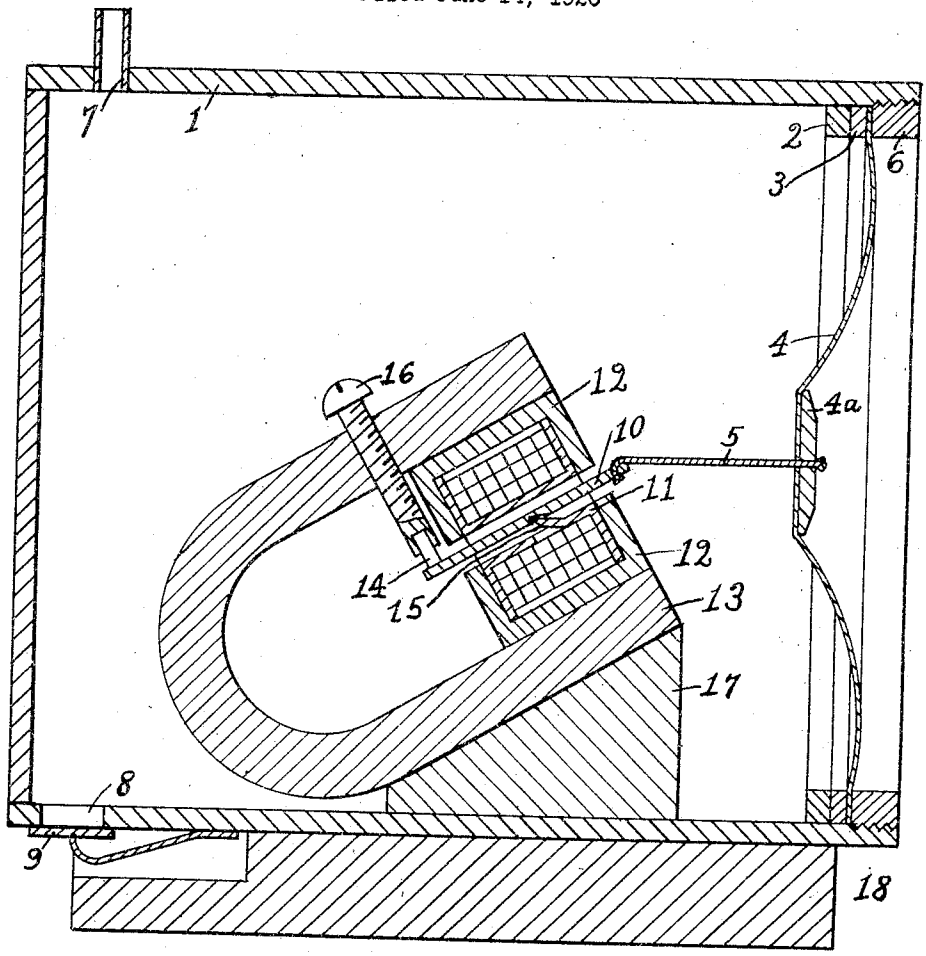
Sept. 11, 1928. 1,683,946

N. BALDWIN

LOUD SPEAKER

Filed June 14, 1926



Nathaniel Baldwin INVENTOR

Patented Sept. 11, 1928. 1,683,946

UNITED STATES PATENT OFFICE.

NATHANIEL BALDWIN, OF EAST MILL CREEK, UTAH.

LOUD SPEAKER.

Application filed June 14, 1926. Serial No. 115,892.

The present invention appertains to loud speakers and particularly to those in which large diaphragms are used without horns.

The principal objects are to provide a simple and efficient means to increase the force of the operating armature upon the diaphragm and to increase the freedom of operation of such diaphragm. I attain these and other objects by the mechanism illustrated in the accompanying drawing in which Figure 1 is a section of the instrument embodying the essential features of the invention.

Numeral 1 designates a housing in which the working elements are mounted. The ring 2 secured to the inner surface of this housing near one end and the gasket ring 3 made of soft rubber or other suitable material form a seat for the diaphragm 4. This diaphragm made of paper or other light membrane has a special cuspoidal curvature as shown and is adapted to withstand pneumatic pressure within the housing 1, which pressure against the diaphragm is counter-balanced by the tension on the connecting link 5 which may be a cord or a rod having a flexible connection to the operating element. A disc 4a made of stiff light material may be used to advantage to re-enforce the middle part of the diaphragm. A threaded ring 6 clamps the edge of the diaphragm against the gasket 3 and seals the joint between the diaphragm and housing.

A stream of gas, preferably some gas lighter than air such as hydrogen is admitted to the chamber thus formed through the tube 7 and escapes through the opening 8. The valve 9 is acted upon by a spring so that a certain pressure suitable for the diaphragm 4 is required to open it, and this pressure will be accurately maintained within the housing 1.

The operating element consists essentially of an armature 10, fulcrumed within the spool 11 containing the actuating winding, pole pieces 12, 12, magnet 13 and cushion 14.

Special shaped fulcrum points 15 fixed within the spool 11 fit into special shaped sockets formed in the armature 10, in such way that the fulcrum will stand an end pull on the armature, or a side pressure, and the armature is placed on an angle exceeding ninety degrees with the connecting link 5 thus providing a mechanical power on the principle of the toggle joint. It will be seen that between the limits of ninety degrees and one hundred eighty degrees the greater the angle the greater the mechanical advantage, and the angle of greatest efficiency is found experimentally for the particular diaphragm to be used.

The pressure of the gas within the housing 1 produces a tension on the link 5 which holds one end of the armature 10 in contact with the cushion 14 and the adjusting screw 16 serves to center the armature between the polepieces.

The gas within the housing 1 being much lighter than air offers slight resistance to the vibration of the diaphragm, thus permitting most of its acoustic energy to be impressed upon the open air.

The magnet 13 with the other operating parts is mounted within the housing 1 upon the block 17 and the housing 1 is mounted upon the base plate 18.

One of the principal features of the present invention is the armature disposed at an obtuse angle with the connecting link and it is understood that this combination may be used in connection with sound producing elements other than diaphragms such as sound boards, pneumatic valves or microphones as indicated in the appended claims.

I claim:

1. A loud speaker comprising a diaphragm, an electrically operated armature mounted upon a fulcrum, and a link flexibly connected to said armature to transmit the movement of said armature to said diaphragm, said armature being disposed to said link at an angle substantially greater than ninety degrees.

2. A loud speaker comprising a diaphragm, an electrically operated armature mounted upon a fulcrum, and a link flexibly connected to said armature to transmit the movement of said armature to said diaphragm, said armature being disposed to said link at an angle substantially greater than ninety degrees and substantially less than one hundred eighty degrees.

3. A loud speaker comprising a diaphragm, an electrically operated armature mounted upon a fulcrum, a link under tension and flexibly connected to said armature to transmit the movement of said armature to said diaphragm, said armature being disposed to said link at an angle substantially greater than ninety degrees and substantially less than one hundred eighty degrees, and a resilient member at one end of said armature to balance the tension of said link.

4. A loud speaker comprising a diaphragm

having a light gas on one side and the other side exposed to the open air, an electrically operated armature mounted upon a fulcrum and a link flexibly connected to said armature to transmit the movement of said armature to said diaphragm, said armature being disposed to said link at an angle substantially greater than ninety degrees and substantially less than one hundred eighty degrees.

5. A loud speaker comprising a diaphragm having a light gas under excess pressure on one side and the other side exposed to the open air, an electrically operated armature mounted upon a fulcrum, a link flexibly connected to said armature and under tension to counter-balance the excess pressure on said diaphragm and to transmit the movement of said armature to said diaphragm, said armature being disposed to said link at an angle substantially greater than ninety degrees and substantially less than one hundred eighty degrees, and a resilient member at one end of said armature to balance the tension of said link.

6. A loud speaker comprising a sound producing element, an electrically operated armature mounted upon a fulcrum, and a link flexibly connected to said armature to transmit the vibration of said armature to said sound producing element, said link being disposed to said armature at an obtuse angle.

7. A loud speaker comprising a housing, an electrically operated armature, a diaphragm co-operating with said housing to form an enclosed space, said diaphragm being actuated by said armature, and a gas lighter than air in the space enclosed by said housing and said diaphragm.

8. A loud speaker comprising a housing, an electrically operated armature, a diaphragm co-operating with said housing to form an enclosure space, said diaphragm being actuated by said armature and a gas lighter than air under modified pressure in the space enclosed by said housing and said diaphragm.

9. A loud speaker comprising a sound producing element, an electrically operated armature, and a link flexibly connected to said armature to transmit the vibration of said armature to said sound producing element, said link being disposed to said armature at an obtuse angle.

NATHANIEL BALDWIN.