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W. E. GIBBS

CONE SPEAKER

Filed Nov. 2, 1926

Fig. 1.

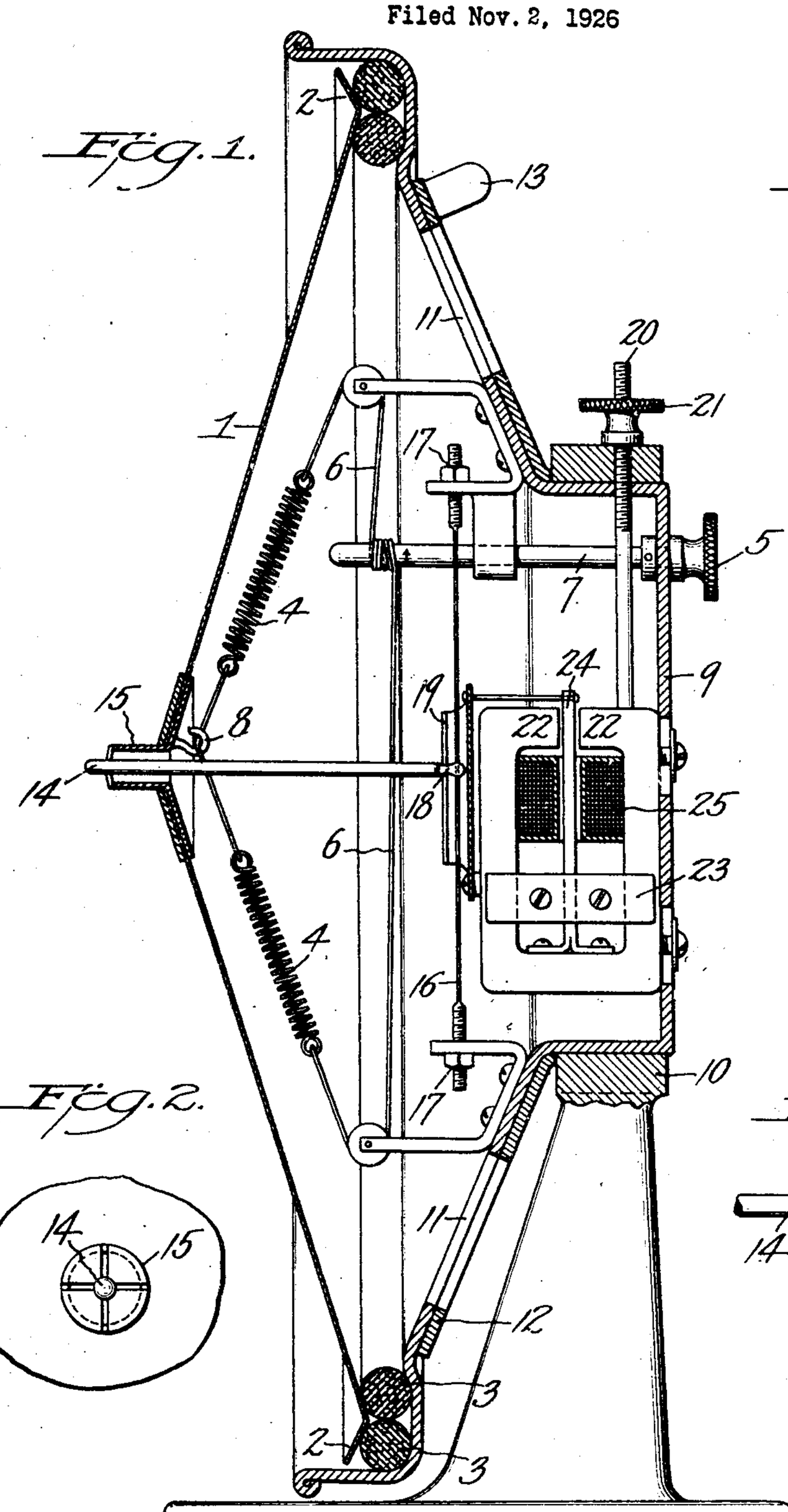


Fig. 3.

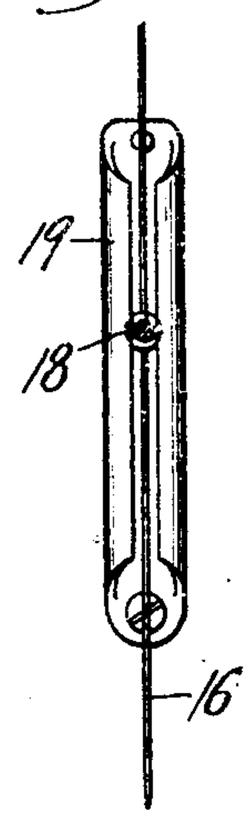


Fig. 2.




Fig. 4.


WITNESS

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# UNITED STATES PATENT OFFICE.

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## CONE SPEAKER.

Application filed November 2, 1926. Serial No. 145,831.

My invention relates in general to loud speakers of cone or similar type and has for its object to provide a construction by which fidelity of reproduction may be secured. To this end, the invention provides for certain adjustments by which the performance of the various elements may be so regulated as to most advantageously cooperate with each other for the attainment of a high degree of quality and purity of tone. In many respects, the present invention presents further improvements on the loud speaker set forth in my prior application filed July 15, 1926, Serial No. 122,600.

An embodiment of the invention is shown by way of example in the accompanying drawing, in which

Figure 1 is a vertical section of a loud speaker containing the improvements, on a plane extending from front to rear.

Figure 2 is a detail front elevation of the frictional connection between the apex of the cone and the drive rod of the actuating unit.

Figure 3 is a detail view of the adjustable connection between the inner or rear end of the drive rod and the vibrating lever of the actuating unit.

Figure 4 is a top plan view of a portion of the drive rod showing the vibrating lever of the actuating unit in cross section.

In the drawings, 1 is a cone of vibratile material having an everted edge 2 in engagement with annular cushions 3, 3, under variable pressure controlled by tension means such as springs 4, 4, whose tension may be adjusted by turning the milled head 5 whereby the cord 6 is wound round the shaft 7. The cord 6 engages a hook 8 near the center of the cone by which said cone is drawn against cushions 3, 3. The cone is thus put under strain by forces that tend to increase its angle.

Cones of different sizes, thickness, angle or material require that different degrees of tension be applied to their apices to give each its maximum sensitiveness to vibrations conveyed to it by the drive rod of the actuating unit.

A case 9 which may be of stamped metal supports the cushion 3 and is itself held in a stand 10. The case has openings 11 in its wall, whose area may be varied by a concentric shutter 12 that may be turned by the handle 13.

I find that the resonance of the enclosed space between the cone and the case when properly adjusted by means of the shutter adds richness to the tone. If the shutter is closed too much, however, a hollow or barrely tone is produced. The correct opening depends on so many variables that means for adjusting it are necessary for bringing out the desired timbre.

The cone 1 is vibrated by means of a drive rod 14 of novel construction. Its outer end engages the jaws of the spring chuck 15 with frictional contact as set forth in my earlier application, Serial No. 122,600, filed July 15, 1926. The other or inner end of drive rod 14 is held in the axis of the cone by being fastened to a wire 16 which may be tightened by adjusting means such as the screws and nuts 17 at its ends.

The drive rod has near its inner end a neck 18. The driving member 19 of elastic metal is tubular in cross section and has a longitudinal slot in its wall. The edges of said slot engage the neck 18 of the drive rod frictionally with sufficient force to transmit sonorous vibrations thereto. The neck of the drive rod has a gradual reduction of diameter toward its center so that it tends to maintain a position in the slotted tube where the engaging edges find the smallest diameter. Moreover, a temporary displacement from that position caused by unusually violent vibration is free from rattle. The engagements of the ends of the drive-rod with the cone and actuating member act as universal joints for the angular component of the small amplitude of the vibratory motion transmitted. Hence there is no side whip to the drive rod, with its attendant waste of energy.

The point at which the drive rod engages the actuating lever 19 has a marked effect on the development of the bass notes of the musical scale, and this point also varies with different cones.

In order to bring out the best qualities of the cone in use, I provide means such as the threaded rod 20 and milled nut 21 for raising or lowering the actuating unit which is slidably supported in the case.

The taut wire 16 holds the head of the drive rod in axial position so that by raising or lowering the actuating unit the split tube 19 may be moved up or down to a place where the most desirable tone-quality is obtained. The frictional grip on the neck of

said drive rod remains practically constant for the entire length of the split tube.

It frequently happens in actuating units of the vibrating reed type, or in the balanced armature type, that these parts too closely approach magnetic saturation due to the proximity of the poles of the permanent magnet such as 22.

I have therefore provided adjustment means consisting of an iron bar 23 across the limbs of the magnet and fastened by screws to a similar bar on the other side. This pair of bars may be moved up or down. Their object is to short circuit part of the magnetic flux in the permanent magnet 22, 22 and thereby reduce the flux in the reed 24 to a degree at which its faithful response to the fluctuating currents in the surrounding coil 25 is a maximum.

By means of the various adjustments herein described, I am able to improve, in quality and range, the tones of loud speakers of this type.

I claim:—

1. In a loud speaker, a conical vibratile member having an everted rim, a cushion support therefor in elastic engagement therewith and having contact both within and without the angle formed by said conical member and its everted portion, and elastic tension means applied axially to said conical member in opposition to the thrust of said cushion.

2. In a loud speaker having a vibratile member and an actuating unit therefor, a drive rod connecting them having adjustable frictional engagement with the actuating unit, and means for varying the amplitude of longitudinal vibration of said drive-rod.

3. In a loud speaker, a vibratile member, an actuating unit therefor and a connecting drive-rod in frictional engagement with said vibratile member and vibration amplitude adjusting engagement with said actuating unit.

4. In a loud speaker, a vibratile member, an actuating unit therefor and a connecting drive rod in frictional engagement with said vibratile member and vibration amplitude adjusting engagement with said actuating unit, said engagements being universal joints.

5. In a loud speaker, a vibratile member, an actuating unit and a drive rod connecting them by frictional engagement, means independent of said actuating unit for maintaining said drive rod in substantially axial position.

6. In a loud speaker, an actuating unit having a vibrating lever, a drive rod engaging said lever and having its point of engagement movable longitudinally of said lever.

7. In a loud speaker, an actuating unit having a vibrating lever, a drive rod engaging said lever and having its point of engagement movable longitudinally of said lever, and adjustment means for moving said point of engagement.

8. In a loud speaker, a case, a drive rod maintained axially thereof, an actuating unit in movable engagement with said case and said drive rod, and adjustment means for varying the position of said actuating unit relatively to said drive rod.

9. In a loud speaker having a vibratile member, an air enclosing case supporting said vibratile member and having openings through its wall, an adjustable shutter coacting with said openings to vary the resonance of the enclosed air.

10. In a loud speaker having a vibratile member, an actuating unit therefor and a drive-rod connecting them, an angularly flexible frictional engagement of the drive rod and the vibratile member permitting frictionally retarded longitudinal movement between said drive rod and said vibratile member, an angularly flexible frictional engagement of said drive rod with said actuating unit, permitting frictionally retarded adjustment of the point of engagement of said drive rod with the actuating unit in a direction transverse to said drive rod.

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