

Dec. 16, 1969

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3,484,799

VOICE AMPLIFIER TOY

Filed Jan. 15, 1968

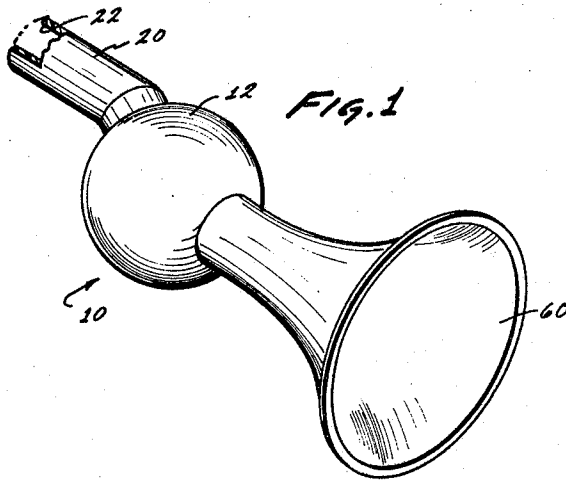


FIG. 1

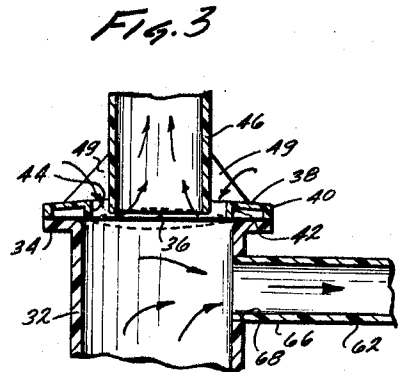


FIG. 3

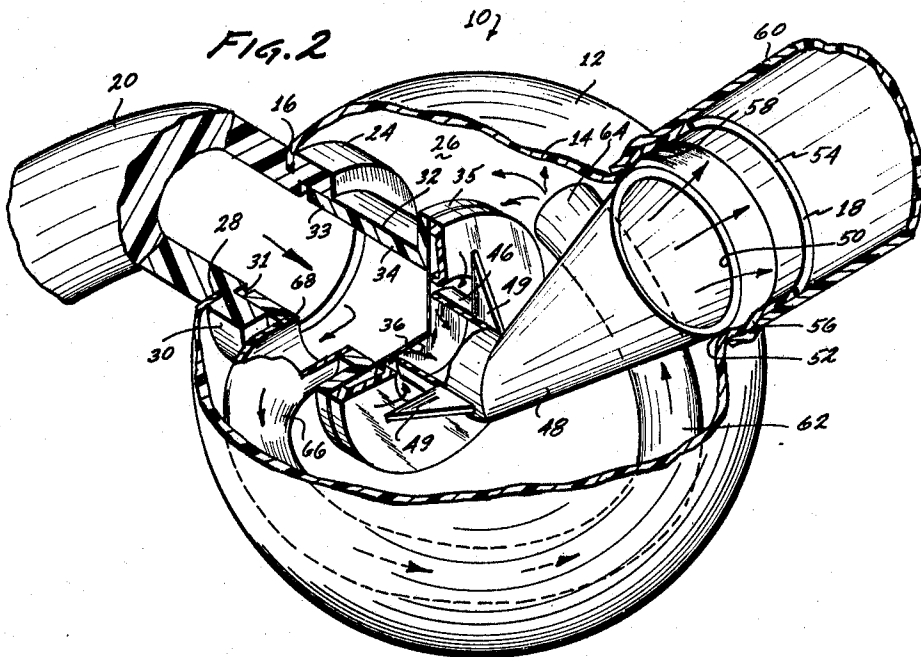


FIG. 2

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**VOICE AMPLIFIER TOY**

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Filed Jan. 15, 1968, Ser. No. 697,813

Int. Cl. A63h 5/00

U.S. Cl. 46—182

8 Claims

**ABSTRACT OF THE DISCLOSURE**

A voice amplifier includes a diaphragm mounted in one end of a mouthpiece. A plenum chamber encompasses the diaphragm and suitable means, such as a tube, places the upstream side of the diaphragm in fluid communication with the downstream side thereof forming a low impedance path for air flow and a high impedance path for audio frequency.

**BACKGROUND OF THE INVENTION**

The background of the invention will be set forth in two parts.

**Field of the invention**

The invention pertains generally to the field of voice amplifier toys and more particularly to an improvement in such a toy of means placing the upstream side of a voice-actuated diaphragm in fluid communication with the downstream side thereof inside a plenum chamber encompassing the diaphragm and an acoustic cone communicating with the downstream side of the diaphragm.

**Description of the prior art**

A kazoo of the type comprising an open-ended tube with a membrane-covered side hole is, of course, well known. The membrane vibrates when a person sings or hums into the kazoo.

Other examples of devices having a membrane or diaphragm which vibrates when a person sings or hums into the device may be found in U.S. Patent Nos. 2,559,124; 2,700,316 and 3,343,298.

**SUMMARY OF THE INVENTION**

It is a primary object of the present invention to provide a device of the type described which exemplifies improvements over the prior art.

Another object of the present invention is to provide a new and useful device of the type described which includes means placing the upstream side of its diaphragm in fluid communication with the downstream side thereof.

According to the present invention, a voice amplifier toy is provided which includes a mouthpiece having a mouth-engaging end and another end. A diaphragm is mounted in the other end of the mouthpiece and includes an upstream side communicating with the mouthpiece and a downstream side. A sealed plenum chamber encompasses the diaphragm and an acoustic cone communicates with the downstream side of the diaphragm and has its small end mounted closely adjacent the diaphragm.

Means are provided for placing the upstream side of the diaphragm in fluid communication with the downstream side thereof for forming a low impedance path for air flow and a high impedance path for audio frequency. This permits volume flow of air through the cone amplifying the sound emitted by the toy. The large end of the cone is disposed in a transition member which connects a horn to the plenum chamber.

The features of the present invention which are believed to be novel are set forth with particularity in the appended

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claims. The present invention, both as to its organization and manner of operation, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings in which like reference characters refer to like elements in the several views.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIGURE 1 is a perspective view of a voice amplifier toy constituting a presently preferred embodiment of the invention;

FIGURE 2 is an enlarged, partial perspective view similar to FIGURE 1 with parts broken away to show internal construction;

FIGURE 3 is a partial cross-sectional view of the internal construction shown in FIGURE 2.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring again to the drawings, a voice amplifier toy constituting a presently preferred embodiment of the invention, generally designated 10, includes a plenum means 12 having an encompassing wall 14 provided with an aperture 16 and a substantially cylindrical neck member 18. The plenum means 12 may take any suitable shape and is shown herein for purposes of illustration, but not of limitation, as comprising a hollow spherical member.

Toy 10 also includes a mouthpiece means 20 having an open, mouth-engaging end 22 and another end 24. Mouthpiece means 20 is mounted in aperture 16 with end 24 disposed within a chamber 26 within plenum means 12 and is provided with an annular groove 28 engaged by wall 14 for securing mouthpiece means 20 to plenum means 12. End 24 of mouthpiece means 20 is provided with an enlarged portion 30 having an increased, inside diameter forming a shoulder 31 with end 24. A cylindrical member 32 includes a first end 33 received in enlarged portion 30 adjacent shoulder 31 and a second end 34 provided with an annular, diaphragm-carrying flange 35 to which a diaphragm means 36 may be affixed.

A torus-shaped cap member 38 includes an outer annular rim 40 and an inner annular rim 42 and is affixed to flange 34 in such a manner that rim 40 engages diaphragm means 36 against flange 34 and rim 42 engages diaphragm means 36 inside cylindrical member 32. Cap member 38 also includes an annular opening 44 in which a cylindrical throat 46 of a conical coupling member 48 is received. The diameter of throat 46 is sufficiently smaller than the diameter of opening 44 that throat 46 may be maintained in spaced relationship with cap member 38 by a plurality of gusset plates 49.

Coupling member 48 includes an opening end 50 frictionally engaged in an open end 52 of a cylindrical neck 54 formed integrally with plenum 12. Neck 54 is provided with an annular bead 56 frictionally receiving a matching annular trough 58 provided on a bell or horn 60 for connecting horn 60 to plenum 12 for receiving sounds issuing from coupling member 48.

A hollow tube or conduit 62 is mounted in chamber 26 and includes a discharge end 64 and an inlet end 66. Inlet end 66 is received in an aperture 68 provided in cylindrical member 32 intermediate its ends 33 and 34 for placing mouthpiece means 20 in fluid communication with chamber 26 upstream of diaphragm means 36. Conduit 62 comprises a low impedance path for air flow and a high impedance path for audio frequencies. A user of voice amplifier 10 may position his lips at end 22 of mouthpiece means 20 and hum expelling air as well as acoustic energy. This air flows into plenum 12 developing a pressure causing flow through throat 46. Additionally, acoustic pressures are created in mouthpiece means 20 causing

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vibrations of diaphragm means 36 with corresponding changes in resistance to flow in an annulus defined by diaphragm means 36 and tone throat 46. The fluctuating flow through throat 46 results in an acoustic output. The use of both this acoustic energy and flow energy effects a substantial increase in output over the unaided voice. The conduit 62 permits flow energy to flow into plenum 12, from whence the developed pressure causes flow through throat 46, where this flow energy is modulated by the varying position of diaphragm means 36 in response to the incident acoustic pressure.

A number of different materials may be used satisfactorily for making voice amplifier 10. For example, diaphragm means 36 may comprise a film of polyethylene terephthalate. The conduit 62 may be made from any suitable pliable plastic or rubber material and the remaining portions may be made from suitable acetal resin compositions.

A number of different design parameters for the voice amplifier 10 will manifest themselves to those skilled in the art. For example, diaphragm means 36 may be spaced approximately 0.013 inch from throat 46; diaphragm means 36 may be approximately 0.001 inch thick; mouthpiece means 20 may have an inside diameter of approximately 1 inch and may be 2 to 3 inches long; conduit 62 may have an inside diameter of approximately one-half inch and may be approximately 5½ inches long; chamber 26 may have a volume of approximately 25-30 cubic inches; the end of throat 46 adjacent diaphragm means 36 may be formed with a rim radius of approximately 0.035 inch and the inside diameter of throat 46 may be approximately 0.5 inch. Diaphragm means 36 should be free of wrinkles when installed, but should not be under tension. The center of diaphragm means 36 should be within approximately 0.025 inch of the axial center line of throat 46.

Additionally, outlet 64 of conduit 62 should exhaust freely into chamber 26, rather than near a boundary which could provide a constriction to the flow. Diaphragm means 36, flange 35 and annular rim 38 may be cemented or ultrasonically welded together.

While the particular voice amplifier herein shown and described in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiment of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims, which form a part of this disclosure.

What is claimed is:

1. In combination with a voice amplifier including a mouthpiece means having a mouth-engaging end and another end, a diaphragm means mounted in said other end,

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said diaphragm means having an upstream side communicating with said mouthpiece means and a downstream side, a plenum chamber encompassing said diaphragm means and a coupling member communicating with the downstream side of said diaphragm means, the improvement comprising:

means placing the upstream side of said diaphragm means in fluid communication with the downstream side thereof for forming a low impedance path for air flow and a high impedance path for audio frequency, thereby permitting volume flow of air through said coupling member.

2. A combination as stated in claim 1 including a horn in fluid communication with said coupling member.

3. A combination as stated in claim 1 wherein said coupling member includes a throat having an end spaced from said diaphragm means, whereby said coupling member is free of engagement with said diaphragm means.

4. A combination as stated in claim 1 wherein said plenum chamber is a hollow, spherical member.

5. A combination as stated in claim 1 wherein said diaphragm means comprises a film of polyethylene terephthalate having a thickness of approximately 0.001 inch.

6. A combination as stated in claim 1 wherein said fluid communication means comprises a hollow conduit mounted in said plenum chamber and having an inlet end connected to said mouthpiece means upstream of said diaphragm means and an outlet end exhausting freely into said plenum chamber.

7. A combination as stated in claim 4 wherein said spherical member is provided with a first aperture receiving said mouthpiece means and wherein said mouthpiece means is an L-shaped member, said spherical member being provided with a cylindrical member having an open end forming another aperture in said spherical member, said coupling member having an open end frictionally engaged in said second aperture.

8. A combination as stated in claim 7 including a horn connected to said cylindrical member.

#### References Cited

##### UNITED STATES PATENTS

705,398	7/1902	Gustine	46-182
3,343,298	9/1967	Green	46-182
3,407,897	10/1968	Jenny	46-182 X

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U.S. Cl. X.R.

84-330