Sept. 4, 1923. 1,466,877

L. J. GRUBMAN

SOUND PRODUCING DEVICE

Filed Dec. 28, 1922 2 Sheets-Sheet 1

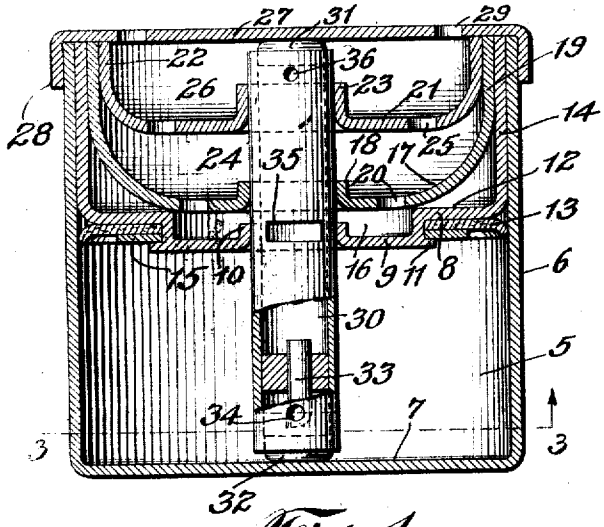


Fig. 1.

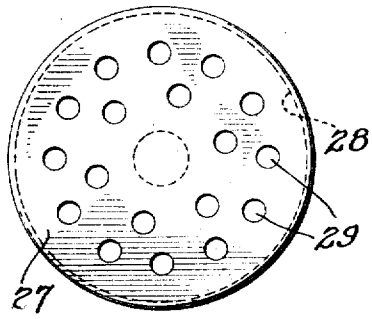


Fig. 2.

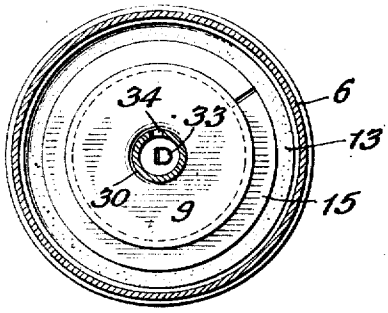


Fig. 3.

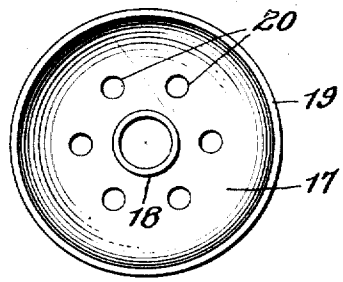


Fig. 4.

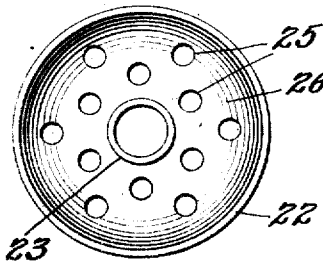


Fig. 5.

Inventor
Leo J. Grubman,
By his Attorney C. P. Goepel

Sept. 4, 1923. 1,466,877

L. J. GRUBMAN

SOUND PRODUCING DEVICE

Filed Dec. 28, 1922 2 Sheets-Sheet 2

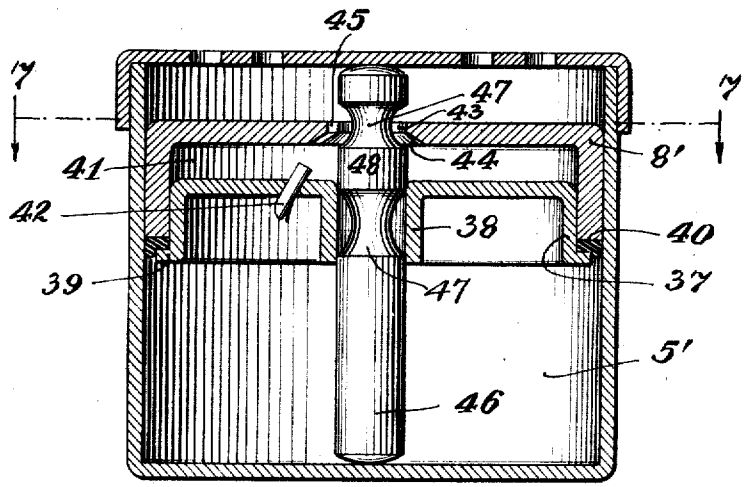


Fig. 6.

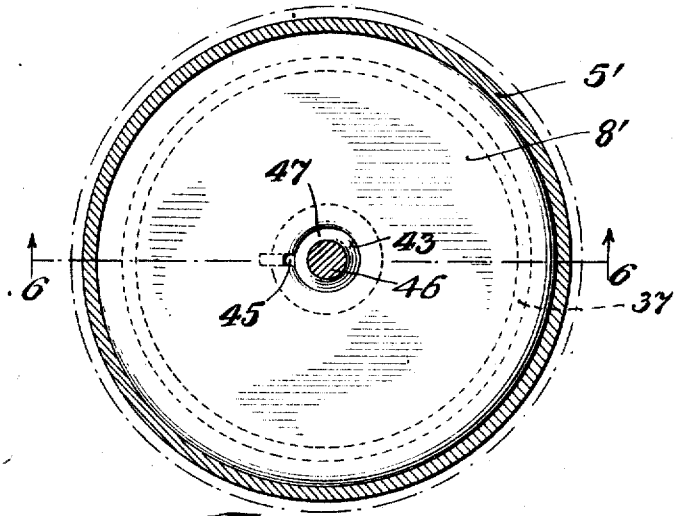


Fig. 7.

Inventor
Leo J. Grubman
By his Attorney C. P. Goepel

Patented Sept. 4, 1923. 1,466,877

UNITED STATES PATENT OFFICE.

LEO J. GRUBMAN, OF NEW YORK, N. Y., ASSIGNOR TO GRUBMAN ENGINEERING & MANUFACTURING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

SOUND-PRODUCING DEVICE.

Application filed December 28, 1922. Serial No. 609,397.

To all whom it may concern:

Be it known that I, LEO J. GRUBMAN, a citizen of the United States, and a resident of New York city, county and State of New York, have invented certain new and useful Improvements in Sound-Producing Devices, of which the following is a specification.

This invention relates to sound producing devices, and more particularly, to a device of that type which is incorporated within the body of a doll for the purpose of simulating an infant cry, such as the exclamations "Oh! Ma-ma" or "Ma-ma." Various devices for the above purpose have heretofore been employed with more or less success. In most instances, however, it has been proposed to utilize a bellows of conventional form, one part of which carries a sound producing reed. Devices of this class are, however, more or less uncertain in their operation, and will not long withstand severe shocks and jars incident to abusive handling to which such dolls are not infrequently subjected. Again, it has been proposed to discard the conventional V type of bellows and in lieu thereof, employ a gravity movable air expelling member mounted within an air receiving chamber and connected by a flexible membrane to the head closing one end of such chamber. In this case, however, the movable member is supported upon a central sound emitting tube fixed at its ends and contact between this tube and the part of the gravity movable member engaged therewith offers an appreciable frictional resistance to the free movement of said member.

In my present invention I aim to overcome the above and other objectional features existing in sound producing devices of this character and to provide such a device which is not only of simple construction and great durability, but which will also operate without fail in a very positive manner to produce a realistic simulation of the human infant cry. To this end therefore, in one embodiment of the invention, I provide an air receiving chamber which may be suitably mounted within the body of a doll. Within this chamber there is arranged a member freely movable by gravity longitudinally of the chamber. Extending longitudinally of the air chamber, there is loosely arranged a sound emitting tube carrying a sound producing reed. This tube has a free floating movement within the chamber, or in other words, is not positively secured in fixed relation to the chamber walls. Thus while said tube provides means for controlling the expulsion of air from said chamber in the gravity movement of the member therein, it does not in any sense serve as a support for said member. In my present construction this support is afforded by the body wall of the air chamber, said member having an annular wall slidingly engaged with the chamber wall. Thus it will be understood that I dispense altogether with the use of a flexible or collapsible membrane and since such membranes are liable to structural deterioration or disconnection or rupture at their points of attachment to the fixed and movable parts, it will be manifest that I have materially enhanced the durability and positive action of devices of this nature.

In a preferred embodiment of the invention, I so construct the gravity movable member that there is produced a series of spaced relatively fixed parts controlling the emission of air from the sound producing means and thus determining the intervals between the emitted sounds in the gravity movement of said member.

With the above and other objects in view, my invention consists in the improved sound producing device for dolls or other toys and in the form, construction and relative arrangement of its several parts as will be hereinafter more fully described, illustrated in the accompanying drawing and subsequently incorporated in the subjoined claims.

In the drawing wherein I have disclosed several practical and satisfactory embodiments of the invention and in which similar reference characters designate corresponding parts throughout the several views:

Figure 1 is a longitudinal section of a sound producing device constructed in accordance with my present disclosure;

Figure 2 is an end elevation;

Figure 3 is a horizontal section taken on the line 3—3 of Figure 1;

Figures 4 and 5 are detail plan views of the nested sound controlling sections of the gravity movable member;

Figure 6 is a sectional view similar to Figure 1 illustrating an alternative form of the device; and

Figure 7 is a horizontal section taken on the line 7—7 of Figure 6.

In the drawing for purposes of illustration I have shown the several essential elements of the present invention assembled in co-operative relation with a cylindrical or drum shaped form of the air receiving chamber. It will, however, be apparent as the description proceeds, that this chamber may assume various other forms, shapes or dimensions in order to satisfactorily meet the particular conditions which may exist in a specific practical application of the device to a doll or other toy figure. I may, therefore, refer generally to this air receiving chamber, herein designated by the numeral 5, as being of sufficient internal dimensions that it possesses the requisite air capacity for the production and emission of the desired sounds. This chamber may be conveniently constructed by a suitable stamping operation from aluminum or other sheet material, and as herein shown, is formed with a cylindrical body wall 6 and an integral end wall 7 closing one end of said chamber.

Within the chamber 5 a gravity movable air expelling member is arranged, said member having a maximum external diameter substantially equal to the internal diameter of the chamber but permitting of the free and unretarded sliding movement of said member therein. This air expelling member is preferably constructed in three separate sections, of cast iron, steel or other relatively heavy material. The lower section 8 of said member is provided with a central depressed annular portion 9 having a central opening therein surrounded by an upwardly projecting boss or flange 10. The lower or base wall of the depressed portion 9 of said section is laterally extended to form an annular flange 11 thereon which is spaced from the outer portion 12 of the bottom wall of said section. An annular ring or gasket 13 of flexible material is engaged with the lower face of the portion 12 of the bottom wall and at its outer edge has sliding frictional contact with the inner surface of the chamber wall 6 to prevent the escape of air upwardly between said wall and the cylindrical body wall 14 of the section 8. The ring or gasket 13 is held in place by a split resilient washer 15 interposed between the inner edge of said ring and the flange 11.

The depressed portion 9 of the section 8 provides an annular air expansion chamber 16. This chamber at its upper side is partially closed by the section 17 of the gravity movable member which, as herein illustrated, is of cup-shaped form and provided in its base portion with a central opening surrounded by the upstanding boss or flange 18.

The section 17 is nested within the section 8, the wall thereof having a longitudinally extending annular portion 19 closely engaged with the wall 14 and frictionally coacting therewith so as to retain said sections in permanent assembled relation. The base wall of the section 17 is further provided with an annular series of apertures 20 surrounding the boss 18 and communicating with the air expansion chamber 16 of the section 8.

Within the section 17, a third section 21 is held in permanently assembled or nested relation by frictional coaction of its longitudinally extending wall portion 22 with the parallel cylindrical portion 19 of the wall of the section 17. This section 21 is likewise centrally provided with an opening surrounded by an upstanding boss or flange 23, the bottom or base portion of said section being spaced from the corresponding opposed portion of the section 17 and thus providing a second air expansion chamber 24. The horizontal portion of the section 21 is provided with a plurality of spaced apertures 25 which afford communication between the chamber 24 and a third air expansion chamber 26 which is formed between the wall of the section 21 and the closure head 27 for the open end of the chamber 5. This head may be secured upon the end of the body wall 6 of said chamber in any preferred manner, but as herein shown, said head is provided with an annular marginal flange 28 engaging the outer surface of the wall 6 with close frictional contact. The head 27 is provided with a multiplicity of spaced apertures 29 which afford communication between the expansion chamber 26 and the atmosphere exteriorly of the device and constitute the final emission apertures or openings for the sound waves.

The three part gravity movable member above described co-operates with an air emitting means which is provided with a sound producing reed or other equivalent element. This emission means for the air expelled from the chamber 5 in the present instance, is illustrated in the form of a tube 30 which is loosely engaged through the central openings of the three sections 8, 17 and 21 of the air expelling member, said tube being slidingly engaged by the flanges 10, 18 and 23 of the respective sections. Each end of the tube 30 is closed by a suitable plug, the plug 31 in one end of said tube having sliding contact with the face of the head 27, while the plug 32 in the other end of said tube has sliding contact upon the base wall 7 of the air chamber 5. It will thus be under-

stood that this tube is not fixed with respect to the walls of the main air chamber, and may, therefore, be aptly referred to as "floating" within said chamber. It will accordingly be understood that this tube does not constitute a support for the gravity movable member, such support being entirely furnished by the sliding coacting engagement of the cylindrical wall portion 14 of the section 8 with the wall 6 of the main air chamber.

Within one end of the tube 30 adjacent to the closure plug 32 a sound producing reed 33 is suitably mounted, and contiguous to this reed the wall of the tube is provided with an air inlet aperture 34. Intermediate of its ends, the wall of the tube 30 is also provided with a main air emission orifice or opening 35, herein illustrated as of rectangular form. Adjacent to its other end, the wall of said tube is provided with a second air emission orifice or opening 36 which, however, is of appreciably less area than the openings 34 or 35.

In the operation of the device as above described, when the doll or other figure toy is inverted or disposed in certain predetermined positions, the air expelling member will move along the tube 30 into one end of the chamber 5, as shown in Figure 1 of the drawing. When the doll is again returned to upright position, said member moves by gravity in the reverse direction or downwardly in the chamber 5 and along the tube 30 from the position shown in Figure 1. In this gravity movement of the air expelling member, the air in the chamber 5 below said member is first forced through the orifice 34 and passing through the reed 33 the expelled air is converted into sound waves. In the initial gravity movement of the expelling member, the expelled air having been converted into sound by the reed 33, first issues through the opening 35 of the tube 30, emitting a more or less subdued sound simulating the exclamation Oh! as the flange 10 passes said opening. When the opening is closed by flange 18 of the section 17 of the expelling member, the sound waves issue from the nasal orifice 36, simulating the sounding of the consonant M. As the flange 18 passes below the orifice 35, the sound waves issuing therefrom simulate the sound of the spoken vowel "a". When the flange 23 covers the opening 35, the sound waves again isssue from orifice 36 and the sound of the second consonant M is produced and as this flange 23 passes said opening the second vowel sound "a" is emitted therefrom. Thus the entire exclamation "Oh! Ma-ma" will be realistically simulated. As I have disclosed in a co-pending companion application Serial No. 609,398, filed December 28th, 1922, by the elimination of the smaller orifice 36, thereby eliminating the sounding of the nasal consonant M, the emitted sounds may be caused to simulate the pronunciation of the word "Pa-pa".

Of course, it will be understood that when the sound expelling member finally comes to a position of rest, all of the air has been expelled from the chamber 5 and when the device is again inverted to cause the member to move by gravity in the opposite direction, the air entering through the openings 29 will immediately pass through the openings 35 and 34 into said chamber and again fill the same. Free communication exists between the several chambers, 16, 24 and 26 with the exterior atmosphere during this movement of the member 8 so that as said member finally comes to a position of rest against the head 27, there is a final intake of air through the opening 35 until this opening is fully closed simultaneously with the termination of such sliding gravity movement of the member 8. Thus the formation of any vacuum within the chamber 5 is obviated and the complete filling of said chamber with air is assured so that there will be an immediate expulsion of air from said chamber through the sounding reed at the start of the gravity movement of the member 8 from the position shown in Figure 1.

In Figures 6 and 7 of the drawing I have illustrated an alternative embodiment of my present invention, wherein the cup-shaped piston or air expelling member 8′ is positioned for gravity movement in the air chamber 5′ in a reverse position to the arrangement shown in Fig. 1 of the drawing. In other words, in this construction the open side of the air expelling member is downwardly disposed. Within said member 8′ the annular member 37 is frictionally fitted and is provided with a central tubular boss or extension 38 on its base wall. The annular body wall of the member 37 is formed with an outwardly projecting flange 39 between which and the edge of the member 8′ a packing ring or gasket 40 is disposed. It will be noted that the base wall of the member 37 is spaced from the corresponding wall of the member 8′ thereby providing the air expansion chamber 41. One end of the sound producing reed 42 fixed in the wall of the member 37 extends into this chamber.

The member 8′ is centrally provided with an opening 43, the lower portion of which is flared or diametrically enlarged as at 24. At one side of the opening 43 a recess or channel 45 is provided which functions as the nasal orifice in a similar manner to the orifice 36 in the construction previously described.

The sound emission member 46 in this form of the device is of solid cylindrical construction and also is free or unattached at its ends to the head walls of the main

air chamber 5'. Adjacent its upper end the member 46 is provided with spaced annular grooves or recesses 47. This member extends freely through the tubular boss 38 and the opening 43, the air expelling member being unretarded in its free gravity movement in the air chamber. Owing to the floating arrangement of the member 46, the parts will nevertheless properly cooperate and function even though the opening 43 and the tubular boss 38 may not be accurately centered.

In Figure 7 of the drawing I have shown the air expelling member in an intermediate position, or at that point in its movement during which the first vowel "a" is being sounded. In the initial movement of this member, it will be understood that the opening 43 with the exception of the lateral recess 45, is closed by the end of the member 46 and during such initial movement before the opening 43 arrives in line with the first of the channels of the recesses 47 the consonant letter "M" will be sounded. After sounding the first vowel "a", in the further movement of the member 8' and while the part 48 of the member 46 between the recess 47 thereof is positioned in the opening 43, the second consonant "M" is sounded and when the opening 43 arrives in registration with the lower channel, or groove 47 of the member 46, the final vowel "a" is sounded. It will thus be apparent that in this alternative arrangement, wherein the reed is carried by the expelling member and the floating member controlling the emission of the sound is of solid construction, the same results as are obtained by the construction first described will be accomplished.

From the foregoing description considered in connection with the accompanying drawing, it will be seen that I have materially improved devices of this character as heretofore used in the art and have provided a gravity operating means primarily controlling the production of the desired sounds which will be perfectly free and positive in its action. At the same time, I have wholly dispensed with the use of the flexible membrane or other parts which may rapidly deteriorate or become easily fractured or broken and thus seriously impair the proper operation of the device if the same is not rendered altogether useless. In other words, by relieving the central air emission tube of the function of furnishing a support for the gravity movable air expelling member so that said tube serves merely the purpose of directing the emission of the air from the main air chamber, I have increased the durability of such devices to a marked degree resulting in a complete assurance of the proper functional operation of the device at all times. I have herein referred with more or less particularity to the particular construction of the gravity movable air expelling member. It is to be understood, however, that such structural details are not necessarily essential to the accomplishment of the desired purpose and that my present improvements broadly comprehend a device of this general character wherein the sound emission and producing means is not subjected to a lateral bearing pressure by the gravity movable air expelling member, said member being supported solely by the walls of the main air chamber within which it is mounted, and, as a structurally novel feature, an air expelling member composed of a series of nested sound emission controlling sections. In so far as I am aware, to this extent my present improvements are broadly new in the art, and it is accordingly to be understood that such improvements might well be exemplified in numerous other structural embodiments of an alternative character, and which I have embraced within the terms and spirit of the appended claims.

I claim:

1. In a sound producing device, an air chamber, an air expelling member movable in said chamber, sound producing means through which the air is expelled, and a floating member structurally separate from the expelling member arranged in said chamber with which said expelling member coacts to control the emission of the sounds produced.

2. In a sound producing device, an air chamber, an air expelling member movable in said chamber, and a floating sound producing and emitting means arranged in said chamber, including a member communicating with said chamber to receive the expelled air and with which said expelling member coacts to control the emission of the sounds produced.

3. In a sound producing device, an air chamber, an air expelling member movable in said chamber and having a plurality of air expansion chambers, and a floating sound producing and emitting means arranged in said air chamber and including a tubular orificed part communicating with said chamber to receive the expelled air and with which said member coacts to control the emission of air through said part into the expansion chambers in the movement of said member in one direction.

4. In a sound producing device, an air chamber, an air expelling member movable in said chamber, and a member unattached to the chamber walls and carrying a sounding reed, said latter member and the air expelling member having coacting means controlling the egress of air expelled by said member from said chamber.

5. In a sound producing device, an air

chamber, an air expelling member movable in said air chamber and provided with a series of communicating air expansion chambers, and a member unattached to the walls of said air chamber communicating with said chamber to receive the expelled air and carrying a sounding reed, said latter member and the air expelling member having coacting means controlling the egress of air from said air chamber into the respective air expansion chambers of said expelling member.

6. In a sound producing device, an air chamber, an air expelling member mounted for axial movement in said chamber and supported solely by the walls thereof, a floating sound producing and emitting means positioned axially of the said chamber and said expelling member and including a part with which said member coacts in its movement in one direction in said chamber to control the character of the sounds produced.

7. In a sound producing device, an air chamber, an air expelling member mounted for axial movement in said chamber and supported solely by the walls thereof, and an orificed tubular member loosely positioned axially through said air expelling member and unattached to the chamber walls and carrying a sounding reed, said tubular member communicating with the chamber to receive the expelled air said expelling member having spaced parts successively coacting with the orifice of said tubular member to control the egress of air therethrough and vary the character of the sounds produced.

8. In a sound producing device, an air chamber, an air expelling member having a wall frictionally engaged with the wall of said chamber but permitting of gravity axial movement of said member, and a floating sound producing means arranged in said air chamber and including an orificed tubular member extending axially through the air expelling member and communicating with the chamber to receive the expelled air, said members having coacting means operative in the movement of said air expelling member in one direction to control the emission of air through said tubular member and thereby vary the character of the sounds produced.

9. In a sound producing device, an air chamber, an air expelling member axially movable in said chamber and consisting of a plurality of nested sections providing a series of air expansion chambers, and sound producing and emitting means arranged in said chamber and communicating therewith to receive the expelled air and including a part with which said member coacts in its movement in one direction to control the egress of sound through said chamber into the respective air expansion chambers in the movement of said member in one direction, and thereby vary the character of the sounds produced.

10. In a sound producing device, an air chamber, an air expelling member axially movable in said chamber and consisting of a plurality of nested sections providing intercommunicating air expansion chambers, one of said chambers directly communicating with the external atmosphere through one end of the main air chamber, and relatively stationary sound producing means axially extending through said member and including a part with which said member coacts in its movement in one direction to control the emission of air from the main air chamber into the several air expansion chambers and thereby vary the character of the sounds produced.

11. In a sound producing device, an air chamber, an air expelling member axially movable in said chamber and supported solely by the walls thereof, said member consisting of a plurality of nested sections providing inter-communicating air expansion chambers, the main air chamber having openings in one wall affording communication between one of the expansion chambers and the external atmosphere, each of said sections being provided with a central opening, and a tubular orificed member carrying a sounding reed loosely engaged through said openings and unattached to the walls of the main air chamber, said member communicating with said chamber to receive the expelled air, said sections successively coacting with the orifice of the tubular member in the movement of said expelling member in one direction to control the emission of air therethrough into the several air expansion chambers and thereby vary the character of the sounds produced.

12. In a sound producing device, an air chamber, a multi-chambered air expelling member mounted for gravity axial movement in said air chamber, and sound producing means axially disposed within the air chamber and having a part with which said member coacts in its movement in one direction to control the emission of air from said air chamber into the several chambers of said member and thereby vary the character of the sounds produced.

13. In a sound producing device, an air chamber, a multi-chambered air expelling member arranged for gravity movement in the air chamber and supported solely by the walls thereof, a tubular member loosely extending axially through said expelling member and slidably engaged at its ends with the walls of said air chamber, said member communicating with the chamber to receive the expelled air, a sounding reed carried by said tubular member, and said

member having an emission orifice with which spaced parts of the air expelling member coact in the movement of the latter member in one direction to control the emission of air from the tubular member into the several chambers of said expelling member and thereby vary the character of the sounds produced.

14. In a sound producing device, an air chamber, a gravity movable member for expelling air from said chamber having a plurality of air expansion chambers, a sound producing reed through which the air is expelled in the gravity movement of said member in one direction, and means with which said expelling member coacts to control the emission of sound successively through the chambers of the expelling member.

15. In a sound producing device, an air chamber, a gravity movable air expelling member in said chamber supported solely by the walls thereof for bodily movement with respect thereto, and sound producing and emitting means arranged in said chamber and including an orificed part with which said member coacts in its gravity movement in one direction to control the duration of the emitted sounds.

16. In a sound producing device, an air chamber, a gravity movable air expelling member in said chamber supported solely by the walls thereof, a sound producing reed, and a tubular orificed sound emitting member axially positioned in said chamber, said air expelling member having spaced relatively fixed parts surrounding the sound emitting member and coacting with the orifice thereof in the gravity movement of the expelling member in one direction to control the duration of the emitted sounds.

17. In a sound producing device, an air chamber, an air expelling member movable in said chamber, sound producing means through which the air is expelled, and a member extending axially of said air chamber and freely movable laterally thereof with which said expelling member coacts in its movement in one direction to control the emission of the sounds produced.

In testimony that I claim the foregoing as my invention, I have signed my name hereunder.

LEO J. GRUBMAN.