Nov. 17, 1942. B. L. HENRY 2,302,318

PLURAL SYLLABLE SOUND ORIGINATOR

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Fig. 1.

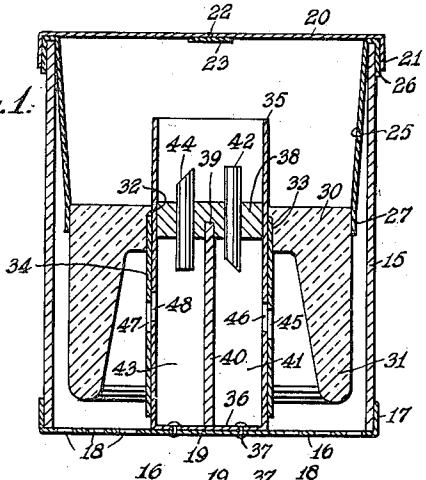


Fig. 2.

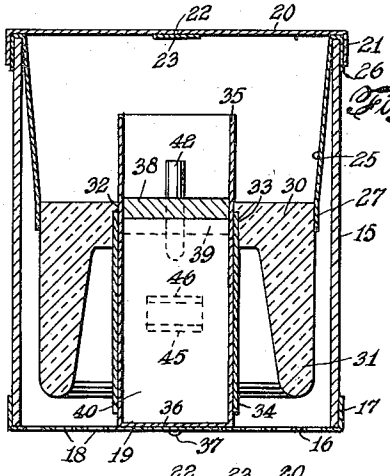


Fig. 3.

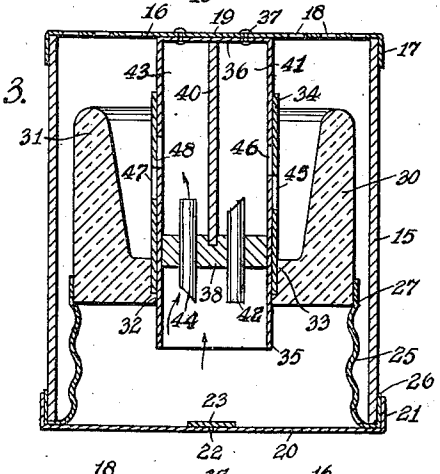


Fig. 5.

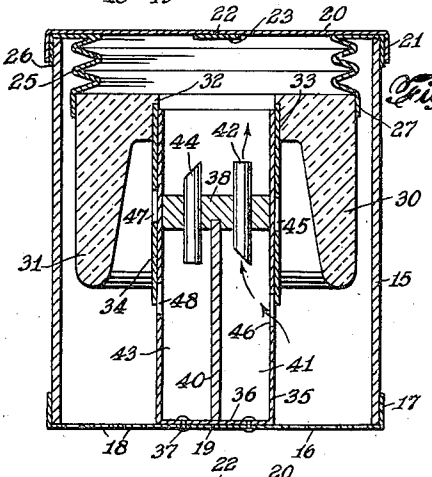


Fig. 4.

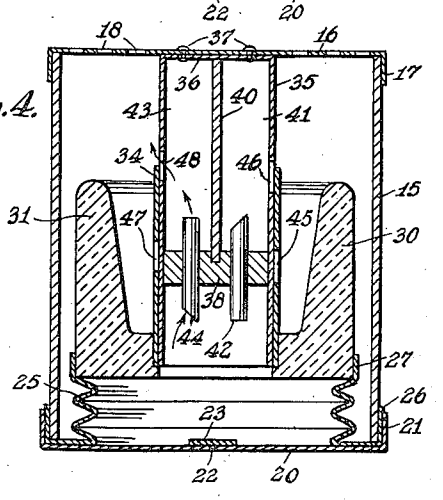
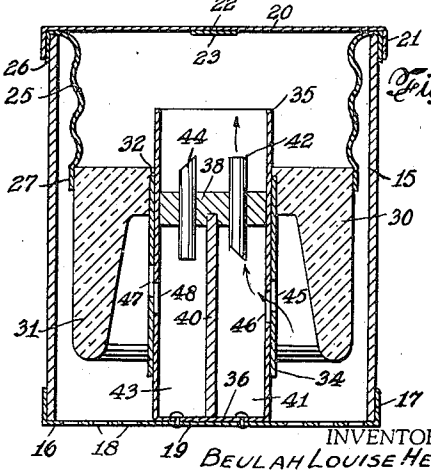


Fig. 6.



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Fig. 7.

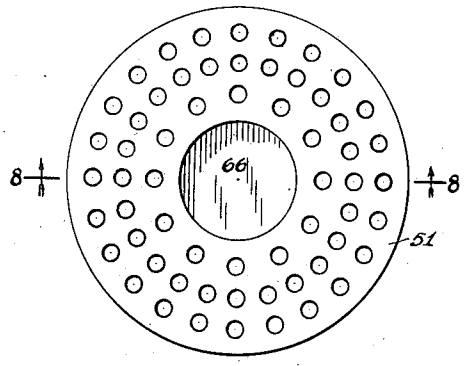


Fig. 10.

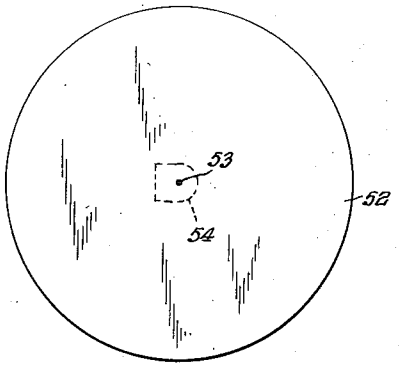


Fig. 8.

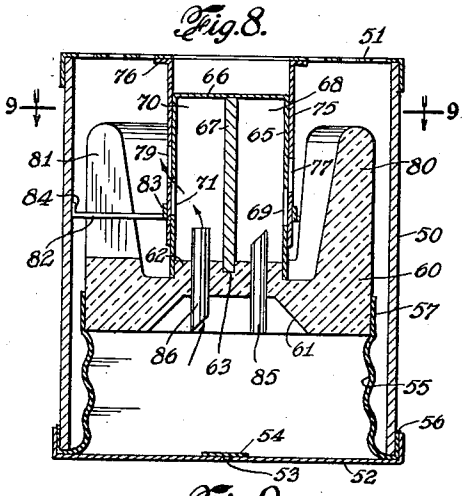


Fig. 11.

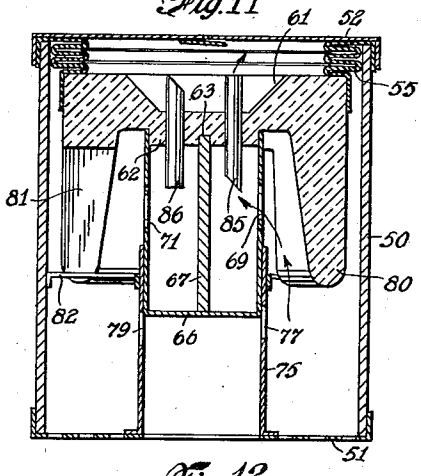


Fig. 9.

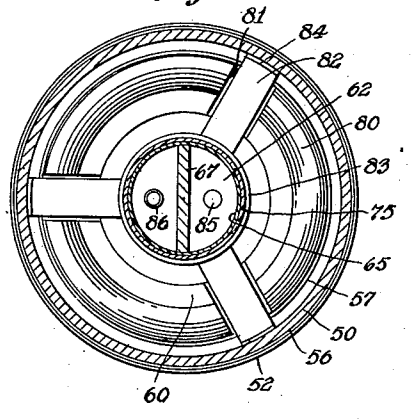
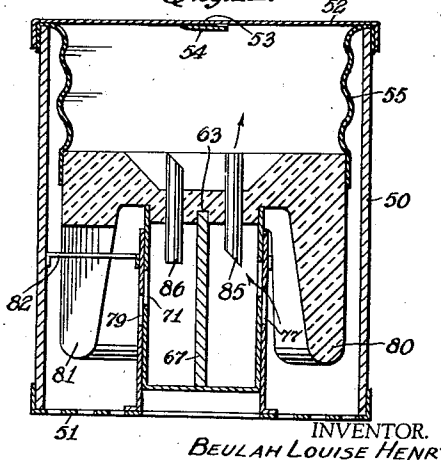


Fig. 12.



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Fig. 13.

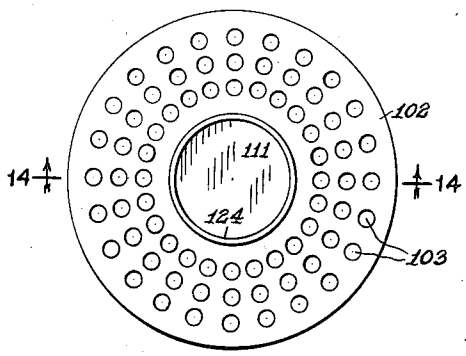


Fig. 14.

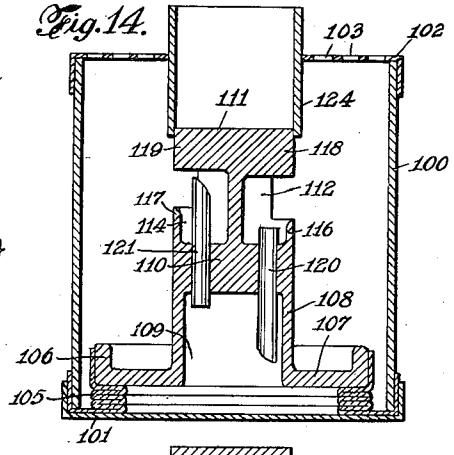


Fig. 15.

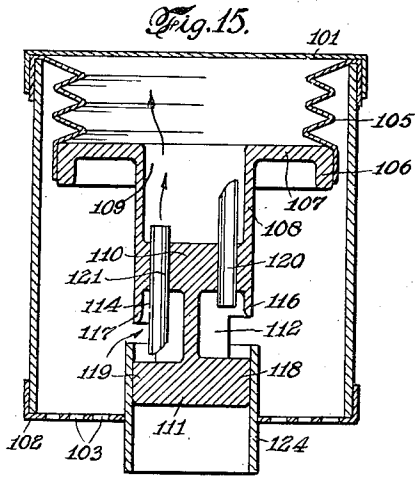


Fig. 17.

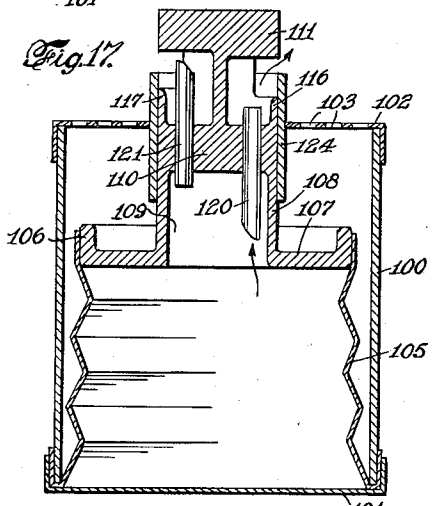


Fig. 16.

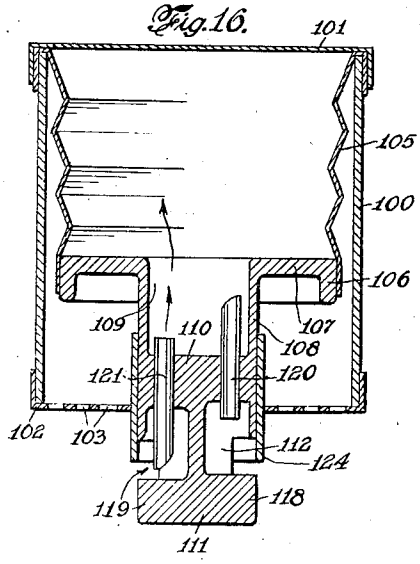
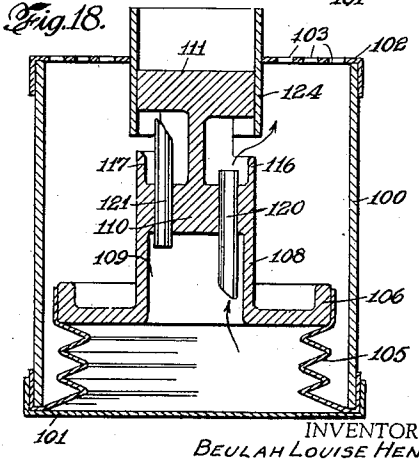


Fig. 18.



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Patented Nov. 17, 1942

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UNITED STATES PATENT OFFICE

2,302,318

PLURAL SYLLABLE SOUND ORIGINATOR

Beulah Louise Henry, New York, N. Y.

Application July 5, 1941, Serial No. 401,208

12 Claims. (Cl. 46—187)

This invention relates to sound making devices and more particularly to such as utilize an induced air current in producing sonic vibrations in reed structures.

The main object of this invention is to utilize the inflation period of a single bellows for the enunciation of two distinct syllables, as "pa-pa," and the deflation period for the enunciation of two distinct syllables as "ma-ma," or vice versa, upon being reversed from one upright position to an opposite position.

Another object is to provide effective, completely inclosed, reed devices, productive of articulate sounds upon being reversed with respect to their ends.

A further feature is in the provision of means whereby the sounds are enunciated in distinct syllables, relatively long and short, at brief intermittencies, accented and modulated harmoniously.

A further purpose is to produce means by which the foregoing aims are fully attained by the relation of few and simple parts, well adapted for long continued service without failure.

These and other useful objects, further on apparent, are accomplished by the novel and practical design, construction and combination of parts, hereinafter described and illustrated in the accompanying drawings, constituting a concrete component of this disclosure, and in which:

Figure 1 is a central longitudinal sectional view of an embodiment of the invention, shown with its bellows fully expanded.

Figure 2 is a similar view of the same taken in a plane at a right angle to Figure 1.

Figure 3 is a sectional view, like that of Figure 1, but showing the device in an inverted position, the bellows partially deflated and indicating the paths of the air currents for the first syllable.

Figure 4 is another sectional view, similar to Figure 3, but showing the bellows further deflated and indicating the paths of the air currents for the second syllable.

Figure 5 is a further view of the parts, as seen in Figure 1, with the weight in position to induce an intake of air.

Figure 6 is a further sectional view, like Figures 1 and 5 but prior to complete inflation of the bellows.

Figure 7 is an air inlet end view of a preferred embodiment of the invention.

Figure 8 is a longitudinal sectional view taken on line 8—8 of Figure 7.

Figure 9 is a transverse sectional view taken on line 9—9 of Figure 8.

Figure 10 is a plan view of the end opposite to that shown in Figure 7.

Figure 11 is a longitudinal sectional view, similar to Figure 8, but showing the device in a reversed position, and at the initial moment of its operation.

Figure 12 is another like view, but showing the parts when nearly at their completed movement.

Figure 13 is an end view of a further modified construction.

Figure 14 is a longitudinal sectional view taken on line 14—14 of Figure 13, showing the bellows completely deflated.

Figure 15 is a similar sectional view of the device, in a reversed position from Figure 14, showing the bellows at the beginning of inflation and emitting a first syllable.

Figure 16 is another like view showing the bellows almost completely inflated, as emitting a second syllable.

Figure 17 is a sectional view, similar to Figure 14, the position of the casing being the same and the parts as reversed from that shown in Figures 15 and 16.

Figure 18 is another like sectional view showing the bellows nearly deflated.

Referring in detail to Figures 1 to 6 of the drawings, the numeral 15 generally designates a cylindrical casing, preferably made of strong paste-board, and of such dimensions as are compatible with its purpose.

Over one end is a disc 16, that may be of thin metal, having an annularly flanged rim 17, secured circumjacent the edge of the casing in the manner of a cap, and provided with a plurality of openings 18, except at its central portion 19, which remains blank.

On the opposite end is a similar cap composed of a disc 20 having a flanged rim 21 and containing a single central vent perforation 22, provided with a flexible flat, flap valve 23 at its inner side, the valve being free, except at one point at its edge, where it is attached to the disc 20.

Disposed within the casing is a highly flexible bellows 25, its outer edge 26 being shown as turned re-entrantly over the edge of the casing 15, cemented thereto and further secured in fixed position by the rim 21 of the cap 20.

The opposite, inner marginal edge 27 of the bellows material is secured by an adhesive to the exterior portion of a molded weight 30, of heavy material, such for instance as porcelain, flanged, as at 31, in the manner of a cup.

This weight is of lesser diameter than the interior of the casing 15 to prevent the bellows fabric,

when deflating, from damage by the wall of the casing and contains a central opening 32, having a counter-bore 33 in its flanged side.

Fixed rigidly in the counter-bore is a tube 34, to extend outwardly beyond the weight, to nearly contact the cap 16, causing the weight 30 to draw the bellows fabric straight, in order to inflate the bellows to its full capacity.

Telescopically engaged within the tube 34, and slidable through the weight opening 32, is a tubular guide 35 having one end 36 closed and secured to the cap element 19 by any preferred means, as the rivets 37.

Set firmly within the guide 35, at a point near its open opposite end, in a manner to completely close the passage therethrough, is a circular block 38 having, in the side adjacent the closed end of the guide 35, a groove 39 in which is set one end of a longitudinal partition 40, extending to make contact with the end wall 36 of the guide, thereby forming two equal air chambers, respectively 41 and 43.

Extending through the block 38 are two sound reeds 42 and 44, arranged in parallel and in relatively reversed relation, the reed 42 communicating with the chamber 41, and the reversed reed 44 entering the chamber 43.

Formed in the opposite side walls of the tube 34 are passages 45 and 47, which are obviously moved whenever the weight 30 moves.

The guide 35 has ports 46 and 48, shown in Figures 1 and 3, registerable with the passages 45 and 47 respectively, upon movement of the weight 30.

Reversing the device from the position shown in Figures 1 and 2, to that of Figures 3 and 4, causes it to draw air into the space within the casing, via the openings 18, due to the descent of the weight 30, causing the bellows 25 to initially deflate.

The air current, indicated by the arrows in Figures 3 and 4, is forced through the reed 44, into the chamber 43, which acts as a sound amplifier.

The air current is created by the gravitational force of the weight 30, acting on the bellows 25, and causes the reed 44 to vibrate, emitting a sound, as "ma," through the openings 47 and 48 until the openings become closed, by the sliding movement of the tube 34 relative to the guide 35, the tube 34 being fixed in the weight 30 which acts to operate the bellows.

When the passage 47 and port 48 are closed, a pause in audition is created, as the air in the bellows cannot escape through the valved vent 22, therefore being forced through the reed 42, which, being in a reversed position, acts as a non-vibrant mute valve for the escape of air only.

As the bellows slowly deflates, and consequently descends, the tube 34, fixed to the weight 30, is moved to present its outer rim to the port 48, opening it to allow the air, under pressure in the chamber 43, to escape in a slightly compressed condition, causing the reed 44 to vibrate, emitting a second syllable, as "ma."

Upon reversing the position of the casing, as shown in Figures 5 and 6, a similar effect is attained in the production of two distinct syllables, as "pa-pa"; in this case the inflation of the bellows is utilized, while its deflation produced the previously described effect.

As the weight 30, to which the bellows 25 is secured, descends inflation of the bellows begins.

Air is drawn through the port 46 into the chamber 41, passing through the reed 42 into the bellows, causing the reed to vibrate and emit a sound, as "pa."

The weight continues downwardly, causing the bellows to further inflate, the port 46 is closed by the edge of the tube 34, causing a pause in audition; as the air current is prevented from entering the bellows 25 through the reed 44, the valve 23 raises, permitting air to enter the bellows.

Continuing, the weight 30 attached to the bellows descends, the tube 34 passing the port 46 and causes its passage 45 to register, temporarily, with the port 46 in the guide 35, during which the air flows into the bellows through the reed 42. The slight vacuum created in the chamber 41 accelerates the vibration of the reed by reason of a more rapid flow of air, causing it to emit a second syllable, as "pa."

Drawing air through the reed 42, causes it to vibrate and originate a short, distinct syllable, thence a quiet period, followed by a long continued syllable as the ports and passages arrive at the positions shown in Figure 1.

Obviously the device may be constructed to originate more than two syllable sounds, depending on the position and number of ports and passages in the elements 34 and 35, and the sounds may be of widely different character, depending on the construction and tuning of the reeds.

In the embodiment, shown in Figures 7 to 12 inclusive, the casing 50 is identical with that previously described, consisting of a cylinder having a plurally perforate cap 51 at one end, and a plain cap 52 at its opposite end, in which is a single central perforation 53 provided with a flap valve 54.

The bellows 55 is secured at its outer end 56 to the cap 52, while its inner end 57 embraces and is cemented to a weight 60 freely slidable in the casing.

The weight has in its level under surface a depression 61, while on its opposite surface is a raised hub 62 in which is a central transverse groove 63.

An inverted tubular cup 65 is firmly secured on the hub 62, the cup having an imperforate bottom 66 against which is fixed one of the end edges of a plate partition 67, its opposite edge fitting the groove 63, dividing the cup into two equal chambers 68 and 70, in which are diametrically opposed ports 69 and 71.

Circumjacent the cup 65 is a sleeve 75, having a flanged base 76 rigidly fixed to the cap 51, the cup being telescopically slidable in the sleeve; this sleeve is provided with ports 77 and 79, which are registerable with the ports 69 and 71 during different stages of weight movement.

A raised annular rim 80 on the weight is plurally recessed, as at 81, to receive a corresponding number of arms 82 of a spider ring 83, the outer ends of the arms being flanged and fastened to the wall of the casing 50, thereby re-enforcing the sleeve 75 and maintaining it in fixed central position.

Set in the central portion of the weight, to extend into the depression 61, is a sound reed 85, while another reed 86 is disposed in reversed position; thus the reed 85 communicates between the chamber 68 and interior of the bellows, while the reed 86 connects the air chamber 70 with the bellows.

As the method of operation is substantially the same as that of the foregoing device, it will be well understood by persons familiar with the art.

In the modification shown in Figures 13 to 18, a similar casing 100 is provided with an imper-

forate cap 101 at one end and at the other end with a cap 102 having a plurality of perforations 103.

Attached to casing by the cap 101, is a bellows 105 secured at its opposite, inner end to the outer annularly flanged wall 106 of a webbed weight 107, from the center of which, opposite the bellows, extends a cylinder 108 greatly reduced from the diameter of the wall 106 and having a chamber 109 open to the bellows.

Below the level bottom wall 110 of the chamber is a plunger head 111, uniform in diameter with the cylinder and having intermediate its length, two opposed, inreaching recesses 112 and 114, both being open at their outer sides.

The recess 112 is partially inclosed by a short down-reaching visor 116, while on the opposite side a similar but relatively longer projection 117 partially covers the recess 114. The head 111 is thicker on the side 118 below the recess 112, than the opposite side 119, thus raising the bottom of the recess 112, offsettedly from that of the recess 114.

Set in the wall 110, and pointed in opposite directions, are a pair of sound producing reeds 120 and 121 respectively, the reed 120 extending from the chamber 109 to the recess 112, and the reed 121 from the chamber 109 to the recess 114.

Fixed axially in the cap 102 is a tubular member 124 to extend a distance within the casing and also outwardly therebeyond, to act as a guide for the head 111 which is slidable therein.

When the device is in the position shown in Figure 15, the bellows is moved down by gravity, air entering the bellows through the perforations 103, recess 114, reed 121 and chamber 109.

Such movement causes the reed 121 to vibrate, producing sound, while the opposite reed 120 is mute; the sound continues until the recess cover 117 enters the tubular guide 124, whereupon a quiet period occurs until the head 111 passes outwardly beyond the end of the guide, thereby allowing air to enter the recess 114, direct, as indicated by the arrows in Figure 16, momentarily producing a second sound or syllable of different tonal quality.

It will be obvious that upon reversing the casing, as in Figures 17 and 18, similar but delayed effects are obtained by the reed 120, the delay being caused by the offset relation of parts 116 and 118 relative to the corresponding parts 117 and 119.

Having thus described the invention, including the manner of its construction and application, what is claimed as new and sought to secure by Letters Patent, is:

1. A sound originator comprising a casing having fixed level end closures, one being plurally perforate and the other having a single central vent, an annularly flanged weight freely slidable within said casing, a bellows fixed at one edge to said weight and at its opposite edge to the vented closure, a tube fixed in said weight to extend opposite the bellows, said tube having single diametrically opposed ports, a tubular guide fixed to the perforate closure to telescopically move within said tube, a block set in said guide, a longitudinal partition in said guide forming independent air chambers, ports in said guide registrable with the ports in said tube, sound reeds, fixed in reverse relation in said block in open communication with said air chambers, and means to close the vent in the closure automatically when said casing is in one position and to open the vent when the casing is in a reversed position.

2. A sound originator comprising a casing, a weight operative therein, a bellows fixed at its ends respectively to said weight and an end of said casing, a tube fixed in said weight to extend oppositely said bellows a definite distance, ports in opposite sides of said tube, a tubular guide fixed to the end of said casing opposed to said bellows and with which it is in open communication, said guide being disposed telescopically within said tube, a block set transversely in said guide, a partition forming two equal longitudinal chambers in said guide, ports in said guide registrable at intervals with the ports in said tube, and a pair of sound reeds set in opposed relation in said block, said reeds being open at their ends to said chambers and bellows respectively.

3. In a sound originator having a casing provided with caps relatively vented and perforate, a cup shaped weight movable in the casing, and a bellows secured at its ends respectively to said plain cap and weight, a tube fixed in said weight to extend oppositely said bellows, said tube having two opposed ports, a hollow guide fixed to the perforate cap, two independent longitudinal air chambers in said guide, each chamber having ports registrable with the ports in said tube, and a sound reed in each chamber, said reeds being oppositely arranged and both open to said bellows at their front and rear ends respectively.

4. In a sound originator having a casing provided with caps relatively vented and perforate, a weight movable in the casing, and a bellows secured at its ends respectively to said vented cap and weight, a tube fixed in said weight to extend oppositely said bellows, said tube having opposed ports, a hollow guide fixed to the perforate cap circumjacent said tube, a spider uniting said casing with said guide, ports in said guide registrable with the tube ports, a partition in said tube forming two chambers open to the respective ports, a sound reed set in said weight to direct air from said bellows to one of said chambers, and a second sound reed set in the weight to direct air from the other of said chambers to said bellows.

5. In a sound originator comprising a casing having a weight, a bellows actuable thereby, a tube set in said weight opposite the bellows, and a guide telescopically engaging said tube, a single port in each of the opposite sides of said tube, two independent longitudinal air chambers in said guide, a port in each chamber registrable with the ports in said tube, and a pair of sound reeds arranged in spaced parallel relation, one in each chamber having its ends inverted relative to the other and both open to said bellows.

6. In a sound originator comprising a casing having a weight, a bellows actuable thereby, a tube set in said weight opposite the bellows, and a guide telescopically engaging said tube, a single port in two opposite sides of said tube, two independent longitudinal air chambers in said guide, a port in each chamber registrable with the ports in said tube, a sound reed in open communication wtih one of said chambers directed into said bellows, and a second sound reed in the other of said chambers directed away from the bellows into the chamber.

7. In a sound originator comprising a casing having a weight, a bellows actuable thereby, a tube set in said weight opposite the bellows, and a guide telescopically engaging said tube, a single port in two opposite sides of said tube, two in-

dependent longitudinal air chambers in said guide, a port in each chamber registrable with the ports in said tube, a sound reed in open communication with one of said chambers its front end directed towards said bellows, and a second sound reed in the other of said chambers directed oppositely with respect to the first reed and parallel therewith.

8. In a sound originator comprising a casing having a weight, a bellows actuable thereby, a tube set in said weight opposite the bellows, and a guide telescopically engaging said tube, said tube being of a definite length and having two opposed lateral ports located at points at selected intervals from the outer end of the tube, two independent longitudinal air chambers in said guide, a port in each chamber registrable with the ports in said tube, and a pair of sound reeds arranged in spaced parallel relation, the front end of one in each chamber inverted relative to the other and both open to said bellows.

9. A sound originator comprising a casing having a weighted bellows, a chamber having two longitudinal compartments in said casing, each compartment having a sound reed disposed in reversed relation therein, and ports communicating between said compartments and bellows whereby one of said reeds is vibrated by air expelled from said bellows and the other by air drawn into the bellows upon reversal of said casing.

10. A sound originator comprising a casing having end closures, one being hermetically sealed and the other perforate, a flanged web freely movable in said casing, a bellows having one end fixed to said casing at its sealed end closure and its opposite inner end attached to the flange of said web, a cylinder integral with said web having a chamber open to the bellows, opposed offset recesses in the said cylinder, a tubular guide for the cylinder fixed in perforate closure to extend inwardly and outwardly therefrom with reference to said recesses, and a pair of sound reeds set in opposite relation in said cylinder to communicate respectively between said chamber and said recesses.

11. A sound originator comprising in combination, a cylindrical casing closed at one end and punctured at the other, a weight movable in the casing, and a bellows fixed at its respective ends to said weight and the closed end of the casing, a tube fixed intermediate its length axially in the punctured end of said casing, a cylinder integral with said weight slidable in said tube, a pair of opposite alcoves in said cylinder disposed relative to the ends of said tube, a chamber in said weight open to the bellows, and sound reeds arranged in opposed relation in said cylinder to communicate between said chamber and alcoves.

12. A sound originator comprising in combination, a cylindrical casing closed at one end and punctured at the other, a weight movable in the casing, and a bellows fixed at its respective ends to said weight and the closed end of the casing, a tube fixed intermediate its length axially in the punctured end of said casing, a cylinder integral with said weight slidable in said tube, a chamber in said cylinder open to the bellows, an alcove in one side of said cylinder, a second alcove in its opposite side, said alcoves being in different planes offset one from the other, and a pair of sound reeds arranged in opposed relation in said cylinder to communicate between the respective alcoves and said chamber.

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