Oct. 18, 1932. L. J. GRUBMAN 1,883,724

SOUND PRODUCING DEVICE

Filed March 5, 1932

Fig. 1.

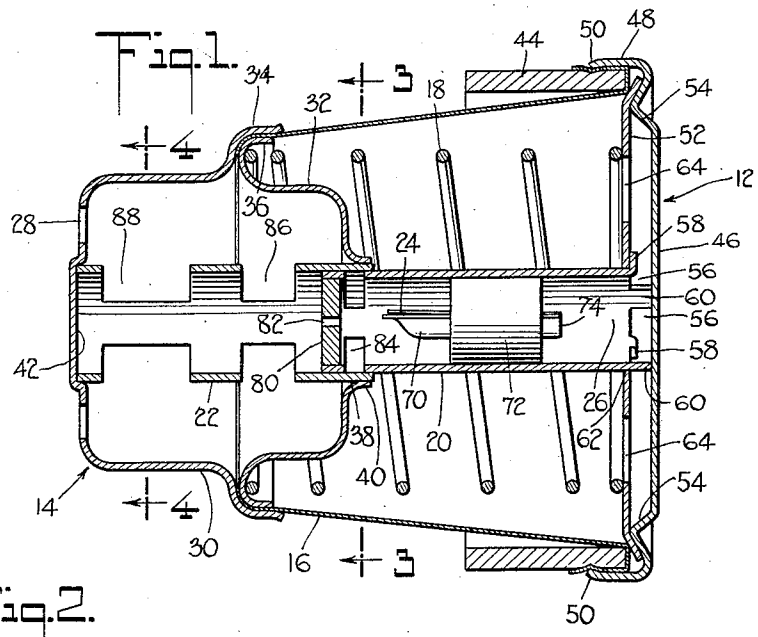


Fig. 2.

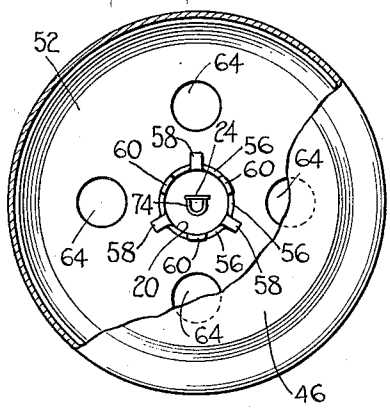


Fig. 3.

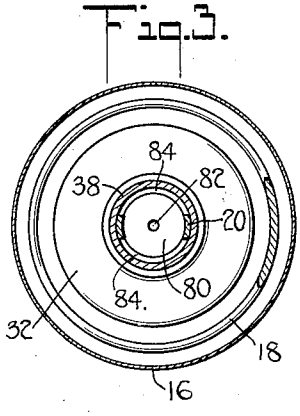


Fig. 4.

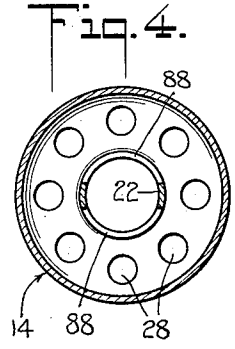
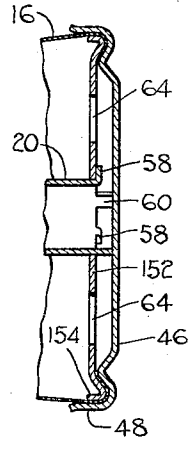


Fig. 5.



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UNITED STATES PATENT OFFICE

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SOUND PRODUCING DEVICE

Application filed March 5, 1932. Serial No. 597,005.

This invention relates to sound producing devices, and more particularly to articulative sound producing devices for toys, especially dolls.

Sound producing devices are used in toys, particularly dolls, in order to enhance the realism of the toy by causing the same to articulate a simple word such as "mama". The primary and general object of the present invention resides in the provision of an improved articulative sound producing device which will be smooth, dependable, and fool-proof in operation, and which is characterized by simplicity and economy in design and manufacture. The invention is especially directed to such a sound producing device adapted for manual operation. Some of the more detailed objects of the present invention center about new and improved means for attaching the flexible bellows member of the device to the relatively movable heads of the unit; improved valve means for modulating the sound produced by the device; improved resonating means or sound chamber for amplifying the sound produced; and improved and simplified means for securing the relatively movable parts of the valve or modulating mechanism to the relatively movable heads of the unit. A more generalized further object of my invention is to devise such a sound producing device particularly adapted to be mounted in and used with stuffed dolls.

To the accomplishment of the foregoing and such other objects as may hereinafter appear, my invention consists in the sound producing mechanism and the elements thereof, and their relation one to the other, as hereinafter are more particularly described in the specification and sought to be defined in the claims. The specification is accompanied by a drawing, in which:

Fig. 1 is a section taken in elevation through a preferred form of manually operable articulative sound producing device constructed in accordance with my invention;

Fig. 2 is a partially sectioned inverted plan view of the unit shown in Fig. 1;

Fig. 3 is a transverse section taken in the plane of the line 3—3 in Fig. 1;

Fig. 4 is a transverse section taken in the plane of the line 4—4 in Fig. 1; and

Fig. 5 is a fragmentary section similar to that shown in Fig. 1, but illustrative of a modification of the invention.

Referring to the drawing, and particularly to Figs. 1 through 4 thereof, the sound producing device of the present invention comprises relatively movable heads 12 and 14 interconnected by a flexible bellows 16, resilient means 18 tending normally to keep the bellows 16 in distended position, telescopically related tubes 20 and 22 connected respectively to the heads 12 and 14 for movement therewith, sound producing means 24, and valve control or modulating means formed in tubes 20 and 22 in a manner subsequently described. The unit is shown in Fig. 1 in its normal or distended position, and upon compression of the unit, bringing the heads 12 and 14 nearer together, air is compressed within bellows 16 and caused to flow through the open or inlet end 26 of tube 20, past the sound producing means 24, through the valve mechanism for modulating the resulting sound, then into the hollow interior of head 14, and finally out of sound discharge openings 28 formed in head 14.

For convenience of reference, the head 12 will be referred to as the bottom and stationary head, while the head 14 will be referred to as the top and movable head, but it will be understood that this terminology is without true significance, for either or both heads may be moved one relative to the other, and the unit may be positioned in any desired direction and, in fact, will most frequently be arranged horizontally, as shown in Fig. 1.

Movable head 14 is hollow and is preferably made up of an outer sheet metal cap 30 and an inner sheet metal diaphragm or cap 32. These parts are generally cup-shaped in configuration and are pressed or drawn from ordinary flat sheet metal. The caps 30 and 32 are provided with mating peripheral flanges 34 and 36 respectively, and these flanges are force-fitted together with one end of bellows 16 therebetween. Bellows 16 is preferably

made from thin air-tight fabric and is desirably made frustro-conical in shape, the small end of the bellows being clamped to the periphery of movable head 14. One of the telescopically related tubes, preferably the outer tube 22, is secured within the interior of head 14, and this is most simply done by providing the inner cap or diaphragm 32 with a central hole 38 through which tube 22 may be driven with a force fit. The opening 38 may be flanged, the flange 40 serving to improve the fit between diaphragm 32 and tube 22, and to keep the tube in the desired axial direction. The opposite end of tube 22 may be seated in a recess 42 formed in outer cap 30, the recess 42 serving to locate tube 22 against transverse movement, while the force fit between the inner cap 32 and tube 22 keeps the tube in recess 42. With this construction, it will be evident that tube 22 is housed within and forms an integral part of head 14 and therefore is movable therewith.

The stationary head 12 preferably comprises a short cylinder or ring 44 which may be made of cardboard or like material, and which is used in cooperation with a closed cap 46. The use of a short cylinder or tube 44 is desirable because it permits the large end of bellows 16 to be locked in place simply by turning the cloth material outwardly around the edge of cylinder 44 and then capping the cylinder with the flanged sheet metal cap 46. Flange 48 on cap 46 bears tightly against the fabric and cardboard cylinder and thus holds the unit in assembled relation. As a final manufacturing step, the edge of flange 48 may be turned or beaded inwardly, as is shown at 50, thus insuring a permanent locking together of the bellows 16 and the head 12. The cylinder 44 has an additional advantage when the unit is used in stuffed dolls, because it keeps the stuffing free of the bellows and insures operating clearance for compression of the unit. Ordinarily this feature is not unduly important because the yieldability of the stuffing of the doll in itself is sufficient to permit operation of the sound producing device. However, if the doll is to be stuffed quite tightly, the advantage in question becomes important. In such case, if desired, cylinder 44 may be lengthened, but in no case should it be extended beyond the minimum dimension of the unit when fully compressed.

As has already been mentioned, the inner tube 20 is secured to head 12. This is preferably accomplished through the use of an intermediate support or holding plate 52 which in turn is secured to head 12, and this is most simply done by clamping the periphery of holding plate 52 between the cylinder 44 and cap 46, as is clearly shown in the drawing. Cap 46 is preferably expanded or dished outwardly, as is shown at 54, in order to provide a clearance between holding plate 52 and closing cap 46.

The bottom or inlet end 26 of tube 20 is preferably provided with a plurality, say, six notches 56. Of the remaining projecting pieces of metal, three alternate ones are bent outwardly to form the tongues 58, while the remaining three are left in position to act as supporting or spacer feet 60. Tube 20 is passed through a central mating aperture 62 in holding plate 52, and, as will be readily understood from an inspection of Fig. 1, the tongues 58 prevent movement of tube 20 away from head 12, while the feet 60 prevent movement of tube 20 in the direction of head 12, the combination of the tongues 58 and feet 60 serving to lock tube 20 securely to holding plate 52 and head 12. The feet 60 further serve to support the central portion of cap 46 against external pressure and thus insure the maintenance of ample clearance between holding plate 52 and cap 46. Holding plate 52 is further provided with air passages or openings 64, thus permitting free passage of air from the interior of bellows 16 to the inlet end 26 of tube 20. The arrangement of tongues 58, feet 60, and air passages 64 will be readily understood from an inspection of Fig. 2 in addition to Fig. 1, said Fig. 2 showing the head 12 with a portion of cap 46 cut away.

Resilient means 18 is preferably in the form of a coiled spring which desirably is located within bellows 16 and between the heads 12 and 14. Specifically, the upper end of spring 18 is located within the annular channel formed by the downwardly bent flange 36 of the inner cap or diaphragm 32, while the bottom end of spring 18 rests upon the holding plate 52.

The sound producing means consists of a reed 24 supported over a channel member 70, the combination of reed and channel member being supported in a plug 72 which is forced within and fills up the interior of tube 20, thus causing the air stream to flow through the open end 74 of channel 70 and then past the free or vibratory end of reed 24.

The valve mechanism for modulating the sound produced by reed 24 is made up as follows. The upper end of tube 20 has force-fitted therein an orifice plate or disc 80 having a relatively constricted opening 82 therein. Tube 20 is cut away just inside of orifice disc 80, forming large slots or openings 84. These slots, as is best shown in Fig. 3, extend almost entirely around the periphery of the tube and provide ample room for free sound discharge.

The outer tube 22 is similarly cut away to form a first set of slots 86 and a second set of slots 88. The slots 86 and 88 also extend almost entirely around the periphery of the tube, as is best shown in Fig. 4, and the tubes 20 and 22 are so related or aligned that the

slots 86 and 88 tend to mate or register with the slots 84 as the heads 12 and 14 are pushed together.

As is clear to those versed in this art, upon compression of the unit the sound produced will first be forced through the constricted opening 82, slots 84 being covered or blanked by tube 22. This produces a sound equivalent to that of the consonant "m", which sound flows into tube 22 and out of slots 86 and 88 into head 14 and then out of sound discharge openings 28. After some movement of head 14, the slots 86 uncover slots 84 and thus permit free discharge of sound into the interior of head 14 and thence out of sound discharge openings 28. This free discharge produces the vowel sound "ah". The hollow interior of head 14 acts as a resonating or amplifying chamber and thus increasses the volume of sound obtained. Upon further movement of head 14, the intermediate portion of tube or sleeve 22 reaches and covers up slots 84, and this again forces the sound to flow through constricted opening 82, thus again producing the consonant sound "m". Still further movement of head 14 brings slots 88 into registry with slots 84 and again permits free discharge of sound into head 14 and out of openings 28, which again results in the vowel sound "ah". The complete movement therefore causes the device to articulate the word "mama". By further constriction or even total stoppage of the opening 82, the word "papa" may be produced.

The unit as so far described may be slightly modified, if desired, by omitting the cylinder or ring 44. In such case the bellows 16 is preferably closed at its bottom end by clamping the same between the holding plate and the cap 46. Such an arrangement is shown in Fig. 5, referring to which it will be observed that holding plate 152 is generally similar to holding plate 52 already described, and has tube 20 similarly secured thereto by means of tongues 58 and spacer feet 60. The periphery of plate 152, however, is turned upwardly to form a flange 154 mating with flange 48 of cap 46. The end of bellows 16 is turned inwardly and clamped between plate 152 and cap 46 in a manner clearly evident from an inspection of the drawing. This modification is simpler than that shown in Fig. 1, in that it dispenses with the use of cylinder 44. However, I consider the arrangement of Fig. 1 including cylinder 44 to be a preferred form of the invention for the reason that the cardboard cylinder is very slight in cost, and by its use the final assembly of the sound producing device is very greatly facilitated. Whether the assembly is performed manually or by wholly or partially automatic means, I have found that the necessary operation may be greatly speeded when it is only necessary to turn the bellows fabric outwardly around a cylinder and then to cap the cylinder in order to clamp the same in place, and this is the method sequence used when constructing the device shown in Fig. 1.

It is believed that the mode of constructing and using the improved sound producing device of my invention, and the many advantages thereof, will for the most part be apparent from the foregoing detailed description. The finished unit is well adapted for manual operation and is sufficiently strong and rugged to take the wear occasioned by such operation. The unit is smooth in operation and clear in articulation. It is made from a relatively few parts nearly all of which may be stamped or made from sheet metal by machine methods at slight cost. The parts are easily assembled to form the complete unit, and the assembly is adapted for machine operation. The valve or modulating mechanism consists of a pair of telescopically related tubes one of which is secured to one of the heads by an ordinary force fit, and the other of which is secured to the other head by a bent tongue construction of extreme simplicity. The closing of the fabric bellows may be performed by outward turning or flanging of the fabric, with accompanying ease of assembly.

It will be understood that while the articulative sound producing device has been described as manually operated, some of the features, such as the mode of mounting the telescopic tubes on the movable heads, are equally well adapted for use in a gravity operated device. By omitting the resilient restoring means for keeping the bellows distended, and by extending cylinder 44 to completely house the unit, the device is capable of gravity operation, particularly so if head 14 is weighted. When arranged for manual operation as here shown, either or both of the heads may be moved and the unit may be positioned upright, inverted, horizontally, or, in fact, in any desired direction. The valve design may readily be varied to produce a number of syllables different from the two here shown, as, for example, one or three, and the produced syllable may itself be varied, depending upon the design of the sound producing and modulating mechanism.

It will therefore be apparent that while I have shown and described my invention in preferred forms, many changes and modifications may be made in the structures disclosed, without departing from the spirit of the invention, defined in the following claims.

I claim:

1. A manually operable articulative sound producing device comprising relatively movable heads, resilient means for keeping the same normally in separated position, and a pair of telescopically related tubes secured to the heads for relative movement therewith,

said tubes including valve means for modulating the sound produced by the device.

2. A manually operable articulative sound producing device comprising relatively movable heads interconnected by a flexible bellows, resilient means for keeping the same normally in distended position, and a pair of telescopically related tubes secured to the heads for relative movement therewith, said tubes including sound producing means and valve means for modulating the sound produced thereby.

3. A manually operable articulative sound producing device comprising relatively movable heads interconnected by a flexible bellows, resilient means between said heads within said bellows for keeping the same normally in distended position, and a pair of telescopically related tubes within said device, one of the tubes being secured to one of the heads, and the other of the tubes being secured to the other of the heads, said tubes including sound producing means, valve means for modulating the sound produced thereby, and means for guiding the modulated sound out of one of the heads.

4. A manually operable articulative sound producing device comprising a bottom head, a relatively movable hollow top head, bellows interconnecting the top and bottom heads, resilient means for keeping the bellows normally in distended position, telescopically related tubes one of which is secured to the bottom head, and the other of which is secured to the top head, sound producing and modulating means in said tubes, and sound discharge openings in said top head.

5. A manually operable articulative sound producing device comprising a closed bottom head, a relatively movable top head including outer and inner caps forming a chamber therebetween, flexible bellows interconnecting the top and bottom heads, resilient means for keeping the bellows normally in distended position, telescopically related tubes one of which is secured to the bottom head, and the other of which is secured within the top head, inlet passages from the bellows to the lower tube, sound producing means in the lower tube, mating passages on the tubes for modulating the sound and for guiding the same into the top head, and sound discharge openings in the outer cap.

6. A manually operable articulative sound producing device comprising a closed bottom head, a relatively movable top head including outer and inner caps forming a chamber therebetween, a frusto-conical flexible cloth bellows interconnecting the top and bottom heads, a coiled spring located within the bellows and between the heads in order to keep the bellows normally in distended position, telescopically related tubes the inner of which is secured to the bottom head and the outer of which is secured within the top head, inlet passages from the bellows to the inner tube, sound producing means in the inner tube, mating passages on the inner and outer tubes for modulating the sound and for guiding the same into the top head, and sound discharge openings in the outer cap.

7. An articulative sound producing device comprising relatively movable heads interconnected by bellows, telescopically related valve tubes secured to the heads for relative movement therewith, one of said heads comprising a closed metal cap, and a holding plate secured therein and spaced therefrom, the telescoping tube secured to the said head being provided with means to anchor the tube to the holding plate and to permit flow of air into the tube.

8. A manually operable articulative sound producing device comprising relatively movable heads interconnected by bellows and normally distended by resilient means, telescopically related valve tubes secured to the heads for relative movement therewith, one of said heads comprising a closed metal cap, and a perforated holding plate secured therein, the end of the telescoping tube secured to the said head being notched to form tongues some of which are bent outwardly to anchor the tube to the holding plate, and others of which form feet for spacing the holding plate from the cap and for preventing movement of the tube.

9. A manually operable articulative sound producing device comprising relatively movable heads interconnected by bellows and normally distended by resilient means, telescopically related valve tubes secured to the heads for relative movement therewith, one of said heads comprising a short cardboard cylinder for receiving one end of the bellows, and a closed metal cap fitting over the cylinder and locking the cloth and cardboard together.

10. An articulative sound producing device comprising relatively movable heads interconnected by a cloth bellows, telescopically related valve tubes secured to the heads for relative movement therewith, an outer cylinder receiving one end of the bellows, a closed metal cap fitting over the cylinder and locking the cloth and cylinder together, and a holding plate locked between the cylinder and cap and spaced from the cap, the end of the telescoping tube secured to said head being provided with means to anchor the tube to the holding plate and to permit flow of air into the tube.

11. A manually operable articulative sound producing device comprising relatively movable heads interconnected by a cloth bellows and normally distended by a compression spring located within the bellows and between the heads, telescopically related valve tubes secured to the heads for relative

movement therewith, one of said heads comprising a short cardboard cylinder for receiving one end of the bellows, and a closed metal cap fitting over the cylinder and locking the cloth and cardboard together, and a perforated holding plate locked between the cardboard cylinder and the cap, the end of the telescoping tube secured to the said head being notched to form tongues some of which are bent outwardly to anchor the tube to the holding plate, and others of which form feet for spacing the holding plate from the cap and for preventing movement of the tube.

12. A manually operable articulative sound producing device comprising relatively movable heads interconnected by a flexible bellows, telescopically related valve tubes one secured to each of the heads, one of said heads being hollow and having sound discharge openings on its outer surface and an aperture on its inner surface, one of said tubes being forced through the aperture and into the head with a force fit.

13. A manually operable articulative sound producing device comprising relatively movable heads interconnected by a flexible bellows, telescopically related tubes one secured to each of the heads, one of said heads being hollow and including cup-shaped spaced outer and inner members secured together and to the bellows by peripheral flanges, the outer of said members having sound discharge openings, and the inner of said members being centrally apertured to receive one of the tubes with a force fit.

14. A manually operable articulative sound producing device comprising relatively movable heads interconnected by a flexible bellows and normally distended by a compression spring located within the bellows and between the heads, telescopically related tubes one secured to each of the heads, one of said heads being hollow and including cup-shaped spaced outer and inner members secured together and to the bellows by peripheral flanges, the outer of said members having sound discharge openings and being centrally recessed to receive one end of a tube, and the inner of said members being centrally apertured and flanged to receive the other end of said tube with a force fit, so that the tube will move with the head.

Signed at New York in the county of New York and State of New York this 2nd day of March, A. D. 1932.

LEO J. GRUBMAN.