

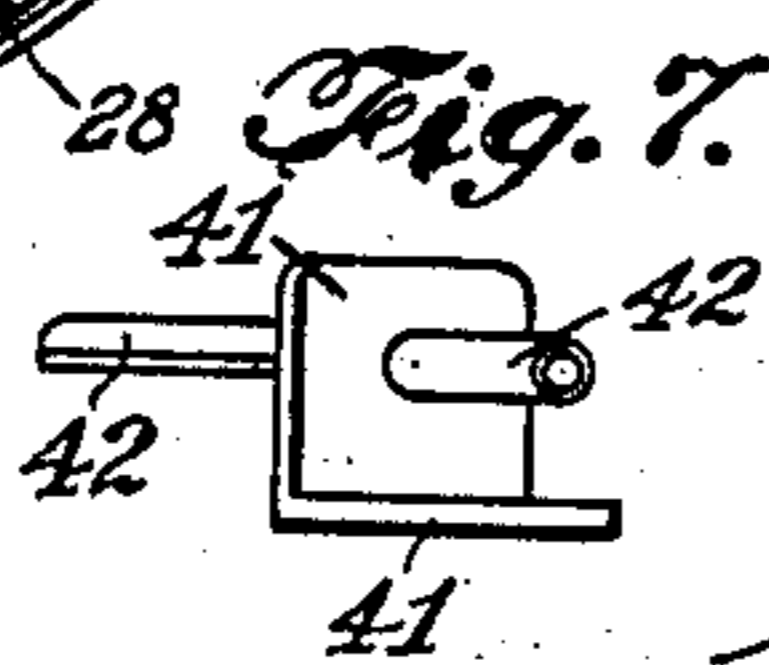
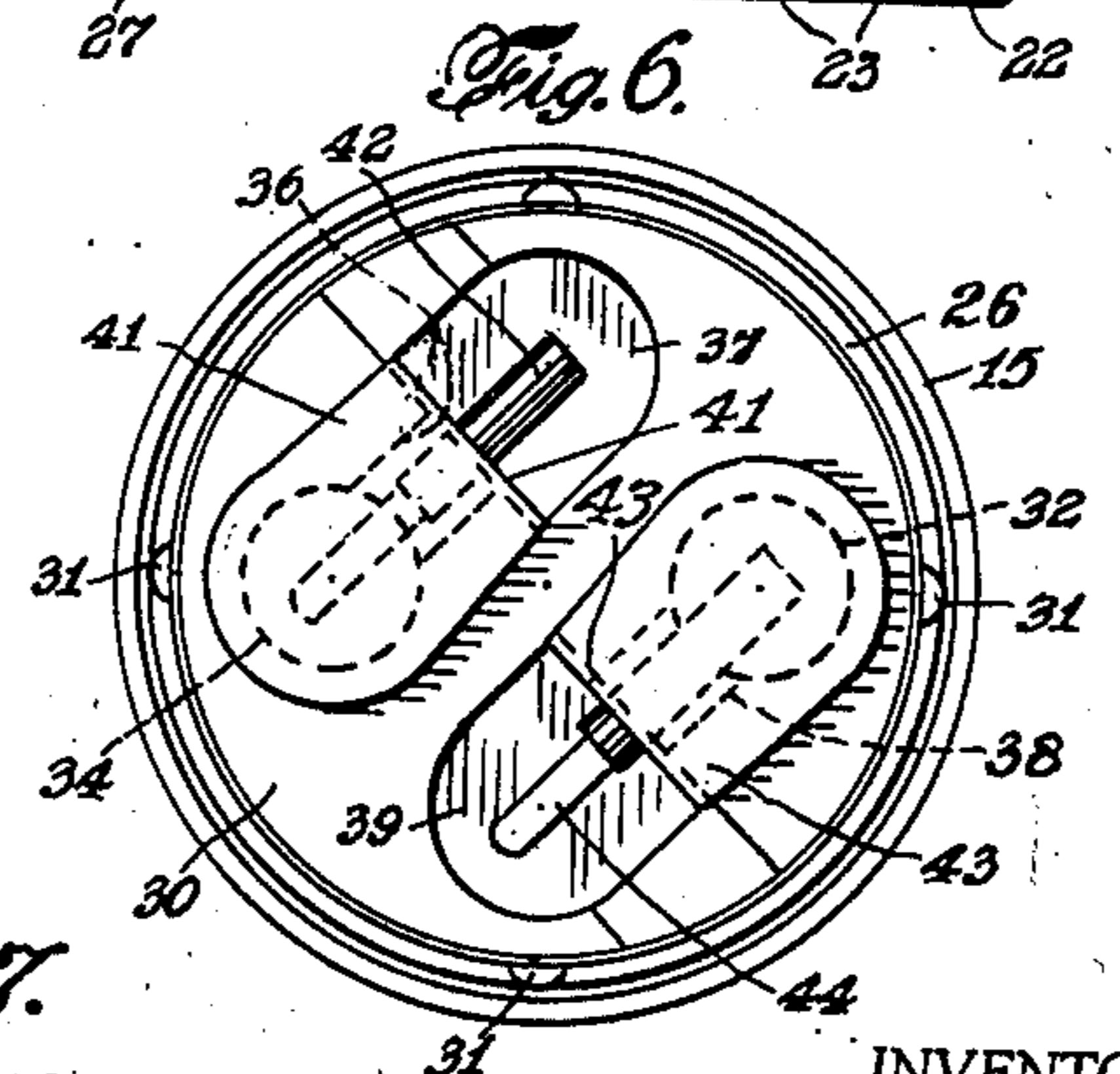
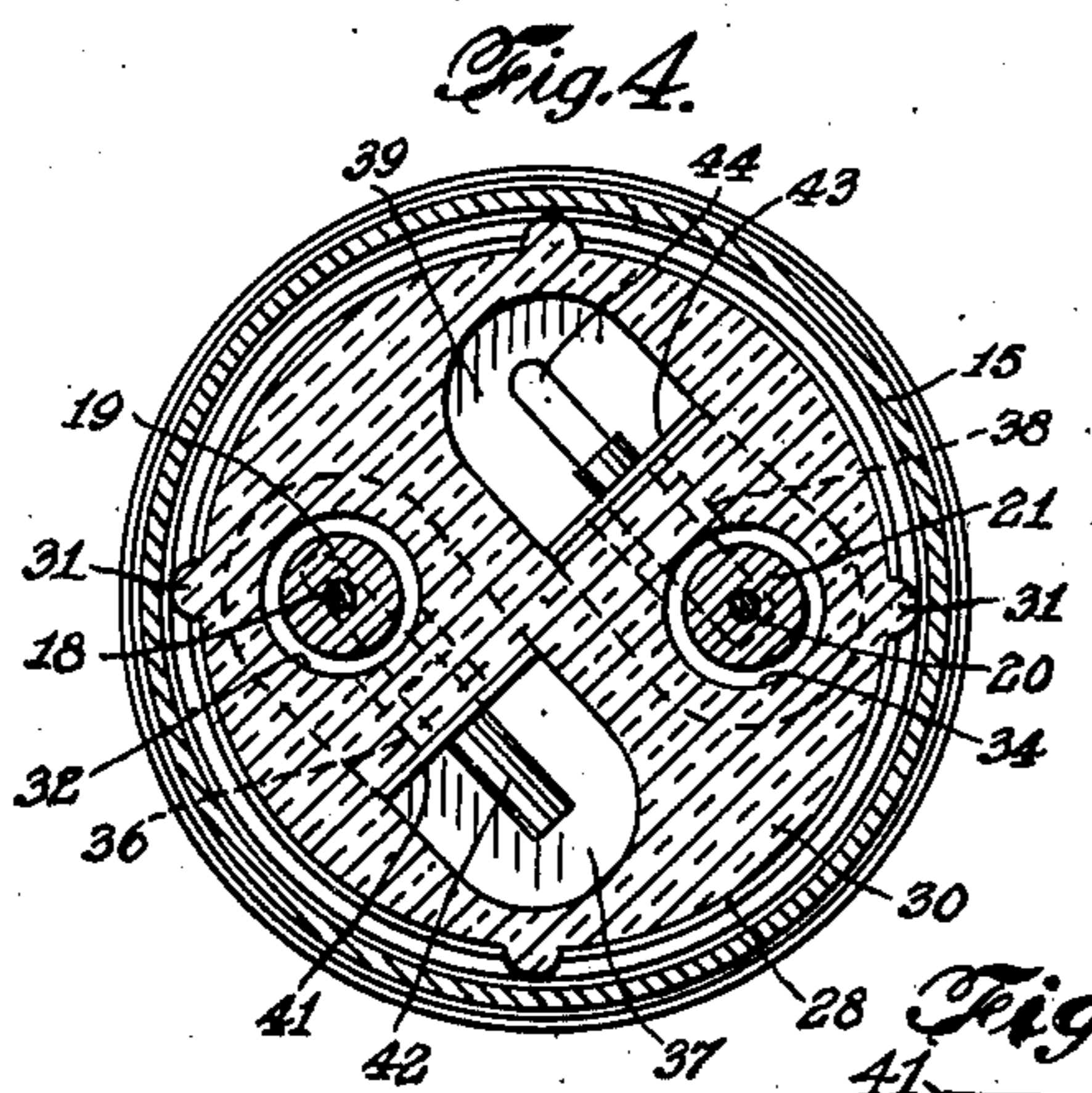
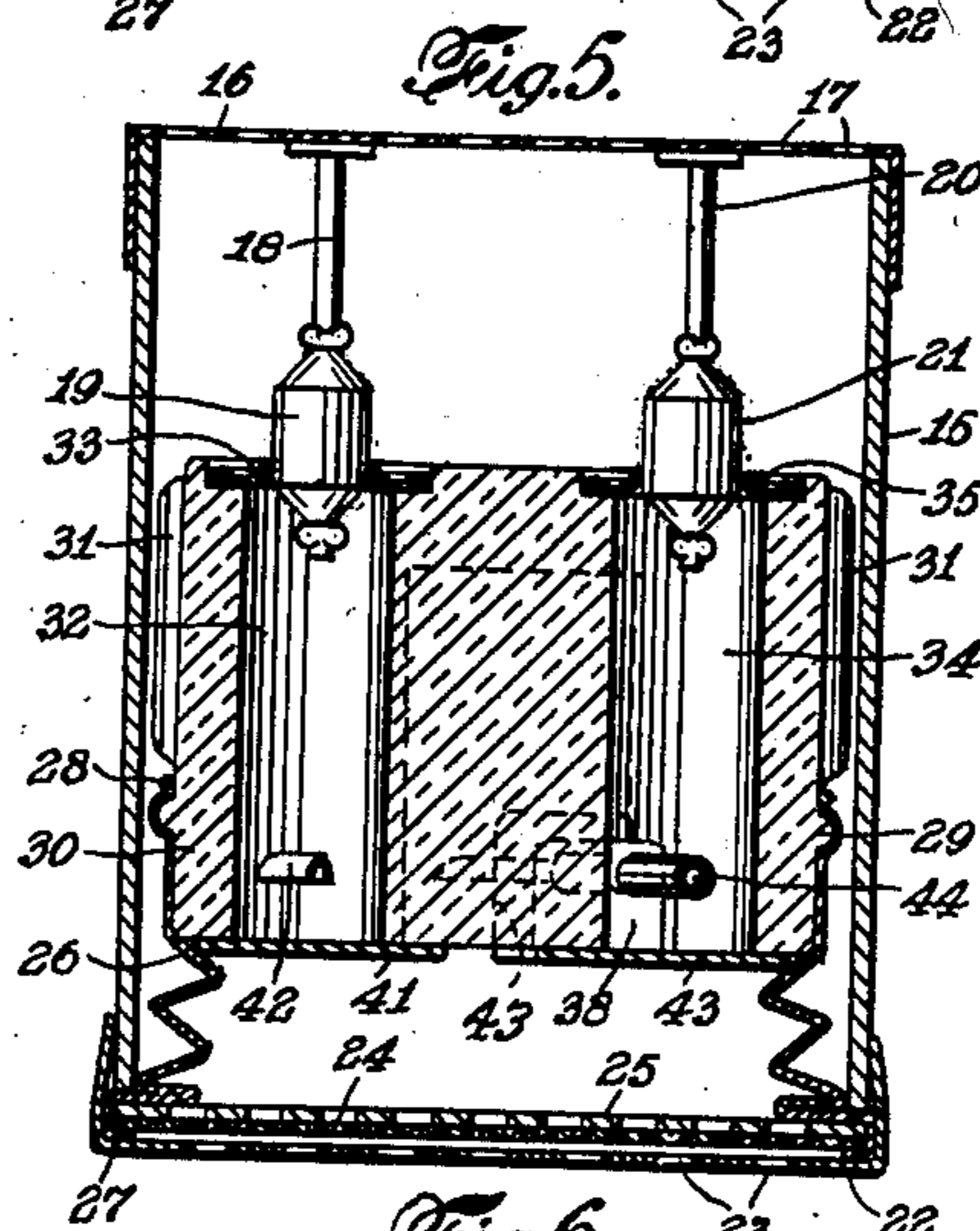
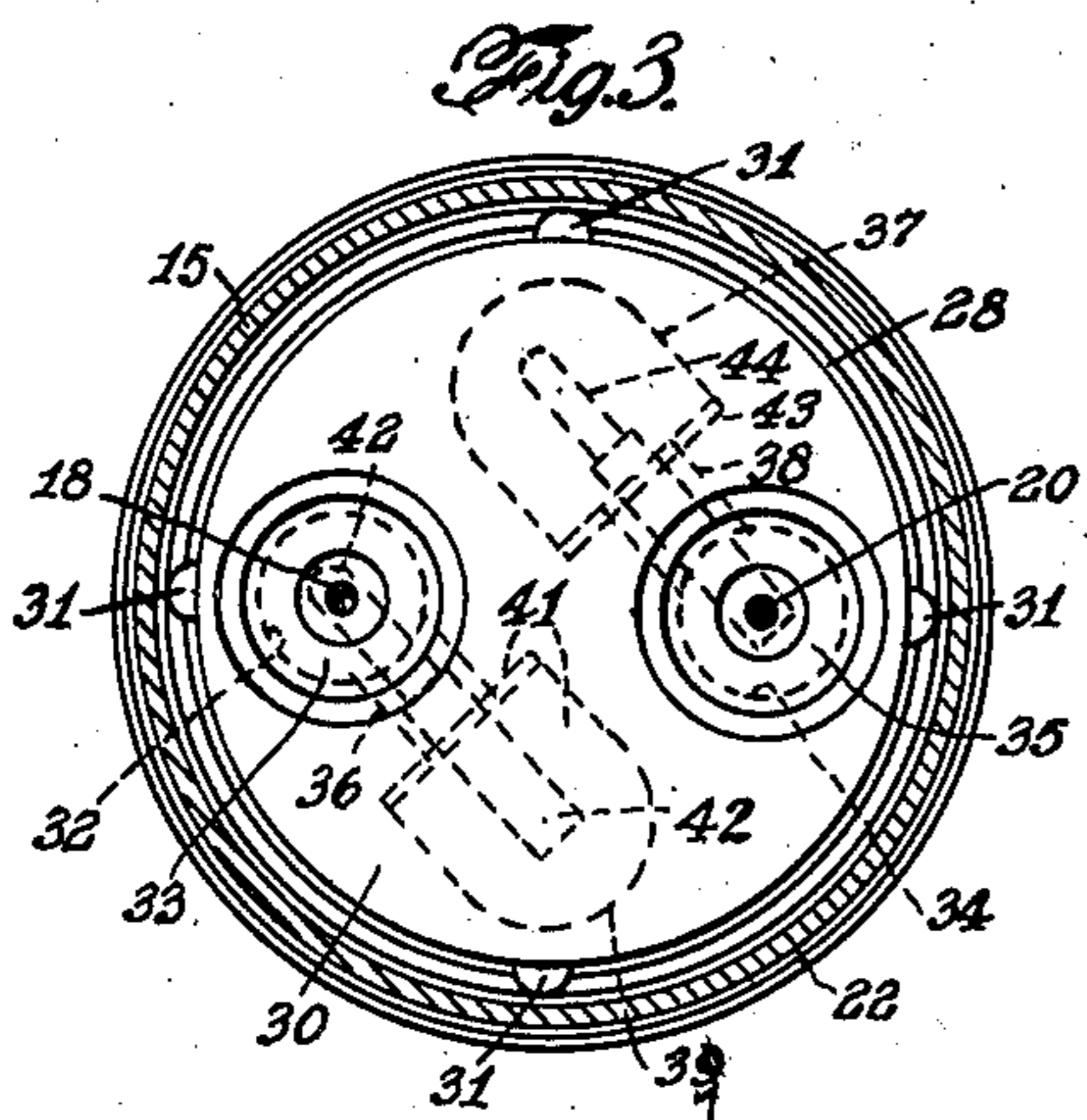
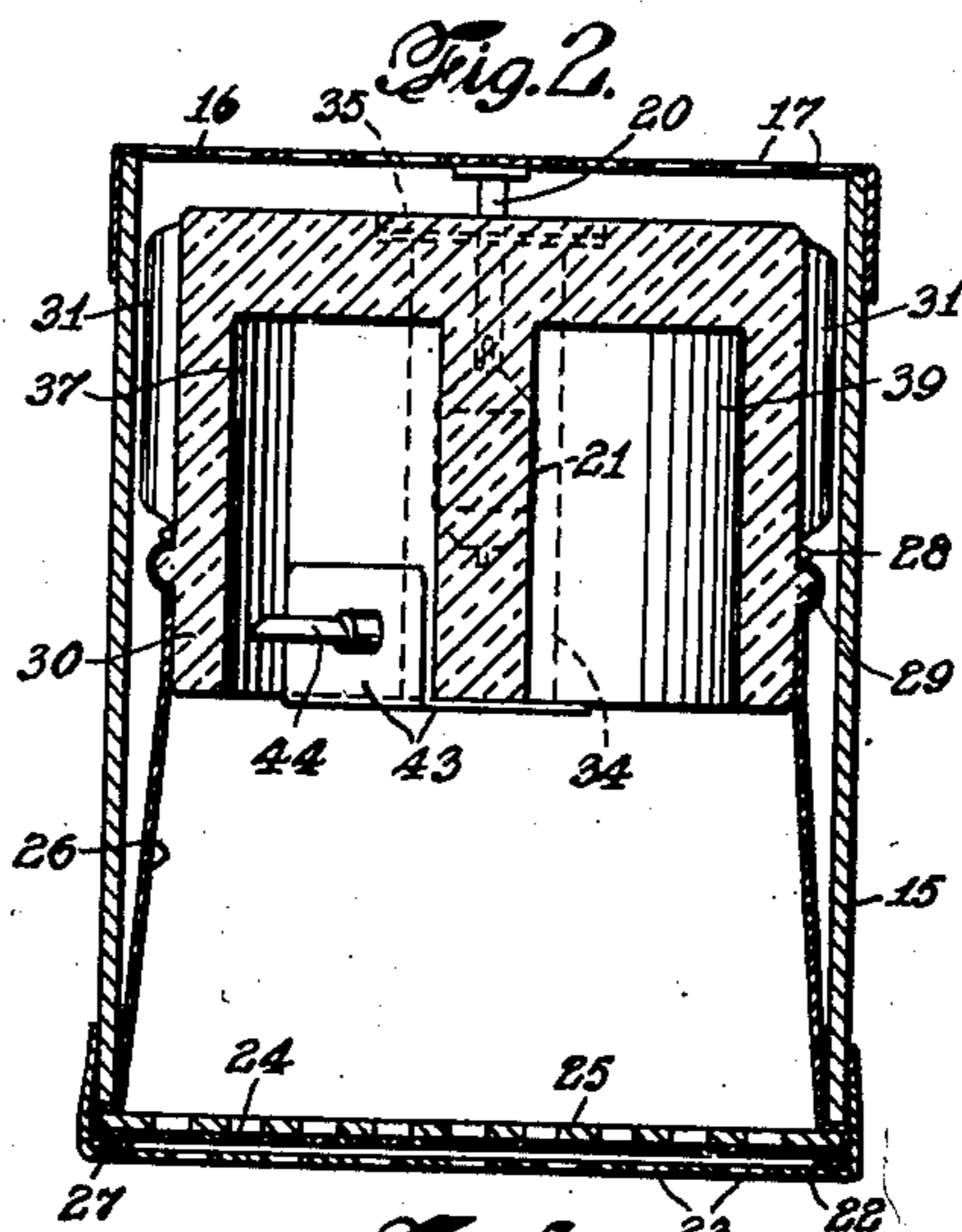
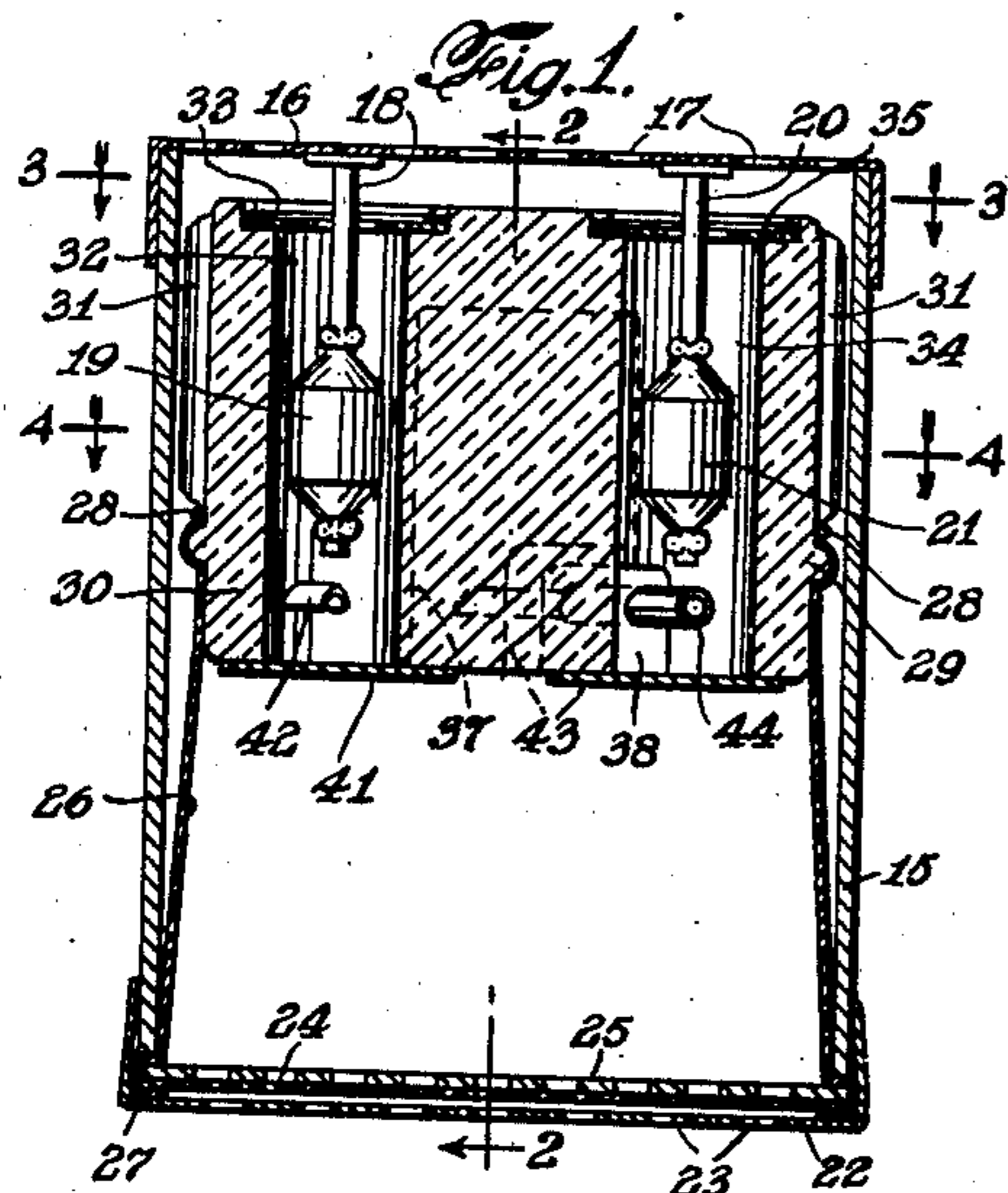
April 11, 1944.

B. L. HENRY

2,346,580

DUPLEX SOUND PRODUCER

Filed Oct. 11, 1941



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# UNITED STATES PATENT OFFICE

2,346,580

## DUPLEX SOUND PRODUCER

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9 Claims. (Cl. 46—187)

This invention relates to pneumatic vocalizers, particularly to types productive of sound emanations upon reversal of position, and more specifically to such as are used in connection with playthings, toys and novelties.

It is known that many devices exist for creating sounds simulative of infants, animals, etc., etc., to be incorporated in toys, and that the majority are objectionable because of their complicated nature, cost of construction, frequent failure to function, and are subject to corrosion of their metal parts, rendering them unsatisfactory to the ultimate consumer.

One of the objects of the invention is to provide a compact sound creating device, substantially free from metallic elements, inexpensive to manufacture and capable of long continued performance.

A further feature is in the provision of means whereby the issuing sound is articulated in distinct syllables, clearly enunciated, and spaced apart by a pause, closely simulative of natural speech.

Another purpose is to produce a multiple sound producer, operative at each reversal of its casing and containing non-metallic valves operating through fixed elastic diaphragms in a novel and highly practical manner, whereby issuing sound may be divided into syllables of different lengths.

These and other advantageous aims are attained by the construction and combination of simple parts, hereinafter described and shown in the annexed drawing constituting a graphical component of this disclosure, and in which:

Figure 1 is a longitudinal sectional view taken substantially on the center line of an embodiment of the invention, showing the parts as at the beginning of the first sound.

Figure 2 is a similar sectional view taken on line 2—2 of Figure 1.

Figure 3 is a transverse sectional view taken on line 3—3 of Figure 1.

Figure 4 is a similar sectional view taken on line 4—4 of Figure 1.

Figure 5 is a view similar to Figure 2 but showing the parts as at near the termination of the second sound.

Figure 6 is a bottom plan view of Figure 5, the cover being omitted.

Figure 7 is a detail perspective view of one of the reed holding brackets.

In the drawing, the casing, designated by the numeral 15, is shown as a cylindrical shell, made of strong pulp board, provided at one end with

a flanged pulpboard cap 16 having a plurality of perforations 17.

A pair of inreaching, rigid stems 18 and 20 are firmly secured to the underside of the cap 16, equally spaced from the center, and fixed on these stems, at predetermined points, are valve plugs, respectively 19 and 21, each having a cylindrical body and conically bevelled ends; these plugs are preferably made of non-metallic material, as wood, or one of the numerous moldable plastics.

At the opposite end of the casing is a similar flanged cap 22, which may have a circular opening, or perforations 23, as preferred. Adjacent the inner side of the cap 22 is a sheet of porous textile fabric 24 overlying a perforated stiff pulpboard disc 25 held against the edge of the casing by the cap 22.

A highly flexible cylindrical bellows 26, preferably made of thin rubber, has a thickened rim 27 at one end, disposed over and around the disc 25 and its porous cover 24, and held firmly thereagainst by the cap 22 when secured in position on the casing.

The opposite, inner end of the bellows has a similar thickened rim 28 disposed over and around a raised annular ridge 29 on a gravitational bellows weight 30, of ceramic material, cylindrical in cross section, of a diameter to move freely in the casing and guided by longitudinal ribs 31.

A pair of circular flues 32 and 34 are disposed longitudinally in the weight 30, in alinement with the valve plugs 19 and 21, which are of lesser diameter than that of the flues. The outer ends of these flues are slightly recessed and secured therein are highly flexible, rubber diaphragms 33 and 35 having central openings of lesser diameter than that of the valve plugs, and reinforced by washers.

The flue 32 has, at its inner end, a channel 36 in open communication with a resonating chamber 39, in which is fixed an angular bracket 41 carrying a vibratable reed 42 extending into the flue 32.

The flue 34 is open to a channel 38 leading to a resonating chamber 37, in which is set an angular bracket 43 carrying a vibratable reed 44 extending into the flue 34. Both reeds are at right angles to the axis of the casing and each is provided with a tongue reaching into the respective flues.

When the device is assembled in the manner indicated, and disposed in the position shown in Figure 1, the weight 30, descending by gravity, tends to compress the air in the bellows 26, causing it to travel through the channels 36 and 38

into the chambers 39 and 37, entering the reeds 42 and 44 to pass into the atmosphere by way of the perforated cap 16.

It is well known that in order to produce audible sounds from ordinary reeds an air current must impinge on the tongue or thin extending vibratory member of the reed, while air entering the cylindrical base or body portion of the reed is ineffective in producing sound, therefore it is to be noted that the reeds are so disposed that one will be mute while the other responds; as shown in Fig. 4, the reed 44 will be caused to vibrate and for a moment produce sound; the air passing through it is delivered outwardly through the hole in the diaphragm 35, then free from the valve plug, and out through the perforations in the cap 16.

As the weight descends, carrying the diaphragm with it, the hole is closed by the fixed plug 21 and the sound is temporarily interrupted, beginning again when the plug emerges through the diaphragm, repeating the sound and continuing until the weight has reached its lowermost position.

Thereupon, by reversing the casing, the opposite elements become operative, in a manner opposed to the foregoing, resulting in a second sound series, repeated in syllables in a reverse manner.

From the foregoing it will be seen that a simple, inexpensive device for this purpose has been described in the preferred form of its embodiment, but the invention is not restricted in details to the exact construction shown, it being obvious that changes may be made within the scope of the appended claims.

Having thus described the invention, including the manner of its construction and operation, what is claimed as new and sought to be secured by Letters Patent of the United States, is:

1. A duplex sound producer comprising a non-metallic cylindrical casing having a perforate cap at each end, a ceramic weight having a plurality of longitudinal guide ribs and an annular ridge on its periphery, a rigid perforate disc and a porous textile fabric disc juxtaposed against an end of said casing, a rubber bellows having a thickened rim stretched over the circumferential edges of said discs under one of said caps, the opposed rim of said bellows being fixed around and over said annular ridge, a pair of spaced chambers in said weight open to said bellows, a reed fixed in reversed relation in each chamber, a flue leading from each chamber through said weight, a flexible diaphragm in the outer end of each flue, said diaphragms having central openings, and conical ended valve plugs fixedly carried by the other of said caps to pass through said diaphragms to control the passage of air through said flues, thereby to regulate the issuance of sound from said reeds.

2. A duplex sound producer comprising a non-metallic casing having perforate caps, a rubber bellows, a porous disc abutting one end of said casing under its cap over which one of the ends of said bellows is stretched, a gravity weight having an annular ridge over which the other end of said bellows is disposed, guide ribs on said weight to contact the interior of said casing, said weight having a pair of spaced longitudinal flues, diaphragms having central openings fixed at the outer ends of said flues, a pair of chambers in said weight communicating with the inner ends of the flues, reeds in each of said chambers, said chambers open to the interior of said bellows, and double coned valves fixed to the other of said

caps in register with said flues and adapted to pass through the openings in said diaphragms to control the emission of sound.

3. In a sound producer, the combination with a cylindrical casing having perforate caps, a weight having ribs to guide it in said casing, a resonating chamber in one side portion of said weight open at one end and closed at the other, a bellows attached at its respective extremities around said weight open to said chamber and to one of said caps, a reed held horizontally in said chamber open to said bellows; a flue leading from said chamber through the weight, a flexible diaphragm fixed in the outer end of said flue, said diaphragm having an opening, and a valve plug fixedly carried by the other of said caps for passage through said diaphragm to control the emission of sound from said reed.

4. In a sound producer, the combination with a cylindrical casing having perforate caps, a cylindrical weight having a chamber eccentric to its axis and open at one end, a bellows attached at its respective extremities to said weight and one of said caps, at the open end of said chamber, a reed held horizontally in said chamber open to said bellows; a flue leading from said chamber through the weight, a flexible diaphragm fixed in the outer end of said flue, said diaphragm having an opening, and a valve plug fixedly carried by the other of said caps, said plugs being of lesser diameter than that of said flue and having conical ends adapted to facilitate passage through the diaphragm, thereby to regulate the dispersion of sound from said reed.

5. In a sound producer, the combination with a cylindrical casing having a cap at each end both being perforated, a weight having a chamber in one end, a flue leading from the chamber through the weight, and a horizontal reed set in the chamber; an annular ridge on said weight, a rigid perforate disc abutting an end of said casing below its cap, a flexible bellows having one end secured over said ridge and its other end fixed over said disc intermediate the cap and disc, and valve means to control the passage of air in said flue, said valve means including a flexible disc having a central aperture and carried by said weight, and a plug fixed to one of said heads operative through said disc.

6. In a sound producer, the combination with a cylindrical casing having perforate end caps, a weight having a chamber in one end, a flue leading from the chamber through the weight, and a horizontal reed set in the chamber; an annular ridge on said weight, a rigid perforate disc abutting an end of said casing below its cap, a porous fabric disposed over said disc, a flexible normally cylindrical bellows having thickened rims, one rim fixed over said annular ridge and the other engaged over the circumferential edge of said disc and fabric and clamped by the corresponding cap, a flexible valve seat in the outer end of said flue, and a valve plug carried by the opposite end cap co-operative with said valve seat thereby to control emission of sound from said reed.

7. A sound producing device comprising a casing having a perforate cap at each end, a weight movable therein, a pair of independent chambers in said weight, a flue extending from each of the weight chambers through said weight, a reed fixed in each chamber with its tongue projecting into its associated flue, a yieldable diaphragm having a central opening fixed in the end of said flues, a bellows extending from said weight to

the adjacent cap open to said chambers, a stem fixed to extend inwardly from the opposite cap, and a valve plug carried by each stem adapted to co-operate with said diaphragm to control the emission of sound.

8. A sound producing device comprising a casing having a perforated single cap at one end and a perforated double cap at the opposite end, a weight having peripheral guide means to move longitudinally in said casing, chambers in the inner side of said weight, flues leading from said chambers through the weight, a reed fixed in each chamber with its tongue extending into its associated flue, a bellows fixed on said weight at one end and held to said casing by said double cap, flexible valve seats at the outer ends of said flues, and elongated plugs movable through said seats carried by said single cap.

9. A sound producing device comprising a cas-

ing having a perforated single cap at one end and a perforated double cap at the opposite end, a weight movable lengthwise in said casing, a pair of resonating chambers in said weight open at its inner end, a pair of flues offset from said chambers and connected therewith at their lower ends, a reed fixed in each chamber its tongue extending into the flue connected therewith, a bellows having its ends connected respectively to said weight and said double cap, a flexible diaphragm set in the outer ends of each flue, said diaphragms having a central aperture, re-enforcing means for said diaphragms, and valve plugs rigidly affixed to the inner surface of said single cap in register with the apertures in said diaphragms and adapted to pass therethrough upon movement of said weight to control sound emanating from said reeds.

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