March 26, 1963 W. S. GAJDOSIK 3,082,838

TOY COMMUNICATION DEVICE

Filed Nov. 3, 1959

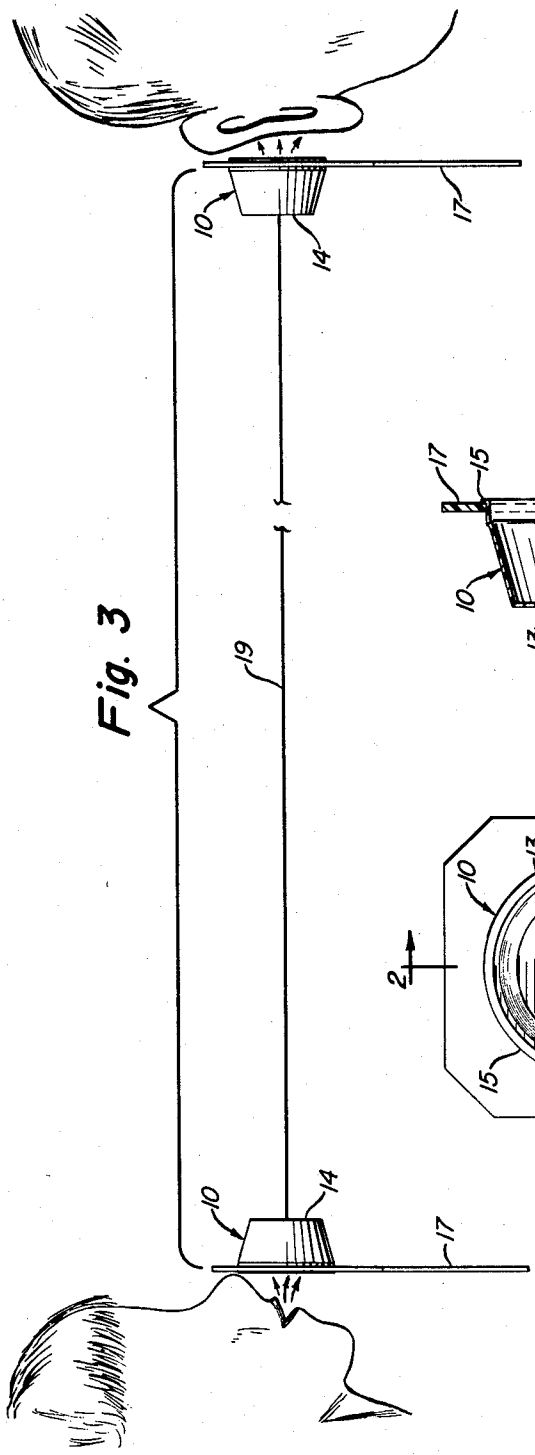


Fig. 3

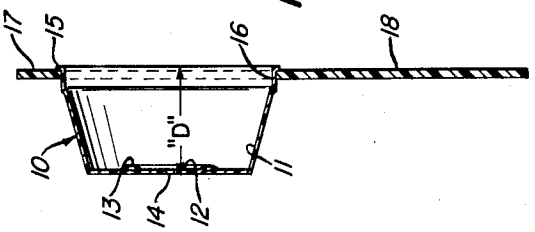


Fig. 2

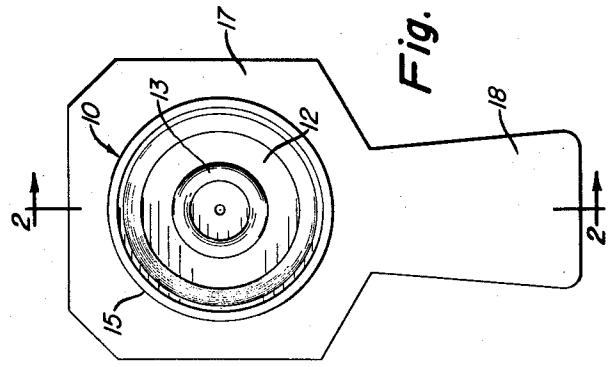


Fig. 1

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United States Patent Office 3,082,838 Patented Mar. 26, 1963

3,082,838

TOY COMMUNICATION DEVICE

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Filed Nov. 3, 1959, Ser. No. 850,675
4 Claims. (Cl. 181—29)

This invention relates to a play-toy intercommunication device. It more specifically is concerned with a toy telesonic device for receiving and transmitting audible sounds.

The transmission of sound requires the use of a proper medium for propagating the vibrational disturbances known as sound waves. The transmission of sound waves is effected by gaseous, liquid, or solid media. The latter means for transmitting sound is exemplified by the so-called "string telephone" wherein sound waves are transmitted along a length of string held tautly between spaced cup-shaped combination transmitter-receivers. In these devices, the string is preferably secured to the center of the bottom of the selected cup-shaped article such as a "tin-can" so as to provide symmetrical vibrations. Accordingly the bottom manifests a diaphragmatic action providing a set of characteristic frequencies.

A number of devices—both make-shift on a do-it-yourself basis or designed for factory production—have been used as combination transmitter-receivers, for "string telephones" such as tin cans having one end thereof removed, paper cups having flat bottoms, molded plastic articles having a thin, flat back and others. It has been found, however, that the transmission of sound which is effected by the "diaphragm elements" of such combination transmitter-receivers is not satisfactory. Although more elaborate designs and manufacturing techniques could be utilized to produce suitable devices having a diaphragm member which would more properly transmit sound, the economics of manufacturing such devices is such that the production of nicer sound transmission equipment is not commercially desirable.

According to this invention, it has been found that the transmission efficiency of so-called "string type" toy telephones is enhanced by employing a unitary cup-shaped, plastic, combination transmitter-receiver element formed from thermoplastic sheeting. The method of forming the one-piece, cup-shaped transmitter-receiver element is selected so as to produce wall and bottom portions thereof have a substantially constant thickness, with the bottom having a sufficient area and being sufficiently thin to permit diaphragmatic action.

In the drawings:

FIGURE 1 is an elevation view of an embodiment of a transmitter-receiver employed in the instant invention.

FIGURE 2 is a cross sectional side view of the transmitter-receiver shown in FIGURE 1 taken along line 2—2.

FIGURE 3 is a pictorial illustration of the toy communication device of this invention in use.

Referring to the drawings, the specific illustrative embodiment shown therein consists of a thin-walled, unitary, cup-shaped, plastic, combination transmitter-receiver **10** having a lower frustoconical wall portion **11**. The smaller diameter end of the cup-shaped element **10** is enclosed by a bottom portion **12**. As shown additional rigidity can be imparted to the bottom portion **12** without deleteriously affecing the diaphragm action by forming one or more concentric grooves **13** therein. The bottom portion **12** is also provided with an opening **14** through which the filar, sound transmission line interconnecting a pair of opposed transmitter-receivers is passed and secured in place by intertwining the terminal end thereof to provide a sufficiently large knot which will prevent the terminal end from being easily withdrawn through the hole. An

outwardly directed flange **15** is formed at the open end of the cup and is used in cooperation with the upper cylindrical wall portion **16** to hold transmitter-receiver element **10** in place within the circular cut-out area of frame **17**. Frame **17** has a handle **18** to facilitate holding the transmitter-receiver element **10** in operative position. In this embodiment the clearance between the diameter of the cut-out hole in frame **17** and the upper cylindrical portion **16** of wall **11**, is such as to provide a friction fit for retaining the transmitter-receiver element **10** in place in the handle without the use of adhesives.

In use, a suitable filar sound transmission line **19** is used to interconnect the bottom portions **12** of a pair of spaced transmitter-receiver elements **10** in the manner shown in FIGURE 3. To transmit audible sounds by means of the toy communication device of this invention, the handles **18** are gripped by the respective operators and are held so that the filar transmission line **19** is stretched tautly between the bottom portions **12** of the spaced, transmitter-receiver elements. In this position, one of the receiver-transmitter elements is used as a transmitter into which one of the operators talks. The other transmitter-receiver is employed as a receiver and is held close to the ear of the other operator to receive the audible sounds transmitted along the filar sound transmission line **19**. After the transmission has been received, the operation can be reversed and the auditor can become the speaker using the same transmission-receiver element to transmit a reply to the original speaker whose transmission-receiver element is now employed in receiver service.

It is essential to this invention that the cup-shaped plastic element which is employed as the combination transmitter-receiver be formed as a one-piece thin-walled article having a substantially constant wall and bottom thickness. It has been found that eminently satisfactory plastic cups can be formed employing the method for forming thermoplastic sheeting set forth in the application of Walter S. Gajdosik, Serial No. 756,858, filed August 25, 1958, now U.S. Patent No. 2,983,955. In this method, thin-walled plastic cups suitable for use in the instant invention are prepared from a thermoplastic sheeting by means of a technique wherein the portion of the plastic sheeting to be drawn is circumambiently clamped by a suitable clamping means. The clamped portion is initially drawn by means of a mechanical die, a fractional portion of the total draw. One of the important features of this invention is that the initial draw is done only in the marginal peripheral area of the clamped portion between the clamping means and the initial mechanical forming die as shown in the application. As a further part of the invention, it is to be noted that this initial draw is in a direction opposite to the second draw which is used to partially form the product. As a result of the initial draw, a reduction in the thickness in the sheeting is effected only in the marginal peripheral area while the thickness of the remainder of the clamped portion within the outline of the initial forming die is substantially unaffected. The second draw mechanically forces the partially drawn sheeting into the internal cavity of the female die, and, in cooperation with the male forming die, provides a partially formed product. Thereafter, a fluid pressure is provided from within one of the forming dies to finish form the remaining part of the product.

A substantial portion of the product is formed by the cooperation of the co-acting surfaces of the male and female die members of the die set and a substantial portion is also formed by means of the fluid pressure employed to finish form the remaining portion of the formed article to the configuration of the male forming die. Because it is necessary to cool the formed product to below

the softening point of the material in order to obtain dimensional stability, the instant invention, as another one of its features, employs a cooling technique which is not disclosed by the prior art. In other words, the fluid employed to effect a fluid forming pressure, in the event a gaseous fluid is used, can provide the desired cooling action because the cooling gas is not entrapped within the remaining cavity of the female forming die, but is permitted to bleed off through portholes provided in the female forming die structure. This preferred mechanical, forming method permits the economical fabrication of thin-walled, cup-shaped elements wherein the wall and bottom portions have a substantially constant thickness and a bottom portion is provided which has sufficient area and is thin enough to effect the desired diaphragmatic action. Other mechanical plastic forming techniques which can be used satisfactorily depending upon the depth of draw of the cup-shaped element include the conventional ring and plug technique. Other mechanical, plastic forming techniques wherein the desired characteristics can be produced in the cup-shaped receiver-transmitter will be evident to those skilled in the prior art. It is to be noted, however, that vacuum-forming or injection molding techniques cannot be employed to produce transmitter-receiver elements suitable for use in the instant invention.

In fabricating the cup-shaped element, a number of plastic materials can be employed including rigid vinyl, rigid cellulosics such as acetate, butyrate, etc., styrenes, high density polyethylene, polypropylene and other such rigid plastic materials. The thickness of the plastic sheeting employed is within the range of about 5–25 mils depending upon the dimensions of the finished cup-shaped transmitter-receiver elements. In order to provide a bottom portion having a diaphragmatic action, the depth of draw and thickness of the sheeting material should be selected so that the bottom be about 7 to 15 mils thick. The dimension of the cup-shaped plastic element should be selected such that the ratio of the depth of draw D used in forming the cup to the diameter of the diaphragm is not greater than about 1. For example using a 7.5 mils thick plastic sheeting a draw of about ½" is used. On the other hand the use of a 20 mils thick plastic sheeting will permit the use of about 1" or more. To provide a suitable transmitter-receiver element, a draw of about ½"–2" is preferably used. The diameter of the diaphragmatic bottom should be about 1" or more, and preferably within the range of about 1"–3". In the event that the diaphragm portion of the transmitter-receiver element requires stiffening to improve its sound transmission properties, concentric annular reinforcing grooves as hereinbefore mentioned can be integrally formed in the face of the diaphragm. The use of a reinforcing groove is illustrated, for example, in the illustrative embodiment.

For example in the embodiment illustrated in FIGURE 1, a cup-shaped element having the configuration shown therein was formed from 7.5 mils thick rigid vinyl sheeting employing the method described and claimed in the aforementioned U.S. Patent 2,983,955. The forming dies were designed such that the diameter of the open mouth of the cup-shaped element was 1½" with a peripheral outwardly depending flange ⅛" wide formed thereon. Plastic sheeting was drawn to provide a plastic cup ⅝" deep with a diaphragmatic bottom having a diameter of 1⅛". The transmitter-receiver element was mounted in a cardboard frame such as shown in the accompanying drawings. By employing a pair of these units spaced 25' apart and interconnected at the center of the diaphragms by a cotton string maintained under tension by the cooperation of the human operators using the device audible intelligible oral communications were sent and received.

Although the transmitter-receiver element can be held between the fingers to operate the top intercommunication device of this invention, the operation thereof is facilitated by the mounting of the plastic cup-shaped transmitter-receiver element in a suitable frame having a handle portion. In order to insure a rigid mounting, it is preferred that the frame encompass the periphery of the transmitter-receiver element adjacent the open mouth thereof. However, other frame designs can be utilized for holding the transmitter-receiver element during use. The handle such as shown in the accompanying drawing can be fabricated from a thin rigid sheet of plastic, cardboard, wood, or the like.

To interconnect the diaphragms of the cooperating transmitter-receiver elements, a suitable filar, sound-transmission line prepared from multi-strand braided or twisted string can be used. Other lines which are satisfactory include waxed or rosin treated string. A large variety of such strings are available which are fabricated not only from cotton yarn but also those which are prepared from plastic filaments such as nylon, vinylidene chloride resins, polyesters such as Dacron, as well as the various acrylics and others. Suitable intercommunication can be effected employing lengths of transmission line between about 20 to 50 feet; however, other lengths con be used depending upon the desired operating efficiency.

Although the subject invention has been described with reference to a specific illustrative embodiment suitable as a transmitter-receiver element, it is apparent that various modifications and variations can be made in the instant invention by one skilled in the art without departing from the scope of the invention. It is therefore intended that this invention be limited only in the manner defined in the following claims.

I claim:

1. A toy telesonic intercommunication device which comprises a pair of sound transmitter-receivers, each of said transmitter-receivers comprising a cup-shaped element of thin, substantially uniform thickness, thermoplastic material having supporting means adjacent the rim thereof and a filar having its opposite ends connected to a central portion of each of said cup-shaped elements.

2. A toy telesonic intercommunication device in accordance with claim 1 in which said thermoplastic material is 5–25 mils thick.

3. A toy telesonic intercommunication device in accordance with claim 1 in which said thermoplastic material is a vinyl sheeting.

4. A toy telesonic intercommunication device in accordance with claim 1 in which the ratio of the depth of said cup to its diameter is not greater than about 1.

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