

# United States Patent

**[11] 3,547,448**

|      |           |                                                                                       |
|------|-----------|---------------------------------------------------------------------------------------|
| [72] | Inventor  | <b>Richard Shih-Teng Chang</b><br><b>Gardena, Calif.</b>                              |
| [21] | Appl. No. | <b>726,668</b>                                                                        |
| [22] | Filed     | <b>May 6, 1968</b>                                                                    |
| [45] | Patented  | <b>Dec. 15, 1970</b>                                                                  |
| [73] | Assignee  | <b>Mattel, Inc.</b><br><b>Hawthorne, Calif.</b><br><b>a corporation of California</b> |

[56]

## References Cited

## UNITED STATES PATENTS

|           |         |                        |           |
|-----------|---------|------------------------|-----------|
| 3,082,006 | 3/1963  | Ryan .....             | 274/1(.1) |
| 3,370,855 | 2/1968  | Lindsay .....          | 274/1(.1) |
| 3,484,160 | 12/1969 | Glass et al.....       | 274/9     |
| 3,420,530 | 1/1969  | Ryan et al.....        | 274/1.1   |
| 3,484,798 | 12/1969 | Disko et al.....       | 274/15    |
| 3,452,991 | 7/1969  | Rabe (Schildkrot)..... | 274/1.1   |
| 3,286,396 | 11/1966 | Ryan .....             |           |

## FOREIGN PATENTS

|           |         |                  |       |
|-----------|---------|------------------|-------|
| 448,553   | 12/1967 | Switzerland..... | 274/1 |
| 1,210,582 | 2/1966  | Germany.....     |       |

**Primary Examiner**—Leonard Forman  
**Assistant Examiner**—Steven L. Stephan  
**Attorney**—Seymour A. Scholnick

**[54] PHONOGRAPH TOY HAVING AN IMPROVED  
SPEAKER CONE  
2 Claims, 5 Drawing Figs.**

[52] U.S. Cl..... 274/7.

274/1

[51] Int. Cl. .... G11b 3/00

[50] **Field of Search**..... 274/1, 1.1,

1.9, 2; 46/117, 175, (Inquired); 179/(Inquired);  
181/(Inquired)

**ABSTRACT:** A tone-arm engaging member is provided on a speaker cone and extends radially above the recorded portion of a phonograph record where it is engageable by a tone arm at all times during reproduction of the recorded portion.

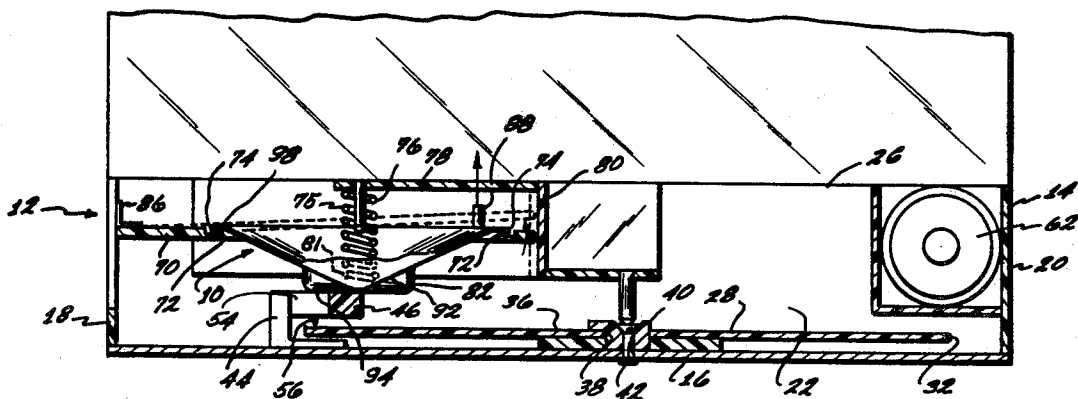


FIG. 1

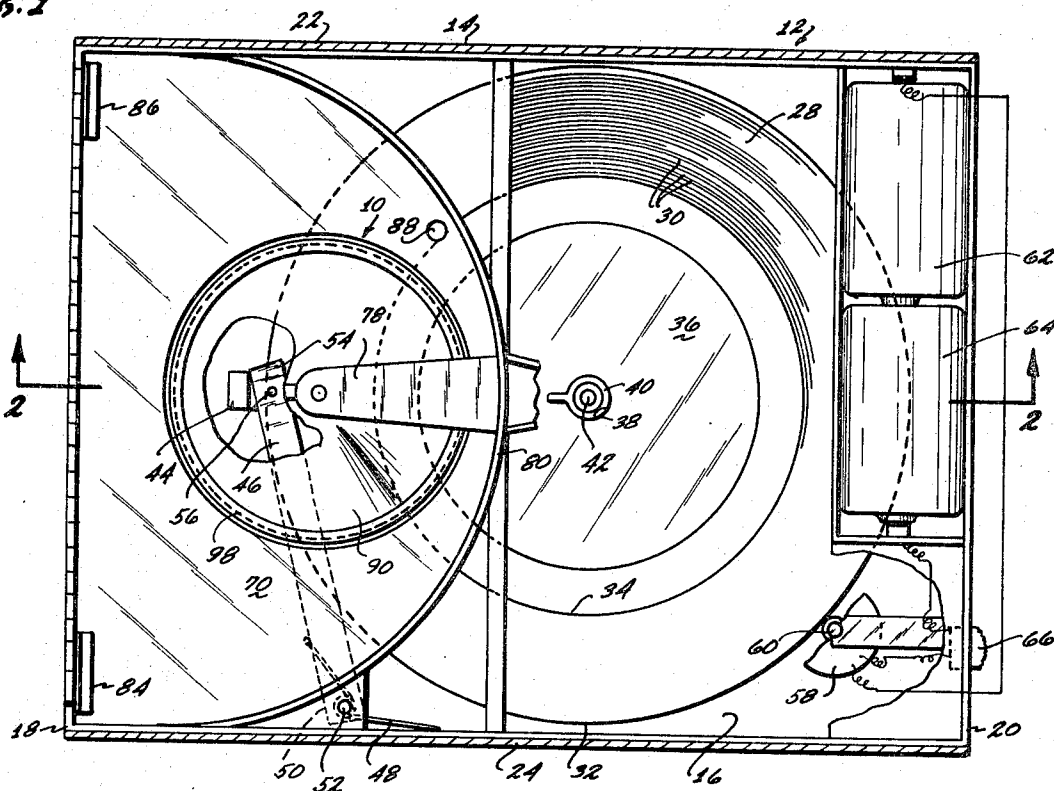
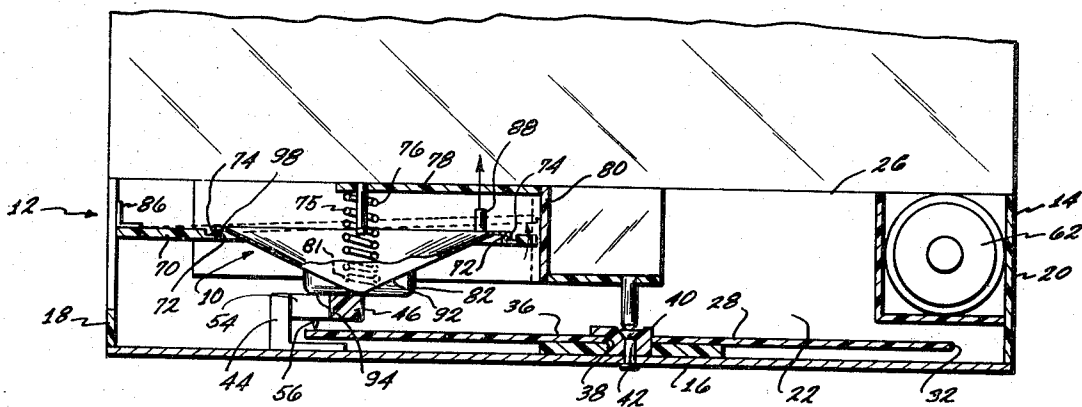
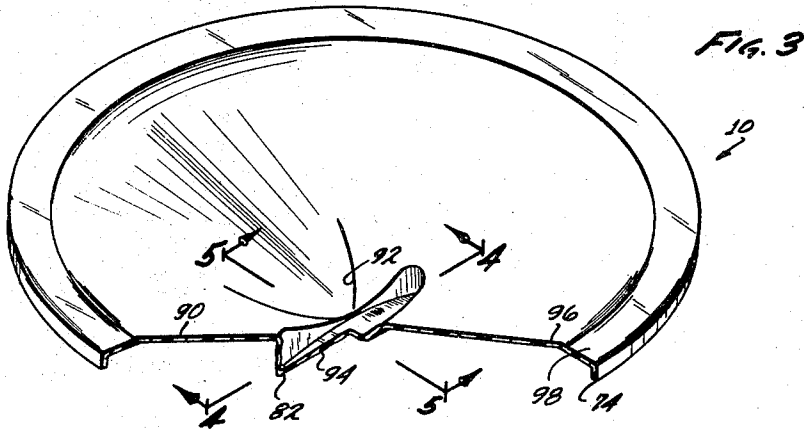
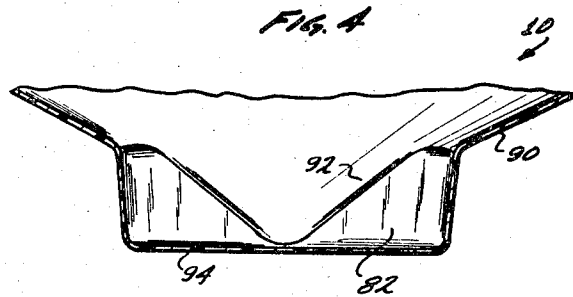
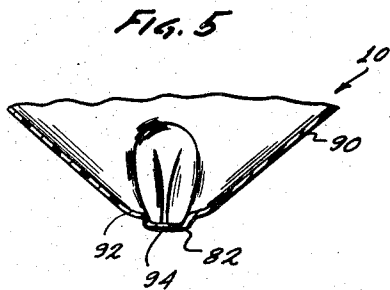


FIG. 2

INVENTORS  
RICHARD SHIH-TENG CHANG

by Herzog + Walsh  
ATTORNEYS



INVENTORS  
RICHARD SHIN-TENG CHAN

By *Herzog Walsh*  
ATTORNEYS

# PHONOGRAPH TOY HAVING AN IMPROVED SPEAKER CONE

## BACKGROUND OF THE INVENTION:

The background of the invention is set forth in two parts:

### FIELD OF THE INVENTION

The present invention pertains generally to the field of phonograph toys and more particularly to such a toy having an improved speaker cone.

### DESCRIPTION OF THE PRIOR ART

Toy phonographs of the type disclosed in U.S. Pat. No. 3,165,320 include a speaker cone which carries a piston spring-biased into engagement with a crossbar provided on a tone arm for transmitting vibrations received from a phonograph needle to the speaker cone. The needle is adapted to track a sound groove in a phonograph record from the beginning of a play area to the end thereof. The width of this play area determines the length of the crossbar on the tone arm because the crossbar must maintain sliding engagement with the piston at all times while the needle tracks the groove.

Sound is generated when the needle tip reacts to the modulation in the groove of the record. If the groove carries a hill-and-dale type recording, the needle tip moves toward and away from the piston on the speaker cone. This motion is radiated by the speaker cone as sound. If it be assumed that the record is made of extremely hard material and is axially immovable, then the needle will have an optimum reaction to the modulation. In actual practice, however, not all of the motion will be imparted to the needle tip because all physical systems have compliance. A compliant record results in motion away from the needle tip with a resultant drop in volume and quality of the sound reproduced by the speaker cone. Motion away from the needle tip in phonograph toys of the type disclosed in said United States patent is minimized by mounting the record on a turntable having a comparatively heavy mass. This, of course, adds to the first-cost of the toy.

It has been found that twisting of the tone arm about its longitudinal axis also results in poor sound volume and quality. It will be apparent to those skilled in the art that comparatively large records having wide recorded areas will require a comparatively long crossbar on the tone arm to maintain proper contact with the piston on the speaker cone. This results in a long, slender tone arm which may be easily twisted about its longitudinal axis due to the force exerted on the cross bar by the spring-biased piston.

### SUMMARY OF THE INVENTION:

In view of the foregoing factors and conditions characteristic of phonograph toys, it is a primary object of the present invention to provide a new and useful phonograph toy not subject to the disadvantages enumerated above and having a speaker cone especially designed for minimizing record motion away from the phonograph needle tip.

Another object of the present invention is to provide a new and useful speaker cone which includes a tone-arm engaging member extending radially over the play area of a record from the beginning of the play area to the end thereof.

A further object of the present invention is to provide a speaker cone of the type described which comprises a dish member having a compliant outer rim, a body portion and a central portion and which includes concentric reinforcing ribs on the body portion and a tone-arm engaging portion on the central portion.

According to the present invention, a phonograph toy of the type which includes a recorded-message carrier having sound tracks defining a play area thereon, a needle for tracking the sound track, a substantially frustoconical speaker cone and a tone arm is provided with a tone-arm engaging member on the speaker cone. The tone-arm engaging member extends radi-

ally over the track from the beginning of the play area to the end thereof. Thus, the tone arm may maintain sliding engagement with the tone-arm engaging member at all times during tracking of the sound track by the needle. The tone-arm engaging member eliminates the need for a crossbar of the type employed in prior art phonograph toys for connecting the tone arm to the speaker cone. This minimizes the twisting of the tone arm about its longitudinal axis. Additionally, the prior art piston is eliminated and it is permissible to make the tone arm of lighter material than would be needed to withstand the twisting imparted thereto by the crossbar of the prior art. This results in a tone arm and speaker cone having less weight than those employed in the prior art making it feasible to eliminate the heavy turntable required in prior art devices to minimize record motion away from the needle tip.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings in which like reference characters refer to like elements in the several views.

### BRIEF DESCRIPTION OF THE DRAWINGS:

FIG. 1 is a plan view of a phonograph toy employing a new and improved speaker cone constituting a first embodiment of the present invention;

FIG. 2 is a cross-sectional view taken along line 2-2 of FIG. 1;

FIG. 3 is an enlarged, partial perspective view of the speaker cone used in the phonograph toy of FIG. 1;

FIG. 4 is an enlarged, partial cross-sectional view taken along line 4-4 of FIG. 3; and

FIG. 5 is an enlarged, partial cross-sectional view taken along line 5-5 of FIG. 3.

### DESCRIPTION OF THE PREFERRED EMBODIMENTS:

Referring again to the drawings, and more particularly to FIGS. 1-5, a speaker cone constituting a first embodiment of the present invention, generally designated 10 is shown for purposes of illustration, but not of limitation, as comprising the speaker cone in a phonograph toy 12. The phonograph toy 12 includes a housing 14 having a bottom wall 16, a pair of end walls 18, 20, a pair of sidewalls 22, 24 and an open top 26.

The phonograph toy 12 also includes a recorded-message carrier 28 having sound tracks 30 defining a play area thereon between the outer periphery 32 and the inner periphery 34 thereof. Recorded-message carrier 28 is also provided with a hub portion 36 formed integrally with the portion thereof which carries the sound tracks 30. Hub 36 is provided with an aperture 38 frictionally engaged by a cylindrical sleeve 40 rotatably connecting record-message carrier means 28 to a fixed spindle 42 affixed to bottom wall 16. Bottom wall 16 also carries an upstanding stop member 44 adapted to arrest a tone arm 46 when it is swung to the outer periphery 32 by a return spring 48. Tone arm 46 includes a first end 50 which is pivotally connected to sidewall 24 by a pivot pin 52 and a free end 54 which carries a phonograph needle 56.

Recorded-message carrier means 28 may be rotated by an electric motor 58 having an output shaft 60 engaging outer periphery 32 of recorded-message carrier means 28. Motor 58 derives power from a pair of dry cells 62, 64 which are connected to motor 58 through a switch 66.

Speaker cone 10 is mounted in a plate 70 having an upstanding, annular rim 72 provided thereon. Speaker cone 10 includes a depending, annular rib 74 forming a coupling with rim 72 so that cone 10 is free to move axially under the influence of tone arm 46 which, in turn, is moved by needle 56 tracking sound tracks 30. Tone arm 46 is urged toward recorded-message carrier means 28 by a compression spring 75 having one end 76 bearing against a bracket 78 affixed to a

rim 80 in open top 26 and a second end 81 bearing against an elongated, tonearm engaging member 82. Plate 70 is swingably mounted in rim 80 by a pair of hinges 84, 86 and carries a lift button 88 which may be grasped to lift plate 70 sufficiently to release tone arm 46 so that it is free to be moved to a position against stop member 44 under the influence of spring 48.

Tone-arm engaging member 82 may be formed integrally with cone 10 during the manufacture thereof by well-known molding techniques and is of sufficient length to extend radially over the play area from the beginning to the end thereof, whereby tone arm 46 may maintain a sliding engagement with member 82 at all times during tracking of sound tracks 30 by needle 56.

Speaker cone 10 may be made from any suitable thin material of types well known to those skilled in the art. For example, cone 10 may be made from a styrene monomer: vinylbenzene; phenylethylene; cinnamene; and cinnamol. Cone 10 includes a substantially frustoconical body portion 90 having an apex 92 merging into the tone-arm engaging member 82 which, in turn, includes a lower surface 94 engageable by the tone arm 46. Cone 10 also includes an upper end 96 formed integrally with a concentric shelf 98 and rib 74.

Tone arm 46 and recorded-message carrier means 28 may be made from suitable plastic materials such as an acetal resin and the combined weight of the tone arm 46 and the speaker cone employed therewith is sufficiently reduced in comparison to the weight of the speaker cone and tone arm employed in said United States patent that movement of recorded-message carrier means 28 away from needle 56 will be minimized.

While the particular phonograph toys and speaker cone combinations herein shown and described in detail are fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that they are merely

illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown.

I claim:

1. In a phonograph toy including a recorded-message carrier means having side-by-side sound track portions defining a play area thereon, a needle for tracking said sound track, a frustoconical speaker cone and a tone arm having said needle depending therefrom, said tone arm transmitting vibrations from said needle to said speaker cone, the improvement which comprises:

a tone-arm engaging member on said speaker cone, said tone-arm engaging member extending transversely over said sound track portions from the beginning of said play area to the end thereof and having a lowermost ridge portion, whereby said tone arm is engageable with said tone-arm engaging member at all times during tracking of said sound track by said needle;

said tone arm extending under said ridge portion and having an upper surface slidably engaging said ridge portion substantially directly opposite said needle, said ridge portion being an elongated member extending substantially diametrically across the apex of said cone; and said cone and tone arm engaging member are of sheet material and said tone arm engaging member being a hollow structure formed integrally with said cone during the manufacture thereof.

2. An improvement as stated in claim 1 wherein said speaker cone includes an annular depending rib at its outer periphery and wherein said phonograph toy includes an annular rim loosely telescopically engaging said rib to form a floating mounting for said cone, whereby said cone is free to move axially.

40

45

50

55

60

65

70

75