Jan. 13, 1953 H. ZIMMERMAN 2,625,069

MUSICAL TOY

Filed July 28, 1950

Fig. 1

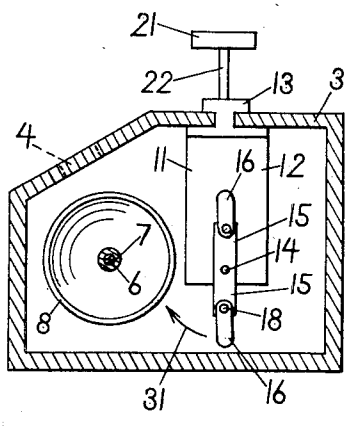


Fig. 2

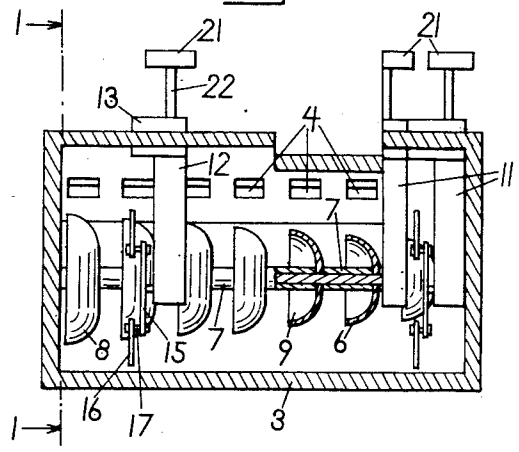


Fig. 5

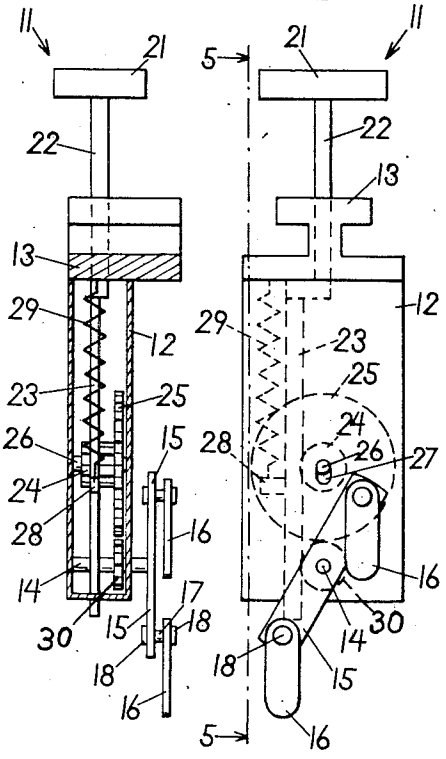
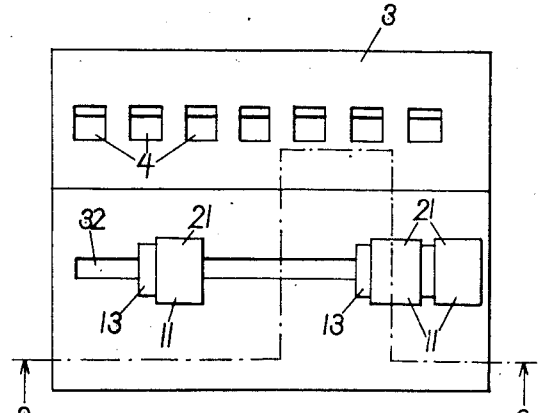


Fig. 4

Fig. 3



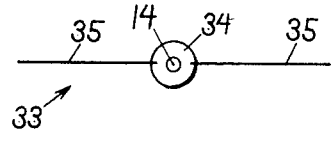


Fig. 6

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MUSICAL TOY

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6 Claims. (Cl. 84—406)

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My invention relates to musical toys or instruments which have a plurality of differently tuned tone members and means for activating these members selectively in any desired sequence whereby any desired melody can be played.

Objects of my invention are to activate the tone members by striking means contacting the surfaces of the tone members while by-passing these surfaces in a direction that is substantially tangential with respect to the path of the striking means and to the surface of the contacted tone member, thereby to produce clear, loud and pleasantly ringing tones, and to make this particular contact possible by striking means arranged so rotatably that the rotary path leads these means into substantially tangential contact with the tone members.

Other objects are to hit each tone member to be activated several times at each single hand stroke of the player, thereby to produce tremolant tones, to blend the individual tone impulses into one pleasant tremolant tone by the mentioned ringing quality of the individual tones, and to make these effects possible by a structure which allows passage of the striking means at the contacted tone surfaces whereby the striking means can continue rotating and can strike the tone members repeatedly.

Further objects are to provide tone members having the shape and the superior tone quality of bells, to provide different tones by using bells of different diameters, and too to provide rotatable striking means of variable radial length whereby the same striking member can contact the smallest bell and can by-pass the largest bell.

Still further objects are to attain the mentioned results with simple and inexpensive means, and to provide a musical toy of superior tone effect that can be made and assembled easily and quickly.

Still other objects and advantages will appear from the following description of an exemplifying embodiment of my invention, from the appended claims and from the accompanying drawing in which:

Fig. 1 shows a cross-section of an illustrative embodiment of my invention, this cross-section being taken along the line 1—1 in Fig. 2.

Fig. 2 shows another cross-section of the same embodiment, this cross-section being taken along the broken line 2—2 in Fig. 3.

Fig. 3 shows a top view of the same embodiment.

Fig. 4 shows a side view of an activating unit which is a part of the embodiment shown in Figs. 1 to 3, this view being seen in the direction of Fig. 1.

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Fig. 5 shows a cross-section taken along the line 5—5 in Fig. 4.

Fig. 6 shows a side view of a striking member which may be used instead of the striking member shown in Figs. 4 and 5.

Figs. 4 to 6 are represented on a larger scale than Figs. 1 to 3.

The shown embodiment comprises a supporting structure constituted by a casing 3 which may be provided with openings 4 for the passage of tone waves. A shaft 6 is affixed to the casing 3 and crosses its inner space horizontally. A number of sleeves, some of which are indicated by 7, surround the shaft 6.

Tone members, some of which are indicated by 8 and 9, are shaped like bells and have central bores through which the shaft 6 passes. These tone members are supported by this shaft in a row and are held in spaced positions by the sleeves. Each bell is tuned to a different tone, preferably by providing the bells with different diameters. The drawing shows seven bells. But I desire it understood that any number of tone members sufficient for playing a melody may be incorporated in the embodiment, for example, 8 or more tone members.

There may be one or more units 11 for ringing or activating the tone members. Each unit may have the structure shown in Figs. 4 and 5. This structure comprises a frame or housing 12 having a top 13 supported by the casing 3, a shaft 14 rotatably carried by the frame 12, an operating mechanism for rotating the shaft 14, and rotatable striking means. The latter comprise an arm 15 affixed to the shaft 14 and extending therefrom radially and a striking element 16 which is movably connected to the outer end of the arm 15, for example, by an axle 17 passing through bores of the arm 15 and of the element 16 and provided with end heads 18 which prevent separation of the parts 15 and 16. Preferably, the distance between the two end heads 18 is large enough to provide some clearance between the parts 15 and 16.

The axis of the axle 17 is not radial, but preferably parallel to the shaft 14 and is eccentric with respect to the striking element 16 whereby the striking member constituted by this element and the arm 15 has a variable radial length. When the striking member rotates, the centrifugal force holds the element 16 in its most outward position as shown in Figs. 1 and 2. In this position, the striking element 16 forms an outer or radial extension of the arm 15. When, during the rotation, the striking elements hit a tone member, the element 16 turns about the axle 17 so far as neces-

sary to allow passage of the striking member at the tone member whereby the striking member can continue rotating and can contact and activate the tone member repeatedly.

The arm 15 may have an integral extension forming another arm 15 positioned symmetrically at the opposite side of the shaft 14. This other arm 15 may be also provided with a striking element 16 and an axle 17 whereby the striking member is balanced about the shaft 14, and the number of contacts with the tone member is doubled. When the striking member does not rotate, the striking elements 16 depend from the axle 17 as shown in Figs. 4 and 5.

The operating mechanism is so constructed that one stroke of the player's hand or finger rotates the shaft 14 in one direction only and several times around whereby the striking member rotates in a circularly closed path. In the shown embodiment, for example, the unit 11 is provided with a handle or key 21 positioned over the casing 3 and affixed to a vertical stem 22 which passes slidably through the top 13. A rack 23 guided in a bottom opening of the housing 12 is affixed to the lower end of the stem 22 and engages a pinion 24. This pinion and a toothed wheel 25 are co-axially affixed to a shaft 26 which is rotatably in openings 27 of the housing 12.

The openings 27 have an elongated shape forming a short vertical slot. The rack 23 has a horizontal projection 28 to which the lower end of a coiled spring 29 is affixed. The tension of this spring urges the rack, the handle, the pinion 24, the wheel 25 and the shaft 26 into the shown uppermost position in which the shaft 26 rests in the upper ends of the openings 27. When the handle 21 is pressed down, the shaft slides down in the openings 27, and the wheel 25 engages another pinion 30 which is affixed to the shaft 14. This shaft is rotatable in bores of the housing 12. Further depression of the handle and, thereby, of the rack 23 causes rotation of the pinion 24 and of the wheel 25 which, in turn, rotates the pinion 30 and the shaft 14 whereby the striking member rotates in the direction of the arrow 31 in Fig. 1.

When the pressure on the handle 21 ceases, the rack and the shaft 26 return into their uppermost position, and the wheel 25 is disengaged from the pinion 30. This pinion and the striking member continue rotating in the direction of the arrow 31 until they are braked by friction and by contacts with the tone member.

The units 11 are so arranged that their operative means allow selection of the path of the striking means in such a manner that the striking means can contact and activate any desired one of the tone members. This selection may be made possible in several manners. For example, the unit may be so shiftable that it can be brought into proper position to or into registry with any of the tone members. Or several units may be so arranged in fixed positions that each unit is in registry with one of the tone members. Or some tone members may be contactable by a shiftable unit and other tone members by fixed units.

The shown embodiment illustrates the latter combination between shiftable and fixed units. The tone members positioned in Fig. 2 at the left side of the casing 3 from 8 to 9 can be activated by a unit 11 which is shiftable parallel to the shaft 6 or along the row of tone members, the top 13 of the unit 11 having an I-shaped cross-section engaging a slot 32 of the casing 3 slidably. The tone members positioned in Fig. 2

at the right side of the tone member 9 can be activated by units 11 which may be identical to the shiftable unit, but are held in fixed positions.

When a unit is in registry with a tone member, the shaft 14 has a distance from the tone member which is so measured that the tone member reaches slightly into the rotary path of the striking element whereby rotation of the striking element brings the same into contact with the tone member. These contacting bodies are sufficiently movable away from each other to allow passage of the striking element at the tone member. This movability may result from resilience, for example in the manner which will be described later, or from a movable connection of one of the contacting elements with the supporting structure. An example of such a movably connected element is the striking element 16 which is connected to the arm 15 and, hence, to the supporting structure by the axle 17. The striking member comprising the arm 15 and the element 16 has a maximal radial length sufficient for contact with the bell of smallest diameter and has a minimal length smaller than the distance of the shaft 14 from the largest bell.

Resilient evasion of the striking element may be produced, for example, by the following structure. Instead of the striking member comprising the arm 15 and the element 16, the striking member 33 shown in Fig. 6 may be used. This member has a central disk 34 affixed to the shaft 14 and two arms 35 formed by flat springs and extending radially from the disk 34 whereby the length of these arms is shortened when the springs 35 bend resiliently.

The rotating striking element by-passes the tone member while striking and activating the latter. During this passing contact, the striking element moves tangentially to the contacted surface of the tone member and continues rotating in a circularly closed path.

I desire it understood that my invention is not confined to the particular embodiment shown and described, the same being merely illustrative, and that my invention may be carried out in other ways without departing from the spirit of my invention as it is obvious that the particular embodiment shown and described is only one of the many that may be employed to attain the objects of my invention.

Having described the nature of my invention, what I claim and desire to protect by Letters Patent is:

1. A musical toy comprising a supporting structure, a row of differently tuned tone members supported by said structure, and an activating unit comprising a frame guided relatively to said structure and shiftable along said row into registry with any of said tone members, a shaft carried by said frame and shiftable together with said frame along an axis extending along said row at different distances from the individual tone members, an arm carried by said shaft rotatably in a circularly closed path, a striking element forming a movably connected extension of said arm and, together with said arm, forming a striking member of variable radial length, said length being sufficient for contact between said striking element and any tone member that is in registry with said unit, and operative means operated by hand stroke and, at each single hand stroke, rotating said striking member in a circularly closed path.

2. A musical toy comprising a supporting structure, a row of differently tuned tone members

formed by bells of different diameters and supported by said structure, and an activating unit comprising a frame guided relatively to said structure and shiftable along said row into registry with any of said tone members, a shaft carried by said frame and shiftable together with said frame along an axis extending along said row at different distances from the individual tone members, an arm carried by said shaft rotatably in a circularly closed path, a striking element forming a movably connected extension of said arm and, together with said arm, forming a striking member of variable radial length, said length being sufficient for contact between said striking element and any tone member that is in registry with said unit, and operative means operated by hand stroke and, at each single hand stroke, rotating said striking member in a circularly closed path.

3. A musical toy comprising a supporting structure, a row of differently tuned tone members supported by said structure, and an activating unit comprising a frame guided relatively to said structure and shiftable along said row into registry with any of said tone members, a shaft carried by said frame and shiftable together with said frame along an axis extending along said row at different distances from the individual tone members, an arm carried by said shaft rotatably in a circularly closed path, having a radial length sufficient for contact with any tone member that is in registry with said unit and being sufficiently resilient to allow by-passing rotation of said arm, and operative means operated by hand stroke and, at each single hand stroke, rotating said striking member in a circularly closed path.

4. In a musical toy; the combination of a series of bells of different diameters arranged in a row with their centers in axial alignment; and striking means for selective engagement with each of said bells and including at least one striking member, and means supporting said striking member for rotation in a circular closed path about an axis parallel to said row, said striking member having a radial length which is variable by at least as much as the maximum difference between the diameters of said bells and said axis of rotation being disposed so that all of said bells are spaced from said axis by distances falling within said variable length of the striking member.

5. A musical toy comprising a supporting structure; a series of bells of different diameters arranged in a row with their centers in axial alignment and supported by said structure; and an activating unit mounted on said structure for movement along a path parallel to said row into registry with any of said bells, said unit including a striking member mounted for rotation in a closed circular path about an axis parallel to said path of movement of the unit and having a radial length which is variable by at least as much as the difference between the radii of the largest and smallest of said bells, said axis of rotation being disposed so that the radial distances therefrom to the peripheries of the largest and smallest of said bells are greater than the minimum radial length and less than the maximum radial length, respectively, of said striking member.

6. A musical toy comprising a supporting structure, a row of differently tuned tone members formed by bells of different diameters and supported by said structure, and an activating unit comprising a frame guided relatively to said structure and shiftable along said row into registry with any of said tone members, a shaft carried by said frame and shiftable together with said frame along an axis spaced from and extending along said row, an arm carried by said shaft rotatably in a circularly closed path, a striking element eccentrically pivoted to said arm for forming a movably connected extension of said arm and, together with said arm, providing a striking member of variable radial length, the smallest length of said striking member being equal to the radial length of said arm and smaller than the distance of said shaft from any of said tone members, the largest length of said striking member being equal to the combined radial length of said arm and of said striking element and being larger than the distance of said shaft from any of said tone members, and operative means rotating said striking member in a circularly closed path.

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