United States Patent

[11] **3,532,022**

[72] Inventor **Robert I. Genin**
Scarsdale, New York

[21] Appl. No. **520,430**
[22] Filed **Jan. 13, 1966**
[45] Patented **Oct. 6, 1970**
[73] Assignee **Child Guidance Toys Inc.**
Bronx, New York, New York
a corporation of New York

[54] **MOTOR-OPERATED MUSICAL INSTRUMENT**
7 Claims, 11 Drawing Figs.

[52] **U.S. Cl.** **84/102,**
84/404, 46/177, 46/216
[51] **Int. Cl.** **A63h 19/00,**
A63h 21/00
[50] **Field of Search** 84/102,
402, 403, 404; 104/60; 46/111, 112, 113, 177,
216, 217, 218; 238/2, 6, 10, 11, 12

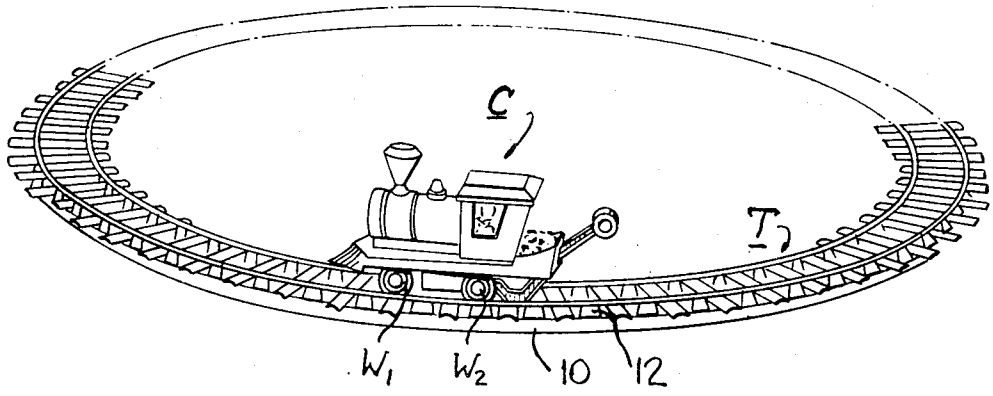
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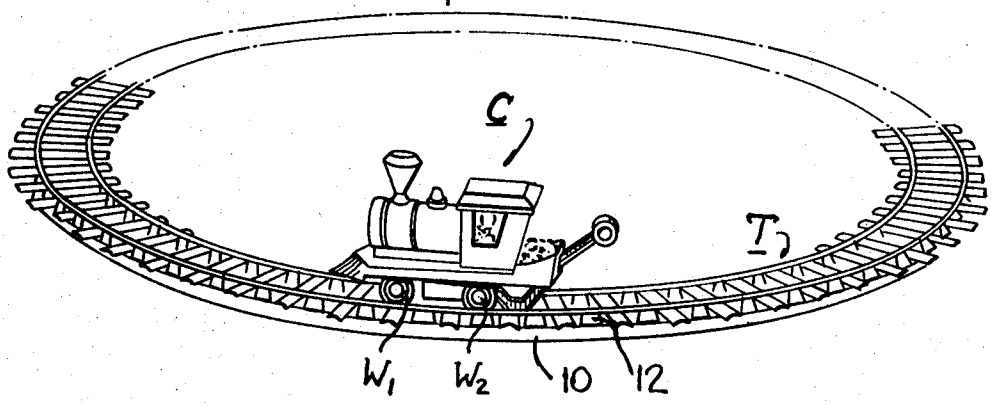
Primary Examiner—Richard B. Wilkinson
Assistant Examiner—George H. Miller, Jr.
Attorney—Michael Ebert

ABSTRACT: A musical toy railroad comprising a track composed of sound emitting bodies, toy vehicle moving along said track and striking said sound emitting bodies during movement along said track so as to play a tune.



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Fig. 1.



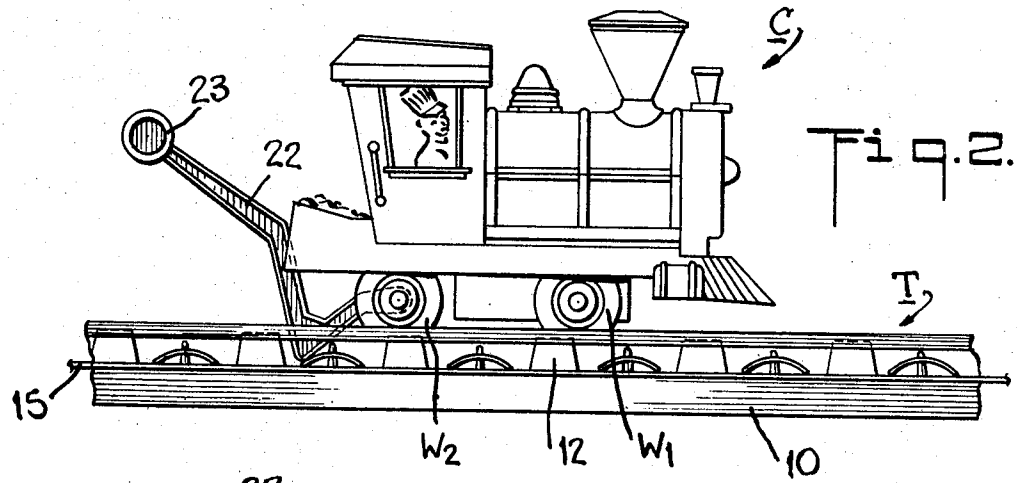


Fig. 2.

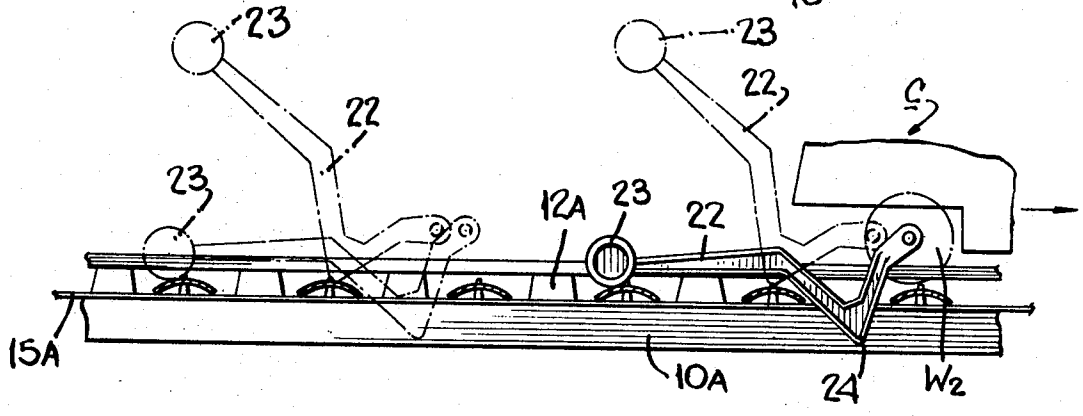


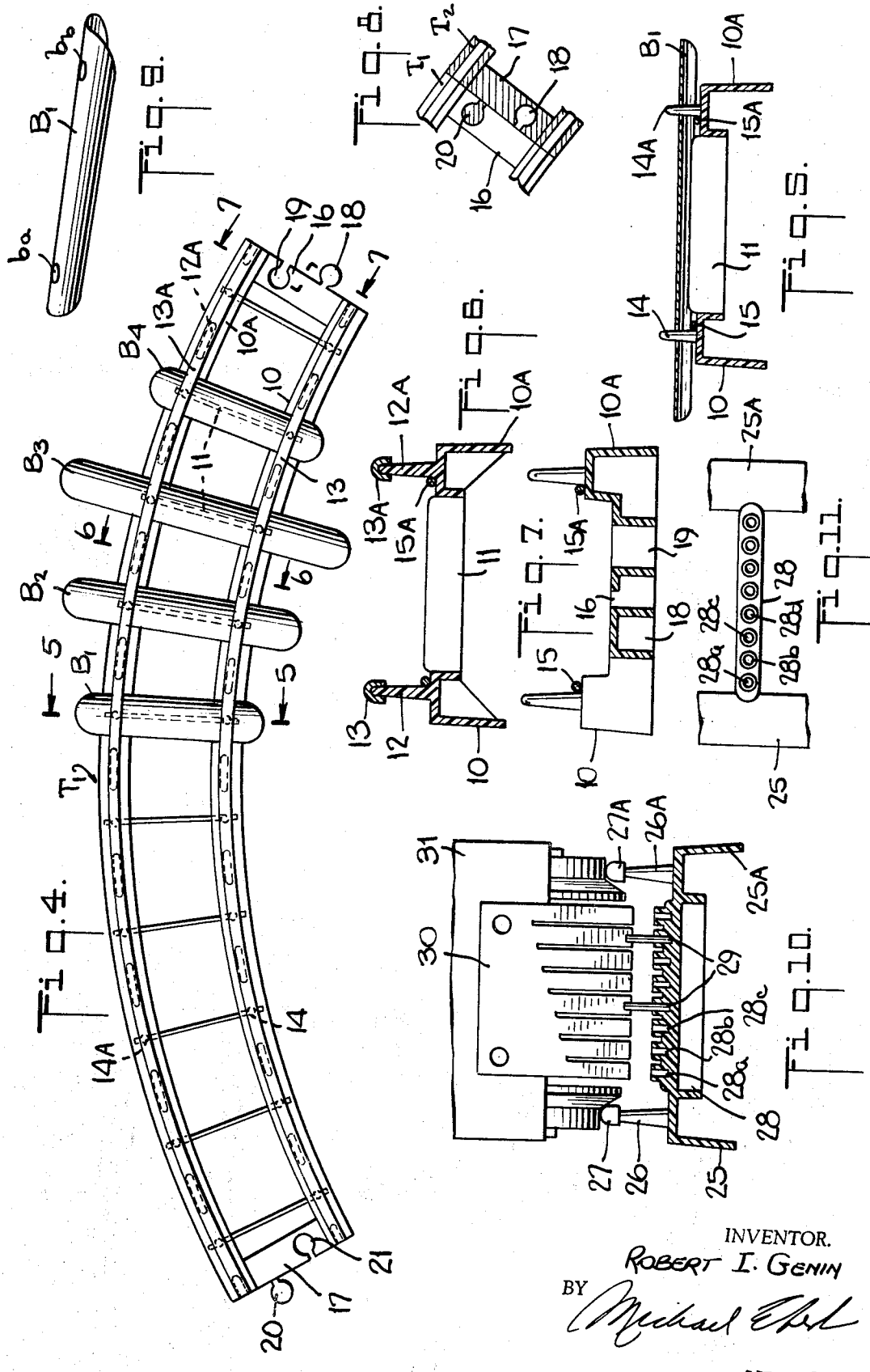
Fig. 3.

INVENTOR.
ROBERT I. GENIN
BY Michael Ebert
ATTORNEY

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INVENTOR.
ROBERT I. GENIN
BY Michael Ebert
ATTORNEY

MOTOR-OPERATED MUSICAL INSTRUMENT

This invention relates generally to musical toys, and more particularly to a motor-operated xylophone whose bars are automatically struck in direct sequence to play a desired tune.

A xylophone is a musical instrument constituted by a row of parallel resonator bars, formed of wood or metal and graduated in length to form a musical scale, the bars being struck by small mallets. Each bar produces a distinctive tone which depends on its length. The vibratory bars are arranged in a fixed series wherein the bars increase progressively in length, so that the lowest tone is at one end of the series and the highest at the other end thereof. In order, therefore, to play a tune composed of notes whose tonal sequence is not progressive, it is necessary to shift the mallet position back and forth along the series of bars to strike the appropriate notes.

Accordingly, it is the main object of this invention to provide a motor-generated musical instrument composed of resonator bars which may be selectively laid down in any desired nonprogressive tonal sequence in accordance with the notes in a particular tune, whereby by automatically striking the bars in direct sequence the tune may be played.

More specifically, it is an object of the invention to provide a trackway adapted to receive resonator bars thereacross at spaced positions in any desired order in terms of bar lengths, a motor-driven carriage or other vehicle running along the trackway at a predetermined speed and carrying a reciprocating mallet which is adapted to strike successive bars along the trackway to play a tune.

A significant feature of the invention is that by the use of a continuous trackway, the tune composed of a series of bars laid down on the trackway is repeatedly sounded as the carriage runs cyclically along the trackway.

A further advantage of the invention resides in the fact that the bars may be quickly laid down or removed from the trackway to create any desired tune.

From the standpoint of a toy, the device in accordance with the invention has several recreational aspects, for not only is the player able to set up any tune of his choice, but by proper selection and insertion of the bars of different length, he can also determine which portion of the trackway is to contain a series of bars and which portion is to be silent, the player also deriving pleasure from operating the carriage over the trackway and from erecting various forms of trackway configurations.

The invention also has educational value for the bars may be color coded to an instruction sheet and marked with numbers at each end to depict the notes of the scale, whereby the player receives instruction in the musical scale and also is free to compose his own tunes.

Briefly stated, these objects are accomplished in a musical xylophone trackway and carriage arrangement wherein selected resonator bars of different lengths are laid over transverse ties which interconnect the parallel rails of the trackway, a carriage running on the rails and over the ties being provided with a pivoted mallet arm at the end of which is a mallet head adapted to strike the bars to produce sounds, the arm having an elbow theron which is arranged to engage successive ties on the tracks or the bars laid thereover to cause said arm to first elevate the mallet head and then to permit it to drop upon a resonator bar when the elbow falls between adjacent ties.

Thus as the carriage travels over the trackway, the oscillating mallet is alternately raised and dropped as the elbow alternately engages a tie or a bar thereon and then falls between adjacent ties, whereby a sound is produced each time the mallet head strikes a resonator bar. By the choice of resonator bars and the placement thereof on the trackway, any desired tune may be played in the course of carriage travel.

For a better understanding of the invention as well as other objects and features thereof, reference is made to the following detailed description to be read in conjunction with the accompanying drawings, wherein:

FIG. 1 is a perspective view of a musical trackway and mallet-carriage assembly in accordance with the invention;

FIG. 2 is an elevational view showing the mallet-carriage on the trackway;

FIG. 3 illustrates the oscillating movement of the mallet arm in the course of carriage travel;

FIG. 4 is a plan view of one track section;

FIG. 5 is a transverse section taken in the plane indicated by line 5–5 in FIG. 4;

FIG. 6 is a transverse section taken in the plane indicated by line 6–6 in FIG. 4;

FIG. 7 is an end view, partially in section, taken in the planes indicated by lines 7–7 in FIG. 4;

FIG. 8 is a plan view showing two interconnected track sections;

FIG. 9 shows a single resonator bar;

FIG. 10 shows another embodiment of the invention wherein the musical elements are carried by the carriage and are actuated by pins supported on the trackway in position to intercept the musical elements; and

FIG. 11 is a plan view of the trackway of FIG. 10.

XYLOPHONE-LOCOMOTIVE

Referring now to the drawings, and more particularly to FIGS. 1 to 9, one preferred embodiment of the invention is constituted by a mallet-carriage C which runs along a circular trackway T. The carriage is in the form of a toy locomotive having a front wheel assembly W_1 and a rear wheel assembly W_2, the wheels being designed to run on rails.

While the invention is illustrated in connection with a toy locomotive, it will be appreciated that in practice any other form of carriage may be used. Preferably the carriage is driven by a battery-operated electric motor, so that by a simple switch action the carriage proceeds to travel over the trackway. Also, while a circular trackway is disclosed, in practice, the trackway may be in any other continuous configuration, such as a figure-of-eight pattern.

The trackway T is made up of a series of interconnected arcuate track sections, one of which, T_1, is shown separately in FIGS. 4, 5, 6 and 7. Each trackway section is composed of a pair of parallel channel members 10 and 10A which are joined together at equispaced positions by transverse tie elements 11. Projecting upwardly from the channel members 10 and 10A at spaced positions therealong, are a series of pedestals 12 and 12A, respectively, which serve to support rails 13 and 13A having a U-shaped cross section, the rails being raised by the pedestals above the channel members to define open slots between the pedestals.

Projecting upwardly from the channel members 10 and 10A in the slots intermediate the pedestals thereon and in alignment with ties 11, are spikes or locating pins 14 and 14A, respectively. These pins receive resonator bars B_1, B_2, B_3, B_4, etc., each of which is provided with a pair of elongated holes b_a and b_b to accommodate the locating pins.

The resonator bars are preferably metallic and are in varying lengths determined by the notes in the musical scale. The holes in the several bars are the same centered distance apart regardless of the bar lengths. The bars are arcuate in cross section and when placed under the rails 13 and 13A on the pins 14 and 14A, they lie at positions superposed on the ties 11. In practice, the bars of different length may be distinctly colored and numbered, so that all bars of the same length have an identical color and number to facilitate the selection of bars corresponding to the notes of a tune. An instruction sheet may be provided using the same color and number code to facilitate the deployment of bars to play particular tunes.

In order to permit the bars to vibrate freely when struck and to avoid the dampening effect of the channel members 10 and 10A thereunder, the bars are accoustically isolated from the channel members by a pair of strings 15 and 15A each of which runs along the trackway section above the associated channel member. The strings are preferably in the form of elastic yarns which are maintained under tension, the ends of the strings being anchored at the ends of the trackway section.

At opposing extremities of the trackway section are transverse slats **16** and **17**, slat **16** having a circular tongue **18** extending therefrom adjacent channel member **10**, and having a circular recess **19** formed therein adjacent channel member **10A**. Slat **17** is provided with a like tongue **20** and a recess **21**, the positions of these elements relative to the channel members **10** and **10A** being the reverse of that on the other slat.

Thus when two track sections T_1 and T_2 are to be interconnected, as shown in FIG. **8**, the tongue **18** of section T_1 fits into the recess of section T_2, and the tongue **20** of section T_2 fits into the recess **19** of section T_1, the recesses being formed as snap sockets to provide a reliable coupling.

As best seen in FIGS. **2** and **3**, pivotally mounted on the axle of the rear wheels W_2 of the locomotive and extending rearwardly therefrom is a mallet constituted by a mallet arm **22**, at the free end of which is a mallet head **23**. Arm **22** is formed with an elbow **24**, the arm position being such that it lies between the rails **13** and **13A**. Thus as the locomotive runs along the trackway, the elbow **24** engages successive ties **11** therealong or bars B_1 etc. in the event a bar is placed over the tie. In positions intermediate the ties or the bars, the elbow enters the space therebetween.

In operation, therefore, when the elbow engages a bar or a tie it causes the arm **22** and the mallet head **23** to be raised over the trackway and when the elbow falls into the space between the ties, the raised mallet head drops by its own weight, the length of the arm with respect to the space between ties being such that the mallet head strikes whatever bar is positioned on a tie once removed from those ties defining the space into which the elbow has fallen, as demonstrated in FIG. **3**.

Since the timing of the xylophone depends on the speed of the locomotive along the track, it is essential that the locomotive travel at a rate which is musically appropriate. To this end, an electric motor is used for the locomotive which is geared down to drive the shaft of the wheels at about 100 r.p.m. A motor control box may be provided including a variable resistance in the battery circuit for the motor to permit adjustment of motor speed to attain the desired musical timing.

It is important to note that the mallet arm is raised at each tie position whether or not a bar is placed thereover, hence the presence of a bar is not essential to actuate the mallet. In practice, where a series of bars are located along only a portion of the trackway, all of the bars will be struck by the mallet including the last bar in the series in that even though there are no bars on the ties following the end of the bar series, the ties nevertheless act to raise the mallet.

While the ties are shown as transversely positioned to engage the elbow, the height of the ties being such that they lie just below the bars, it is possible to use ties in a criss-cross or other formation well below the level of the bars. But in this event, in order to actuate the mallet, it is necessary to provide a raised projection just below the bar level, which projection is engaged by the elbow.

In practice, all of the elements of the trackway section, other than the rails, may be molded in a single piece, with the rails formed of extruded plastic and fitted over the supporting pedestals.

HARP-LOCOMOTIVE

In FIGS. **1** to **10**, there is illustrated a xylophone-locomotive in which the xylophone bars are arrayed along a trackway and are struck one note at a time by a mallet drawn by the locomotive. In FIGS. **10** and **11** there is shown another embodiment of the invention in which a harp structure is carried by the locomotive or other motorized carriage, the reeds of the harp being selectively actuated by pins mounted on the trackway.

To this end, the trackway is formed by a pair of channel members **25** and **25A** having pedestals **26** and **26A** thereon to support rails **27** and **27A**, very much in the manner of the xylophone. However, the transverse ties **28**, which interconnect the channel members, are formed with a series of circular sockets **28***a*, **28***b*, **28***c*, adapted to receive removable pins **29**.

Sockets **28***a* etc. are in registration with the reeds of a harp member **30** secured to a locomotive **31** and depending therefrom, such that if a pin **29** is placed in a particular socket, when the locomotive rides over the tie, the pin will intercept the related reed and set it into vibration. The sockets and associated pins are preferably of the snap-fit type.

Thus, as distinguished from the xylophone, more than one note may be struck at each tie position and it becomes possible to play chords. The reeds of the harp are of progressively varying lengths to form a musical scale. To facilitate playing the instrument, the sockets may be differently colored, with the harp reeds having corresponding colors, whereby pins positioned appropriate to the chords may be readily selected.

Alternatively, removable ties may be provided in lieu of the fixed ties shown, the removable ties being molded with a single protrusion at a position selected to strike a specific note on the harp. A set of removable ties is provided with differently positioned protrusions to play the notes of the scale, and the ties may be color-coded to facilitate selection and instruction.

While there have been shown preferred embodiments of the invention, it is to be understood that many changes may be made therein without departing from the spirit of the invention as defined in the annexed claims.

I claim:

1. A motor-operated xylophone comprising:

a. a trackway formed of interconnecting track sections, each constituted by a pair of spaced rails supported at raised positions above a pair of base members to define spaces therebetween, and locating elements in said spaces to receive resonator bars at equispaced positions along said section;

b. a resonator bars of different length insertable in said spaces on said elements and resting transversely on said base members below said rails;

c. a motorized carriage riding on the rails of said trackway and having a mallet adapted to strike the bars along the trackway to play a tune which depends on the choice of bars. said mallet being constituted by an arm pivotally mounted on said carriage and extending rearwardly therefrom and bearing a mallet head at the free end thereof, said arm having a downwardly projecting elbow which when it engages any bar raises the arm and the head thereon. the head thereafter dropping on another bar along said trackway. whereby said arm is caused to reciprocate when the carriage rides over a bar: and

d. means on said section to cause said arm to reciprocate even in the absence of a bar at any one of said equispaced positions.

2. A xylophone, as set forth in claim **1**, wherein said trackway sections further include transverse ties at positions in alignment with said locating elements, said ties having an elevation such that in the absence of a bar thereon, the elbow on the mallet arm engages the tie to elevate the mallet head.

3. A xylophone, as set forth in claim **1**, wherein said elements are constituted by pins projecting upwardly from the base members and said bars have holes therein penetrated by said pins.

4. A xylophone, as set forth in claim **1**, wherein said track sections at either end thereof are provided with transverse slats each having a projecting tongue and a groove formed therein to permit intercoupling of the sections.

5. A xylophone, as set forth in claim **1**, wherein said carriage is a locomotive having front and rear wheel assemblies, the arm being pivoted on the axle of the rear wheels.

6. A xylophone, as set forth in claim **1**, wherein a pair of strings are stretched along said base members to acoustically isolate said bars therefrom.

7. A xylophone, as set forth in claim **1**, wherein said track section further includes at positions in alignment with said locating means a series of equispaced projections which when bars are inserted lie directly thereunder and when bars are absent serve to engage said elbow to actuate the mallet.