ABSTRACT: A model player piano is disclosed that simulates certain operations of a player piano while reproducing, through tape recording means, the musical sounds of an authentic piano.
PLAYER PIANO SimULATOR WITH BUILT-IN TAPE RECORDER

BACKGROUND OF THE INVENTION

1. Field of the Invention
This invention relates to amusement devices and more particularly to toy pianos having means for simulating certain operations of real pianos.

2. Description of the Prior Art
In the amusement field, there are countless devices that are toy models of actual articles of manufacture, such as toy tanks, airplanes, jeeps, etc. Also included are toy models of musical instruments that can reproduce certain musical sounds, although these sounds rarely resemble those of the authentic instruments.

In the piano art, player pianos have long been utilized for entertainment purposes. In a typical player piano, a piano roll feeds programmed information to sensing means, which, in turn, actuates the instrument to reproduce the programmed composition. The piano roll is usually motivated by foot pedals operated by the player or an electric motor located within the piano.

The toy models of pianos are usually miniaturized to resemble the real instruments. However, as stated earlier, the sound reproduction is intended to be elementary and used for the entertainment of children.

SUMMARY OF THE INVENTION

This invention provides for a miniaturized model of a player piano that simulates certain operations of the player piano while reproducing, through tape recording means, the musical sounds of an authentic piano. The simulation is accomplished by a motor driven chain which, in turn, actuates the nonfunctional piano roll, keys, foot pedals and hammers of the model. The tape recorder is connected to a pair of speakers located within the model, and is actuated, along with the electric motor, by a starting switch. A turnoff switch is controlled by the tape cartridge. The starting switch may be coin-operated if so desired.

The invention thus fulfills a primary objective by providing a model player piano that is attractive in appearance while emitting pleasing sound recordings in stereophonic sound.

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.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front view of a model player piano in accordance with the present invention;
FIG. 2 is a rear view of the model player piano showing the interior structure thereof;
FIG. 3 is a side view, partly in section, of the model player piano, taken along lines 3-3 of FIG. 2; and
FIG. 4 is a schematic view of the electrical circuit of the model player piano.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, FIG. 1 shows a model player piano generally indicated by arrow 10, having a base 11 supporting an upright body 12 which houses the internal structure of the piano 10. A shelf 13 is integrally connected to the front side of the body 12 for supporting a plurality of keys 14 which are longitudinally spaced thereon. The front end of the shelf 13 is supported at its ends by a pair of legs 15 which are mounted on the base 11.

A window 16 is formed on the front surface of the body 12 above the shelf 13. A pair of panels 17, each having a handle 18, is slidable supported within the body 12 and are adapted to be drawn together to close the window 16. A perforated piano roll 20, made of paper, canvas, or the like, is mounted on a pair of rollers 21 and 22 and appears through the open window 16. The support structure for the roll 20 will be more thoroughly described hereinafter.

Another window 23 is formed on the front surface of the body 12 below the shelf 13. Likewise a pair of panels 24, each having a handle 25, is slidable supported within the body 12 to be drawn together to close the window 23. A pair of foot pedals 26 is pivotally mounted within the body 12 and appears through the open window 23. The support structure for the pedals 26 will also be more thoroughly described with reference to FIGS. 2 and 3.

Still another pair of windows 60 is formed on the front surface of the body 12 on opposite sides of the window 16. Each window is enclosed by a panel 61 of transparent plastic to enable a plurality of hammers 62 to appear therethrough. The construction of the hammers 62 will also be more thoroughly described hereinafter.

A tape recorder 27, shown in broken lines, is located within the base 11 and is operable to produce musical sounds, preferably a reproduction of the sounds of an authentic player piano. These sounds are emitted from a pair of speakers 28, which are mounted directly behind a pair of portals 30 formed on the front surface of the body 12.

Referring now to FIGS. 2 and 3, the internal structure of the piano 10 is more clearly shown.

As previously stated, the piano roll 20 is mounted on a pair of rollers 21 and 22. A bar 31 is also mounted within the roll 20 to further support the roll 20 outwardly.

The roller 21 and the bar 31 are journaled at their ends to a pair of arms 33 which are pivotally supported about fulcrum 34 located on the upright support 32. A tension spring 35 is attached to the rearward end of each of the arms 33 with the other end of each spring 35 being connected to the respective upright support 32. The tension springs 35 thus maintains the piano roll 20 under tension by providing a downward force on the rearward ends of the arms 33 which in turn moves the roller 22 upward.

The one end of the roller 21 extends outwardly and is coupled to a shaft 36 which is journaled at the other end within a wall section of an interior frame 37. The end of the shaft 36 that extends beyond the frame 37 is connected to a notched pulley 38.

As shown in FIGS. 2 and 3, a number of keys 14 are pivotally mounted about a fulcrum 40 located on the shelf 13. A cam shaft 41 is journaled at both ends to the frame 37 and includes a plurality of cams 42 spaced longitudinally along the camshaft 41 at various angular positions. As the camshaft 41 is rotated, each of these cams 42 is adapted to engage the rearward end of a registering key 14 to move that end upward. This movement, of course, causes the key 14 to pivot on the fulcrum 40 and move the forward end of the key 14 downward. Being spaced at various angular positions, the cams 42 engage their respective keys 14 at different time intervals thereby moving the keys 14 in a patterned sequence to give the illusion that these keys are actually moving in response to the music being produced. The one end of the camshaft 41 is also connected to a notched pulley 43.

The camshaft 41 also functions to actuate the plurality of hammers 62 which are pivotally mounted on a rod 63. The hammers 62 extend across the entire width of the windows 60 and are positioned to contact the cams 42 immediately after the cams 42 contact the registering keys 14. The hammers 62 are then pivoted about the rod 63 with the hammer heads 64 moving rearwardly to contact the respective piano strings 65. After each cam 42 is rotated out of contact with its registering hammer 62, the hammer 62 is pivoted forward to a position adjacent the shaft 41 by a spring 66 which is connected to the interior side of the body 12. As a result, the illusion is created that the keys 14 are operating the hammers 62 to produce the music which is actually being reproduced by the tape recorder.
FIG. 2 shows the foot pedals 26 being pivotally connected to the bottom section of the frame 37. Both of the pedals 26 are supported on a rearward slant by a pair of cams 44 which are integrally mounted on a shaft 45. The shaft 45 is journaled within the upright supports 32, with one end extending through the frame 37 and being connected to a notched pulley 46. The cams 44 are oriented at different angles, whereupon rotation of the shaft 45 causes the foot pedals 26 to be moved by the cams 44 sequentially.

FIG. 3 more clearly shows the pulleys 38, 43 and 46 being driven by a drive pulley 47 by means of a chain 48. The drive pulley 47 is connected to a motor shaft 49 which is journaled within the frame 37. The shaft 48 is integrally connected to a motor 50 that is mounted on the frame 37. As can be seen, the motor driven pulley 47 drives the chain 48 which in turn rotates: (1) the pulley 48, causing the piano roll 20 to travel; (2) the pulley 43, causing the keys 14 to pivot; and (3) the pulley 46, causing the foot pedals 26 to oscillate.

FIG. 2 shows a transformer and a rectifier 51 and a relay switch 52 for providing 12 volts of DC current to the tape recorder 27. The transformer and rectifier 51 and relay switch 52 are mounted on the body 12 by means of a bracket 53.

FIG. 4 shows a schematic of the electrical circuit in involved. The tape recorder 27 is electrically connected to a plug 54 with a normally open switch 55 interconnected therewith. The switch 55 is coin-operated for closing the switch to close the circuit and operate the tape recorder 27. A shutoff switch 56 is located in the tape recorder 27 and actuated by the tape cartridge (not shown) when the tape on the supply reel is completed to open the circuit thereby turning off the tape recorder 27. The motor 50 is also connected in parallel to the circuit and is controlled in like manner by the switches 55 and 56. A solenoid switch with a timing mechanism (not shown) is also connected to the tape cartridge to operate when a coin is inserted. The timing mechanism will disengage the tape cartridge at the end of the time allowed.

In operation, the coin-operated switch 55 simultaneously starts the tape recorder 27 and the motor 50. As a result, while music is being reproduced by the tape recording means, the motor 50 drivingly operates the piano roll 20, the keys 14 and the foot pedals 26. The important feature of this combination is the fact that while music is being reproduced, an illusion is created that the piano roll 20, the keys 14 and the foot pedals 26 are actually operating to produce the sound made by the player piano. This illusion greatly enhances the entertainment value of the model player piano while it reproduces the musical sounds in stereophonic sound.

I claim:
1. A model player piano comprising:
   a main piano housing having a forward wall section;
   a shelf integrally mounted on said forward wall section of the main housing;
   a plurality of keys pivotally mounted on said shelf longitudinally along the length thereof, said keys extending through said forward wall section into the interior of said housing;
   a piano roll located within said housing adjacent a first opening formed on said forward wall section above said shelf, said roll being mounted on roller means;
   a pair of foot pedals pivotally mounted within said housing adjacent a second opening formed on said forward wall section below said shelf;
   tape recording means located within said housing; and
   means located within said housing for simultaneously operating said tape recording means, oscillating said keys and said foot pedal and rotating said piano roll.
2. The invention in accordance with claim 1 wherein said roller means comprises:
   a first roller rotatably mounted within said housing;
   a second roller movably mounted within said housing, said piano roll extending over both of said rollers; and
   spring bias means connected to said second roller whereby upon rotation of said first roller, the said second roller is held under tension acting away from said first roller to maintain the piano roll under frictional contact with said rollers.
3. The invention in accordance with claim 2 wherein the camshaft adjacent said keys, the shaft adjacent said foot pedals and said first roller are rotated simultaneously by common drive means drivenly engaged therewith.
4. The invention in accordance with claim 3 wherein said drive means includes a motor driven pulley and a continuous chain being connected to said pulley, said shafts and said roller.
5. The invention in accordance with claim 4 wherein a pulley is connected to each of said cam shaft, said shaft and said first roller with said chain engaging each of said pulleys.
6. The invention in accordance with claim 5 wherein said cam shaft, said shaft and said first roller rotate about parallel axes.
7. The invention in accordance with claim 5 wherein said starting switch is actuated by a coin inserted into a slot located on the switch.
8. The invention in accordance with claim 1 wherein said means for oscillating said keys comprises:
   a camshaft rotatably mounted within said housing, said shaft being adjacent said keys;
   a plurality of cam projections mounted on said shaft, each of said projections being adapted to engage the end of a registering key that extends into said housing, said projections being angularly spaced on said shaft whereby upon rotation of said shaft, different groups of keys will be oscillated by the projections at various time intervals.
9. The invention in accordance with claim 8 further including a plurality of hammers pivotally mounted within said housing adjacent a third opening formed on said forward wall section adjacent said first opening.
10. The invention in accordance with claim 9 wherein said shaft is also adjacent said hammers and said plurality of cam projections are also adapted to engage said registering hammers, each projection being adapted to engage a respective hammer and key whereby upon rotation of said shaft, each hammer and key will be oscillated by the respective projection.
11. The invention in accordance with claim 1 further including a plurality of hammers pivotally mounted within said housing adjacent a third opening formed on said forward wall section adjacent said first opening.
12. The invention in accordance with claim 11 further including means for oscillating said hammers comprising:
   a camshaft rotatably mounted within said housing, said shaft being adjacent said hammers;
   a plurality of cam projections mounted on said shaft, each of said projections being adapted to engage a registering hammer, said projections being angularly spaced on said shaft whereby upon rotation of said shaft, different groups of hammers will be oscillated by the projections at various time intervals.
12. The invention in accordance with claim 1 wherein said tape recording means and said oscillating means are controlled by a starting switch and a turnoff switch, said turnoff switch being actuated by the tape cartridge.
14. The invention in accordance with claim 1 wherein said means for oscillating said foot pedals comprises:
   a shaft rotatably mounted within said housing, said shaft being adjacent said foot pedals; and
   a pair of cams mounted on said shaft, each of said cams being adapted to engage the free end of a respective foot pedal, said cams being angularly spaced on said shaft whereby upon rotation of said shaft the foot pedals will be oscillated by said cams out of phase.