The present invention relates to electromechanical devices and in particular relates to an improved device for coordinating electrical signals with and extending musical sounds.

It has been observed that the psychological effect of simultaneously stimulating a person by two separate sensory means such as coordinated and synchronized audio and visual signals results in a far more intense stimulation than is obtainable by means of a signal acting on only one sense perception. This observed psychological phenomenon is evident when one looks at the fast-moving base of a toy, a decoration, or an advertising display. Hereotofore, electronic devices adapted to coordinating musical sounds with an electrical signal suitable for lighting displays or mechanical motions utilized audio frequency filters with by-pass circuits which limited the available power critically or utilized mechanisms which were noisy, bulky, difficult to coordinate with precision and frequently were too expensive for most applications.

One object of my invention is to provide a mechanical means for coordinating musical sounds from a music box with electrical signals suitable for operating lighting displays.

Another object of my invention is to provide a mechanism adaptable to a toy, or a decorative or advertising display wherein the sounding of musical notes having a particular pitch or range of pitches may be coordinated with actuation of lights having a particular color or location.

Still another object of my invention is to provide an inexpensive switching mechanism which coordinates electrical contacts positively with sounding vibrating reeds.

These and other objects and advantages of my invention will appear from the following specification, claims and the accompanying drawings.

My invention is briefly an improved apparatus adapted to coordinate closing of selected electrical circuits during the period of time that a sounding reed is actually in vibration comprising electrically conducting rotating means having metal pins projecting therefrom, a first bank of reeds adapted to sound musical notes mounted to contact the pins at the extreme tips of the reeds, and a second bank of reeds prepared from a soft metal mounted to contact the pins at the reed tips in coordinated time phase with selected vibrating reeds, and an electrical circuit adapted to supply power to lights connected through the rotating means and the soft metal reeds during the contact thereof with the pins.

FIG. 1 is a partly cut away view of a typical adaptation of my invention to a child's music box showing a stylized light Christmas tree mounted thereon.

FIG. 2 is a schematic diagram of the mechanism and wiring of the device illustrated in FIG. 1.

FIG. 3 is a schematic drawing of the mechanism and wiring diagram of an adaptation of my invention suitable for combining a music box with a Christmas tree lighting system powered by a 110-volt, 60-cycle means.

FIG. 4 is another adaptation of the first embodiment of my invention utilizing 110-volt, 60-cycle power source.

FIG. 5 is another embodiment of my invention.

Referring now to the drawings, a preferred embodiment of my invention is illustrated in FIG. 1 and FIG. 2 wherein a drum 10 is mounted on bearing blocks 12 by means of shaft 14. The shaft 14 is rotated by a spring drive mechanism 16 which is not shown in detail in FIG. 1 but is a standard music box drive mechanism. The bearing blocks 12 and the spring drive 16 are mounted on a base 18 which is made of an insulated material such as wood, polymer or plastic. A bracket 20 is mounted to the base 18 in spaced relationship to the drum 10. Steel reeds 22 held by the bracket 20 extend toward but do not quite touch the drum 10. The steel reeds are of graduated length and are tuned to musical pitches. A plurality of metal pins 24 is inserted radially in the drum about the periphery thereof and extend a short distance beyond the surface of the drum. These pins are arranged in such a manner that they contact the reeds 22 in sequence, each pin corresponding to a musical note of a tone is positioned longitudinally on the drum 10 so that the appropriate reed 22 is set into sonic vibration as the pin passes over the tip thereof, and is positioned angularly about the drum to effect the appropriate time sequence of the musical notes of the tune.

A second bank of reeds 26, prepared from a ductile material such as copper, is mounted on the bracket 20 parallel immediately above the reeds 22 but separated therefrom by an insulating block 58. The reeds 26 are positioned such that the contacts 20 extend in sequence and immediately follows release of the corresponding sounding reed 22. The reeds 26 are slightly longer than the reeds 22 and accordingly as the drum 10 rotates the reeds 26 are in contact with the pins 24 a longer period than the sounding reed 22. Moreover, the reeds 26 are positioned by means of a shallow angle 30 therein such that the period of contact between the reeds 26 and the pins 24 will correspond to that period of time in which the reeds 22 are vibrating with sufficient amplitude to produce audible sound. By this arrangement an electrical contact may be made during those short intervals of time in which the sounding reed is producing an audible sound. The coordination between the electrical contact through the drum 10, pins 24 and the appropriate reed 26 corresponds precisely with the interval of time in which the reed 22 is sounding. The reeds 26 are fastened to the bracket 20 by a second insulating block 32 and are grouped into three banks 34, 36 and 38. Within each bank electrical contact between the reeds is continuous. However, each bank is electrically separated by small spaces 36a and 38a. A battery 40 is connected at a first terminal by means of a lead 44 to one of the bearing blocks 12. The bearing block 12 is in electrical contact with the shaft 14 and that in turn is in electrical contact with the drum 10. The second terminal of the battery 46 is connected through a lead 48 and throw switch 50 to a parallel circuit 52 in which is connected a plurality of lights 54. The lights within each of the separate parallel branches 54a, 54b and 54c are different colors. However, in the preferred embodiment it is recommended that the lights in each branch of circuit 54a are all the same colors such as red in 54a, yellow in 54b and blue in 54c. Each of the parallel branches 54a, 54b and 54c is connected electrically respectively to the reed banks 34, 36 and 38.

The electrical reeds 26 may be adapted from copper wire of suitable stiffness which is flattened at the contact ends thereof. Such an additional embodiment is illustrated in the drawings. The wire strands are, however, readily held in rigid mounting by means of clamping blocks such as illustrated in FIG. 1 at 28 and 32.

The lights 54 as illustrated in FIG. 1 are arranged on a decorative stylized Christmas tree 55 which is mounted on a pedestal 56 and is not shown in the drawings. The tree base 56 is in electrical contact with the base 18. Suitable provision is made in the fastenings in the box 56 so that the battery 40 may be periodically replaced. The spring drive mechanism 16 is acti-
vated by rotating the key 58 which loads the main drive spring within the mechanism 16. The key 58 protrudes below the spring drive mechanism 16 as shown in FIG. 2 and is accessible from underneath the box 18.

FIG. 3 illustrates a variation on the embodiment of my invention as shown in FIGS. 1 and 2 which adapts my device to utilize 60-cycle, 110 volt power. A small electric timing motor 64 is utilized by means of shaft 14 to rotate the drum 10. The motor and attendant gear train indicated at 64 is adapted for instance to rotate the shaft 14 one revolution per minute or even slower as appropriate to the dimensions of the drum 10. The lights 54 are powered through a transformer 66 adapted to reduce the voltage for instance in a typical application from 110 volts to six (6) volts or even less. Leads 68 and 68a are connected to the 110 volt power mains; leads 70 and 72 are electrically connected to the power mains 68 and 68a and supply power to the motor 64. Switch 74 in the lead 72 provides on and off control for the motor 64.

Still another adaptation of the electrical circuit utilized in combination with my invention is illustrated in FIG. 4 wherein 110 volt, 60-cycle power is adapted to supply power at 110 volts to standard Christmas tree light circuits coordinated with the sounding reed device illustrated in FIG. 3. Power mains 80 and 82 are connected to one terminal of each of three electrical connectors 84, 86 and 88. The other terminals of each of the connectors 84, 86 and 88 are electrically connected to the output side respectively of relays 90, 92 and 94. When any of the relays 90, 92 or 94 are closed 110 volt power is available through the connectors 84, 86 and 88 respectively. The relays are normally in an open position. When power is applied through leads 96, 98 or 110 to the respective coils of the relays 90, 92 or 94 the relays are closed and 110 volt power is available through the connectors 84, 86 and 88. Leads 96, 98 and 100 are connected to reed banks 34, 36 and 38 respectively. Lead 102 is connected electrically to bearing block 12, thus closing the circuit through the drum 10; reeds 26 through the respective relays 90, 92 and 94. The secondary coil of transformer 104 reduces the voltage downward for the power passed through drum 10 and reeds 26. This step is necessary in order to prevent excessive arcing when the contacts between the pins 24 and reeds 26 are made. A three-position switch 106 is inserted in the power main 80 and is electrically connected so that connectors 84, 86 and 88 may be energized continuously from the mains without energizing the reed banks, or in position the switch 106 is adapted so that the connectors 84, 86 and 88 are energized only through the relays 90, 92 and 94 respectively thereby including the reed banks 34, 36 and 38, pins 24 and drum 10 in the circuit. In the first position a Christmas tree light system may be energized continuously; in the second position a Christmas tree light system is coordinated with activation of the sounding reeds.

Still another useful variation in the circuit utilized in connection with my invention may be described as being identical in all particulars to that described above in connection with FIG. 4 excepting that the relays 90, 92 and 94 are removed and power passes through the contact reeds directly to the respective connectors 84, 86 and 88.

A second distinct embodiment of my invention is illustrated in FIG. 5 wherein two separate drums 116 and 118 are adapted to rotate simultaneously by means of two intermeshing gears 120 and 122. The two drums are powered by a spring drive 124 connected to drum 118 through gears 126 and 128. The drums are mounted on suitable shafts within bearing blocks 130, 130a, 132 and 132a. The whole of this mechanism is mounted to an electrically insulating base 134. The sounding reeds 136 are fastened respectively at their fixed ends to an insulated mounting block 138 which, in turn, is mounted to the base 134. Pins 140 projecting radially from drum 116 contact the extreme ends of the sounding reeds 136 in time sequence as the drum 116 rotates. Thus the sounding reeds are caused to vibrate sonically. Simultaneously, a bank of electrical contact reeds 142 prepared of non-spring material such as mild copper is mounted through an insulating block 146 to the base 134. The reeds 144 are adapted to contact pins 146 mounted radially in drum 118.

The electrical reeds 142 are divided into three banks each connected electrically to leads 148, 150 and 152 respectively. Leads 148, 150 and 154 are in a typical application, utilized similarly as the electrical leads attached to the reed bank sections 34, 36 and 38 respectively such as is illustrated in FIG. 2. The above specifications and drawings are not intended to limit the scope of my invention but are merely for illustrative purposes. The scope of my invention is set forth below in the following claims.

I claim:

1. A mechanical device adapted to coordinate the sounding of a musical note with an electrical signal comprising a rotatably mounted metal drum having radially positioned metal pins on the exterior thereof, means for rotating the drum, a first bank of reeds each reed being tuned to a single musical pitch and mounted to contact the pins at their tips, a second bank of metallic non-vibrating reeds, electrically insulated from the first bank, positioned to briefly contact the pins at the instant that the respective first bank reeds are released by the pins.

2. A device for producing musical notes in coordination with preselected lighting effects comprising a set of tuned reeds having a rotatable pin bearing drum operatively associated therewith, a set of contacts having portions adjacent corresponding reed ends and in conducting relationship with the pins of said drum, a plurality of lights, electric circuitry interconnecting certain of said lights to selected contacts and said pins, whereby when a reed is set into vibration by one of said pins and said pin promptly engages a selected one of said contacts a selected one of said lights will be lighted.

3. The device of claim 2 wherein the set of contacts comprises a bank of conducting reeds mounted parallel and in spaced relationship to the set of tuned reeds, the said contact reeds being adapted to contact the pins as the drum rotates for a period of time following the release of the respective tuned reed by the pin rotating thereon.

4. The device of claim 2 wherein the tuned reeds are made of spring steel, each reed being tuned to a single musical frequency, the whole tuned reed bank being mounted on a base electrically insulated from the other parts of the device, and the contact being made of a ductile metal.

5. The device of claim 2 wherein the tuned reeds are made of a metal having a high modulus of elasticity and the set of contacts are made of a metal having a low modulus of elasticity.

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