Feb. 4, 1958 T. AHOLA 2,821,880

PIANO PLAYING DEVICE

Filed Oct. 26, 1953 2 Sheets-Sheet 1

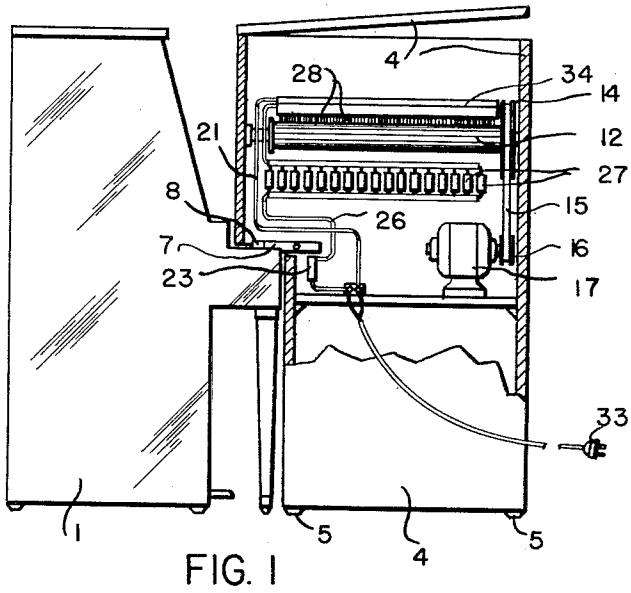


FIG. 1

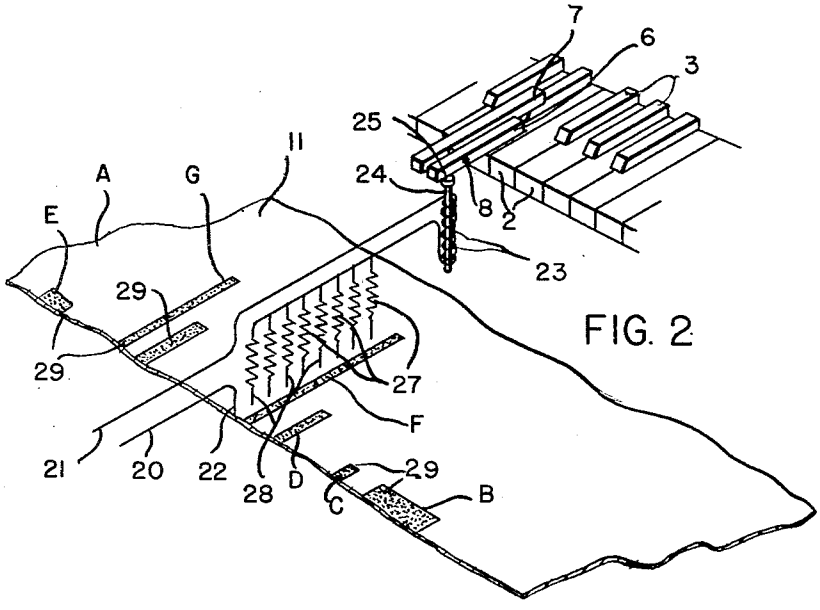


FIG. 2

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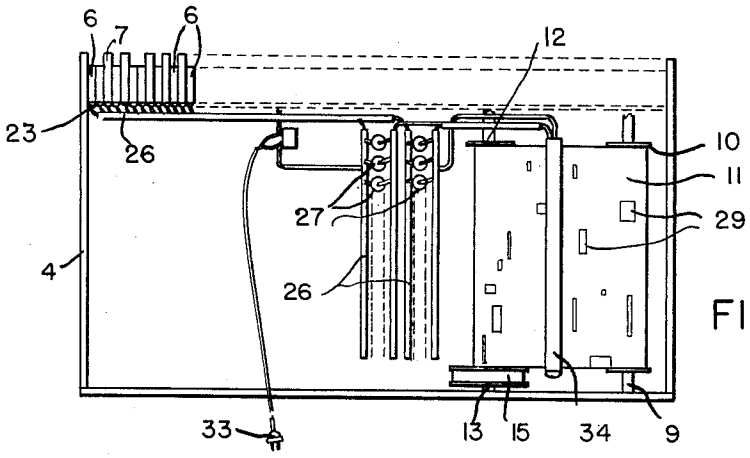


FIG. 4

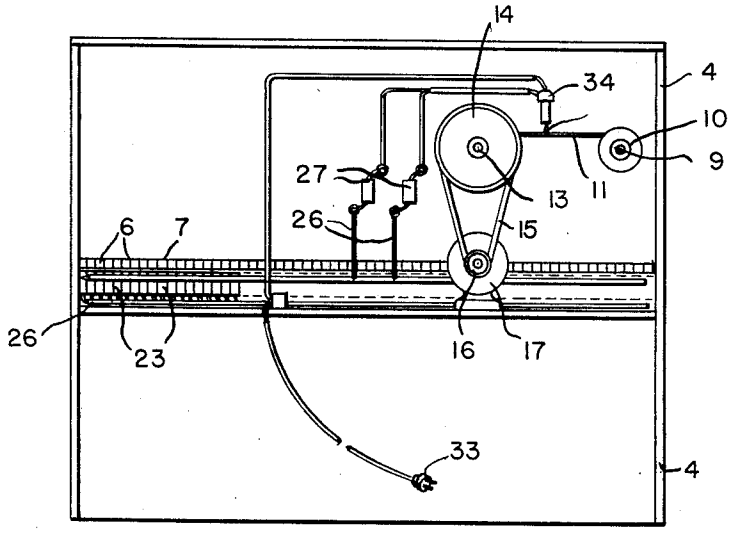


FIG. 3

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PIANO PLAYING DEVICE

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Application October 26, 1953, Serial No. 388,274

3 Claims. (Cl. 84—21)

This invention relates to a device for playing a piano or the like, with a roll and mechanism associated with said roll for operating the sound producing mechanism of the piano, or similar instrument.

One of the principal objects of this invention is to provide a device which is electrically operated.

Another object is to provide such a device which includes a roll having suitable indicia thereon to co-act with suitable mechanism associated with the roll for controlling the individual notes of a mechanical instrument, such as the piano, as the roll is wound from one reel to another.

Another object is to provide such a device which is portable, and which may be associated with a piano or the like, at will, to play music from rolls, and removed when desired to render the piano to its original state for manual operation. Another object is to provide such a device which may be associated with any piano or the like, without being custom made for individual pianos whereby the device may be used on any number of brands and sizes of pianos or the like.

A more specific object is to provide a length of sheet material wound on a reel and comprising a roll, said sheet material having applied thereon suitable electric conducting material to be engaged by a pre-determined arrangement of brushes and resistors whereby the length, or duration, of a musical note as well as the loudness, or volume, of the individual notes is controlled in a suitable arrangement whereby musical renditions may be rendered on the piano as the roll is wound from one reel to another.

Another object is to provide a suitable solenoid arrangement in conjunction with the above mentioned resistors whereby an operating lever is actuated and controlled by the contact of suitable brushes on specially treated portions of the roll as the roll is moving from one reel to another.

Another object of this invention is to provide a device for playing a piano mechanically wherein the volume and length, or duration, of any key, or note, on the keyboard of a piano, may be individually and independently controlled, whereby the device will be capable of duplicating any effect capable of being produced by an accomplished musician playing a piano, making full use of the pedals and keys. In addition, it is an object of my invention to make it possible to write and play music which would be impossible to play by any human being because of the individual control of each key, or note, of the piano, making, in effect, a pianist using 88 fingers each with perfect touch, time, and rhythm.

These and other objects and advantages of my invention will become more apparent as the description proceeds.

In the accompanying drawing, forming a part of this application for patent;

Fig. 1 is a side elevational view of a piano, and showing my player unit in operating position, parts being broken away to more clearly illustrate same.

Fig. 2 is a diagrammatical view showing the electric mechanism for operating one of the keys of a piano, and various note values on the roller strip.

Fig. 3 is an end view of the player device shown in Fig. 1 with the wall thereof removed.

Fig. 4 is a top plan view of Fig. 3.

In the drawing the reference numeral 1 indicates a piano of any common make or description having white keys 2 and black keys 3 which form a keyboard for the piano, all of which is conventional.

My invention comprises a suitable housing or cabinet having casters 5—5 thereon to permit the movement of the cabinet easily around a room, and permitting the cabinet to be moved into place adjacent the keyboard 2—3 of a piano 1, as shown in Fig. 1. The cabinet or housing 4 has a plurality of levers 6—7 pivotally mounted thereon to extend from the cabinet over the keyboard 2—3. There is one lever 6 for each of the white and a lever 7 for each of the black keys of the piano, and the levers 6—7 are so arranged that they will extend within the cabinet 4. I have provided a suitable axle, or shaft 9, on which a roller, or spool 10, may be mounted in any desired manner, the roller, or spool, having wound thereon an elongated strip 11 or any suitable material, such as paper, to comprise a player roll for the device.

A similar roll or spool 12 is mounted in spaced relation to the spool 10 on an axle 13. The spool 12 comprises the winding spool for the player, and a pulley 14 is mounted on the shaft 13 and is driven by a belt 15 from the pulley shaft 16 on the motor 17 whereby the sheet roll 11 will be wound from the spool 10 onto the spool 12 when the motor 17 is in operation. This general structure and operation is well known in the player-piano art, and it is deemed that no excessive detail is required to adequately disclose this arrangement.

Fig. 2 is a diagrammatic view illustrating the operating components of my invention for playing a single note of the piano. Because all of the notes would be similarly controlled and operated, the description of the structure for operating a single note will be described, and will cover the operation of each of the notes.

In Fig. 2, I have shown a pair of conductors 20 and 21 which lead to a suitable source of electric power, not shown. The conductor 20 has a brush 22 which engages the material of the roll or strip 11 along one edge of the longitudinal portion of the strip which has been set aside for a given note, or key, of the piano. The brush 22 comprises a suitable electrical conductor member which will make a suitable electrical contact to complete a circuit when it engages certain portions of the roll 11 to be described. The conductor 21 is connected to one end of a solenoid coil 23, the solenoid 23 having a movable core 24 therein which is mounted adjacent the lever 6 for playing a specific one of the piano keys 2. It is deemed apparent that the reciprocation of the solenoid core 24 will cause the lever 6 to be actuated, there being a suitable connection 25 between the one end of the lever 6 and the core 24. The opposite end of the coil 23 is connected to a conductor 26 to which a plurality of resistors 27—27 are connected in parallel as shown. Each of the resistors has a brush, or electrical conductor member 28—28, connected to its opposite end, and the brushes 28 are arranged in alined relationship across the longitudinal section of the roll 11 set aside for the given note of the piano, the brushes being spaced apart a predetermined distance to provide the desired result. Each of the brushes engages the sheet 11 in spaced relation to the other brushes, and are preferably equi-distant apart as shown in Fig. 2.

The sheet 11 has longitudinal segments set aside for each of the notes of the piano, one of these segments A being shown in Fig. 2, and each of these segments is

set aside to control a single note of the piano. The playing of each of the piano keys is accomplished by means of an arrangement whereby the brushes 27 engage electricity conducting material with which the brush 22 is also engaged during predetermined intervals and periods of travel of the roll. It should be noted that the roll travels in a continuous speed during the operation of the device.

As shown in the drawing, I have provided the sheet 11 on the segment A with printed strips, or blocks 29, of various lengths and widths, the strips being of electrical conductive material, and may be a suitable link, or the like, capable of forming a part of an electrical circuit. The strips, or blocks 29, are so arranged that the brush 22 and the brushes 28 will simultaneously engage them as the roll 11 travels whereby the strips, or block 29, serves to complete the circuit between conductors 21 and 20, as is deemed apparent from the drawing.

A strip 29 such as that indicated at B is elongated longitudinally and narrow transversely of the segment A and comprises a long note in that the brush 22 and one brush 28 would engage the strip B and remain in engagement therewith for a relatively long period during the travel of the strip 11. Likewise the strip B would comprise a relatively soft note in that a maximum resistance would be present in the circuit and would thereby affect the current in the coil 23 and reduce the force of the movement of the core 24 which would pivot the lever 6 to engage the piano key. The piano key would be held down for a relatively long period of time because of the conducted electrical circuit completed by this strip B.

The strip 29 indicated at C would be a short soft note, as would the strip indicated at D, the strip indicated at E would be of the same volume value as notes B, C, however, it would be shorter in length, or duration, than in note B and longer than in notes C and D.

At F, I have indicated a strip 29 which is wide transversely of the segment A and narrow longitudinally of the roll 11, whereby all of the brushes 28 and the brush 22 would engage strip F simultaneously, and because resistors in parallel tend to divide their values rather than add, a relatively loud and short note would be sounded as the brushes 28 and 22 engage the strip F. The strip G would provide less volume than the strip F and would be of substantially the same duration.

It is deemed apparent from the above explanation and from the drawing, that any desired volume and duration of note can be provided by suitably marking the segments A of the roll 11 at predetermned intervals along its length. It is also deemed apparent that the individual control of the operation of the various keys of the piano can be arranged in such a way that perfect volume duration and rhythm can be provided for the various notes relative to each other to render any musical composition desired by merely moving the cabinet 4 adjacent the piano as shown in Fig. 1 place the desired roll 11 in the player device, and starting the motor to drive the roll, suitable electrical connections being made to the source of power as by a suitable plug 33 to fit any household electrical outlet.

Any desired effect can be provided by the predetermined arrangement of various note values on the segments of the roll 11.

Having thus described my invention what I claim is:

1. A device for playing a piano or similar instrument by engaging the keying instrumentalities of said instrument comprising: a housing; means within said housing to rotatably receive a spool, an elongated indicia sheet wound on said spool; a second spool; means within said housing to rotatably receive said second spool and on which said indicia sheet may be wound from first said spool; means for winding said second spool; a plurality of levers carried in said housing and adapted to extend over portions of said instrument to engage the keying instrumentalities of said instrument, indicia on said sheet capable of providing an electrical contact, and means actuated by indicia on said sheet to move said levers to operate the keying instrumentalities of said instrument; said last mentioned means comprising a plurality of coils each having a movable core; one of said coils being arranged adjacent each of said levers whereby the movable core thereof may engage and operate its respective lever; and electrical means normally engaging said sheet and adapted to complete an electrical circuit to said coils when indicia on said sheet is contacted by said electrical means; said electrical means for each of said coils including a plurality of resistors, an electrical condutor connecting said resistors in parallel at one end thereof; said conductor being connected to one end of its respective coil; a plurality of contacts, one of said contacts connected with each of said resistors on the opposite end thereof from said conductor; said contacts being arranged in side by side relationship adjacent said sheet, said indicia being varied as to length and width and said contacts being adapted to engage indicia on said sheet in varying numbers depending on the size of said indicia to control the volume and duration of each note; and a separate electrical contact engaging indicia on said sheet connected to a source of power and providing a complete circuit for electricity to operate said coil and core to move said levers.

2. In a device for playing a piano or similar instrument by engaging the keying instrumentalities of said instrument including a housing having means therewithin to wind an indicia sheet from one spool to another, a plurality of levers carried in said housing and adapted to extend over portions of said instrument to engage its keying instrumentalities and solenoids actuated by indicia on said sheet to move said levers to operate the keying instrumentalities of said instrument, indicia on said sheet capable of providing an electrical contact, electrical means to complete an electrical circuit to said solenoids when indicia on said sheet is contacted by said electrical means; said electrical means for each of said solenoids comprising a plurality of resistors, an electrical conductor connecting said resistors in parallel at one end thereof, said conductor being connected to one end of its respective solenoid, a plurality of contacts, one of said contacts being connected with each of said resistors on the opposite end thereof from said conductor; said indicia being of varied length and width and said contacts being engageable with said indicia on said sheet in varying numbers and for varying periods of time depending on the size of said indicia thereby causing the volume and duration of each note to be controlled; and a separate electrical contact engaging indicia on said sheet connected to a source of power and providing a complete circuit for electricity to operate said solenoids to move said levers.

3. In a device for playing a piano or similar instrument by engaging the keying instrumentalities of said instrument said device including a housing, means within said housing to wind an elongated sheet from one spool to another, indicia on said sheet capable of permitting an electrical contact to be made, a plurality of solenoid actuated levers carried by said housing and adapted to extend over portions of said instrument to engage the keying instrumentalities thereof; electrical means for each of said solenoids including a plurality of resistors, an electrical conductor connecting said resistors in parallel at one end thereof, said conductor being connected to one end of its respective solenoid, a plurality of contacts, one connected with each of said resistors on the opposite end thereof from said conductor, said indicia being varied as to shape and size and said contacts being arranged in side by side relationship to engage indicia on said sheet in varying numbers and for varying periods of time depending on the character of said indicia to control the volume and duration of each note, a separate electrical contact to engage indicia on said sheet, said separate contact and the oppo-

site end of said solenoid being connected to a source of electricity providing a complete circuit for electricity to operate said solenoids to move said levers as said contacts engage said indicia.

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