

# United States Patent

Nakae et al.

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[54] **SOUND REPRODUCTION SYSTEM**

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[30] **Foreign Application Priority Data**

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[51] Int. Cl. ....A47b 81/06

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[57] **ABSTRACT**

A sound reproduction system in which a radio receiver is coupled to the top of a record player through a lifting mechanism so that a cover of the record player is eliminated, and in addition, the sound reproduction system is made compact and lightweight as a whole.

[56] **References Cited**

**1 Claim, 8 Drawing Figures**

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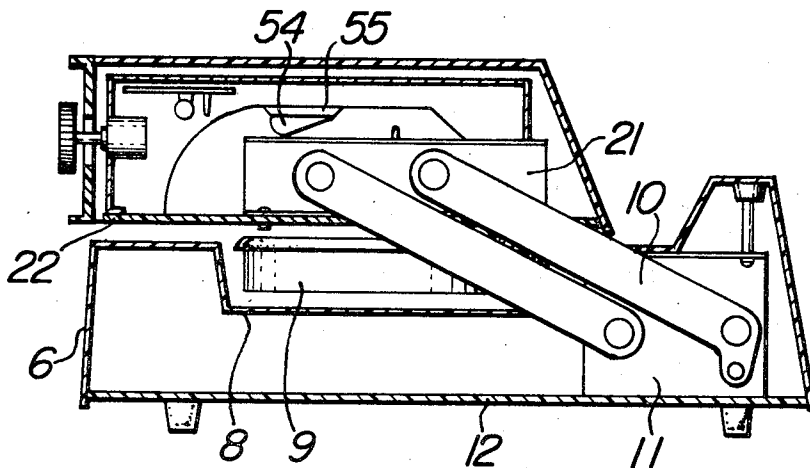


FIG. 1 PRIOR ART

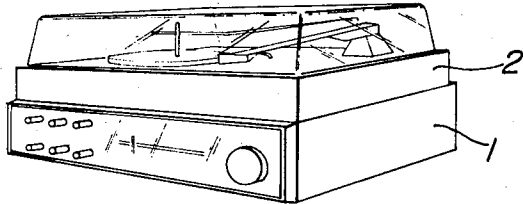


FIG. 2 PRIOR ART

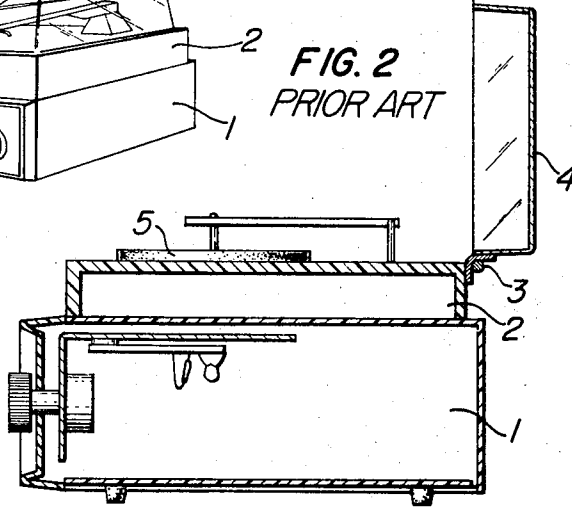


FIG. 3

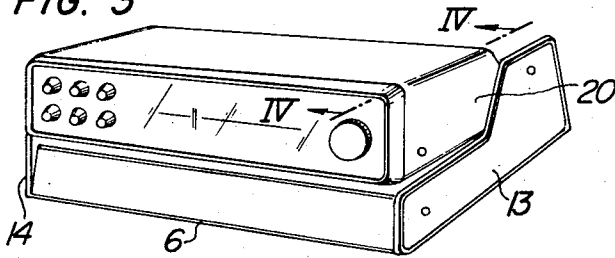
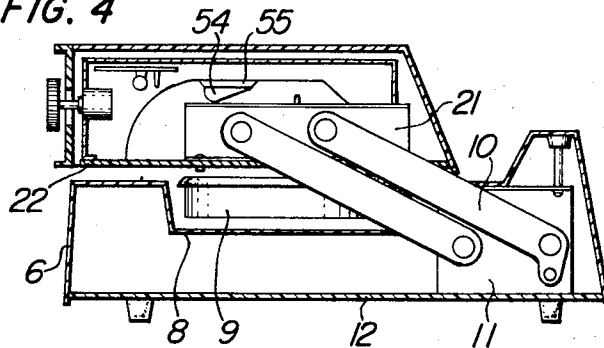


FIG. 4



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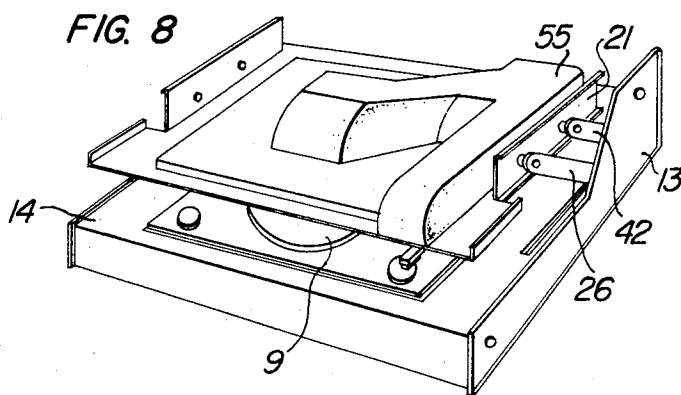
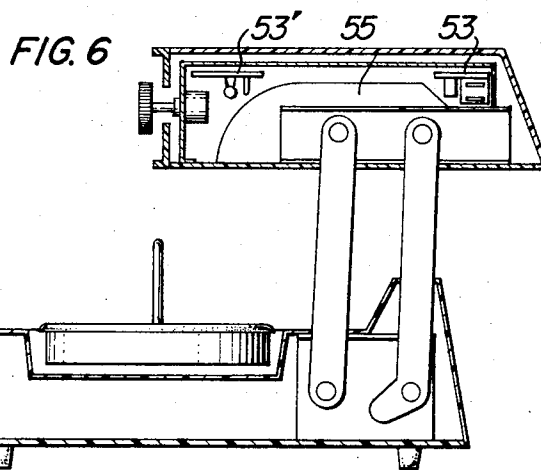
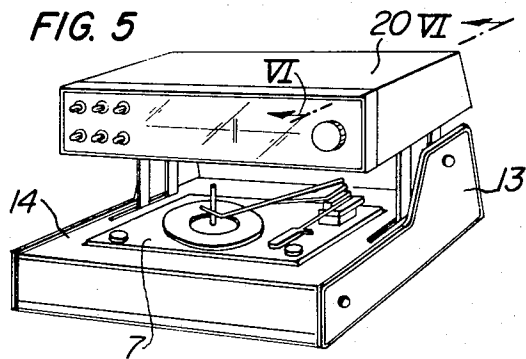
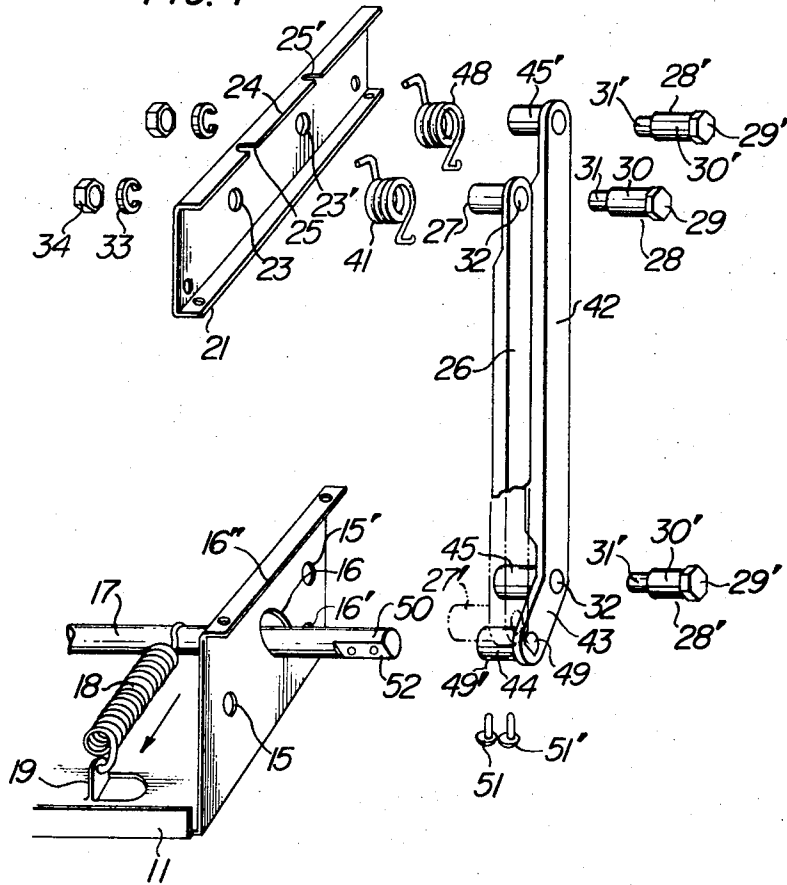


FIG. 7



## SOUND REPRODUCTION SYSTEM

The present invention relates to an improvement of a sound reproduction system incorporating a radio receiver and a record player, and has for its object to provide an improved sound reproduction system compact and lightweight.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of the conventional sound reproduction system;

FIG. 2 is a side sectional view thereof with its cover opened;

FIG. 3 is a perspective view of a sound reproduction system in accordance with the present invention with its radio receiver in an operative position;

FIG. 4 is a longitudinal sectional view thereof taken along the line IV—IV of FIG. 3;

FIG. 5 is a perspective view thereof with a record player in an operative position;

FIG. 6 is a longitudinal sectional view taken along the line VI—VI of FIG. 5;

FIG. 7 is an exploded perspective view of an lifting mechanism for lifting the radio receiver in an upright position; and

FIG. 8 is a perspective view of the principal part of the lifting mechanism.

A typical conventional sound reproduction system is shown in FIGS. 1 and 2, in which over a radio receiver set (or an audio frequency amplifier) 1 is disposed a record player 2 with its cover 4 hinged thereto by hinges 3. The cover 4 serves to protect a turntable 5 and the like disposed upon a record player 2. Because of the construction described, the conventional sound reproduction system is generally large in size.

In view of the above, the present invention contemplates an arrangement of disposing a radio receiver upon a record player through a lifting mechanism so as to eliminate a cover for the record player and make the sound reproduction system compact, lightweight and easy to operate.

The present invention will become more apparent from the following description of the preferred embodiment thereof taken in conjunction with FIGS. 3—8.

In FIGS. 3—8, the reference numeral 6 denotes a cabinet proper of a record player; 7, an auto-changer mechanism including a turntable 9 disposed within a recess 8 of the cabinet proper 6; 10, a drive mechanism disposed below the auto-changer mechanism 7; and 11, a plate disposed in the rear portion of the cabinet proper 6 for mounting a drive mechanism 10. The drive mechanism 10 including a mounting plate 11 is disposed in spaced-apart and parallel relation with a side plate 13 of the cabinet proper 6. Another similar drive mechanism including a mounting plate is also disposed inwardly of an opposite side plate 14 of the cabinet proper 6 together with an erecting mechanism to be described in detail hereinafter. Since they are similar in construction, only one of them will be described.

Referring to FIG. 7, the reference numerals 15 and 15' denote holes drilled through the mounting plate 11; and the numeral 16, an arcuate slot formed between

the holes 15 and 15' and adjacent to hole 15'. 17 denotes a sliding rod extending through the arcuate slot 16; and 18, a bias spring one end of which is fixed to the sliding rod 17 and the other end of which is fixed to a projection 19 struck out of the mounting plate 11, whereby the sliding rod 17 is biased in the direction indicated by the arrow in FIG. 7.

The reference numeral 20 denotes a radio receiver or audio frequency amplifier which is so disposed over the cabinet proper 6 of the record player as to be selectively lifted in upright position as shown in FIG. 5; 21, mounting plates fixed to the both of the lateral side walls of the radio receiver 20 and provided with holes 23 and 23' corresponding to the holes 15 and 15' of the mounting plate 11; 24, a bent portion of the mounting plate 21 provided with notches 25 and 25' in alignment with the holes 23 and 23' respectively in the vertical direction; and 26, a straight lifting lever having bosses or bearings 27 and 27' at both ends. A shaft 28 comprises a head 29, a large diameter portion 30 and a threaded reduced diameter portion 31, and the large diameter portion 30 is fitted into a hole 32 drilled through the boss or bearing 27, thereby rotatably supporting the lifting lever 26. The reduced diameter threaded portion 31 extends through the hole 23 of the mounting plate 21 and is secured in position by means of a spring washer 33 and a nut 34. The other end of the erecting lever 26 is rotatably fixed to the plate 11 since the boss 27' is rotatably fitted into the hole 15 and secured in position in the similar manner as described above.

One end of a spring 41 mounted upon the boss 27 of the lifting lever 26 is engaged with the notch 25 and the other end is engaged with the side edge of the lifting lever 26. 42 denotes another lifting lever having an inclined portion 43, a boss 44 extending inwardly from the lower end of the inclined portion 43 and bosses 45 and 45' which correspond to the bosses 27 and 27' of the lifting lever 26. The lifting lever 42 is rotatably fixed to the mounting plates 11 and 24 with the bosses 45 and 45' fitted into the holes 15' and 23' and secured in position by means of shafts or pins 28' having a head 29', a larger diameter portion 30' and a threaded reduced diameter portion 31' similar to those of the shaft or pin 28, and washers and nuts in a similar manner as described above. A spring 48 mounted upon the boss 45' of the erecting lever 42 has its one end engaged with the notch 25' and its the other end with the side edge of the lever 42.

The end 50 of the sliding rod 17 is fitted into a hole 49 of the boss 44 and secured in position by means of screws 51 and 51' which engage the recess 49' or the boss 44. The end 50 of the sliding rod 17 has a flattened surface 52 so as to prevent the rotation of the sliding rod 17 relative to the boss 44 of the lifting lever 42 as is well known in the art.

Referring to FIG. 6, the numerals 53 and 53' denote electrical devices incorporated in the cabinet proper 22 of the radio receiver 20. They are so positioned that they will not hinder the movement of the radio receiver 20 from the position shown in FIG. 4 to the position shown in FIG. 6. More specifically a recess 55 (see FIG. 8) is formed in the bottom wall of the cabinet proper 22 of the radio receiver so as to define a free space 54 into which a pickup arm, a spindle of the

turntable and the like upstanding from the top wall of the cabinet proper 6 of the record player may be located when the radio receiver is in a lowered or normal position as viewed from FIG. 4.

Next, the mode of operation will be described. FIGS. 3 and 4 show the radio receiver 20 in its normal or lowered position, that is the receiver 20 is placed on the cabinet proper 6 of the phonograph. In this position the radio receiver 20 may be turned on and both of the lifting levers 26 and 42 are inclined in parallel with each other as viewed from FIG. 4 whereas the sliding rod 17 engages with one end 16' of the arcuate slot 16 (See FIG. 7).

When it is desired to operate the record player, the radio receiver 20 is lifted as viewed from FIGS. 5 and 6. It is noted that only a little force is required to lift the radio receiver 20 because of the springs 18, 41 and 48 and that the receiver 20 may be maintained horizontally during the lifting or movement from the position shown in FIGS. 3 and 4 to the position shown in FIGS. 5 and 6. When the radio receiver 20 is lifted to a predetermined level, the forces of the springs 18, 41 and 48 are diminished and the radio receiver 20 may be lifted at a constant speed to the stable position shown in FIGS. 5 and 6. In this case, the spring 18 serves to pull the sliding rod 17 in the direction indicated by the arrow in FIG. 7 until the rod 17 engages with the other end 16'' of the arcuate slot 16. The sliding rod 17 has therefore a double function of facilitating the lifting of the radio receiver 20 under the force of the spring 18 and maintaining it in a stable position as shown in FIGS. 3 and 4 or 5 and 6.

When the radio receiver 20 is lifted as shown in FIGS. 5 and 6, the record player may be operated in a usual manner. For example the audio signals from the record player may be amplified by the radio receiver and reproduced through its loudspeaker (not shown).

When it is desired to return the radio receiver 20 to its normal position shown in FIGS. 3 and 4 from the position shown in FIGS. 5 and 6, a little force is applied to the radio receiver in the forwardly downwardly inclined direction so that the radio receiver 20 is gradually returned to its normal position under the force of the springs 11, 41 and 48 and under its own weight. It should be noted that the radio receiver 20 may be maintained in a horizontal position during this

movement.

From the foregoing, it is seen that in accordance with the present invention the radio receiver is coupled through the lifting mechanism to the record player in such a way that the radio receiver may be normally positioned over the phonograph and may be erected in upright position away from the record player. Thus the radio receiver functions as a cover of the record player and in addition the radio receiver may be maintained horizontally during the upward and downward movements away from and toward the record player. In its lower or normal position the radio receiver may completely close the record player, and in its lifted position the radio receiver may reproduce the audio signals from the record player. Thus the present invention provides an improved sound reproduction system compact, lightweight and easy to operate.

What is claimed is:

1. A sound reproduction system comprising a record player, a radio receiver disposed above said record player, and lifting means interconnecting said record player and said radio receiver for supporting said radio receiver and permitting said radio receiver to move in an arcuate path, wherein said lifting means comprises:

- a first mounting plate fixed to each side of said radio receiver;
- a second mounting plate fixed to each side of said record player;
- a pair of lifting levers provided on each side of said system, one end of each of said pair of lifting levers being pivotally connected to said first mounting plate and the other end thereof being pivotally connected to said second mounting plate; said radio receiver being movable in an arcuate path while maintaining a planar position parallel to that of said record player;
- an inclined portion formed at one end of at least one of said pair of levers;
- an arcuate slot formed in each of said second mounting plates;
- a sliding rod extending through said arcuate slots and secured to said inclined portion, said sliding rod being slideable in said arcuate slots; and
- spring means connected between said sliding rod and said second mounting plate to bias said rod normally in a given direction.

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