Oct. 6, 1936. C. W. SCHWARTZ 2,056,372

CONTROL FOR PHONOGRAPHS

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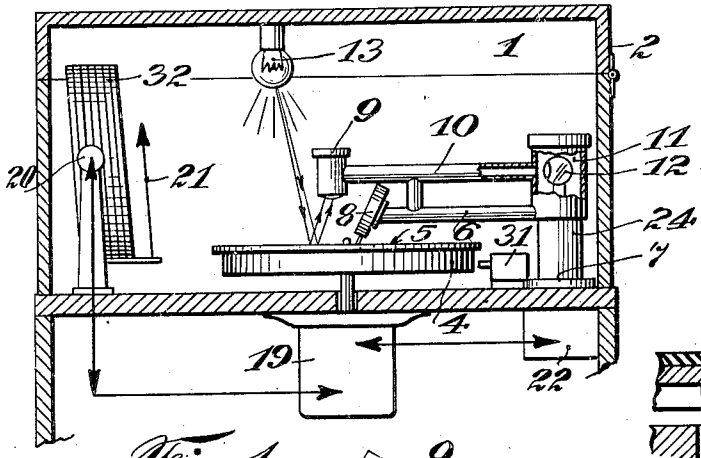


Fig. 1.

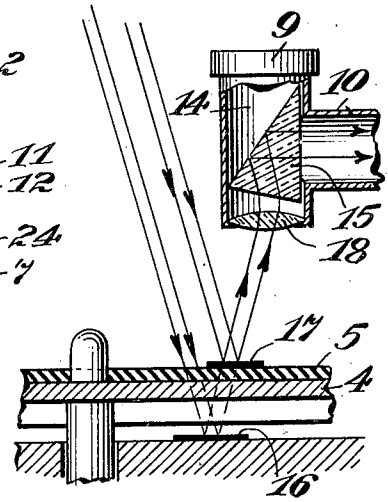


Fig. 2.

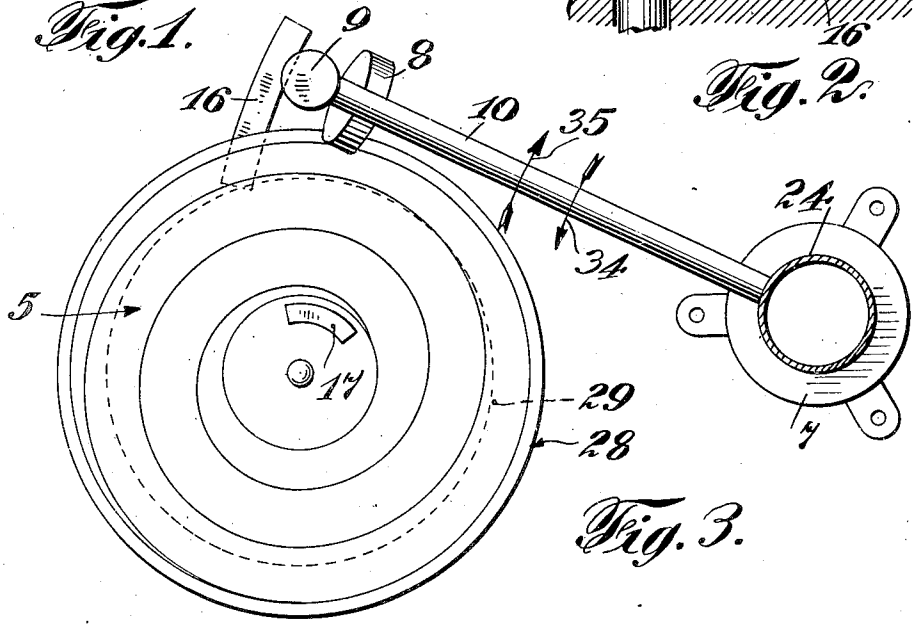
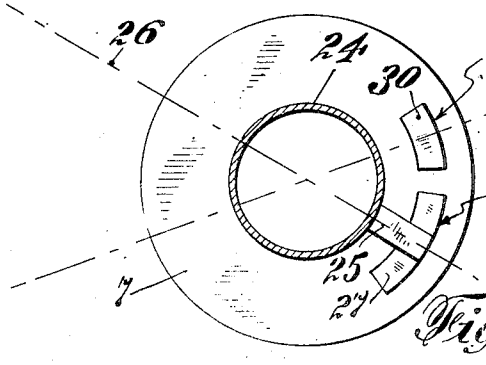


Fig. 3.



TO OPERATE MECHANISM AT END OF RECORD

TO CONTROL PICKUP FOR DIFFERENT SIZED RECORDS

Fig. 4.

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CONTROL FOR PHONOGRAPHS

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2 Claims. (Cl. 274—1)

The present invention relates broadly to phonographs and more especially to phonograph control mechanism which is operated electrically through the medium of a light sensitive electrical device such as a photo-electric cell.

It it well known in the art of phonographs to provide mechanically operated mechanism for automatic operation of the phonograph, as shown, for example, in United States Patent No. 1,465,909, August 21, 1923. Such automatic operation includes the placing of the pick-up in proper position upon different sized records at the beginning of the cycle of operations and either applying an automatic brake to stop the machine at the end of the cycle of operations or lifting the record from the table and replacing it with a new record. Automatic mechanisms have also been developed for turning a record over to play both sides thereof before the record is replaced by a new one. Other automatic operations include constructions for automatically repeating the playing of a record.

The present invention comprises devices for controlling the various operations of an automatic phonograph such as for example the operations above outlined. The control provided by the present invention is actuated without physical contact with the record and preferably through the medium of a light beam falling upon a photo-electric cell connected in circuit with suitable amplifying means and suitable electrical means, whereby the automatic operations of the phonograph are controlled.

More specifically, the present invention comprises a photo-electric cell mechanism which moves coordinately with the pick-up arm. Preferably, an electric light is mounted in a light tight chamber enclosing the record table, the pick-up, the photo-electric cell mechanism, and the supply of records for the automatic machine. The rays of light from the electric lamp fall upon a stationary white reflecting strip which extends under the record table that is slightly smaller than the smallest size record to be played.

When the machine starts its cycle of operations, the usual pick-up handling mechanism swings the pick-up arm and the photo-electric cell in an arc toward the center of the record in a raised position. The light falling upon the white reflecting strip activates the photo-electric cell circuit which continues the movement of the mechanism moving the pick-up arm in an arc toward and over the edge of the record. As soon as the photo-electric cell passes the edge of a record, the strong reflected light acting on the photo-electric cell is cut off by the edge of the common form of black disc record. This diminishes the current through the photo-electric cell to such an extent as to activate electrical devices which stops the swing of the arm, lowers the sound pick-up until the needle is resting in the record groove and the sound pick-up arm is now freed from mechanism which swings the arm, so that as the record rotates, the sound pick-up operates in the normal way. It will be observed that the operation of stopping the swing of the arm and lowering the needle into the groove is controlled by the edge of the record which intercepts the strong light rays coming from the reflected surface, beneath the record, to the photo-electric cell. Preferably, a sliding shoe controlled by the pick-up arm makes contact with a contact plate during the time of the swing of the pick-up arm over the edge of the record. As the pick-up arm swings toward the center of the record while playing, this shoe carried by the pick-up arm leaves the end of this contact bar, and prior to the end of the record being reached the shoe contacts with a second contact plate which is connected in a different electrical circuit. Inside of the last groove on the record is provided a reflecting surface carried by the record itself. This reflecting surface may comprise a circle of white or a spot of white such as would be produced by pasting a white paper wafer on the common form of black record. When the pick-up arm moves inward sufficiently to permit the photo-electric cell apparatus to pick up rays of light from the white spot on the record, the current through the photo-electric cell, the shoe and the second contact plate energizes electrical apparatus which lifts the pick-up arm from the record, swings it in a reverse direction outside of the zone of the largest record to be played and then the automatic operations of the machine continue to turn the record over or replace the record with a new record, or in semi-automatic machines to operate an electrical brake which shuts off the current to the motor and applies a brake to the record table.

The preferred construction comprises a small prism mounted adjacent the pick-up head in such manner as to reflect light back through a hollow tube to a photo electric cell mounted over the vertical axis of the pick-up arm.

Preferably, the present invention is adapted for use with black records common in the art. If a white record be used, then a black strip is arranged adjacent or beneath the edge of the

records and a black spot is provided inside of the record grooves. It is to be understood that the present device operates due to a sudden change in light conditions effective on the photo-electric cell and not upon any particular definite color of record.

Since the automatic mechanisms of phonograph structure are all well known in the art, and since the electrical amplifying apparatus and reproducing apparatus are also well known, these features are omitted from the disclosure in order to simplify the same in such manner that it will be well understood by those skilled in the art.

It is to be understood that the disclosure is more or less diagrammatic of the preferred embodiment of the invention, but that the invention may be embodied in structures other than those specifically disclosed herewith and, therefore, the present disclosure is to be understood as illustrative and not in the limiting sense.

Fig. 1 is an elevational view showing the parts diagrammatically and illustrating the photo-electric cell, the pick-up mechanism and a supply of records as being mounted in a light tight chamber which is illuminated by an electric light.

Fig. 2 is a detail view, showing parts in section, which illustrate the preferred form of light of the pick-up.

Fig. 3 is a plan view illustrating the reflecting surfaces with which the photo-electric cell cooperates.

Fig. 4 is a diagrammatic view illustrating the shoe and contact plates with which the photo-electric cell circuit may be effective to perform the operation desired.

Referring to the drawing and more especially to Fig. 1, a light tight chamber 1 may be enclosed by a suitable hinged top 2 to enclose the record table 4 which carries the record 5. A pick-up arm 6 is mounted in a suitable base 7 in such manner as to be movable vertically sufficiently to lift the sound pick-up 8 to clear the needle from the record grooves, and also to permit an oscillating movement of the arm parallel to the surface of the record 5. A light pick-up 9, adapted to receive rays from the light 13, is mounted upon the end of a light pick-up tube 10 which leads to a light tight chamber 11 in which is mounted a photo-electric cell 12.

Referring to Fig. 2, a light pick-up 9 preferably comprises a light tight head 14 in which is mounted a prism 15 to receive the light rays falling upon a reflecting surface 16, mounted stationary beneath the record table 4 at the edge thereof, in such manner that the light rays will be reflected by the prism down the light pick-up tube 10 to the photo-electric cell 12. The same path for the light rays applies when the spot 17 on the record rotates past the bottom of the light pick-up head. A lens 18 may be provided if desired to concentrate the reflected rays on the prism 15. A suitable electric motor 19 is adapted to rotate the record table 4 and is mechanically connected as indicated by the arrows in Fig. 1 with the record change mechanism 20 and the record turn over mechanism 21 and the pick-up arm operating mechanism 22. These mechanisms are all operated under control of currents from the photo-electric cell 12.

Fig. 4 illustrates the stem 24 of the pick-up arm as carrying a contact shoe 25 when the pick-up arm occupies the radial position as indicated by the line 26 when the arm is outside of the edge of a record. The contact shoe 25 is in engagement with and slides over a contact plate 27. This contact plate is connected with the pick-up arm operating mechanism, which swings the arm inwardly and lowers the sound pick-up head 8 so that sound pick-up needle engages the groove adjacent the edge of the record. Since this operation is under control of light reflected from the stationary reflector 16, which may be a white surface, it will be observed that the control is actuated by the light pick-up 9 passing from the zone of the reflecting surface 16 into the non-reflecting zone on the edge of the record. Therefore, the operation of the pick-up arm is determined by the size of the record. In Fig. 3, the edge 28 of the full line record indicates a large size record, whereas dotted lines 29 indicate a smaller record. It is to be understood, of course, that a single record at a time is on the record table, and with the large size record, the sound pick-up head will be lowered after a lesser degree of radial movement by the pick-up arm than is the case with the smaller sized record 29.

As the pick up arm 6 moves inwardly toward the center of the record, the shoe 25 (Fig. 3) contacts with the stationary plate 30, establishing a circuit with the control mechanism for the record change and record turn over, so that when the light pick-up 9 reaches a position to receive a flash of light from the spot 17 on the record, the current through the photo-electric cell changes and the change in the current actuates the automatic mechanism to perform whatever operations are desired after the record has been played. In a semi-automatic machine, this current controls the brake 31 and at the same time, the current to the motor 14 is cut off. In the full automatic machine, this current controls the removal mechanism taking the record from the table and either turning it over or putting a new record in place and replacing the played record on the stack of records 32.

In a full automatic machine, records are turned over and played consecutively one after the other from a stack. Therefore, where cycles of operations are referred to in the present machine, these cycles may be considered as beginning at any place in the automatic operation. As a matter of convenience, the description herewith begins these cycles at the swinging of the tone arm inwardly in the direction of the arrow 34 in Fig. 3 and at the end of the operations, the pick-up arm swings in the direction of the arrow 35

It is to be understood that the present invention is disclosed to those skilled in the art so that the invention may be used merely for the purpose of applying an automatic brake without the full automatic features or the invention may be utilized in connection with a full automatic phonograph to control the several operations which are performed by such a machine.

What I claim is:

1. A control mechanism for phonographs comprising a photo-electric cell, operating mechanism for said phonograph, control means for said operating mechanism in circuit with said photo-electric cell, means to rotate a phonograph record, a phonograph record adapted to be rotated, movable sound pick-up mechanism adapted to cooperate with said record to reproduce sound therefrom, a source of light, and light reflecting means carried by said record and adapted to reflect light from said source of light to be effective on said photo-electric cell whereby the

operation of said cell by said reflected light operates said control means.

2. In an automatic phonograph, the combination of means to rotate a record, a record carried by said means, a sound pick-up, a photo-electric cell, a source of light, a light pick-up movable with said sound pick-up and being adapted to transmit light to said photo-electric cell, mechanism to lower the sound pick-up to said record, and means to transmit light to said photo-electric cell when said light pick-up is outside of said record, the edge of said record intercepting the said light and causing said photo-electric cell to operate said mechanism to lower said sound pick-up to said record when the edge of said record intercepts said light.

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