

UNITED STATES PATENT OFFICE.

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APPARATUS FOR CONTROLLING SOUND-RECORDS, &c.

No. 907,177

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ELIAS E. RIES, a citizen of the United States, and a resident of the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Apparatus for Controlling Sound-Records, &c., of which the following is a specification.

My invention relates generally to that class of instruments which are operated by prepared records or record surfaces in the form of perforated or other rolls, sheets, strips or bands such as organettes, self-playing pianos and organs, orchestrians, music-boxes and the like.

My invention is likewise applicable to and intended for use in connection with record media in the form of cylinders, disks or strips such as used for phonographs, gramophones, kinetoscopes and other reproducing and projection apparatus, as will hereinafter appear. The particular embodiment that I have shown in the accompanying drawings is that of a perforated music sheet suitable for organs or pianos and one form of feeding and reversing mechanism, which my invention may assume, for operating the same.

In musical and certain other instruments of the character described, it is customary to have the roll, or other record to be reproduced, wound upon a spool or drum, which spool is introduced into the instrument and slowly unwound, the sheet or strip containing the record, meanwhile, being drawn across the record-translating device or playing surface, such as a tracker-board or its equivalent, and wound upon another drum.

The principal object of my present invention is to provide a record medium, such as a record sheet, having two sets of records thereon in opposite directions, together with means for reversing the movement of such medium and for automatically shifting it sidewise at the end of one of the records, for the purpose of bringing the other into action in the reverse direction of travel of the sheet. With such a record medium and with such means for controlling the movements thereof two parts of a continuous record, one part running in one direction and the other part in the other direction, may be successively brought into operative relation with the translating device or tracker-board and separately reproduced without interrupting the

continuity of the reproduction, this result being attained by the automatic reversal of the direction of travel of the medium and the automatic shifting of one set of records out of action when the end of such set is reached and the automatic shifting of the other set into action. In this manner a record may be indefinitely reproduced without break or interruption as long as the same may be desired, and this is especially important in the case of records containing, for example, dance music or other selections having a large number of similar verses or of alternate stanzas and chorus, which can thus be indefinitely and economically reproduced without curtailment and with considerably less attention on the part of the operator or attendant than is now required.

In the drawings, which clearly show one means of carrying out my invention, which I have here illustrated as applied to perforated music strips for organettes, pianos, orchestrians, etc., Figure 1 is a top view showing a record sheet with two sets of perforations and an operating and feeding mechanism therefor, Fig. 2 is a side view of the same, and Fig. 3 an enlarged, detailed view of a portion of the shifting mechanism thereof.

Similar letters of reference indicate like parts in all the drawings.

A is the record sheet or strip about to be unwound from the spool B.

C is a rock-frame free to oscillate on the shaft D, which is suitably mounted in the main frame of the instrument, organ, piano, etc., which is not shown in the drawings for the sake of clearness. Journaled in the outer, lower ends of the rock-frame, are the shafts *b* and *b'*, which carry respectively, a pulley *s*, *s'* and a gear wheel *t*, *t'*. Upon shaft D are rigidly fastened a double transmitting pulley *m* and a power pulley *p*, the former of which is connected by means of belts with pulleys *s* and *s'*, the belt connecting with *s'* being crossed as shown in order to reverse the direction of rotation. The outer ends of the rock-frame C form upwardly extending L-shaped arms *o*, *o'*, provided with slots *j*, *j'*, which engage the shafts M and N journaled in suitable bearings *r*, (see Fig. 3.) in the main frame, a pin *f* serving to keep the shafts in position. These arms *o*, *o'*, are flattened in the plane of oscillation of the rock-frame C and are

provided with shoulders g, g' , which are reversed on the opposite arms, that is, the upper end of the arm o is bent out, away from the spool E and gear wheel h , as shown in Figs. 1 and 3, while the upper end of the arm o' , is bent inward.

Upon shafts M and N respectively, the spools E and B, carrying the gear wheels h and c , are journaled, spool B being easily detachable from shaft N and gear wheel o and being merely one of many such spools, each of which carries its own record strip or roll, A, and when inserted in position engages by any suitable means the gear wheel c , to revolve with it. It will be seen from Fig. 3 that the shafts M and N do not revolve, but have a limited movement in the direction of their length, and are normally forced toward the left (Fig. 3) by springs y bearing against shoulders on said shafts and some portion of the main frame as x .

Coöperating with the rock-frame C and associated with it is the releasing and shifting mechanism, the functions of which will presently appear. This consists of a pivot or shaft z (shown near the upper central portion of Fig. 2) which supports a bell-crank lever v in such a position that one of its arms provided with a lug or bearing surface v' , is normally pressed upward against the record sheet A by spring k on pivot z , while a pin l in the other arm engages a slot q in the upwardly extending portion u of the rock-frame C within which slot it has a free but limited motion. A rod or lever n , (Fig. 2) is provided, which may be used for rocking or tilting the frame C, while the blocks or guides e and e' , located at the front and rear, respectively, of the tracker-board I, form a bearing surface over which the perforated record sheet A is drawn in the usual manner. This record sheet, however, is provided with two distinct or alternate sets of perforations, one of which P, is arranged to operate when the sheet is being moved in the direction of the arrow, the other or reversed set R being arranged to operate when the sheet is moving in the opposite direction.

It will be understood that the perforations P and R may either represent a record of two or more distinct selections or compositions, or they may jointly constitute a single composition according to the particular nature of the record. In the latter case, the end of the series of perforations P is preferably made coincident with the end of the main theme or verse or at the termination of some section thereof, the reverse series of perforations R beginning or containing the refrain or chorus, in order that the selection may be repeated in complete form as often as desired and that no break in the production at the point of reversal of the sheet may occur.

At the end of the first set of perforations or at any suitable place along the record sheet A, preferably at or near the desired point of reversal, an additional perforation or stop V is provided which is designed in connection with the reversing or shifting mechanism already described, to cause the spools and record sheet to be shifted laterally a distance sufficient to bring either set of perforations into proper position over the translating device or tracker-board I. This tracker-board contains the usual air tubes i supplied with air from a suitable source, but is arranged with somewhat wider spaces or partitions between them, over which the perforations not in use pass without effect.

The operation of the instrument is as follows:—A spool carrying a roll of the character described having been placed in position on the shaft N, the end of the sheet is passed over the guides and the tracker-board and made fast to the spool E. The rock-frame is then tilted so that the gear wheel t meshes with gear h . This operation, it will be seen, causes the spools and record sheet, through the coöperation of the cams or shoulders g, g' , on the arms o, o' , and the shifting springs y , to be shifted laterally to their full extent toward the left (Fig. 3) (or toward the top in Fig. 1.) and this brings the first set or series of perforations P over the air tubes, i . Power being now applied to the power-pulley p in the proper direction, the record sheet is gradually drawn across the tracker-board or playing surface I in the direction of the arrow (Fig. 1.) until it is entirely unwound. At this point the perforation V' shown in dotted outline, located at or near the rear end of the sheet, and which is similar to that shown at V above referred to, passes over the lug v' on the bell-crank lever v and permits the latter to be forced upward by means of its spring k . This causes the lower arm of lever v , through the pin l and slot q , to slightly rock the frame C about its shaft D, thereby disengaging gears h and t , and, according to one method of practicing my invention, (as shown in the drawing by the position of the rock-frame and driving belts as indicated by full lines,) stopping the operation of the instrument. The rock-frame may then, according to the method just referred to, be tilted still further by means of the shifting lever or rod n , thereby bringing the gears c and t' together, which results in causing the record sheet to be wound back on its spool B, at substantially the same rate of speed with which it was originally wound upon spool E. The meshing of the right hand gears c and t' , by reason of the movement of the rock-frame and its arms o, o' , causes at the same time the lateral shifting of the record sheet A with its roll-supporting shafts M, N, for a distance equal to the space between the cen-

ters of two adjacent perforations or set of perforations P, R, so that as the sheet A travels backward, the intermediate or reversed set of perforations R are drawn over the air tubes *i* in the tracker board. Since the perforations R, as already stated, are impressed in the sheet A in a reversed direction to that of the perforations P, with respect to the direction of travel of the record sheet, it follows that its musical selection or other record will be rendered in a proper manner.

Instead of manually shifting the rock-frame C by means of the rod *n* to bring the reversing gears *t'*, *c*, into engagement, as just described, it will be obvious that this may be performed automatically. This, in fact, is the preferred method of practicing my invention, especially in cases where the musical composition or other selection represented by the two sets of perforations P and R of the record sheet A form parts of a single composition or record, as is likely to be the case in the majority of instances, or where the roll contains two or more separate selections that are to be played in succession. It will be apparent that this may be accomplished by so proportioning or adjusting the bell-crank lever *v* and its connections with the rock-frame that when the lug *v'* is permitted to rise through the perforation or stop V' in the sheet at the end of the first set of perforations P, the rock-frame with its driving gears is shifted to its full extent, as indicated by the dotted lines in Fig. 2, thus causing the right hand gears *c* and *t'* to mesh and thereby at once bringing about the return movement of the sheet automatically. The slot *g* is of such length that after the frame has been fully tilted for the reverse movement as just described, it will permit the subsequent depression of the lug *v'* by the record sheet without disturbing the position of the rock-frame until the composition has been played through.

Instead of employing as the reversing medium the special perforation or stop V', (which is made sufficiently wide to permit of the lateral shifting of the sheet without binding against the sides of the lug *v'*), I may make use of the one or both of the narrow end portions of the sheet, as at *a*, as a means to permit the rise of the bell crank lever *v*. Instead of a single bell-crank lever, I may use a pair of bell-crank levers mounted together on the same shaft *s* but facing in opposite directions, where it is desired to cause the roll to automatically repeat its record, in order to insure the proper and positive reversal of the sheet at both ends of its travel, or I may make use of one of said levers as a reversing device and the other as a detent or stopping device, the functions of either or both being brought into play, or determined, by the position of

the rod *n*, which may be set so as to produce the desired result.

I am, of course, not limited, nor do I desire to restrict myself to, the particular form of feeding, stopping, shifting, reversing and repeating mechanism herein described, or any one or more of them, in as much as it will be understood that the same are subject to many modifications and may be widely varied according to the special requirements of any particular case, without departing from the spirit of my invention. Neither do I restrict myself to the particular form of operating or driving mechanism illustrated, since the same is but one of several types, which will readily suggest themselves to those skilled in the art, that may be employed by me for this purpose.

While I have shown my invention in connection with perforated rolls or sheets applicable to pneumatically operated organs, pianos and similar musical instruments, in which a "translator" in the form of a tracker-board is used, it is evident that the same may be equally well applied to musical and other instruments operated by mechanical, electrical, chemical or other translating devices, irrespective of the nature of the record roll or carrier, that is to say, irrespective of whether the record sheet or surface be smooth or perforated or whether it be provided with alternate conducting and non-conducting portions, or with alternate transparent and opaque surfaces, or with elevations or indentations suitable for the movement of a reed or stylus, or with records of any desired different character from those shown, so long as the records carried by the roll or sheet consist of two or more parallel series running in opposite directions. Nor is it essential to my invention that the oppositely running records alternate as shown, since the carrier, for some purposes, may be so subdivided that the first record or records may all be at one side of its longitudinal center and the second record or records at the other. It will also be obvious that instead of impressing my records upon a longitudinal moving surface in the form of a flat sheet, strip or band, I may apply the same to carriers in the form of cylinders or disks, such as used in phonographs and gramophones as well as in certain types of music boxes.

Instead of alternating the perforations P and R as shown, I may in some cases place the first set of perforations all at one side and the return perforations all at the other side of the longitudinal center of the sheet A. In this event a tracker-board would be preferably used, having two sets of openings, one set being closed by a suitable valve or screen operated by the reversing mechanism when the opposite set is in use and vice versa. This arrangement is especially

desirable for musical instruments embracing a large number of octaves, which may render it advantageous, owing to the greater width of the record sheet, to provide a special
5 alinement device to guard against undue displacement of its perforations with respect to the tracker-board openings, by reason of possible variations arising from lateral expansion and contraction. In such cases the
10 sheet A may be provided along its center with a row of guiding perforations arranged to engage with one or more sprocket wheels (not shown) suitably mounted upon the driving frame in such a manner as to reduce
15 the effect of any expansion of the sheet that may develop, by causing it to spread outward from the center of the sheet toward its edges.

Having thus described my invention, what
20 I claim and desire to secure by Letters Patent is:—

1. The combination with a record medium having a pair of records disposed side by side, of a translator coöperative separately
25 with the records of said medium, means for feeding said record medium in operative

relation with said translator, and means for automatically stopping, shifting and reversing the movement of said record medium at the end of one record to bring the other
30 record into operative relation with said translator and continue the reproduction.

2. The combination with a perforated music-sheet having a pair of records disposed side by side, of a tracker-board co-
35 operative separately with the records of said sheet, means for feeding said music-sheet in operative relation with said tracker-board, and means for automatically stopping, shifting and reversing the movement of said
40 music-sheet at the end of one record to bring the other record into operative relation with said tracker-board and continue the reproduction.

Signed at the borough of Manhattan in
45 the city, county and State of New York, this 11th day of December, A. D. 1902.

ELIAS E. RIES.

Witnesses:

WM. GOLDBURG,
MARGARET E. BELL.