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MAY 25, 1943.

BY A. P. C.

A. COMPARE
AUTOMATIC RECORD DISC CHANGING
DEVICE FOR GRAMMOPHONES
Filed Jan. 16, 1941

Serial No.

374,772

6 Sheets-Sheet 1

Fig. 1

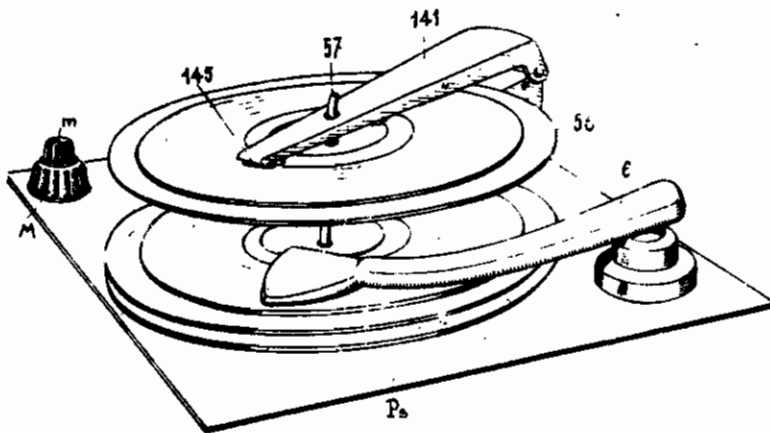
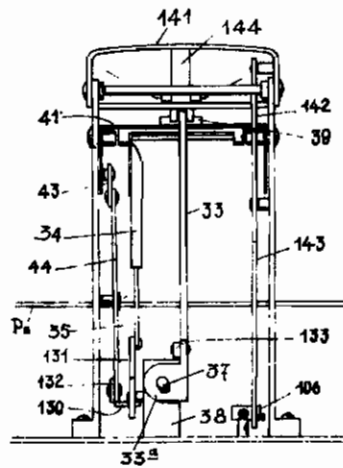


Fig. 3.



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Serial No.
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6 Sheets-Sheet 2

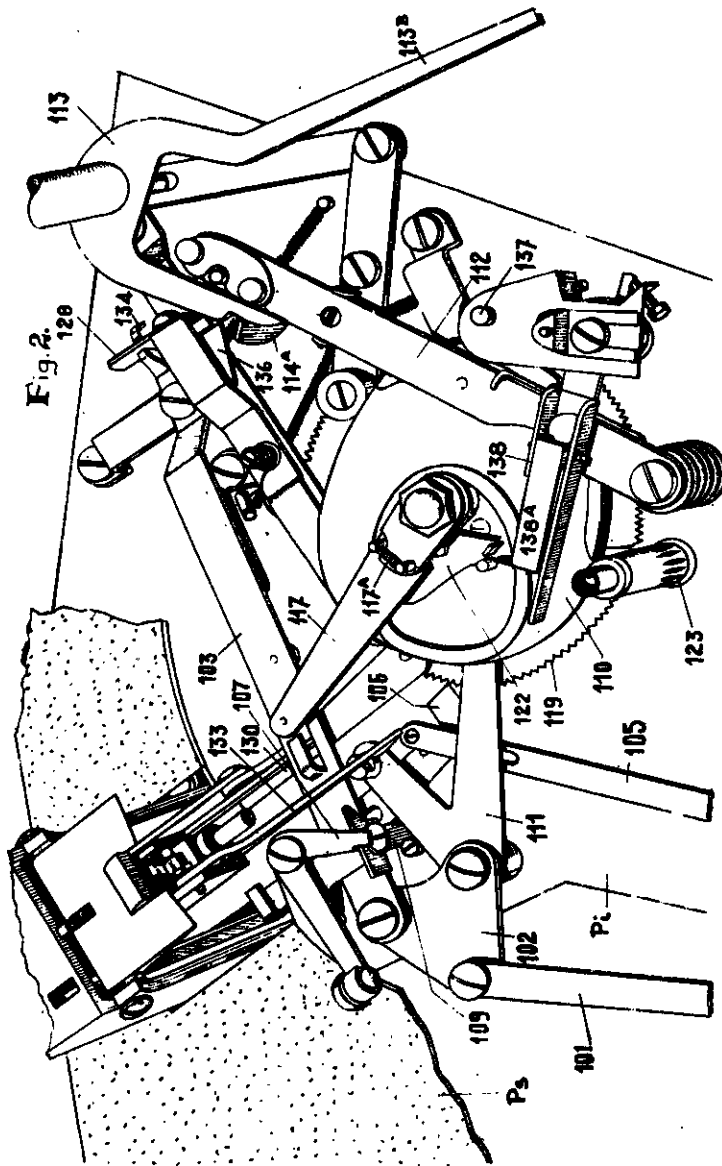


Fig. 2.

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Serial No.
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6 Sheets-Sheet 3

Fig. 4.

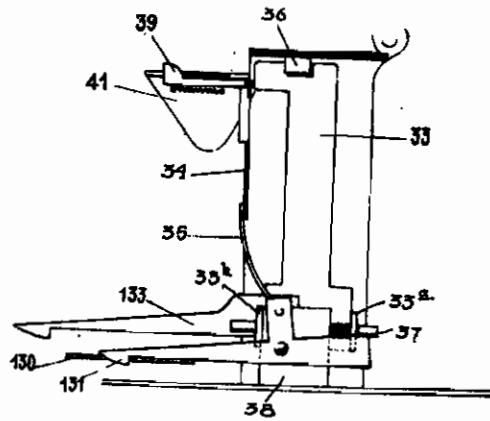
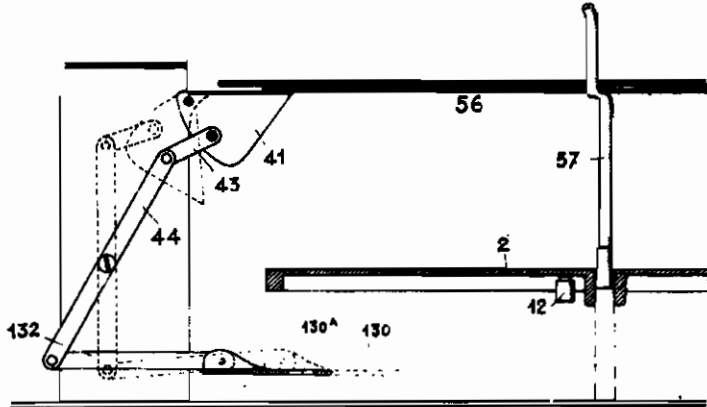


Fig. 5.

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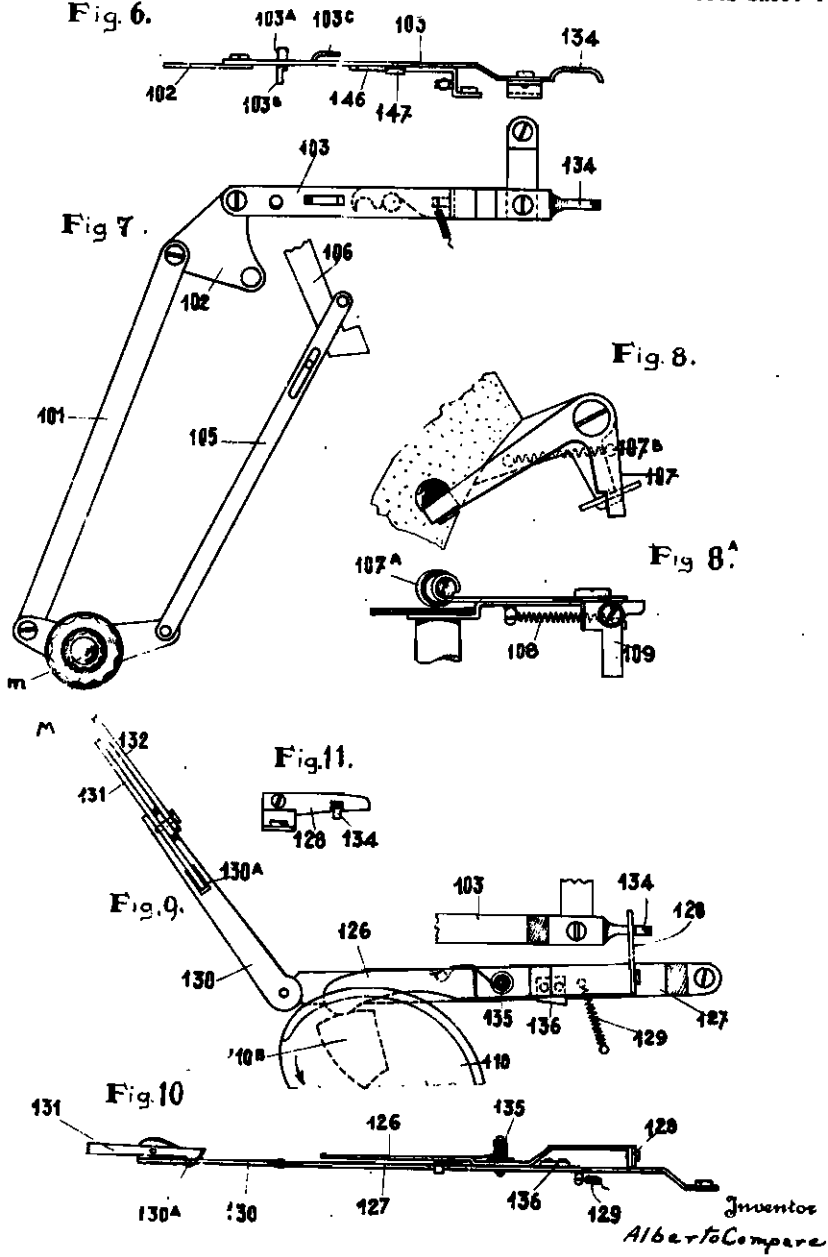
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Fig. 6.

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AUTOMATIC RECORD DISC CHANGING
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6 Sheets-Sheet 4



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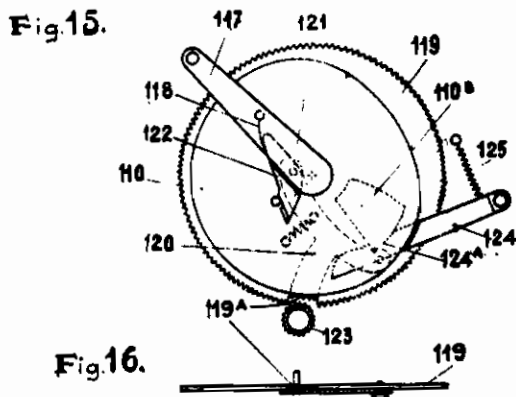
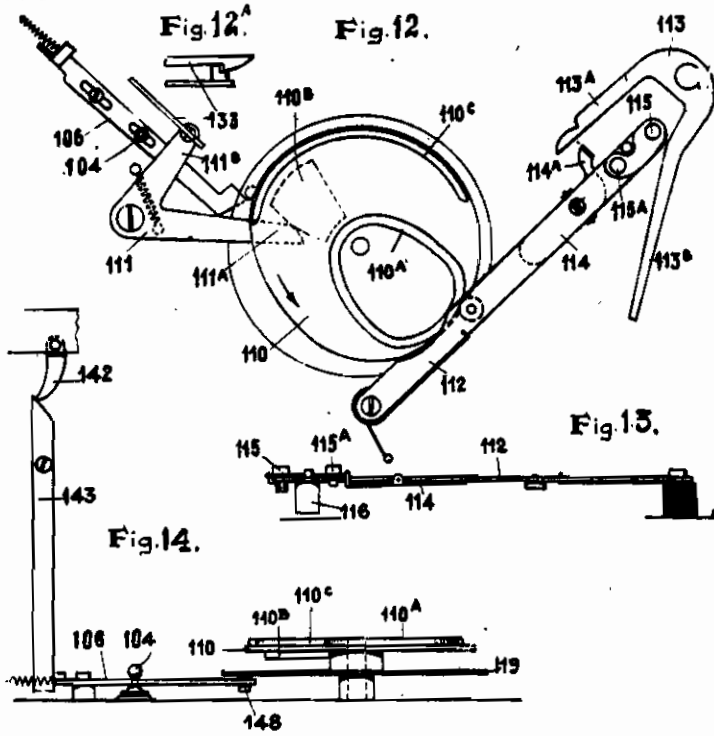
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AUTOMATIC RECORD DISC CRANKING
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6 Sheets—Sheet 6

Fig. 17.

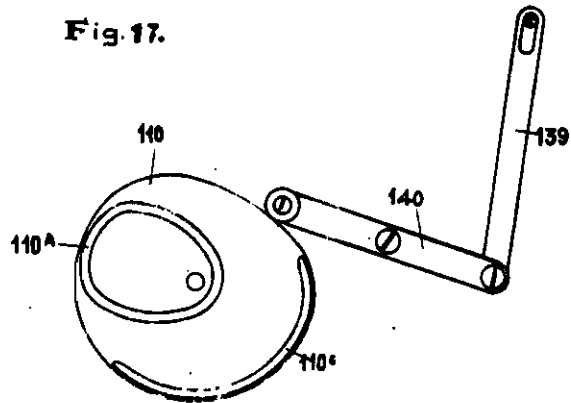


Fig. 18.

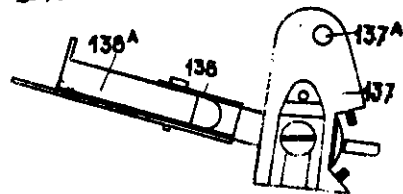
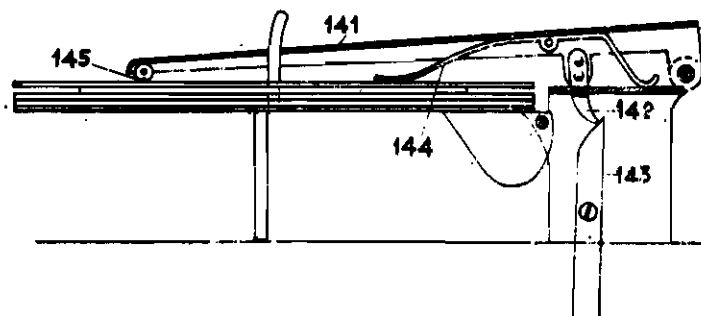


Fig. 19.



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AUTOMATIC RECORD DISC CHANGING DEVICE FOR GRAMMOPHONES

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Application filed January 16, 1941

This invention has for its object an improved automatic record disc changing device for gram-
mophones, of the kind which allows arranging of
a certain number of record discs, for inst. up to
10 discs, on the grammophone and reproducing
same, successively, in a complete automatic man-
ner, i. e. once started the grammophone, all oper-
ations to bring the discs on the turntable and
to reproduce same, one by one, are effected auto-
matically without to put hand on the grammo-
phone.

More precisely the device, by acting the con-
trol knob towards the right, effects the following
operations in succession: the switch is acted to
start the motor so that the turntable begins to
turn; the mechanism to release the first disc on
the turntable is started; the pick up is brought
on the edge of the disc and the stylus is made
to engage the outermost groove of the disc; the
disc changing mechanism is stopped.

On termination of the reproduction of the first
disc, the pick up is raised and moved outwardly
beyond the edge of the discs; the second disc is
released on the turntable; the pick up is again
moved but now inwardly and is brought with the
stylus exactly on the beginning of the grooves
of the disc and is made to engage same. The
disc changing mechanism and pick up control-
ling mechanism is again stopped.

These operations are repeated automatically
on termination of the reproduction of each disc,
up to the last disc, without being necessary to
effect any control or other operation by hand.

On termination of reproduction of the last
disc, the grammophone is automatically stopped.

The device allows, further, to repeat a disc at
the termination of its reproduction; to this pur-
pose it is sufficient to move the control knob
anticlockwise. In this way the disc changing
mechanism remains inoperative and the same
disc is repeated.

Further, by moving the control knob clockwise
during any moment of reproduction of a disc,
this reproduction is immediately ceased and the
disc changing device is started in order to re-
produce the next disc.

The device further allows to arrange, with any
order, a number of discs having differing diam-
eters and both the disc changing mechanism as
well as the pick up controlling device work au-
tomatically for any order of succession of discs of
differing diameter.

The disc changing device according to this in-
vention comprises a cranked spigot which is im-
movably inserted into the shaft carrying the

turntable; on said spigot are arranged the discs
to be reproduced, in form of a pile. It comprises
further a disc releasing device disposed laterally
on the limit of the turntable, a pick up con-
trolling device and a device controlling the disc
releasing device; these three devices cooperate
in a manner to effect automatically the above
described operations.

The present invention refers more particularly
to certain improvements in these devices, which
have the purpose to assure simplicity of the sin-
gle pieces and of the devices, security of working,
reducing of the number of pieces so that, as a
consequence, reducing of manufacturing cost of
the device is obtained. The new and useful im-
provements according to this invention are par-
ticularly set forth in the claims attached at the
end of this specification.

The annexed drawings show the object of the
invention.

Fig. 1 is a perspective view of the external as-
semble of the disc changing device according to
this invention;

Fig. 2 is a perspective view, from above, of the
mechanism for controlling the disc releasing de-
vice and the pick up moving device;

Fig. 3 is a view from behind of the disc re-
leasing device;

Fig. 4 is a detail of the disc releasing device,

Fig. 5 is another detail of this device;

Figures 6 to 18 are details of the mechanism
shown in Fig. 2;

Fig. 19 shows the lateral disc support and with
the arm holding the pile of discs in horizontal
position.

The device comprises a base plate P_i and a
cover plate P_s ; the latter is partially removed in
Fig. 2 in order to show the various devices. The
most organs of the devices are arranged between
these two plates and are fixed or pited on the
base plate P_i .

M and m (Figs. 1 and 7) indicated the control
knobs which are supported in the cover plate P_s
and serve to control the single operations, i. e.
to start the grammophone, to arrest it, to repeat
a disc and to reject a disc. Knob M is connected
with a control bar 101 which, through a trans-
mission plate 102, pivoted on the base plate P_i ,
controls a controlling lever 103. This lever 103
(Fig. 6) presents a superior stud 103A, an inferior
stud 103B and a raised tongue 103C. The free
end of lever 103 presents a lowered portion, on
which a guide lever is pivoted, which is guided
on base plate P_i , and terminates with a raised
tongue 134. This control lever 103 controls start-

ing of the motor, as well as of the disc changing and pick up moving device, as will be described hereafter.

Knob *m* is connected to a bar 5, which is guided, at the other end on the base plate by means of slot and pin and which carries on the underside of its free end a stud by which it may move the lever 106 of the switch of the motor, in order to switch it off.

A double lever 107 serves to arrest the turntable by means of the gum bottom fixed on one end of same, (Figs. 8, 8A). Said lever is pivoted on the base plate *Pi* and is acted by a spring 108 which presses the gum bottom against the inner border of the turntable, whilst a loosely pivoted tooth 109 serves to bring and to hold it in the non arresting position.

On the pivot of the transmission plate 102 there is also pivoted a double lever 111 (Fig. 12) which serves to receive with its arm 111a the action for the disc changing operation from a cam disc 110 and to transmit said operation with its arm 111b to the organs to release the next disc on the turntable. The arm 111a of this lever is acted by a cam disc 110 which during one complete revolution controls all operations of disc changing and pick up moving.

The cam disc 110 has a small inferior cam 110b and a small superior cam 110a, as well as a cam guide 110c. It is fixed on the same axis of the toothed wheel 119 which is meshing with a pinion fixed on the motor shaft 123, which bears also the turntable 2. The inferior cam 110b serves to actuate lever 111 which provokes releasing of the discs on the turntable. The cams 110a and 110c serve to control the tone arm which carries the pick up. To this purpose the cam disc cooperates with a controlling lever 112. This lever is pivoted on the base plate *Pi* and bears on its pivot a spring tensioned so as to push the lever towards the disc cam 110. In the rest position of the gramophones (fig. 12) this lever rests against the cam 110a and the axial spring of the lever is tensioned. About at midway the lever 112 bears on its underside a loosely pivoted balancing member 114, the one end of which carries a tooth projecting laterally above the lever 112. Further, on the upper side of the free end of lever 112 there is pivoted a small plate by means of a pivot 115 forming a stud on the upper side of the lever. The small plate carries another stud 115a at its free end. By means of a spring fixed on its pivot 115, the plate is pressed against a stud fixed on the lever 112. In correspondence of the latter stud, but on the underside of lever 112, there is another stud 116.

The toothed wheel (fig. 15) which is normally meshing with the motor shaft 123, may be disengaged from this shaft by means of the cut portion 119a of the wheel itself; this portion 119a is fixed on a lever 120 pivoted in a point of the wheel 119 and acted by a spring also fixed on this wheel. One end of the lever 120 carries a stud 121 which is extending upwardly through disc 110 and is projecting above said disc where it carries a plate 122. On the common axis of the toothed wheel 119 and cam disc 110, above same, there is also pivoted a lever 117 made of two parts, the one of which is acted by a spring 117a fixed on the other. This lever 117 carries, on its underside, a springy plate 110.

128—127 (figs. 9—10) are the adjusting levers to adjust the disc changing and tone arm mov-

ing device for a great or a small disc as the case may be.

The lever 127 is pivoted on the base plate *Pi* and the lever 126 is pivoted on lever 127, at point 135. The lever 126 is acted by a spring disposed on its pivot and presents a raised position so as to allow fixing of a stop 136 on the lever 127. The end of lever 126 near the pivot point of lever 127 carries a tooth 128 projecting laterally. The end of lever 127 opposite to its pivot is attached to element 130 having an opening 130a, within which element 131 is hookable. The end of lever 126 is in front of cam 110b of disc 110. The lever 127 is also acted by a spring 129.

Fig. 17 shows levers 139, 140 which control lowering and raising of the tone arm carrying the pickup, respectively at the beginning and at finishing of the reproduction. To this purpose the lever 139 presents an opening in which a pin fixed on the pivot of the tone arm is guided. The free end of lever 140 carries a roller running against the peripheric edge of cam disc 110. The two levers 139 and 140 are pivoted together and lever 140 is further pivoted on the base plate *Pi*.

Fig. 18 shows the elements—a plate 137 with a stud 137a and an organ 138 with a loosely pivoted tooth 138a—which provoke starting of the disc changing device when the reproduction of a disc is finished.

Fig. 19 shows schematically the lateral support for the discs on the releasing device with the arm 141 carrying a gum roller resting on the topmost disc and a plate 144 pivoted on said arm, which serve to hold the pile of discs in horizontal position, to assure resting same on the lateral support so that they may be surely engaged by the releasing organs, and, at least, to arrest the gramophone after reproduction of the last disc.

This latter action is effected by a tooth 142 which is attached to the arm 141 and which pushes a lever 143, pivoted on the structure of the releasing device, which pushes the lever 106 of the switch 104 so that the lever 106 is brought beneath the toothed wheel 119.

Figures 3, 4 and 5 show the disc releasing device. This device is consisting of a structure fixed on base plate *Pi*. On the top of this structure is hinged the arm 141; further a support 41 is hinged at this structure towards the inside, i. e. towards the turntable; support 41 is hinged on two lateral projections of said structure which projections form the support for the great discs, while 41 is the support for the small discs. On support 41 is guided the tooth 39 serving to release the small discs. Support 41 may be lowered by means of articulated elements 43, 44, and 132, as shown by dotted lines in fig. 4, so as to allow releasing of the great discs.

The tooth 39 bears on its pivot a plate 34 projecting downwardly; against this plate 34 rests another plate 35 projecting upwardly and fixed on the balancing member 131, which is loosely pivoted on a fixing block 38.

33 is the releasing organ, which is guided on block 38, by means of two lateral flanges 33a, 33b through which pass a pin 37, fixed on block 38. A spring is arranged between one flange 33a and the block 38, so as to return the organ 33 after each action. Hook 133 is fixed on said organ 33. 36 is a guide for the organ 33.

57 indicate the central cranked spigot; 2 the turntable; 56 the discs and 12 a gum bottom fixed on the underside of the turntable near its turning axis.

The various automatic operations of the device proceed as follows:

(1) By rotating knob M to the right, the control lever 103 is moved to the right; this lever, by means of its inferior stud 103B acts firstly on the switch 104 and starts the motor. Then the superior stud 103A pulls the lever 107 which suppresses the tooth 109; this latter becomes raised, because its opposite part is heavier and therefor blocks up the lever 107 so that the turntable is now free to turn and it begins the turn. The raised tongue 103C of lever 103 has displaced the lever 117, so that the plate 118 of same has freed the plate 122 and thus the lever 120, which is pulled by its spring and brings the portion 119A to mesh with the motor shaft 123. Thus begins rotation of the toothed wheel 119 and of the cam disc 110. The position shown in Fig. 12 corresponds to the rest position of the device and with a small record disc in releasing position that is to say in the lowest position of the pile. The tone arm with the pickup is in the rest position outward the turntable.

At beginning of its rotation, cam disc 110, by means of its inferior cam 110B pushes immediately the arm 119A of lever 111 the arm 111B of which pulls the lever 133. The latter pulls the organ 33 which acts on tooth 30 which thus releases the lowest disc on the turntable 2. After this, the superior cam 110A, which in the meantime held the lever 112 and therewith the tone arm 6 in rest position, allows the lever 112 to move inwardly. The lever 112 moves inwardly under the action of its axial spring and follows the cam guide 110A. By moving inwardly the lever 112 brings also the tone arm with the pickup inwardly. To this purpose serves a double lever 113 which is fixed on the tone arm pivot. The tooth 114A of the lever 112 passes beneath the end of lever arm 113A and during this passing beneath the tooth 114A is slightly lowered. When the tooth 114A has surpassed the lever 113A, it is again raised, because its opposite end 114 is heavier. The arm 113A is now between the tooth 114A and the stud 115A of plate 115 and this latter has been slightly moved in opposition to its axial spring. Continuing the rotation of cam disc 110, the lever 112 also continues its inward displacement and as a consequence the lever arm 113A is also moved inwardly and with it also the tone arm. This movement is arrested when the lever 112 is arrested, by its inferior stud 116 against stop 135 fixed on the adjusting lever 127 the position of which corresponds exactly to the diameter of the record disc just released on the turntable. Therefore, the tone arm with the pickup is brought exactly above the border of this record disc. In this moment, when lever 112 is arrested by stop 136, the cam disc 110 has reached, with the flat portion of its peripheric cam guide, the roller of lever 140 so that the levers 139, 140 may become displaced, by the weight of the tone arm so as to allow lowering of the tone arm. After this, the flattened beginning portion of cam guide 110C of the cam disc 110 is arrived in correspondence of member 114. The guide 110C raises this end 114 and now the stud 115A of plate 115, which is slightly tensioned by a spring, as said, pushes slightly the arm 113A. This pushing of arm 113A, and as a consequence of the pickup, serves to bring the stylus of the latter to engage the outermost groove of the record disc and to begin thus the reproduction. In this moment, the plate 122 is arrested by plate 118 of lever 117 and there-

fore the cut portion 119A of the toothed wheel is disengaged from the pinion of the motor shaft 123 and thus the wheel 119 is arrested. Now the disc changing and pickup moving device is arrested and only the motor shaft carrying the turntable rotates.

(2) When reproduction of the record disc is finished, the mechanism is in the position shown in Figs. 2 and 15. At the termination of reproduction the stylus of the pickup is moved inwardly with a rapid curve, as known. Thus the arm 113B pushes the element 138 near the motor shaft 123. When now the gum bottom 12, fixed on the underside of the turntable near this shaft, passes in this point, it pushes the element 138 again in opposite direction whereby the element 138A moves the plate 122 which becomes thus freed from plate 118. In this way the portion 119A may return to mesh with pinion 123 and the wheel 119 begins to rotate. As now the disc cam 110, at the beginning of its rotation, is in the position shown in Figs. 2 and 15, its first action will be that of its peripheric cam guide, which acts on roller of lever 140 and raises the pickup. Immediately thereafter the cam 110A begins to move outwardly the lever 112 which moves outwardly the tone arm. In the meantime the cam 110B reaches the lever 111A and provokes, in the described manner, releasing of the next disc. Now the cam 110A allows returning of the tone arm and beginning of the next reproduction, in the described manner.

(3) When it is desired to interrupt reproduction of a disc, during any movement of its playing, and to play the next disc, then one rotates knob M towards the right. With this movement, the tongue 103C of controlling lever 103 moves lever 117, which liberates plate 122 so that the disc changing device is immediately started and the next disc is brought onto the turntable and the pickup becomes moved so as to play this new disc, in the manner already described.

(4) When a disc should be repeated, one rotates the control knob M to the left, during any moment of its reproduction or on termination of same. With this movement the tongue 103C of control lever 103 raises the lever 133; when now, at the end of reproduction the disc changing and pick up moving device is started, in the described manner, then the lever 111 cannot act on lever 133 and therefor no new disc is released on the turntable. The cam disc 110 commands only the tone arm as to repeat the record disc lying on the turntable. The control lever 103 remains in the repeating position where it is held by a spring acted lever 146 and by an inferior stud 147 and must be returned in normal position by returning the control knob M by hand.

(5) To arrest the grammophone at any desired moment, one rotates control knob m to the right, so that bar 185 pushes the lever 106 of the switch 104 switching off the motor.

(6) When the reproduction of the last disc of the pile is finished, then the tooth 142 of arm 141 (figs. 14 and 19) presses on lever 143 which pushes the end of lever 106 beneath the toothed wheel 119. On termination of reproduction of the last record disc the wheel 119 is started in the known manner and the inferior stud 148 of this wheel acts on the lever 106 so as to switch off the motor. The lever 106 pushes also the inferior portion of balancing tooth 109 the tooth part of which will thus be lowered and the lever

107, under action of its spring 100, presses its gum bottom against the inner edge of the turntable arresting it.

Before switching off the motor, the disc cam 110, by means of guide 110A and lever 112 has brought the tone arm in rest position.

The aforesaid six automatic operations have been described supposing that always a small disc was in releasing position, because the normal position of all elements of the device corresponds to the diameter of a small disc.

Supposing now, that a great disc follows to a small disc in the releasing position in the pile; this great disc presses down the tooth 33 and as a consequence the plate 34 becomes displaced slightly towards the right (in fig. 5); now the balancing hook lever 131 with plate 35 may be unhooked from opening 130A of lever 130. The unhooking is made possible when the cam 110B, at the beginning of its rotation, pushes a little the lever 126 connected to lever 127 through a hook 120. The lever 131 is unhooked from lever 130 because its rear portion is heavier than its hook portion.

When now the wheel 119 and the cam disc 110 are started, then the lever 126—127 tends to move inwardly as drawn by spring 129 and thus also lever 130 becomes drawn, which by means of levers 132, 44 and 43 lowers the support 41 for the small discs, as shown with dotted lines in fig. 4.

Now the great disc is free to be released and its releasing is commanded in the same manner as a small, with the difference that no element 33 directly acts on the disc to be released.

At the same time, the stop 136 fixed to lever 127 is brought inwardly, so that the tone arm carrying the pickup is arrested by this stop in a position corresponding to the border of a great disc.

At beginning of the next disc changing operation, the cam guide 110A pushes firstly levers 126—127 again outwardly so that support is again raised; accordingly that no a small or a great disc is in releasing position, the hook may be hooked in lever 130 or may not be hooked, so that, after being passed cam guide 110B, the levers 126—127 may become drawn inwardly or not, accordingly that a great or a small disc is in releasing position.

When effecting the repeating operation, the control lever 103 which in this case becomes moved towards the left, frees the hook 120. In this manner the disc cam 110 moves only the lever 126 which does not effect any operation, whilst the levers 127 and 130 are not operated and remain in their position that is to say in the outer position when a small disc is on the turntable for playing and in the inner position, when a great disc is on the turntable for playing.

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