July 18, 1950 B. F. WISSNER 2,515,283

RECORD CHANGING DEVICE FOR PHONOGRAPHS

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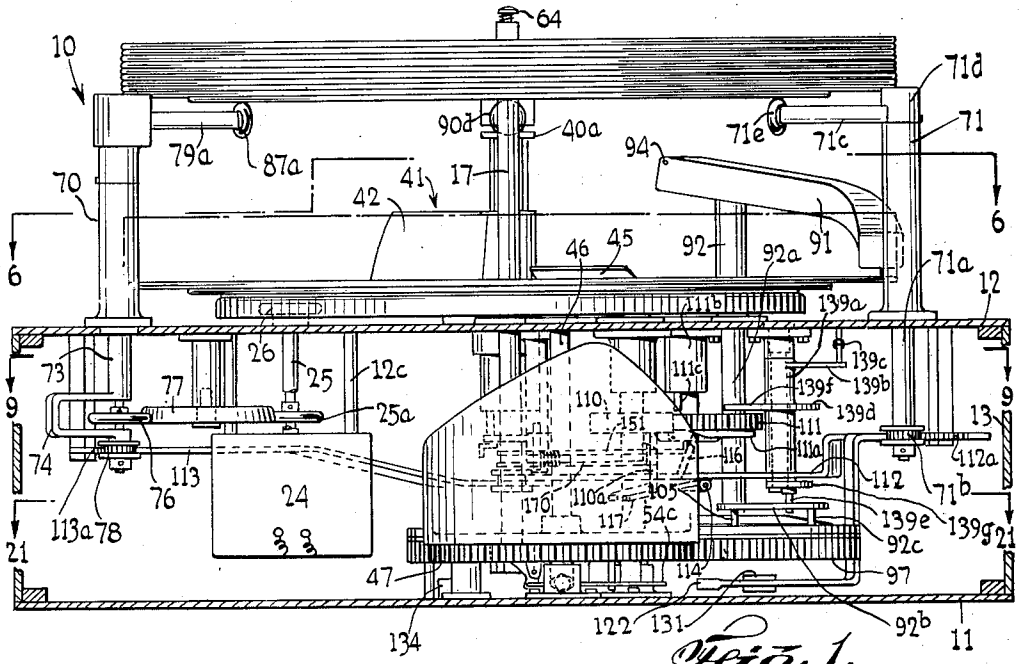


Fig. 1.

Fig. 2.

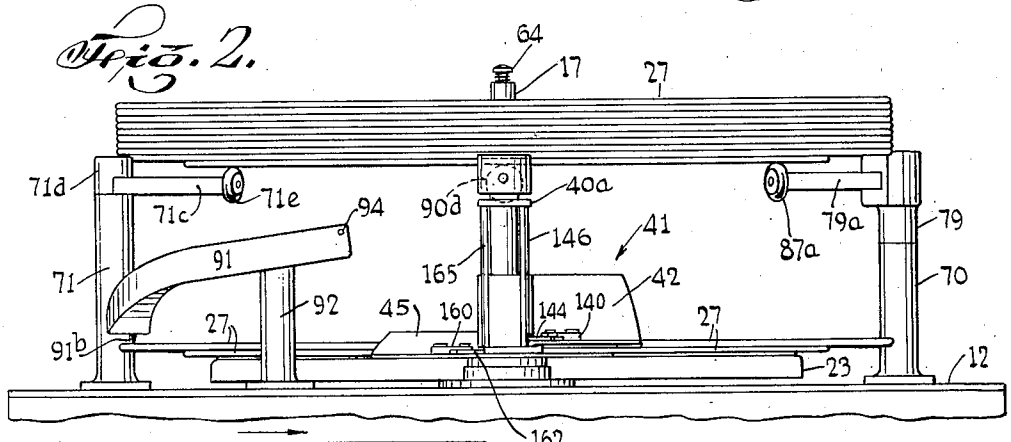
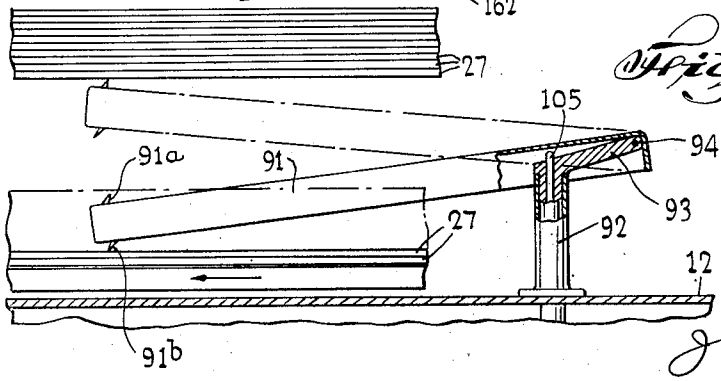


Fig. 4.



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RECORD CHANGING DEVICE FOR PHONOGRAPHS

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Fig. 3.

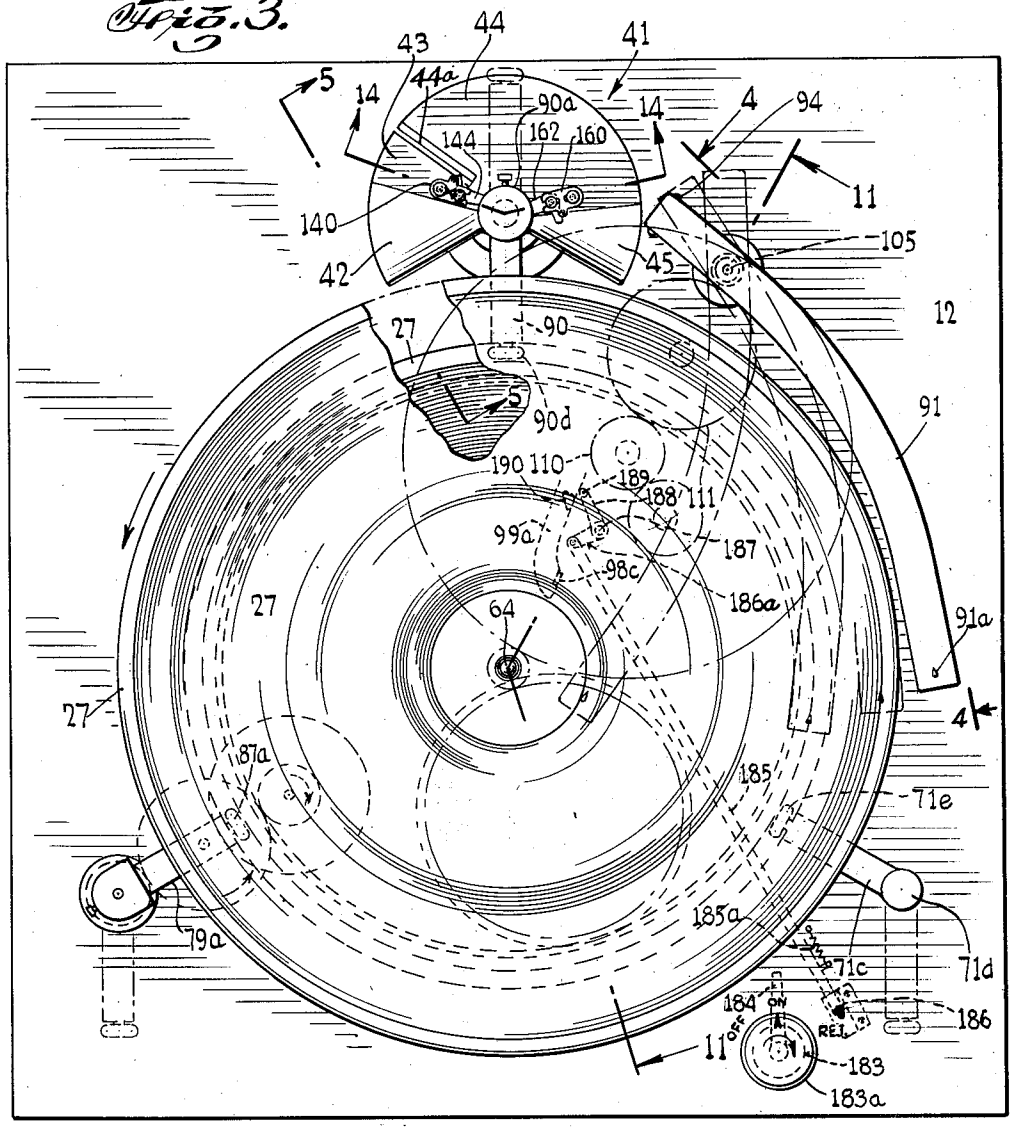
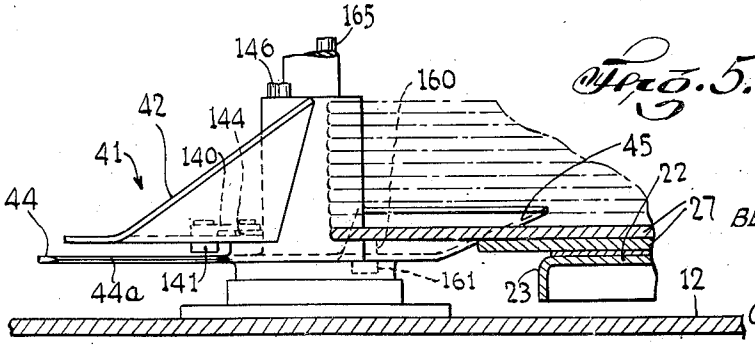


Fig. 5.



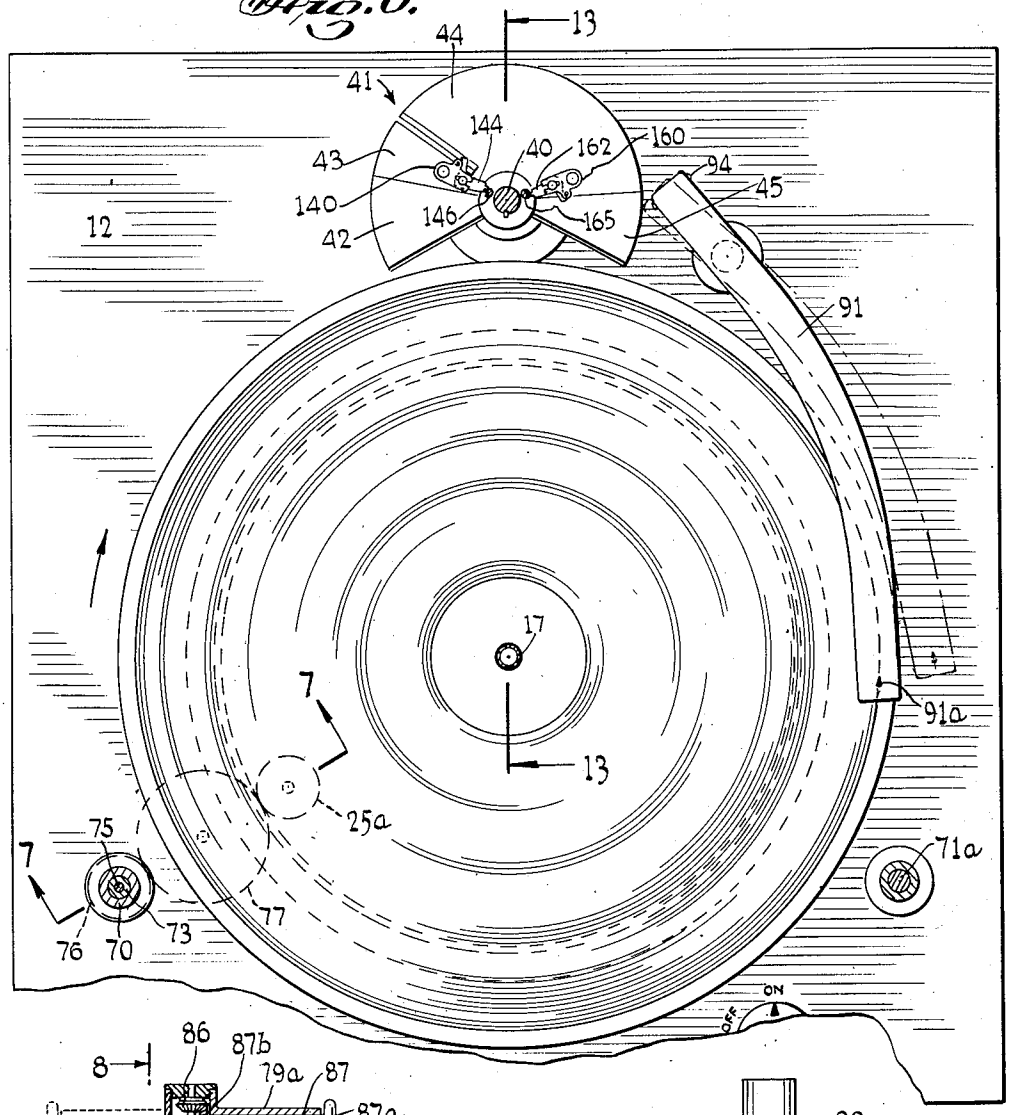
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RECORD CHANGING DEVICE FOR PHONOGRAPHS

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Fig. 6.



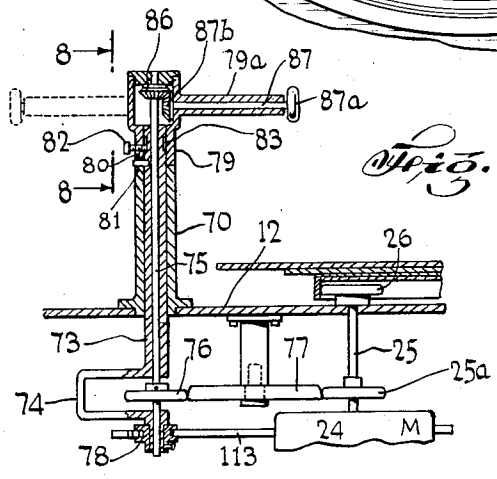


Fig. 7.

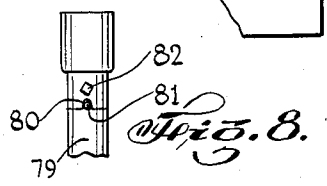


Fig. 8.

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Fig. 9.

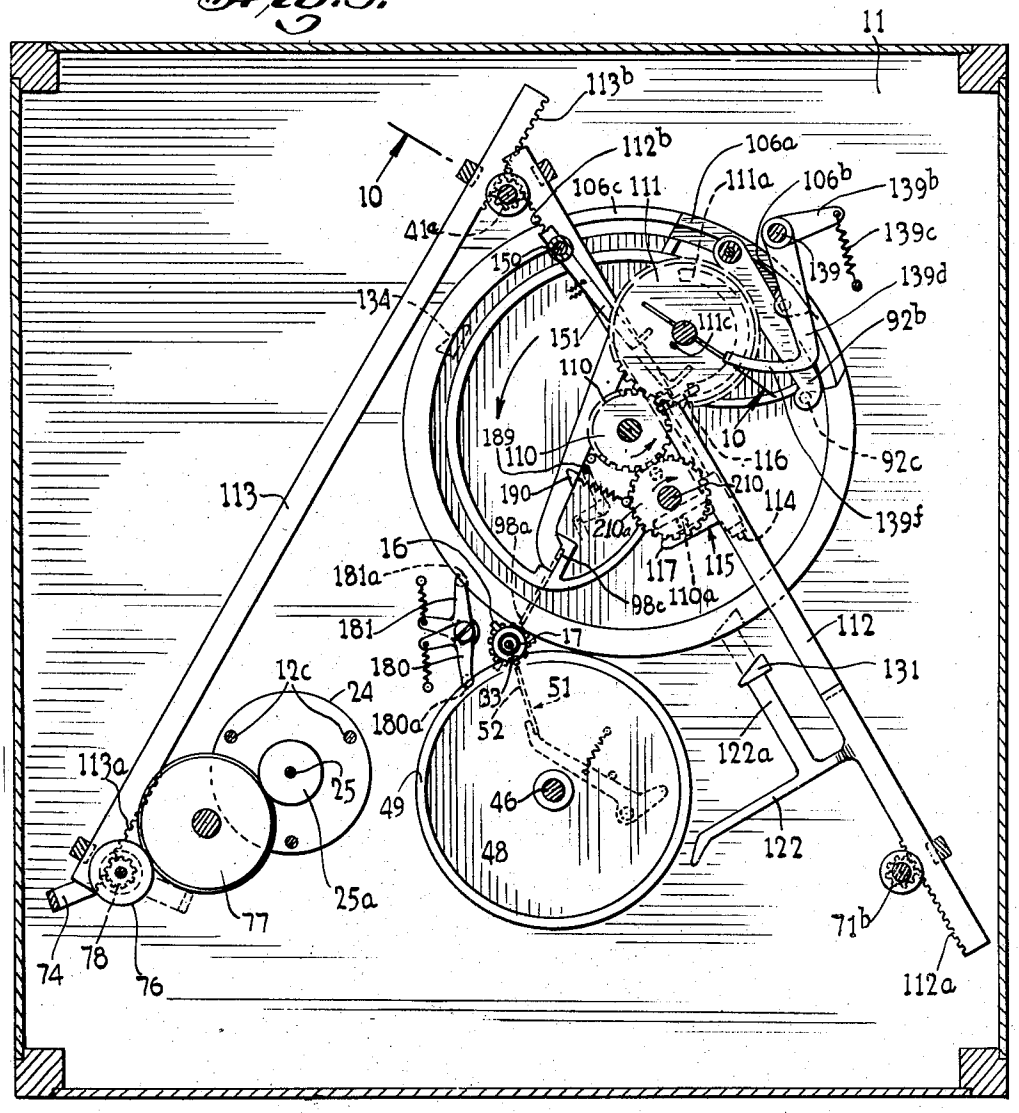
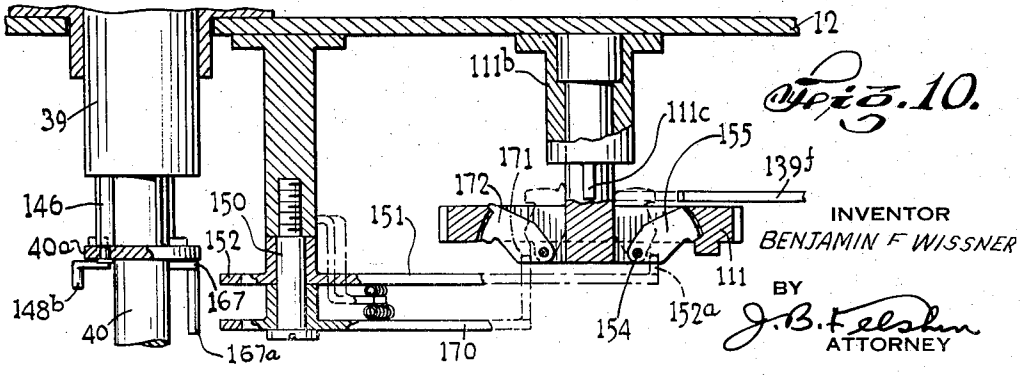


Fig. 10.



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Fig. 11.

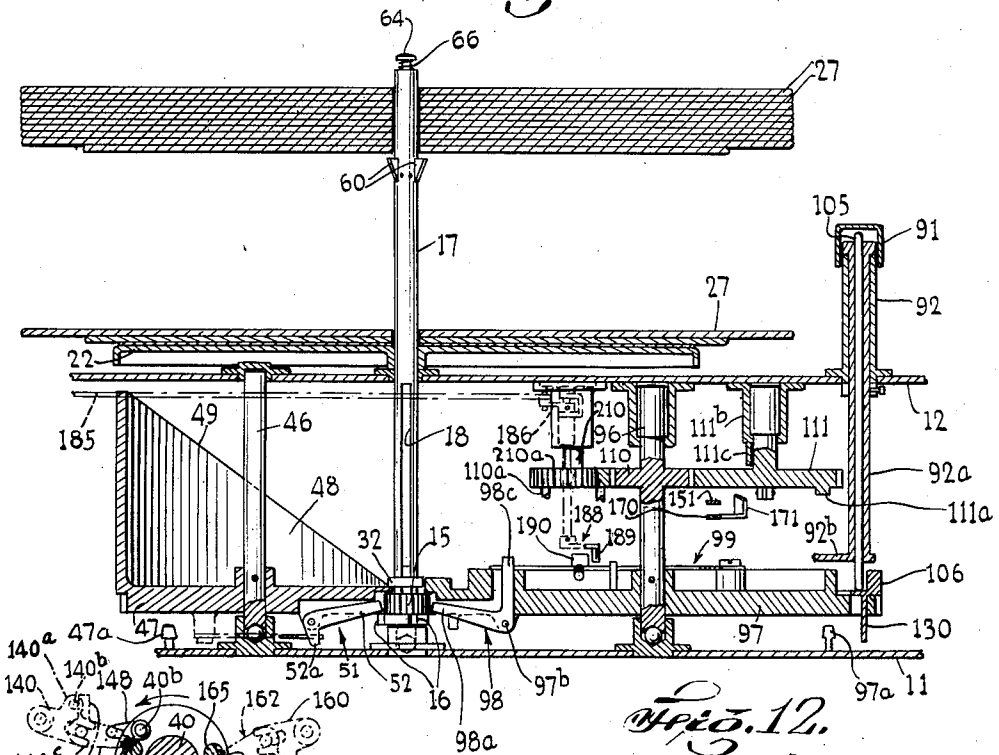


Fig. 12.

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RECORD CHANGING DEVICE FOR PHONOGRAPHS

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Fig. 13.

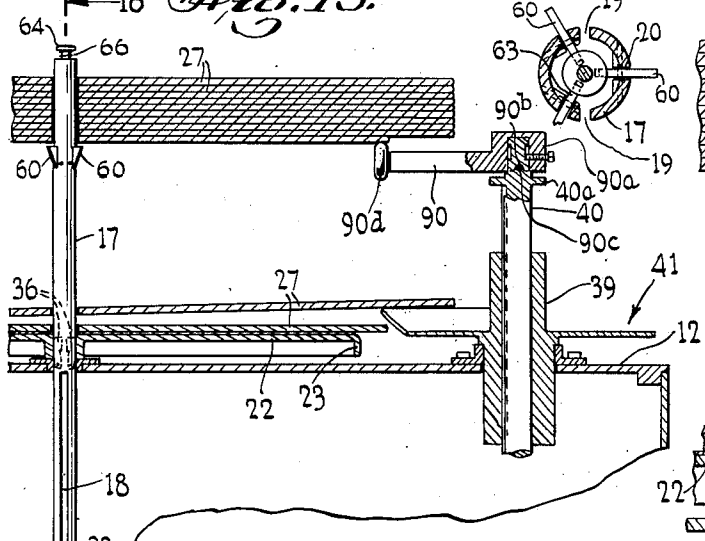


Fig. 17.

Fig. 16.

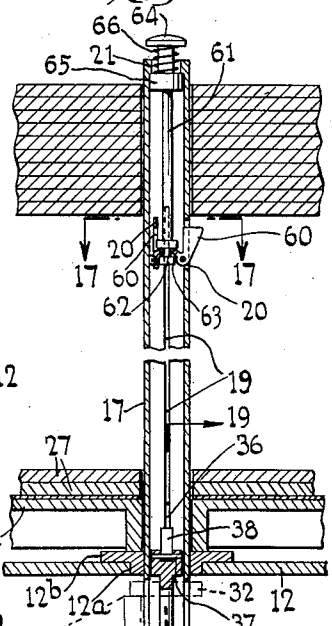


Fig. 15.

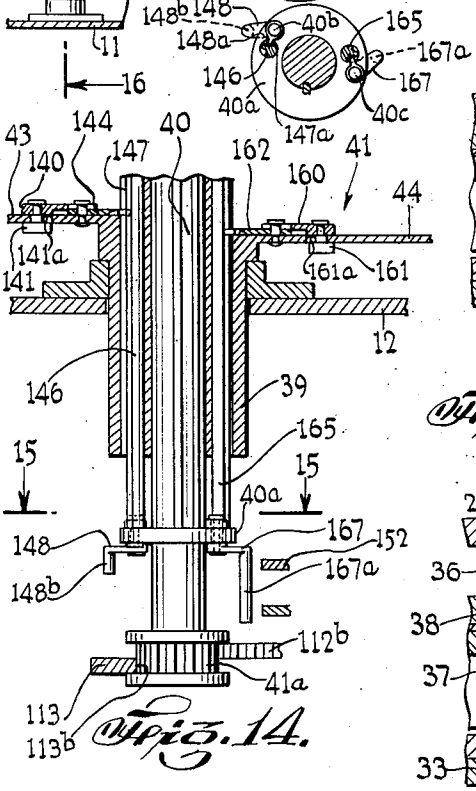


Fig. 19.

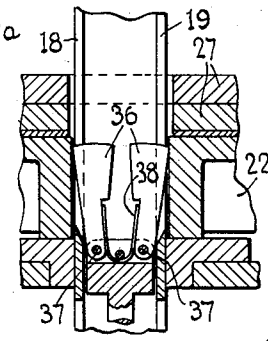


Fig. 20.

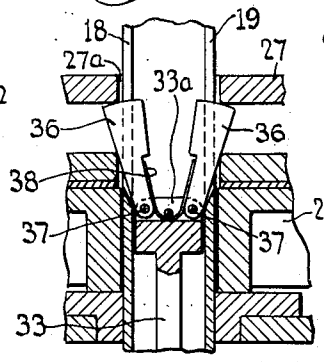
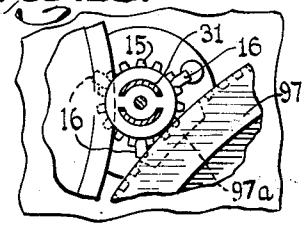


Fig. 18.



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RECORD CHANGING DEVICE FOR PHONOGRAPHS

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Fig. 21.

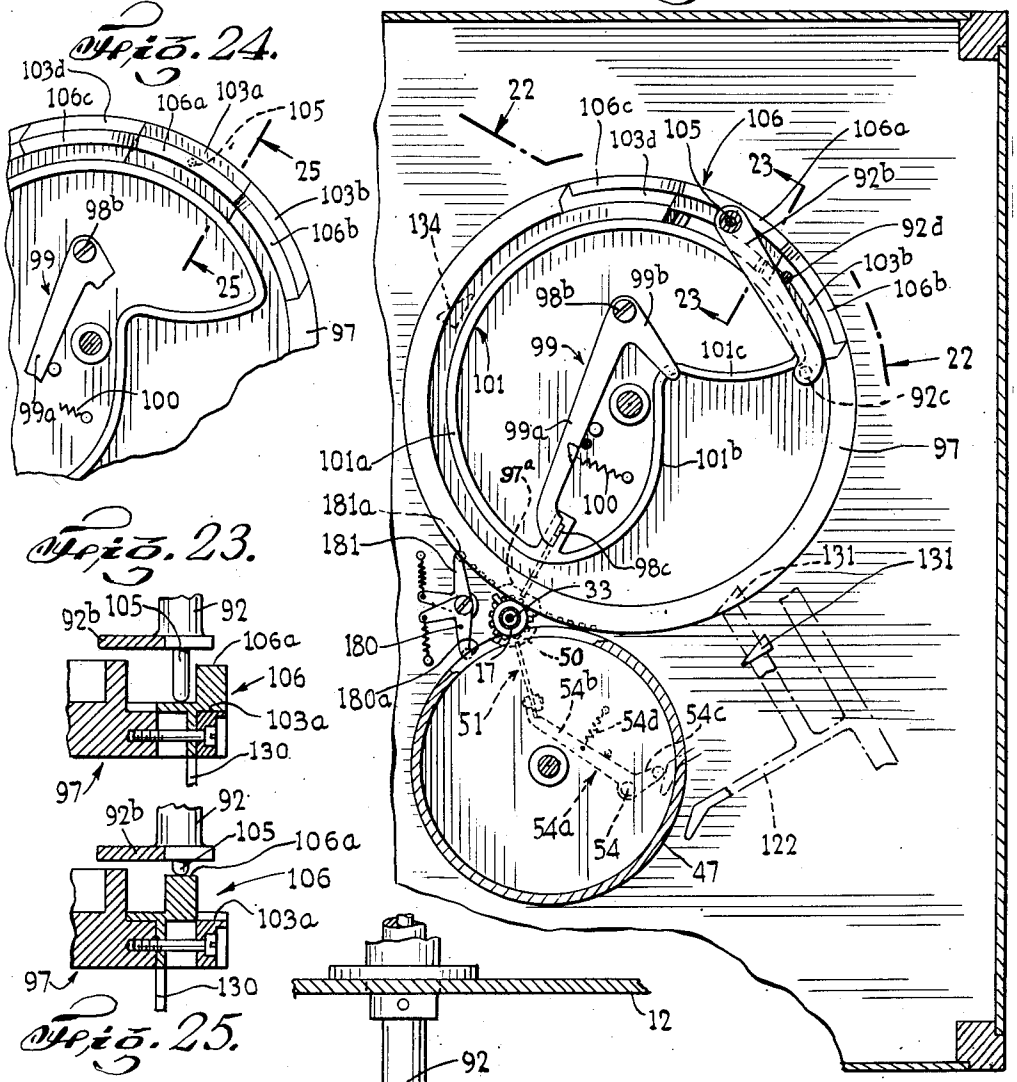


Fig. 24.

Fig. 23.

Fig. 25.

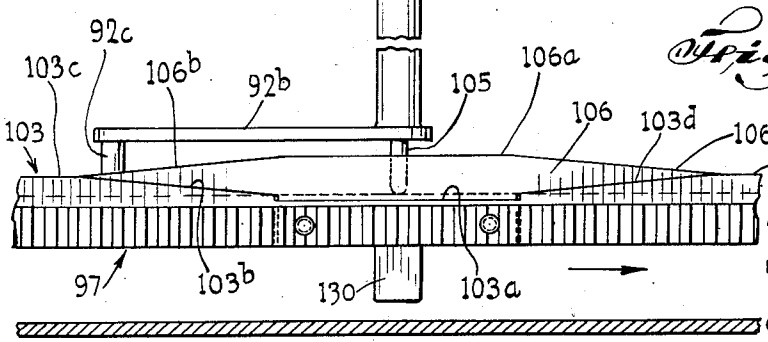


Fig. 22.

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Patented July 18, 1950 2,515,283

UNITED STATES PATENT OFFICE

2,515,283

RECORD CHANGING DEVICE FOR PHONOGRAPHS

Benjamin F. Wissner, New York, N. Y.

Application May 10, 1943, Serial No. 486,292

23 Claims. (Cl. 274—10)

1

This invention relates to record changing devices for phonographs. This application is a continuation in part of my co-pending application, Serial No. 392,740, filed May 9th, 1941, now Patent No. 2,318,654, issued on the 11th day of May, 1943.

An object of this invention is to provide a record changer of the character described in which a stack of records may be played, both sides, successively, said record changer including mechanism for playing first the top of the topmost record of the stack, then lifting the topmost record off the stack, and playing the underside of the lifted record, then playing the top of the then topmost record of the stack, and then lifting it and playing its underside, and so on.

A further object of this invention is to provide a record changer of the character described which will operate with either 10'' or 12'' records mixed in any order.

Yet another object of this invention is to provide a record changer of the character described comprising a turn table on which a stack of records is mounted, and means for lifting each record off the stack after it is played, the lifted records being supported on rotating wheels, and means being provided to rotate the turn table with the stack of records mounted thereon in one direction, while rotating the lifted records in an opposite direction.

Yet a further object of this invention is to provide a record changer of the character described having means to engage the outer edge of the topmost record and lift it sufficiently so that a set of spring pressed catches within the central shaft on which the records are mounted, may snap out beneath the lifted record; means being further provided to raise said catches for raising the lifted record past any other set of spring pressed catches permanently located at a predetermined height above the turn table, whereby said second set may engage beneath the raised record to retain the same at a predetermined level while the first mentioned spring pressed catches are lowered.

Yet a further object of this invention is to provide in a record changer of the character described, a highly improved selector which will lift the topmost record of the stack after it is played, said selector being operative to engage and lift said top record whether it is a 10'' or 12'' record.

Still a further object of this invention is to provide in a record changer of the character described, a tone arm having an upwardly pointed needle or stylus and a downwardly pointed needle

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or stylus, means being provided to bring the tone arm into contact with the topside of the topmost record of the stack to play the top of said record, thereafter to move the tone arm upwardly off the record and outwardly, and to raise the played record and retain it in lifted position, and then to move the tone arm inwardly and in engagement with the underside of the raised record, to play the bottom of said record, said means being operative to move the tone arm into contact with the beginning of said record whether it is a 10'' or 12'' record.

In accordance with the present invention it is only necessary to engage the needle with the top of the first record of the stack, and the tone arm is thereafter automatically engaged with the starting points of the records.

Yet a further object of this invention is to provide in a record changer of the character described highly improved and novel means for lifting the records, one at a time, by mechanisms which are housed in the interior of the turn table shaft which passes through the central openings in the records on the turn table.

A still further object of this invention is to provide in a record changer of the character described, a highly simplified, improved driving means for the turn table and the raised records, the construction including the conventional tired friction wheel contacting the inside edge of the periphery of the turn table to rotate it in one direction, and another wheel mounted on the same axis, which through the transmission of an idler, rotates another wheel which transmits power through gearing to a tired roller wheel which rotates the upper stack of raised records in an opposite direction simultaneously with the rotation of the lower turn table.

Still another object of this invention is to provide a highly improved and compact record changer of the character described, which shall be relatively inexpensive to manufacture, smooth and positive in operation, and which shall yet be practical and efficient to a high degree in use.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the following claims.

In the accompanying drawing, in which is shown one of the various possible illustrative embodiments of this invention,

Fig. 1 is a front elevational view of a record

changer embodying the invention with parts broken away and in cross-section;

Fig. 2 is a rear elevational view of the upper portion of the structure shown in Fig. 1;

Fig. 3 is a top plan view of the structure shown in Fig. 1;

Fig. 4 is a cross-sectional view taken on line 4—4 of Fig. 3;

Fig. 5 is a cross-sectional view taken on line 5—5 of Fig. 3;

Fig. 6 is a cross-sectional view taken on line 6—6 of Fig. 1;

Fig. 7 is a cross-sectional view taken on line 7—7 of Fig. 6;

Fig. 8 is an elevational view taken in the plane of lines 8—8 of Fig. 7;

Fig. 9 is a cross-sectional view taken on line 9—9 of Fig. 1;

Fig. 10 is a cross-sectional view taken on line 10—10 of Fig. 9;

Fig. 11 is an elevational, cross-sectional view through the axis of the turn table on line 11—11 of Fig. 3;

Fig. 12 is a horizontal, cross-sectional view illustrating the feeler mechanism for automatically engaging the tone arm with either 10" or 12" records, according to what records are to be played;

Fig. 13 is a cross-sectional view taken on line 13—13 of Fig. 6;

Fig. 14 is a cross-sectional view taken on line 14—14 of Fig. 3;

Fig. 15 is a cross-sectional view taken on line 15—15 of Fig. 14;

Fig. 16 is a cross-sectional view taken on line 16—16 of Fig. 13;

Fig. 17 is a cross-sectional view taken on line 17—17 of Fig. 16;

Fig. 18 is a cross-sectional view taken on line 18—18 of Fig. 16;

Fig. 19 is a cross-sectional view taken on line 19—19 of Fig. 16, before a record is lifted;

Fig. 20 is a view similar to Fig. 19 but showing the position where the topmost record has been lifted by the selector, and the raising catches are engaged beneath the lifted record for subsequently raising the same;

Fig. 21 is a cross-sectional view taken on line 21—21 of Fig. 1;

Fig. 22 is a cross-sectional view taken on line 22—22 of Fig. 21;

Fig. 23 is a cross-sectional view taken on line 23—23 of Fig. 21;

Fig. 24 is a partial view similar to Fig. 21 but showing the movable cam in operative position; and

Fig. 25 is a cross-sectional view taken on line 25—25 of Fig. 24.

Referring now in detail to the drawing, 10 designates a record changer embodying the invention. The same comprises a frame having a bottom wall 11 and a top wall 12 supported on a vertical wall 13.

On the bottom wall 11 is a thrust bearing 14. Rotatably mounted on the thrust bearing is a pinion 15. On the pinion are three equiangularly spaced radial pins 16 (Fig. 18) for the purpose hereinafter appearing. Mounted on the pinion 15, and fixed thereto, is a vertical, tubular shaft 17 formed below wall 12 with a pair of diametrically opposed vertical slots 18. Above wall 12, shaft 17 is formed with a pair of diametrically opposed slots 19 located in a plane at right angles to the plane of the slots 18.

Said shaft 17 is furthermore formed, just below

the upper ends of slots 19, with three short slots 20 equiangularly spaced from one another, but spaced from slots 19. Shaft 17 may be open at its upper end, but is formed with an internal shoulder 21.

It will be noted that shaft 17 passes through a central opening 12a in wall 12. Wall 12 may be provided with a bearing 12b for said shaft. On said bearing is a turn table 22 fixed to the tubular shaft 17. The turn table 22 has a downwardly extending rim 23 at its outer edge.

Means is provided to rotate the turn table 22. To this end there is suspended from table 12 by means of brackets 12c, an electric motor 24 having a vertical armature shaft 25. On the upper end of shaft 25 is a rubber tired wheel 26 engaging the inner surface of the rim 23. Thus when the motor is running, turn table 22 will be rotated.

A stack of records 27 may be mounted on the turn table 22 with the shaft 17 passing upwardly through the central openings in the records.

In accordance with the present invention there is provided means for playing the upper surface of the topmost record on the stack supported by the turn table, and for thereafter raising the topmost record and supporting it in raised position, and for playing the underside of the raised record. The records may be stacked on the turn table with 10" or 12" records mixed in any order. As will be seen hereinafter it is only necessary to engage the tone arm with the beginning of the topmost record on the turn table and thereafter the records will be played automatically, successively, top and bottom.

The raising mechanism for the records comprises a collar 30 slidably mounted in tube 17, said collar having substantially semi-circular slots 31 through which portions of the tube on opposite sides of slots 18 pass. Said collar is also formed with an outwardly extending annular flange 32. Fixed to the axis of the collar and extending upwardly in the tube is a vertical rod 33 enlarged at its upper end. The upper end of the rod is formed with a diametric slot 33a receiving the lower ends of a pair of fingers 36 pivoted to the rod as at 37.

The fingers are adapted to swing outwardly through the slots 18 to a limited extent. Between the fingers 36 is a spreading spring 38. As the rod 33 moves down in the manner hereinafter appearing, the fingers 36 are pressed inwardly by the inner edges 27a of the record openings. When the rod 33 moves up, the fingers 36 will spread as soon as they move into the clear.

Means is provided to tilt or lift the topmost record upwardly to a degree sufficient to permit the fingers 36 to spread open as rod 33 moves up, and engage beneath the tilted or lifted record, as illustrated in Fig. 20, so that thereafter the rod 33 may be raised for raising the record to a predetermined height. To this end there is journalled on wall 12 a vertical sleeve 39 (Fig. 13). Extending through the sleeve 39 is a vertical rotary shaft 40 to which the sleeve 39 is splined. At the lower end of the shaft is a pinion 41a.

On the sleeve 39 is a selector or tilting plate 41. The same comprises a segmental portion 42 inclined upwardly in a counterclockwise direction, looking at Fig. 3 of the drawing. Extending from the lower end of the portion 42 is a flat segment 43. Beyond flat portion 43 is a flat segment 44 at a level lower than level of segment 43. Extending upwardly in a clockwise direction (Fig. 3) from the end of segment 44 is a segment

45. The vertical height of segment 42 is such that the upper end thereof is slightly above the top surface of the topmost record on the turn table when a maximum number of records are on the turn table.

Means is provided to rotate the sleeve 39 in a counterclockwise direction, about 270°, after each time the top of the uppermost record on the turn table is played, for tilting or lifting said topmost record to the position shown in Fig. 13. The rotating mechanism for the sleeve will be later described. Upon rotation of sleeve 39, selector member 41 will be rotated to first contact the underside of inclined segment 42 with the edge of the topmost record on the turn table. As selector 41 is rotated it will ride up until the underside of segment 43 contacts the top of the upper record. The space between portions 43 and 44 is sufficient to admit the thickness of a record to pass therebetween. Thus as the selector rotates, the forward edge 44a of segment 44 will engage beneath the topmost record. The radius of segment 44 is sufficient to engage a 10" record if there be a 10" record at the top of the stack. Furthermore, segment 43 is of such angular extent that the heel of segment 42 will contact the edge of the 10" records before edge 44a can engage the 12" record below the 10" record. If the topmost record is a 12" record it will also be engaged by segment 44. As the selector continues rotating the inclined segment 45 will engage the topmost record to lift or tilt it to the position shown in Fig. 13. The angle of segment 44 is such that segment 43 will move past the engaged record, either 10" or 12", before the record begins to be tilted by segment 45, so as to prevent pinching of the record. As the topmost record is tilted it will permit spreading of fingers 36 upon raising rod 33, in the manner hereinafter appearing, to enable the fingers to engage beneath the tilted record, whereupon further upward movement of the rod 33, will raise the record to its upper position.

Means is provided for raising the tilted record after it is tilted. To this end there is mounted on and between the walls 11 and 12, a vertical rotary shaft 46. Fixed to the shaft 46 is a gear 47 and extending upwardly from the gear is a cylindrical cam 48. The upper edge 49 of cam 48 has a rise and fall and its greatest height is equivalent to the vertical distance it is desired to raise the records.

The edge 49 of the cam engages beneath collar flange 32 so that as the gear 47 rotates, the collar 30 will be raised for lifting the rod 33 together with the fingers 36 and the record 27 which has been engaged by said fingers. The gear 47 is formed with a notch 50, and the teeth of said gear are adapted to mesh with the teeth of pinion 15. When the notch 50 is in registry with the pinion 15, the pinion will not drive the gear 47. However, when the gear 47 is rotated sufficiently for its teeth to engage with the pinion, it will be rotated one revolution.

Means is provided to kick the gear 47 at predetermined times sufficiently to engage the pinion. To this end there is pivoted to the underside of gear 47 a bell crank 51 having an arm 52 adapted to engage one of the pins 16 on the pinion when said arm drops down by gravity. However, when the bell crank is rotated in a counterclockwise direction, looking at Fig. 11, arm 52 will be raised above the pin 16.

Means is provided to hold the bell crank 51 in non-engaging position relative to the pins 16.

To this end there is pivoted to the underside of gear 47, as at 54, a bell crank 54a having an arm 54b and another arm 54c. A spring 54d urges the arm 54b of the bell crank into engagement with arm 52a of bell crank 51 to retain said bell crank in a position shown in Fig. 11. However, when the bell crank 54a is kicked, in the manner hereinafter to be explained, bell crank 51 is released and drops to a position for engaging pin 16, to kick gear 47 sufficiently for the teeth thereof to mesh with pinion 15, whereby the gear 47 is given one revolution.

Means is provided to retain the raised records in their upper positions. To this end there is pivoted within the tube 17 three equiangularly spaced radial catches 60 adapted to project through the slots 20. Within the upper end of tube 17 is a vertical rod 61 having an annular grooved collar 62 at its lower end engaging inwardly extending fingers 63 on the catches 60.

At the upper end of the rod 61 is a button 64. Fixed within the upper end of tube 17 adjacent shoulder 21 is a sleeve 65 through which rod 61 passes. Interposed between sleeve 65 and button 64 is a compression spring 66. When the button 64 is depressed the catches 60 will be swung inwardly about their pivot points to draw said catches into the tube 17 to permit records to be loaded on the turn table. When a record is moved upwardly by rod 33 the record will move past the catches 60, squeezing them together, and said catches will snap apart beneath the raised record.

Means is provided to support the raised records and rotate the same in a direction opposite to the direction of rotation of the turn table. To this end there is mounted on the wall 12, a pair of sleeves 70 and 71. The sleeves 70 and 71 may be located substantially 120° apart, and 120° from sleeve 39. Extending through sleeve 70 is an inner sleeve 73 formed at its lower end with a yoke 74. Extending through the inner sleeve 73 is a vertical shaft 75 carrying a rubber wheel 76 at its lower end disposed in said yoke. On the motor shaft 25 is a rubber wheel 25a at the level of wheel 76. Fixed to wall 12 is a vertical shaft supporting an idler wheel 77. The idler wheel 77 has a downwardly and outwardly tapered tread surface engaging the wheels 25a and 76. Thus when the motor operates, shaft 75 will be rotated.

On the lower end of the inner sleeve 73 is a pinion 78. The inner sleeve 73 extends above sleeve 70 and rotatably mounted on said upper end is an annular housing 79 formed with a notch 80 at its lower end. Fixed to sleeve 73 is a pin 81 received in the notch 80. Thus when the housing 79 is down, and the pin 81 is engaged in the notch 80, rotation of the inner sleeve 73 in the manner hereinafter appearing, will cause rotation of the housing 79. However, said housing may be lifted and then rotated independently of the inner sleeve. On housing 79 is a screw 82 projecting into a groove 83 on the inner sleeve to limit lifting of the housing 79. At the upper end of the shaft 75 is a bevel gear 86. Extending from housing 79 is a horizontal sleeve 79a. Within sleeve 79a is a shaft 87 carrying a bevel gear 87b at its inner end, meshing with pinion 86. At the opposite end of shaft 87 is a wheel 87a adapted to engage beneath the raised records.

It will now be understood that when the motor operates wheel 87a will be rotated to turn the raised records in a direction opposite to the direction of rotation of the turn table. However,

the housing 79 may be rotated manually to bring sleeve 79a to the dotted line position shown in Fig. 7 when loading records on the turn table.

The raised records are supported at three equally spaced apart points. The place of one support (the drive wheel) has been described. The records are also supported as shown in Fig. 13 by an arm 90 mounted at the upper end of shaft 40. The arm 90 has a sleeve 90a rotatably receiving the upper end of the shaft. Said sleeve has a notch on its underside 90b engaging a pin 90c on shaft 40. When the arm is raised to clear the pin said arm may be rotated outwardly, independently of shaft 40, to permit loading of records on the turn table.

However, when the pin 90c is engaged in notch 90b, said arm 90 will be rotated with shaft 40 in the manner hereinafter to be described. Arm 90 carries an idler wheel 90d likewise supporting the records.

The third point of support for the records is at sleeve 71. Extending through said sleeve is a vertical shaft 71a carrying a pinion 71b at its lower end. On the upper end of shaft 71a is an arm 71c having a sleeve 71d rotatably engaging said shaft, and likewise provided with a notch to engage a pin on said shaft. At the inner end of arm 71c is a wheel 71e likewise engaging beneath the records. The raised records are thus engaged by the wheels 87a, 90d and 71e.

The tone arm 91 is provided with an upwardly pointing needle or stylus 91a and a downwardly pointing needle or stylus 91b. The upper surface of the records are played by the needle 91b, whereas the undersides of said records are played by the needle 91a. To support the tone arm there is fixed to wall 12 a vertical sleeve 92. Extending through sleeve 92 is an inner sleeve 92a formed with an upwardly inclined arm 93 at its upper end, to which the tone arm 91 is pivoted as at 94. At the lower end of sleeve 92a is an arm 92b formed with a downwardly extending finger 92c. A pin 92d (Fig. 21) limits rotation of arm 92b in one direction.

Means is provided to control the up and down movement as well as the swinging movement of tone arm 91. To this end there is mounted on the wall 11 another vertical shaft 96. Pinned to shaft 96 is a gear 97 likewise adapted to mesh with pinion 15. Gear 97 is formed with a peripheral notch 97a. When the notch 97a registers with pinion 15, said pinion can rotate without rotating the gear 97.

Means is provided to kick the gear 97 sufficiently to engage the teeth thereof with pinion 15, so that as the motor operates, gear 97 will make one revolution and then stop. To this end there is pivoted to gear 97, as at 97b, a bell crank 98 having an arm 98a adapted to be engaged by one of the pins 16 when said arm drops by gravity to the level of said pins.

Means is provided for retaining the bell crank 98 out of engagement with pins 16. To this end there is pivoted to gear 97, as at 98b, bell crank 99 having an arm 99a adapted to engage an upwardly extending arm 98c of bell crank 98 to retain said bell crank in the position shown in Fig. 11. Bell crank 99 is urged in a counterclockwise direction, looking at Fig. 21, by spring 100. Said bell crank has a second arm 99b extending at an angle to the arm 99a. On the gear 97 is a cam 101. The cam 101 has a circular dwell portion 101a having an angular extent of about 120°. Said cam also has an inwardly curved portion 101b adapted to engage the pin 92c on arm 92b for swinging the tone arm outwardly after a record is played. As will appear hereinafter, the gear 97 is stationary while the record is being played. During this time the arm 92b will swing in a clockwise direction looking at Fig. 21 of the drawing, and the cam 101 has a portion 101c to permit arm 92b to swing inwardly.

However, when the pin 92c contacts arm 99b at the end of a record play, bell crank 99 will be kicked to release the bell crank 98 which drops into the path of pin 16. This operation kicks gear 97 into engagement with pinion 15 for rotating the gear 97 one revolution. During such revolution arm 92b will be swung outwardly or in a counterclockwise direction due to engagement of pin 92c with cam portion 101b.

As the gear 97 continues to rotate, the tone arm will remain in its outwardly swung position while the record is being lifted, if the top of a record had just previously been played.

However, if the bottom of a record has been played, the tone arm will swing out, stay out for a while, and then will be reengaged with the next record.

Means is provided to raise the tone arm after the top of a lower record has been played to neutral position before it is swung out, and to reengage the tone arm with the underside of a raised record. After the lower side of a raised record has been played, the tone arm will be lowered by said means to neutral position before it is swung out and then will be further lowered into engagement with the starting point of the top of a record on the turn table. To this end, gear 97 is provided with a fixed peripheral cam 103. Said peripheral cam has a low portion 103a, and a rise 103b, and a dwell 103c of constant height, and an incline drop 103d leading back to low portion 103a. Extending through the sleeve 92 is a vertical shaft 105 contacting the underside of tone arm 90. The lower end of rod 105 contacts the cam surface 103. After alternate revolutions of gear 97 rod 105 rests at portion 103a of cam 103. During this time the gear is stationary and the top of a record on the turn table is being played. When the play is completed arm 92b kicks out bell crank 99 which in turn releases bell crank 98, and gear 97 is then rotated for one revolution. During this period rod 105 will ride up on cam 103b to lift the tone arm to neutral height, and the tone arm will remain at such neutral height while the rod engages said cam portion 103c.

Slidably mounted on gear 97 is a segmental cam 106. Segmental cam 106 slides radially into the circle of cam 103, but may be moved outwardly out of the circle of cam 103 so as to be in inoperative position. The cam 106 has a high dwell portion 106a at a greater level than cam portion 103c. It also has an incline portion 106b leading down to dwell portion 103c, and an incline portion 106c which leads up from dwell 103c to the high part 106a.

When a lower record is being played cam 106 is in inoperative position. However, after the lower record is played, and the gear 97 is rotated, rod 105 rides up incline 103b on to dwell 103c, and while it is on the dwell cam 106 is moved inwardly, in the manner hereinafter explained, to operative position, so that rod 105 instead of riding down incline 103d will ride up incline 106c on to the high dwell 106a, thus raising the tone arm from neutral position to engage the underside of a raised record. Thus while the raised record is played, rod 105 is on the dwell 106a;

after the raised record is played and gear 97 is again rotated, rod 105 will ride down incline 106b to lower the tone arm to neutral position, and then while the rod 105 is in contact with dwell 103c, cam 106 will again be moved outwardly to its inoperative position so that as the gear comes around, rod 105 will again ride down incline 103d to lower the tone arm into engagement with the record on the turn table. The operative position of cam 106 is illustrated in Fig. 25, and the inoperative position of said cam is illustrated in Fig. 23.

Means is provided to swing the arms 79a, 71c, and 90 outwardly beyond the records, automatically, after each time a lower record is played so as to permit the played record to be raised and to return said arms to their original positions. Thus the arms are swung outwardly after alternate playings. To this end there is mounted on shaft 96 a gear 110. Rotatably mounted on bearing 111b fixed to wall 12, is a gear 111 meshing with gear 110. The ratio of the gears is such that two revolutions of gear 110 will make one revolution of gear 111. On the underside of gear 111 is a cam 111a extending through an angle of 180°. Slidably mounted on the frame in any suitable manner is an elongated rod 112 having a rack portion 112a at one end and a rack portion 112b at its other end. Rack portion 112a meshes with pinion 71b. Rack portion 112b meshes with pinion 41a on shaft 40.

Slidably mounted on the frame in any suitable manner is a second rod 113 having a rack portion 113a at one end and a rack portion 113b at its other end. Rack portion 113a meshes with pinion 78, whereas rack portion 113b meshes likewise with pinion 41a. It will be understood that as rod 112 moves in one direction, pinions 71b, 41a and 78 will be rotated in counterclockwise directions, thus causing arms 71c, 90 and 78a to swing outwardly to permit a record to be raised. When said arms swing outwardly, the support of the records is transferred from the wheels 71e, 90d and 87a to the catches 60. As rods 112, 113 move back the supporting wheels are returned.

Means is provided to shift the rod 112 back and forth on alternate revolutions of the gear 97. To this end there is journalled in the bearing 210 on the frame, a gear 210a meshing with gear 110. Gears 110 and 210a are of the same diameter and have the same number of teeth, so that one revolution of gear 110 will cause one revolution of gear 210a. On gear 210a is a pin 110a. Pivoted to rod 112 about a horizontal pivot 114 is a bell crank 115 having one arm 116 engageable by the cam 111a and a second forked arm 117 formed with a slot 118. As gear 110 rotates during one revolution, while arm 116 is engaged with the cam 111a, arm 117 will move to a position where the pin 110a on gear 210a will engage within slot 118. Rotation of the gear 110 one complete turn will rotate gear 210a and thus shift rod 112 in one direction, and then back again.

During the next revolution of gear 97, and hence of gear 110, arm 116 will be off cam 111a, and arm 117 will be out of engagement with the pin 110a and rod 112 will therefore not be shifted. Thus the arms which carry the rollers or wheels that support the records, are swung outwardly on alternate playings of the records, that is only after the lower records are played, but not after the upper records are played.

On rod 112 is an outwardly extending arm 122 adapted to kick the bell crank 54a to release the bell crank 51 after alternate playings of the records, that is after each lower record is played.

The means for shifting the cam 106 in and out of operative positions will now be described. On the central part of cam 106 is a downwardly extending finger 130. Attached to rod 112 on arm 122a is a wedge shaped shoe 131. When rod 122 is shifted while gear 97 is rotating, shoe 131 will be moved to a position where it will engage the cam 106 and move it inwardly to operative position. Thus after a lower record has been played, cam 106 will be moved to operative position to raise the tone arm, and that occurs only after the lower records have been played.

The means for moving the cam 106 to inoperative position comprises a wedge shaped fixed cam 134 in a position to engage the finger 130 and move the cam radially outwardly. The cam 134 may be fixed to the frame in any suitable manner.

It will be noted that the shaft 40 is rotated on alternate playings, that is only each time after a lower record has been played.

Means is provided to automatically swing the tone arm inwardly into engagement with either 10" or 12" records, whichever is to be played next, so that it will be necessary only to start the tone arm with the first record. To this end there is mounted on the frame a vertical shaft 139. Rotatably mounted on said shaft is a sleeve 139a. On sleeve 139a is a radial arm 139d connected by spring 139c to a fixed portion of the frame. There is also fixed on said sleeve 139a an arm 139d carrying an offset portion or arm 139f. There is further fixed to said sleeve an arm 139g carrying a pin 139e adapted to contact the arm 92b to retain pin 92c in engagement with the cam 101.

If 10" records are being played arm 92b can move to a position where the pin 92c contacts cam portion 101c. However, as the selector 41 is rotated, after the lower record has been played, it will preset the machine so that during the next two playings of the underside of a raised record and the upper side of the next record on the turn table, the tone arm will automatically move in to proper position to start playing the record, depending upon whether the record to be raised and the next record are 10" or 12" records.

The feeler mechanism comprises a slider 140 slidably mounted on segment 43 and having a projection 141 passing through slot 141a in said segment. Said member 140 has an offset arm 140a provided with a pin 140b. Said member 140 also has a slotted arm 140c. If a 10" record is being raised by the selector, member 140 does not contact the record. However, if a 12" record is being raised by the selector, the projection 141 of slider 140 will engage the edge of the record, and said slider will be moved inwardly.

Pivoted on segment 43 is a bell crank 144. The bell crank 144 is formed with a tooth 145. Said bell crank also has an offset arm 144a contacted by pin 140b. Movement of slider 140 will swing bell crank 144.

Fixed to upper and lower ends of shaft 40 are collars 40a. Rotatably mounted on said collars, and passing through sleeve 39, is a vertical shaft 146 formed with a longitudinal rib 147 engaging the tooth 145 of bell crank 144 and forming shoulder 147a adjacent said rib. Rotation of bell crank 144 will rotate shaft 146 about its axis.

Swiveled on the lower collar 40a, as at 40b, is an offset arm 148 having a tooth 148a adapted to be contacted by shoulder 147a. Said arm 148 has a downwardly extending pin 148b.

Pivoted to the frame as at 150 is a lever 151. Said lever has a curved arm 152 at one end adapted to be engaged by the offset arm 148, if the shaft 146 has been rotated by the bell crank 144. Thus if the top most record is a 12" record, lever 151 is swung in a counterclockwise direction, looking at Fig. 12.

On lever 151 is a cam 152*a*. Pivoted to gear 111 as at 154, is a finger 155. Rotation of lever 151 causes the cam portion 152*a* thereof to lift the finger 155 from the full to the dotted line position of Fig. 10. In such position finger 155 serves as a stop and is adapted to engage an offset arm 139*f* on arm 139*d* limiting movement of the arm 139*g*, and hence limiting movement of arm 92*b*.

The parts are so proportioned that when the stop finger 155 is up it will limit inward movement of the tone arm to start playing a 12" record. If the topmost record lifted by the feeler was a 10" record, lever 151 would not engage the finger 155, and the tone arm could come all the way in to engage the 10" record. On the bearing 111*b* for gear 111 is a finger 111*c* to kick out stop member 155 after the underside of the upper record has been played.

It will be noted that gear 111 makes a half revolution each time a record is played. For this reason means is provided for the selector to also feel the record beneath the topmost record on the turn table to preset the machine so that the tone arm will engage either a 10" or 12" record on the turn table after it has finished playing the underside of the raised record. To this end there is slidably mounted on segment 44 of the selector 41 adjacent the segment 45, a slider 160 having a projection 161 passing down through a slot 161*a* in the segment. Said projection 161 is adapted to contact a record below the topmost record, if it happens to be a 12" record.

However, if the record below the top record on the turn table is a 10" record projection 161 will not engage it. Engagement of the projection 161 with a 12" record will cause the bell crank 160 to slide in and such action causes rotation of a second bell crank 162 similar to 144, for the purpose hereinafter appearing.

Mounted for rotation on the collars 40*a* is a second vertical shaft 165 similar to shaft 146 and located in diametrically opposed relation therewith. Swiveled to the lower collar 40*a*, as at 40*c*, is an arm 167 similar to arm 148 and having a downwardly extending finger 167*a* adapted to engage a lever 170 similar to lever 151. Lever 170 will only be swung if shaft 165 is rotated due to the presence of a 12" record beneath the topmost record. Lever 170 has a cam 171 adapted to lift a pivot finger 172 from full to dotted line positions shown in Fig. 10. Finger 172 is located opposite to finger 155. Thus after the underside of the raised record is played finger 172 will be in position to serve as a stop for arm 139*f* as gear 111 will have been rotated 180° from the position shown in Fig. 12. Projection 111*c* is adapted to kick out stop 172 after the top of the record on the turn table has been played.

As shown in Fig. 21, spring pressed bell cranks 180, 181 engage notches 180*a* and 181*a* in gears 47 and 97 to retain said gears against accidental movement.

Means is provided to reject or omit the play of the topside of the top record on the turn table or the underside of a raised record. To this end there is rotatably mounted on the frame wall 12 an on and off motor switch 183 connected in any suitable manner to the terminals of the motor. Fixed to the switch 183 is an arm 184 (Fig. 3). Slidably mounted on the frame in any suitable manner is an elongated rod 185, urged in one direction by spring 185*a*. At one end of the rod 185 is a projection 186 adapted to be engaged by arm 184 as the switch is turned to rejected position, against the tension of said spring 185*a*.

Journalled in the frame is a shaft 187 from one end of which there extends an arm 186*a* pivotally connected to the opposite end of rod 185. Extending from the other end of shaft 187 is an arm 188 carrying a pin 189 at its outer end. The pin 189 is so located as to engage a lug 190 on arm 99*a* of bell crank 99 when rod 185 is shifted by means of the switch arm 184. Engagement of the pin 189 with lug 190 will cause rotation of the bell crank 99 (Fig. 21) in a direction to disengage arm 98*c* of bell crank 98 to permit arm 98*a* to drop into the path of the pins 16 causing the gear 97 to rotate. The cycle is thus started for the tone arm to move away from the record to continue its movement for the next play.

Means is provided to return bell crank 98 to the position shown in Fig. 11 (out of contact with pins 16) during each revolution of gear 97. To this end there is mounted on the base or bottom wall 11 a cammed projection 97*a* adapted to be contacted by arm 98*a* of bell crank 98, thereby enabling the trigger or bell crank 99 to engage the upwardly extending arm 98*c* of bell crank 98 and retain said bell crank in inoperative position.

Means is also provided to retain the bell crank 51 in inoperative position (out of contact with respect to the pins 16). To this end there is mounted on the base or bottom wall 11, a cammed lug or projection 47*a* adapted to engage arm 52 of the bell crank 51 to raise it as the gear 47 rotates to enable arm 54*b* of bell crank or trigger 54*a* to engage arm 52*a* of bell crank 51 and retain the latter in inoperative position.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A phonograph and record changer comprising rotary means to support a stack of records, means to play the upper side of the topmost record of said stack while the stack is on said supporting means, means to raise said topmost record to a position above said stack and means to play the underside of the raised record in raised position.

2. A phonograph and record changer comprising rotary means to support a stack of records, means to play the upper side of the topmost record of said stack while the stack is on said supporting means, means to raise said topmost record to a position above said stack and means to play the underside of the raised record in raised position, and again play the top of the next record on the supporting means.

3. A phonograph and record changer comprising rotary means to support a stack of records, means to play the upper side of the topmost record of the stack while said stack is on said

supporting means, means to raise said topmost record to a position above said stack and means to play the underside of the raised record in raised position, said record changer including a tone arm carrying a needle, and means to automatically engage the needle on the tone arm with the records to be played irrespective of whether the records are 10" or 12" records.

4. A phonograph and record changer comprising a turn table adapted to support a stack of records, means to rotate the turn table in one direction, a tone arm having a downwardly extending needle and an upwardly extending needle, means to move the downwardly extending needle of the tone arm into engagement with the topside of a top record on the stack to play said topside, means to move the tone arm beyond the stack of records after playing the upper surface of the topmost record, means to lift the topmost record after it is played, to a predetermined height, means to rotate the raised record in an opposite direction, and means to engage the upwardly extending needle of the tone arm with the underside of the raised record to play said underside of said record.

5. A phonograph and record changer comprising a turn table adapted to support a stack of records, means for rotating the turn table in one direction, means for playing the upper surface of the topmost record on the stack, means for raising the played record after it has been played to a position above said stack, means to support the raised record in raised position, means for playing the underside of the raised record in its raised position, and including means to rotate the raised record in an opposite direction.

6. A phonograph and record changer comprising a turn table adapted to support a stack of records, means for rotating the turn table in one direction, means for playing the upper surface of the topmost record on the stack, means for thereafter automatically raising the played record after it has been played, means to support the raised record in raised position, means for thereafter automatically playing the underside of the raised record, including means to rotate the raised record in an opposite direction, the means for supporting the raised record including a plurality of spaced wheels contacting the underside of the raised record, and the driving means for the raised record including means to rotate one of said contacting wheels.

7. A phonograph and record changer comprising a turn table adapted to support a stack of records, means to rotate said turn table, means to play the upper surface of the topmost record, and means to thereafter automatically raise the topmost record off said stack after it is played whether it be a 10" record or a 12" record, and means to thereafter automatically play the underside of the raised record in raised position.

8. A phonograph and record changer comprising a turn table adapted to support a stack of records, means to rotate said turn table, means to play the upper surface of the topmost record, means to automatically raise the topmost record off said stack after it is played whether it be a 10" record or a 12" record, said means comprising an axial tubular shaft passing through the central openings in the records, means engaging an edge of the topmost record to lift said topmost record to a limited degree off the stack, means within the shaft adapted to engage beneath the lifted record, and means to raise the last means for raising the lifted record.

9. A phonograph and record changer comprising a turn table adapted to support a stack of records, means to rotate said turn table, means to play the upper surface of the topmost record, means to thereafter automatically raise the topmost record off said stack after it is played whether it be a 10" record or a 12" record, said means comprising an axial tubular shaft passing through the central openings in the records, means engaging an edge of the top record to lift said top record to a limited degree off the stack, means within the shaft adapted to engage beneath the lifted record, means to raise the last means for raising the lifted record, and spring pressed catches at the upper end of said tubular shaft adapted to permit the raised record to pass said spring catches, normally extending beyond the opening in said records and said spring catches being adapted to be squeezed together by a record passing the springs, and to spring out after the raised record has passed the same and having means to engage beneath the raised record, whereby to serve as a support for the raised record.

10. In a phonograph and record changer, a selector to lift the topmost record off a stack of 10" and 12" records stacked on a turn table and mixed in any order, and operative to lift either 10" or 12" records, said selector comprising a member mounted for rotation about a vertical axis, and having an upwardly inclined segment, and a flat segment extending therefrom, and a second flat segment at a level lower than the level of the first flat segment, and an inclined segment extending from the second flat segment.

11. In a phonograph and record changer, means to support a stack of 10" or 12" records, a tone arm having an upwardly extending needle and a downwardly extending needle, means to engage the downwardly extending needle of the tone arm with the upper side of the topmost record of the stack, means to rotate the stack in one direction to play said upper side of the topmost record, means to thereafter automatically move the tone arm upwardly from the record being played to neutral position, and then outwardly beyond the records, means to thereafter lift the topmost record to a predetermined height, means to then swing the tone arm inwardly, and then upwardly into engagement with the beginning of the raised record, means to thereafter automatically rotate the raised record in an opposite direction to play the same, means to thereafter lower the tone arm out of engagement with the raised record, and to then swing the tone arm outwardly, and then downwardly automatically into engagement with the beginning point of the next record on the stack.

12. In a phonograph and record changer, means to support a stack of 10" or 12" records, a tone arm having an upwardly extending needle and a downwardly extending needle, means to engage the downwardly extending needle of the tone arm with the upper side of the topmost record of the stack, means to rotate the stack in one direction to play said upper side of the topmost record, means to thereafter move the tone arm upwardly from the record being played to neutral position, and then outwardly beyond the records, means to thereafter lift the topmost record to a predetermined height, means to then swing the tone arm inwardly, and then upwardly

into engagement with the beginning of the raised record, means to rotate the raised record in an opposite direction to play the same, means to thereafter lower the tone arm out of engagement with the raised record, and to then swing the tone arm outwardly, and then downwardly automatically into engagement with the beginning point of the next record on the stack, and means to preset the control for the in and out movement of the tone arm during the lifting operation of each record to engage the tone arm with the starting point of the underside of the lifted record and the top of the next record on the turntable.

13. A phonograph and record changer, comprising means to support a stack of records, means to rotate said stack, a tone arm, means to engage the tone arm with the start of the topmost record to play the same, and means operative to engage and lift the topmost record of the stack, whether it be a 10" or 12" record, and means to play the underside of the lifted record in lifted position.

14. A phonograph and record changer, comprising means to support a stack of records, means to rotate said stack, a tone arm, means to engage the tone arm with the starting point of the topmost record to play the same, means operative to engage and lift the topmost record of the stack, whether it be a 10" or 12" record, and means to engage the tone arm with the underside of the raised record, means to rotate the raised record in an opposite direction to play the same, and means to thereafter engage the tone arm with the upper side of the next record on the stack, and means engageable with and controlled by the records in the stack to preset the means for engaging the tone arm with the records so that the tone arm will automatically engage the records at their starting points, whether they be 10" or 12" records.

15. A phonograph and record changer, comprising a turn table adapted to support a stack of records, means to rotate the turn table in one direction, tone arm means, means to move the tone arm means into engagement with the top side of a top record on the stack to play said top side, means to move the tone arm means beyond the stack of records after playing the upper surface of the topmost record, means to lift the topmost record after it is played, means to rotate the raised record in an opposite direction, and means to engage the tone arm means with the underside of the raised record to play said underside of said raised record.

16. A phonograph and record changer comprising a turn table adapted to support a stack of records, means to raise the topmost record off the stack to a raised position above said stack, and means to play the upper side of the topmost record of the stack while it is supported on the turn table, and thereafter play the underside of the raised record while the record is in raised position above the stack.

17. A phonograph and record changer comprising a turn table adapted to support a stack of records, means to raise the topmost record of the stack off the stack to a raised position above the stack, means to support the raised record in raised position above the stack, and means to play the upper side of the topmost record on the stack while said record is supported on the turn table, and thereafter play the underside of the raised record while it is supported in raised position.

18. A phonograph and record changer comprising a turn table adapted to support a stack of records, means to raise the topmost record of the stack off the stack to a raised position above the stack, means to support the raised record in raised position above the stack, and means to play the upper side of the topmost record on the stack while said record is supported on the turn table, and thereafter play the underside of the raised record while it is supported in raised position, said last means including means to rotate the turn table in one direction, means to rotate the means which supports the raised record in raised position in an opposite direction, a tone arm, and means to move the tone arm beyond the outer rim of the record after the top side of the record is played to permit the top record to be raised, and to thereafter move the tone arm into position for playing the underside of the raised record.

19. A phonograph and record changer comprising rotary means to support a stack of records, means to play the upper side of the topmost record of said stack while the stack is on said supporting means, means controlled by the playing means to raise said topmost record to a position above said stack, and means controlled by the raising means, to play the underside of the raised record in raised position.

20. A phonograph and record changer comprising rotary means to support a stack of records, means to play the upper side of the topmost record of said stack while the stack is on said supporting means, means to raise said topmost record to a position above said stack automatically upon completion of playing of said upper side of said record, and means to play the underside of the raised record in raised position automatically after raising the record, and means to thereafter automatically play the top of the next record on the supporting means.

21. A phonograph and record changer comprising rotary means to support a stack of records, means to play the upper side of the topmost record of the stack while said stack is on said supporting means. means to thereafter automatically raise said topmost record to a position above said stack, and means to thereafter play the underside of the raised record in raised position, said record changer including a tone arm carrying a needle, and means to automatically engage the needle on the tone arm with the records to be played irrespective of whether the records are 10" or 12" records.

22. A phonograph and record changer comprising a turn table adapted to support a stack of records, means to rotate the turn table in one direction, a tone arm having a downwardly extending needle and an upwardly extending needle, means to move the downwardly extending needle of the tone arm into engagement with the topside of a top record on the stack to play said topside, means to thereafter automatically move the tone arm beyond the stack of records after playing the upper surface of the topmost record, means to thereafter automatically lift the topmost record after it is played, to a predetermined height, means to thereafter automatically rotate the raised record in an opposite direction, and means to thereafter automatically engage the upwardly extending needle of the tone arm with the underside of the raised record to play said underside of said record.

23. A phonograph and record changer comprising a turn table adapted to support a stack

of records, means for rotating the turn table in one direction, means for playing the upper surface of the topmost record on the stack, means for thereafter automatically raising the played record after it has been played to a position above said stack, means to support the raised record in raised position, means for thereafter automatically playing the underside of the raised record in its raised position, and including means to rotate the raised record in an opposite direction.

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