H. H. WELCH.

REPEATING DEVICE.

APPLICATION FILED OCT. 7, 1916.

1,357,602.

Patented Nov. 2, 1920.

3 SHEETS—SHEET 1.

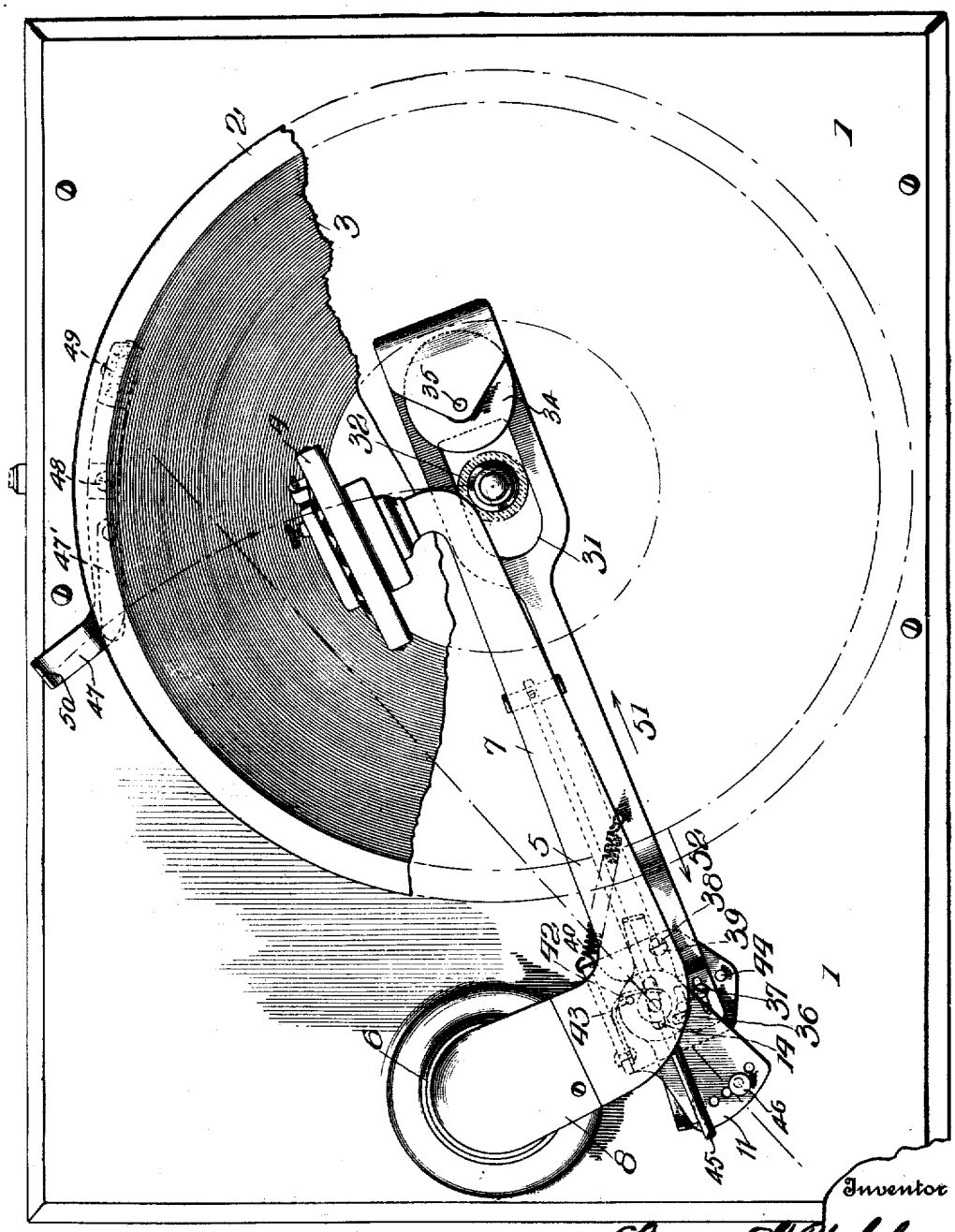


FIG. 1.

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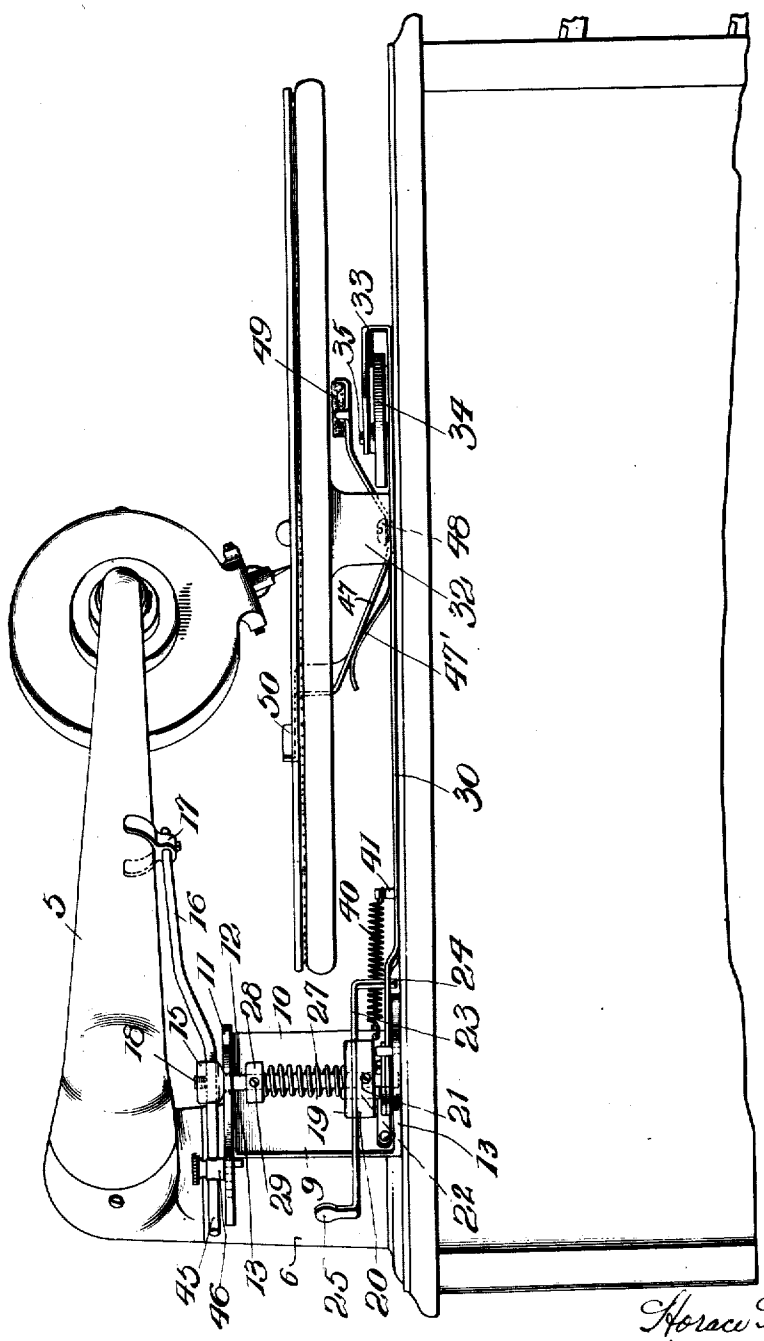


Fig. 2.

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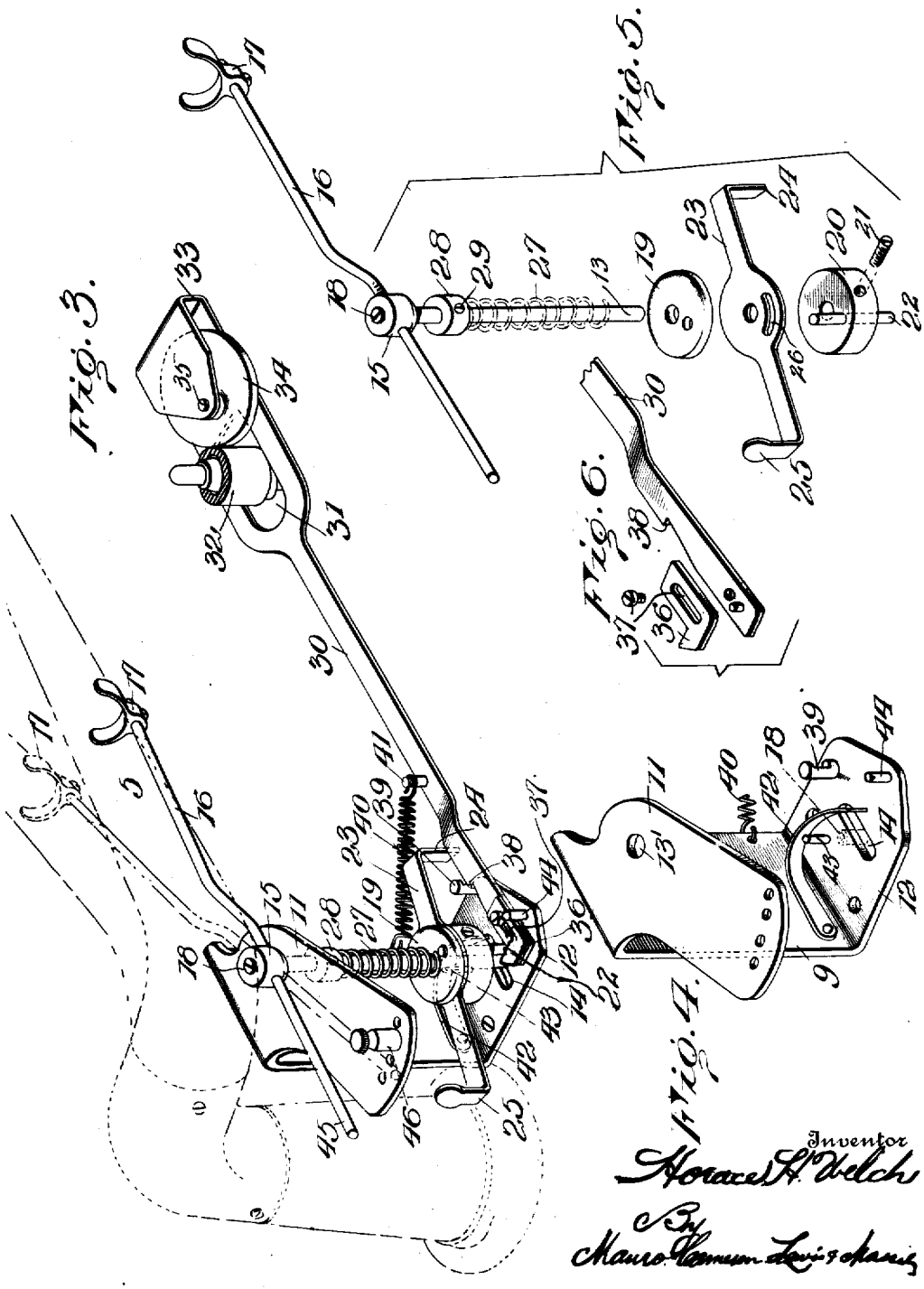
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

HORACE H. WELCH, OF LOS ANGELES, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO COLUMBIA GRAPHOPHONE MANUFACTURING COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF DELAWARE.

REPEATING DEVICE.

1,357,602. Specification of Letters Patent. Patented Nov. 2, 1920.

Application filed October 7, 1916. Serial No. 124,360.

To all whom it may concern:

Be it known that I, HORACE H. WELCH, a citizen of the United States of America, and a resident of Los Angeles, California, have invented a new and useful Improvement in Repeating Devices, which invention is fully set forth in the following specification.

This invention relates to a restoring device, and, while susceptible of a variety of uses, is particularly adapted for returning the sound-box of a sound-reproducing machine to a preceding part of a sound-record for repeating the whole or any desired part of the selection thereon.

The invention has for an object to provide a device of the character described, whereby with the employment of a relatively small number of parts the sound-box is positively raised from the sound-record, returned to a preceding part thereof, and lowered into operative engagement therewith with accuracy and precision and without imposing undue strains upon the elements of the sound-reproducing mechanism.

It has for a further object the provision of a repeating device which is adjustable both as to the point at which the sound-box is raised from the record and as to the point at which it is returned into operative engagement with a preceding part thereof, whereby the device is capable of use with record-tablets of various diameters and carrying records beginning and terminating at different distances from the center thereof.

Yet a further object is to provide a device of the type stated in the form of an attachment which may be readily applied to existing machines without modification thereof.

A still further object is to provide, in combination with a repeating device of the character above described, a stop-mechanism operable by the sound-box or its supporting element upon return thereof to initial position.

Other objects relate to the provision of a repeating device which is simple in construction, inexpensive to manufacture, readily installed, and efficient in operation.

Stated broadly, the invention comprises, in combination with a sound-box and a rotating element, means for raising said sound-box and returning the same to a preceding part of the sound-record comprising a movable member, actuating means for said member preferably carried thereby, said actuating means being shiftable into operative engagement with said rotating element, and means intermediate said movable member and said sound-box whereby the latter is raised and returned to a preceding part of the sound-record by movement of said member by said actuating means.

Described briefly, a preferred embodiment of the invention comprises, in combination with a sound-box, its supporting element pivotally mounted to provide for the traverse of the sound-record by said sound-box, and a rotating means which may desirably be the turn-table shaft or hub, tiltable and rotatable means engaging the sound-box or its supporting element for raising, returning and lowering the sound-box, a reciprocating means for tilting and rotating the said means engaging the sound-box or its supporting element, a cam carried by said reciprocating means for reciprocating the same, a detent for maintaining said reciprocating means with the cam thereon out of operative engagement with the rotating means, means for releasing said reciprocating means from said detent, and means for shifting said reciprocating means to move the cam thereon into operative engagement with said rotating means. With the aforesaid means for returning the sound-box to a preceding part of the sound-record may be employed a stop mechanism comprising a brake device actuated by the weight of the sound-box or its supporting element when the same has been moved beyond the periphery of the record turn-table.

The invention is capable of receiving a variety of mechanical expressions, one of which, for the purposes of illustration, has been shown on the accompanying drawings, but it is to be expressly understood that this embodiment has been selected for purposes of illustration only and is not to be construed as a definition of the limits of the invention, reference being had to the appended claims for that purpose.

Referring in detail to the drawings, wherein the same reference characters designate corresponding parts in the several figures,—

Figure 1 is a plan view of a device em-

bodying the present invention applied to a talking machine of conventional construction;

Fig. 2 is an elevation thereof;

Fig. 3 is a perspective view of the parts of the device shown in detached relationship, the tone-arm being shown in dotted lines;

Fig. 4 is a perspective view of the bracket and shows more clearly the spring mounted thereon and its related parts;

Fig. 5 is a perspective view of several parts in detached relationship;

Fig. 6 is a perspective view of other parts in detached relationship.

1 represents the casing of any usual or preferred form of talking machine, 2 the usual turn-table rotated by a motor of any preferred construction inclosed within the casing 1, 3 a conventional sound-record supported on said turn-table, 4 a sound-box of any preferred construction, and 5 a sound-box supporting element in the form of a tone-arm pivotally mounted by means of the collar 6 which receives the downwardly turned end thereof, to permit traverse of the record. Means are provided whereby the sound-box may also have movement in planes at right angles to the turn-table to permit of the raising and lowering of the same with respect to the sound-record. In the construction illustrated on the drawings, the tone-arm 5 is shown as composed of two sections 7 and 8 connected for relative rotation to provide for the raising and lowering of the sound-box. It is to be expressly understood, however, that the invention is not limited to a sound-box and supporting element of the type illustrated on the drawings, but is equally applicable to any type of construction employing reproducing instrumentalities pivoted for oscillation in a plane parallel to the turn-table and having provision for the raising and lowering of the record engaging element with respect to the sound-record.

In the embodiment of the present invention shown, a bracket 9 comprising an upright portion 10 and upper and lower horizontal portions 11 and 12, respectively, is fixedly secured to the top of the cabinet 1 in any suitable manner. Supported in said bracket 9 is a tiltable and rotatable device adapted to engage the sound-box or its supporting element for raising and rotating the same relatively to the sound-record. In the construction illustrated on the drawings, said tiltable and rotatable device comprises a vertical shaft 13 loosely received within an aperture 13′ in the upper horizontal portion 11 of the bracket 9, said shaft 13 extending at its lower end into an elongated slot 14 provided in the lower horizontal portion 12 of said bracket. On the upper end of the shaft 13 is a collar or sleeve 15 carrying an elongated bar or rod 16 provided at its outer end with a yoke or cradle 17 in a position to engage the lower surface of the sound-box supporting element. To provide for the adjustment of the bar or rod 16 in the sleeve 15, the former may be received slidably within said sleeve and retained in adjusted position as by a set-screw 18.

Carried by the shaft 13, adjacent the lower end thereof, is a pair of collars 19 and 20, said collar 20 being secured fixedly to the shaft by any suitable means, as a set-screw 21, and collar 19 being fixed against rotation with respect to said collar 20 by any suitable means, as the eccentric pin 22 passing through both of said collars. Received between collars 19 and 20 and pivotally mounted on the shaft 13 is a tripping element 23 shown as provided with the down-turned end 24 and the up-turned finger piece 25. To enable rotation of the tripping element 23 about the axis of the shaft 13, the same is provided with an arcuate slot 26, through which passes the pin 22. To urge the collar 19 yieldingly against the tripping element 23 to retain the latter in adjusted position, a spring 27 bears at one end upon the upper surface of the collar 19 and at its other end against a collar 28 fixedly secured to the shaft 13, as by a set-screw 29.

For tilting and rotating the shaft 13, reciprocating means are preferably employed, said means, in the embodiment illustrated on the drawings, comprising a member 30 provided with an elongated slot 31 adapted to receive a rotating means which may desirably be the turn-table shaft or the hub 32 of said turn-table. The inner end of the member 30 is shown as bent back upon itself, as illustrated at 33, and rotatably supports a cam member 34 by means of the pin 35. In the embodiment illustrated on the drawings, said cam is approximately in the form of an eccentric. While, for certain purposes, said cam may be a circular member mounted upon an eccentric axis, the preferred construction comprises a cam formed of opposed symmetrical sections of a logarithmetic spiral. It is to be expressly understood, however, that a cam of any other suitable configuration may be employed, the shape of said cam varying in accordance with the manner in which the mechanism is desired to operate, as will be readily understood by those skilled in the art.

At the opposite end, member 30 is provided with a lateral or hook-like extension 36 adapted to coöperate with the protruding lower end of the pin 22. The hook-like extension 36 may, if desired, be formed separate from the main body of the member 30 and adjustably attached thereto by the pin and slot connections as illustrated at 37. At one portion, the lateral edge of the member 30 is notched, as illustrated at 38, for co-

operation with a fixed detent 39 which may desirably be a beveled pin carried by the lower member of the bracket 9.

To resiliently urge member 30 so as to shift the same in a direction to engage the cam member 34 with the hub 32 of the turn-table, and also to resiliently urge notch 38 into engagement with detent 39 a spring 40 is connected at one end to a pin 41 extending upwardly from the upper surface of the member 30 and at its opposite end to the bracket 9. To prevent the shaft 13 from being tilted by the member 30 beyond a predetermined limit, a stop 42 is provided in the path of movement of said shaft 13, such stop preferably taking the form of a stiff spring held under tension by a pin 43 carried by the lower member of the bracket 9. If desired, a pin 44 may be positioned on the lower member of the bracket 9 to prevent rotation of the reciprocating member 30 about the axis of the turn-table shaft beyond a predetermined extent.

Means are provided to prevent the sound-box supporting element from being carried beyond a predetermined position in the return of the sound-box, said means preferably being adjustable to provide for record-tablets of different diameters. Such means may be of a variety of constructions, that illustrated on the drawings comprising an extension 45 of the bar or rod 16 and a stop 46 adapted to be positioned in any one of a plurality of apertures in the upper member 11 of the bracket 9. Said stop member 46, to provide for minute adjustment of the position at which the sound-box is to be stopped, is desirably made in the form of an eccentric as illustrated on the drawings.

In certain instances, it is desirable to provide for the automatic stoppage of the machine upon the return of the sound-box from the terminal portion of the sound-record to a position adjacent the periphery of the turn-table. To this end, an automatic stop of any suitable construction may be employed. The embodiment illustrated on the drawings comprises a brake lever 47 mounted on the upper surface of the casing 1 by means of the screw 48, said screw permitting a tilting of the lever 47 in its own plane. Carried by one end of the lever 47 is a brake pad 49 in a position to engage the under surface of the turn-table adjacent the periphery thereof. The opposite end of said lever 47 is pressed upwardly by spring 47′ and is extended to constitute a receiving device 50, said receiving device being positioned to receive the needle of the sound-box if the latter be moved to a position outside of the periphery of the turn-table. Obviously, other forms of stop mechanism actuatable by the sound-box or its supporting element as the latter is returned to a position outside of the periphery of the turn-table could be employed with equal facility, or the stopping mechanism could be entirely omitted.

To install the device, bracket 9 is secured upon the top of the casing 1 in such position that the yoke or cradle 17 receives the sound-box supporting element, and member 30 is received over the turn-table shaft and positioned by the engagement of the hub 32 of the turn-table with the sides of the slot 31 in said member 30.

To adjust the device for operation, the sound-box is positioned in the last groove of the sound-record and the tripping element 23 is forced over to such a position that its depending end 24 moves the member 30 over against the pin 44. Tripping element 23 will thereupon be retained in this position owing to the tension of the spring 27 bearing upon the collar 19, which collar in turn grips said tripping element between itself and the collar 20. The sound-box is then moved outwardly adjacent the periphery of the table and the needle positioned in the first groove of the record. Stop member 46 is then positioned in the nearest aperture in the upper member of the bracket 9 and rotated until its eccentric surface engages the extension 45 of the bar or rod 16. Member 30 is then pushed inwardly until its notch 38 is engaged with the detent 39, spring 40 retaining said member in engagement with said detent. The device is now in condition for operation.

In operation, as the sound-box reaches the end of the record-groove, the depending portion 24 of the tripping element 23 engages the member 30 and pushes it to one side, releasing said member from the detent 39. Spring 40 thereupon shifts the member 30, engaging cam 34 with the hub 32 of the turn-table. Cam member 34 is thereupon rotated by frictional engagement with said hub, and member 30 is reciprocated longitudinally thereof by the action of said cam on said hub. Assuming the shortest radius of the cam as first engaging the hub, rotation of said cam will move member 30 in the direction of the arrow 51. As member 30 reciprocates in the direction of the arrow 51, the lateral extension or hook-like member 36 will engage the lower protruding end of pin 22, tilting the shaft 13 about its support in the upper member 11 of the bracket 9 until said shaft 13 engages the stop 42. Further reciprocation of the member 30 will cause a rotation of the shaft 13, owing to the crank arm provided by the eccentricity of the pin 22 with respect to the shaft 13. Tilting of the shaft 13, as heretofore described, produces an elevation of the bar or rod 16, raising the sound-box from the record; and rotation of said shaft 13 produces a rotary movement of the sound-box supporting element, returning the

sound-box to a preceding part of the record or until the extension 45 engages the stop member 46. If there be a further pull exerted on the shaft 13, owing to a further reciprocation of the member 30, the stop 42 owing to its resiliency will yield without injury to the mechanism.

As the cam member 34 rotates beyond that position in which its largest radius is in engagement with the hub 32, the member 30 will be drawn by the spring 40 in the opposite direction, that is, in the direction represented by the arrow 52. The first result of the reciprocation of said member 30 in the latter direction will be to permit of the sound-box to be lowered onto the surface of the record-tablet. Further reciprocation of said member 30 in the direction of the arrow 52 restores the notch 38 into engagement with the detent 39, owing to the lateral pull exerted on the reciprocating member 30 by the spring 40. The cam member now moves out of engagement with the hub 32 to the position shown in Fig. 1, and the device is restored to its original condition of operation, whereby, upon return of the sound-box to the last groove of the sound-record, it will operate to return the same to initial position, as heretofore described.

In case it is desired that the machine shall be automatically stopped upon return of the sound-box, the stop member 46 is moved to such location as to admit of the sound-box traveling to a position outside of the periphery of the turn-table. Arrived at such a position, it will drop by gravity upon the receiving member 50 and, owing to the weight of said sound-box and its supporting element, will tilt the lever 47 so as to throw the brake pad 49 into engagement with the lower surface of the turn-table adjacent the periphery thereof.

While the description of operation has been based upon the assumption that the entire record is to be repeated, it will be apparent that, by the proper selection of the points at which the sound-box is raised and lowered, any desired portion of the sound-record may be repeated.

While the cam 34 has been described and illustrated as coöperating with a rotating means comprising the hub of the turn-table, it is to be expressly understood that any other suitable rotating means may be provided for coöperation with said cam 34, the hub of the turn-table being selected in the embodiment illustrated and described simply as a matter of convenience and to avoid modification of the usual talking machine construction.

While the sound-box supporting element has been illustrated as a tone-arm pivoted for movement in planes at right angles to the sound-record about an axis adjacent to the outer end thereof, it is to be expressly understood that the invention is of equal application in connection with sound-box supporting elements having an axis for vertical oscillation at the inner end or at any point intermediate the two ends of the horizontally rotatable sound-conduit communicating with said sound-box. The term "sound-box supporting element" is therefore to be construed as that element connected with the sound-box which admits of movement of said sound-box in planes at an angle to the record-tablet and has movement with said sound-box as it traverses the record. The term "sound-box" is also to be construed as generic to any suitable reproducing instrumentality that has movement transverse to and toward and from the record tablet.

While the illustrated embodiment has been described with considerable particularity, it is to be expressly understood that the invention is not to be restricted to the exact construction illustrated on the drawings, as such has been selected for purposes of illustration only. Furthermore, certain portions of the invention are susceptible of use without other portions thereof, wherefore the scope of the invention is to be determined by reference to the claims hereto appended.

What is claimed is:

1. In a restoring device for a sound-reproducing machine having a sound-box and a rotating element, a single train of mechanism for raising said sound-box, positively returning the same and lowering it onto a preceding part of the sound record, said train of mechanism comprising actuating means tripped by the movement of said sound-box and automatically shiftable into coöperative engagement with said rotating element.

2. In a restoring device for a sound-reproducing machine having a sound-box and a rotating element, means for raising said sound-box and positively returning the same to a preceding part of the sound record, said means comprising actuating means shiftable into coöperative engagement with said rotating element, a detent for maintaining said actuating means out of said coöperative engagement with said rotating element, and means moving with said sound-box for tripping said actuating means from said detent when the sound-box reaches a predetermined part of said record.

3. In a restoring device for a sound-reproducing machine having a sound-box and a rotating element, means for raising said sound-box and returning the same to a preceding part of the sound record, said means comprising actuating means tripped by the movement of said sound-box and shiftable into engagement with said rotating element, and a single train of elements actuated thereby, initial movement of said train raising said sound-box from the record and fur-

ther movement of said train returning said sound-box to the preceding part of the record.

4. In a restoring device for a sound-reproducing machine having a sound-box and a rotating element, means for raising said sound-box and returning the same to a preceding part of the sound record, said means comprising actuating means shiftable into coöperative engagement with said rotating element, a detent for maintaining said actuating means out of said coöperative engagement with said rotating element, means moving with said sound-box for tripping said actuating means from the said detent when the sound-box reaches a predetermined part of said record, and a single train of elements actuated by said actuating means, initial movement of said train raising said sound-box from the record and further movement of said train returning said sound-box to the preceding part of the record.

5. In a repeating device for a sound-reproducing machine having a sound-box and means for raising said sound-box, returning the same to a preceding part of the sound record, said means comprising a reciprocating element, means for reciprocating said element, and means first tilted and then rotated by said reciprocating element.

6. In a repeating device for a sound-reproducing machine having a sound-box and means for raising said sound-box, for returning and lowering the same on a preceding part of the sound record, said means comprising a reciprocating element, means for reciprocating said element, and means first tilted and then rotated by reciprocation of said element in one direction and oppositely tilted by reciprocation of said element in the opposite direction.

7. In a repeating device for a sound-reproducing machine having a sound-box, tiltable and rotatable means operatively connected to said sound box, and reciprocating means for tilting and rotating said first-named means.

8. In a repeating device for a sound-reproducing machine having a sound-box tiltable and rotatable means operatively connected to said sound box, reciprocating means for tilting and rotating said first-named means, rotating means, and means shiftable into coöperative engagement with said rotating means for reciprocating said second-named means.

9. In a repeating device for a sound-reproducing machine having a sound box, tiltable and rotatable means operatively connected to said sound box, reciprocating means for tilting and rotating said first-named means, rotating means, means shiftable into cooperative engagement with said rotating means for reciprocating said second-named means, a detent for maintaining said shiftable means out of coöperative engagement with said rotating means, and means for releasing said shiftable means from said detent upon said sound-box reaching a predetermined part of the sound record.

10. In a repeating device for a sound-reproducing machine having a sound-box, tiltable and rotatable means operatively connected to said sound box, reciprocating means coacting with said first-named means, a cam on said reciprocating means, rotating means, means for moving said reciprocating means to engage said cam with said rotating means, and a detent for maintaining said reciprocating means with the cam thereon out of engagement with said rotating means.

11. In a repeating device for a sound-reproducing machine having a sound-box, reciprocating means, a cam rotatably mounted thereon to reciprocate the same, a rotating element, means to move said reciprocating means to shift said cam into operative engagement with said rotating element, and operative connections intermediate said reciprocating means and said sound-box.

12. In a repeating device for a sound-reproducing machine having a sound-box, reciprocating means, a cam rotatably mounted thereon to reciprocate the same, a rotating element, means to move said reciprocating means to shift said cam into operative engagement with said rotating element, a detent for maintaining said cam out of engagement with said rotating element, means for releasing said reciprocating means from said detent, and operative connections intermediate said reciprocating means and said sound-box.

13. In a restoring device for a sound-reproducing machine having a sound-box and a rotating means, means shiftable into operative engagement with said rotating means, and means reciprocated by the cooperative engagement of said shiftable and rotatable means for raising said sound-box and returning the same to a preceding part of the sound record.

14. In a restoring device for a sound-reproducing machine having a sound-box and a rotating means, means shiftable into operative engagement with said rotating means, a detent for maintaining said shiftable means out of operative engagement with said rotating means, means for releasing said shiftable means from said detent, and means reciprocated by the coöperative engagement of said shiftable and rotatable means for raising said sound-box and returning the same to a preceding part of the sound record.

15. A repeating device comprising a reciprocatable element carrying a rotary cam and a tiltable and rotatable element operatively related to said reciprocatable element

and adapted to be operatively connected to a sound-box.

16. A repeating device comprising a reciprocatable element carrying a rotary cam, a tiltable and rotatable element operatively related to said reciprocatable element and adapted to be operatively connected to a sound-box, a spring for shifting said reciprocatable element in one direction, and a detent for maintaining said element against the action of said spring.

17. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, a rotary cam carried thereby for reciprocating said element by coaction with said rotating means, and means intermediate said reciprocating element and said sound box whereby reciprocation of the former returns said sound-box to a preceding part of the sound record.

18. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, a rotary cam carried thereby for reciprocating said element by coaction with said rotating means, and tiltable and rotatable means intermediate said reciprocating element and said sound box whereby reciprocation of the former returns said sound-box to a preceding part of the sound record.

19. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, a rotary cam carried thereby for reciprocating said element by coaction with said rotating means, means for shifting said reciprocating element to engage said cam with said rotating means, a detent for maintaining said cam out of engagement with said rotating means, and means intermediate said reciprocating element and said sound box whereby reciprocation of the former returns said sound-box to a preceding part of the sound record.

20. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, a rotary cam carried thereby for reciprocating said element by coaction with said rotating means, means for shifting said reciprocating element to engage said cam with said rotating means, a detent for maintaining said cam out of engagement with said rotating means, adjustable means for releasing said reciprocating element from said detent; and means intermediate said reciprocating element and said sound box whereby reciprocation of the former returns said sound-box to a preceding part of the sound record.

21. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, a rotary cam carried thereby for reciprocating said element by coaction with said rotating means, means intermediate said reciprocating element and said sound box whereby reciprocation of the former returns said sound-box to a preceding part of the sound record, and an adjustable stop for predetermining the extent of return movement of said sound-box.

22. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, a rotary cam carried thereby for reciprocating said element by coaction with said rotating means, means intermediate said reciprocating element and said sound box whereby reciprocation of the former returns said sound-box to a preceding part of the sound record, and stop mechanism actuated by the return of said sound-box by said last-named means beyond a predetermined position.

23. In a restoring device for a sound-reproducing machine having a sound-box, its supporting element, and a turn-table, an element mounted for reciprocation, a rotary cam carried thereby for reciprocating said element by coaction with the turn-table hub, means intermediate said reciprocating element and said sound box whereby reciprocation of the former returns said sound-box to a preceding part of the sound record, and a brake-lever for engaging said turn-table forced into engagement therewith by the weight of said sound-box and its supporting element when the same is returned by said last-named means beyond the periphery of said turn-table.

24. In a restoring device for a sound-reproducing machine having a sound-box and a rotating element, means for raising said sound-box and returning the same to a preceding part of the sound-record comprising a movable member, a rotatable cam cooperating with said rotating element for moving said member, and operative connections between said movable member and said sound-box, a brake adapted to be actuated by the return of said sound-box by said first-named means, and adjustable means associated with said returning means for selectively causing the repetition of the record or the actuation of said brake.

25. In a restoring device for a sound-reproducing machine having a sound-box and a rotating element, means for raising said sound-box and returning the same to a preceding part of the sound-record comprising a movable member, a cam coöperating with said rotating element for moving said member, and operative connections between said movable member and said sound-box, and stop mechanism operated by the

return of said sound-box by said first-named means beyond a predetermined limit.

26. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, a rotatable cam carried by said element for reciprocating the same by coaction with said rotating means, and means intermediate said reciprocating element and said sound box, reciprocation of the former first tilting and then rotating said last-named means.

27. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, a rotatable cam carried by said element for reciprocating the same by coaction with said rotating means, means intermediate said reciprocating element and said sound box, reciprocation of the former first tilting and then rotating said last-named means, and a stop for limiting the extent of tilting movement of said last-named means.

28. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, a rotatable cam carried by said element for reciprocating the same by coaction with said rotating means, means intermediate said reciprocating element and said sound box, reciprocation of the former first tilting and then rotating said last-named means, and a resilient stop for limiting the extent of tilting movement of said last-named means.

29. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, a rotary cam carried thereby for engagement with said rotating means in one position of said reciprocating element, a detent for maintaining said last-named element with the cam thereon out of engagement with said rotating means, means for shifting said reciprocating element to engage said cam with said rotating means, and means intermediate said reciprocating element and said sound box whereby reciprocation of the former returns said sound-box to a preceding part of the sound record.

30. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, a rotary cam carried thereby for engagement with said rotating means in one position of said reciprocating element, a detent for maintaining said last-named element with the cam thereon out of engagement with said rotating means, adjustable means for releasing said reciprocating element from said detent, means for shifting said reciprocating element to engage said cam with said rotating means, and means intermediate said reciprocating element and said sound box whereby reciprocation of the former returns said sound-box to a preceding part of the sound record.

31. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, a rotary cam carried thereby for engagement with said rotating means in one position of said reciprocating element, a detent for maintaining said last-named element with the cam thereon out of engagement with said rotating means, means for shifting said reciprocating element to engage said cam with said rotating means, and means intermediate said reciprocating element and said sound-box, rotation of said cam reciprocating said reciprocatable element to first tilt and then rotate said last-named means.

32. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, a rotary cam carried thereby for engagement with said rotating means in one position of said reciprocating element, a detent for maintaining said last-named element with the cam thereon out of engagement with said rotating means, means for shifting said reciprocating element to engage said cam with said rotating means, and means intermediate said reciprocating element and said sound-box whereby reciprocation of the former returns said sound-box to a preceding part of the sound record, said reciprocating element automatically re-engaging said detent subsequent to the return of said sound-box.

33. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, operative connections between said last-named element and said sound box, and a cam carried by said reciprocating element for reciprocating the same by coaction with said rotating means.

34. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, operative connections between said last-named element and said sound box, a cam carried by said reciprocating element for reciprocating the same by coaction with said rotating means, a detent for maintaining said reciprocating element with the cam thereon out of engagement with said rotating means, and means for shifting said reciprocating element to engage said cam with said rotating means.

35. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, operative connections between said last-named element and said sound box, a cam carried by said reciprocating element for reciprocating the same by coaction with

said rotating means, a detent for maintaining said reciprocating element with the cam thereon out of engagement with said rotating means, and means for shifting said reciprocating element to engage said cam with said rotating means, rotation of said cam reengaging said reciprocating element with said detent.

36. In a restoring device for a sound-reproducing machine having a sound-box, and a rotating means, an element mounted for reciprocation, operative connections between said last-named element and said sound box, a cam carried by said reciprocating element for reciprocating the same by coaction with said rotating means, a detent for maintaining said reciprocating element with the cam thereon out of engagement with said rotating means, adjustable means for releasing said reciprocating element from said detent, and means for shifting said reciprocating means to engage said cam with said rotating element.

37. In a repeating device for a sound-reproducing machine having, a sound-box, reciprocating means, a cam for reciprocating the same, a rotating element, means to shift said cam into operative engagement with said rotating element, and operative connections intermediate said reciprocating means and said sound-box for raising and returning said sound-box to a preceding part of the sound-record.

38. In a repeating device for a sound-reproducing machine having, a sound-box, reciprocating means, a cam for reciprocating the same, a rotating element, means to shift said cam into operative engagement with said rotating element, and tiltable and rotatable connections intermediate said reciprocating means and said sound-box for raising and returning said sound-box to a preceding part of the sound-record.

39. In a repeating device for a sound-reproducing machine having, a sound-box, means for raising and returning the same to a preceding part of the sound-record, and means for predetermining the point of reëngagement of said sound-box with the record, said last-named means comprising a rotatable member provided with an eccentric surface and positioned in the path of movement of an element of said first-named means, and a second member in which said first member may be variously positioned.

40. In a restoring device for a sound-reproducing machine having a sound-box and a rotating element, means for raising said sound-box and returning the same to a preceding part of the sound-record comprising a movable member, a rotatable cam coöperating with said rotating element for moving said member, operative connections between said movable member and said sound-box, and means for predetermining the point of reëngagement of said sound-box with said record comprising a rotatable member provided with an eccentric surface.

41. In a restoring device for a sound-reproducing machine having a sound-box and a rotating element, means for raising said sound-box and returning the same to a preceding part of the sound-record comprising a movable member, a rotatable cam coöperating with said rotating element for moving said member, operative connections between said movable member and said sound-box, means for predetermining the point of reëngagement of said sound-box with said record comprising a rotatable member provided with an eccentric surface, and a second member in which said rotatable member may be variously positioned.

42. In a restoring device for sound-reproducing machines having a sound-box, means for raising the sound-box and returning the same to a preceding part of the sound-record, and means for predetermining the point of reëngagement of said sound-box with said record comprising a rotatable member provided with an eccentric surface, and means for supporting said member in any one of a plurality of positions.

43. In a repeating device for a sound-reproducing machine having, a sound-box, a rotating element, and means for raising said sound-box and returning the same to a preceding part of the sound-record, said means comprising a movable member, a rotatable cam carried by said movable member and coöperating with said rotating element to move said member, and operative connections intermediate said movable member and said sound-box.

44. In a repeating device for a sound-reproducing machine having, a sound-box and a rotating element, means for raising said sound-box and returning the same to a preceding part of the sound-record, said means comprising a movable member, a rotatable cam carried by said movable member and coöperating with said rotating element to move said member, and operative connections intermediate said movable member and said sound-box comprising an element first tilted and then rotated by the movement of said member.

45. In a repeating device for a sound-reproducing machine having, a sound-box, and a rotating element, means for raising said sound-box and returning the same to a preceding part of the sound-record, said means comprising a movable member, a rotatable cam carried by said movable member and cooperating with said rotating element to move said member, a detent for maintaining said cam out of engagement with said ro-

tating element, means for releasing said cam, means for moving said cam into engagement with said rotating element, and operative connections intermediate said movable member and said sound-box.

46. In a repeating device for a sound-reproducing machine having, a sound-box, a rotating element, and means for raising said sound-box and returning the same to a preceding part of the sound-record, said means comprising a movable member, a rotatable cam carried by said movable member and coöperating with said rotating element to move said member, a detent for maintaining said cam out of engagement with said rotating element, means for releasing said cam, means for moving said cam into engagement with said rotating element, and operative connections intermediate said movable member and said sound-box comprising an element first tilted and then rotated by the movement of said member.

47. In a restoring device for a sound-reproducing machine having a sound-box, tiltable and rotatable means operatively connected to said sound-box, and a movable member for tilting and rotating said first-named means.

48. In a restoring device for a sound-reproducing machine having a sound-box, tiltable and rotatable means operatively connected to said sound-box, a movable member for tilting and rotating said first-named means, and a cam for moving said last-named member.

49. In a restoring device for a sound-reproducing machine having a sound-box, tiltable and rotatable means operatively connected to said sound-box, a movable member for tilting and rotating said first-named means, a cam for moving said last-named member, a detent for maintaining said cam out of operation, and means for releasing said cam from said detent.

50. An automatically re-playing phonograph combining a freely swinging tone-arm; a stylus holder, a davit pivoted near the axis of said tone-arm and connected therewith adjacent its free end; and means for tilting the axis of said davit to effect a lifting of said stylus holder.

51. In a repeating device for a sound reproducing machine having a sound box, tiltable and rotatable means operatively connected to said sound box, and means for tilting and rotating said first named means.

52. Repeating mechanism for sound reproducing machines, comprising means for vertically and horizontally swinging the tone-arm of a sound reproducing machine, said means comprising an arm engaging with the tone arm of the machine and mounted for swinging about vertical and horizontal axes, and means including a longitudinally movable link connected with said arm at a point eccentric with relation to the vertical axis of said arm for actuating the latter, substantially as described.

In testimony whereof I have signed this specification.

HORACE H. WELCH.

Corrections in Letters Patent No. 1,357,602.

It is hereby certified that in Letters Patent No. 1,357,602, granted November 2, 1920, upon the application of Horace H. Welch, of Los Angeles, California, for an improvement in "Repeating Devices," errors appear in the printed specification requiring correction as follows: Page 1, line 66, strike out the words "of the invention"; page 5, claims 3–4, lines 1–21, after the word "train" insert the word *positively*; page 8, claim 36, line 22, for the word "means" read *element*, and line 23, for the word "element" read *means*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of December, A.D., 1920.

[SEAL.]

L. B. MANN,

Acting Commissioner of Patents.

Cl. 274—15.