

O. O. STORLE,  
 AUTOMATIC STOP FOR SOUND REPRODUCING MACHINES.  
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1,375,864.

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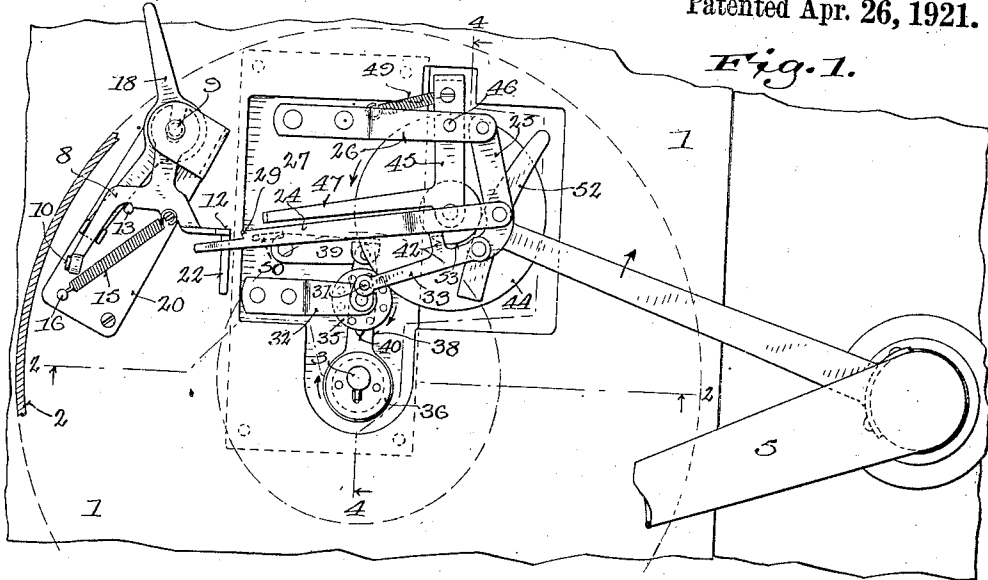


Fig. 1.

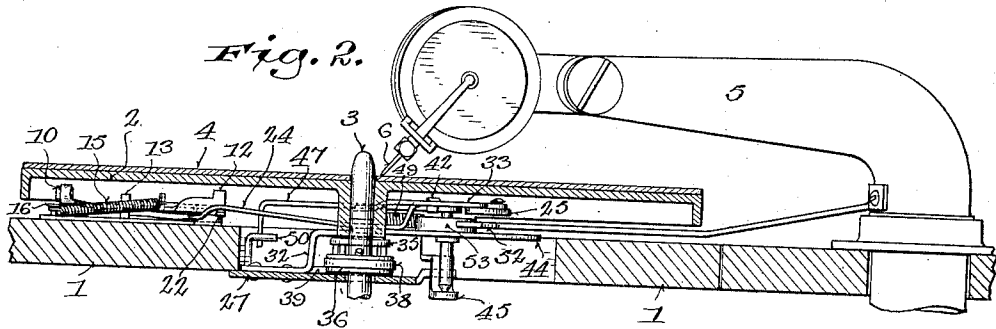


Fig. 2.

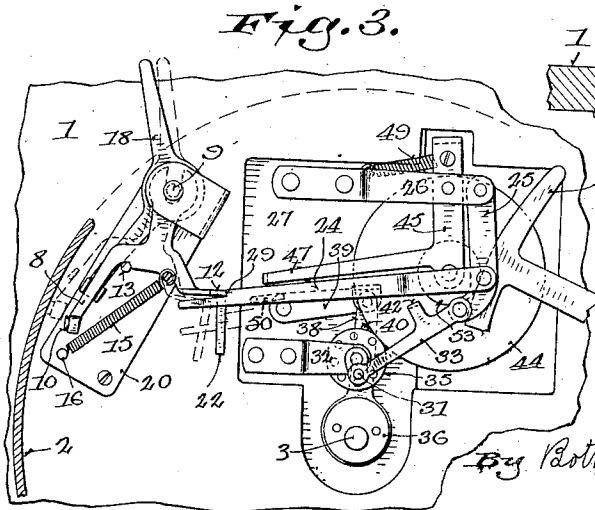


Fig. 3.

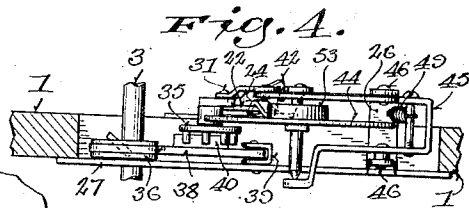


Fig. 4.

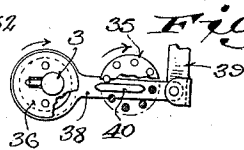


Fig. 5.

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# UNITED STATES PATENT OFFICE.

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AUTOMATIC STOP FOR SOUND-REPRODUCING MACHINES.

1,375,864.

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*To all whom it may concern:*

Be it known that I, OLE O. STORLE, a citizen of the United States, residing at Tacoma, in the county of Pierce and State of Washington, have invented certain new and useful Improvements in Automatic Stops for Sound-Reproducing Machines, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

This invention relates more particularly to sound reproducing machines of the gramophone type in which a stylus traces a spiral record groove in a disk placed on a rotary table, the stylus being movable transversely to the turns of the groove.

The main objects of the invention are to automatically stop such machines upon the completion of the reproduction of records of different lengths without setting or adjusting the stop mechanism for each record, and without interference with the operation of the sound reproducing mechanism, and generally to improve the construction and operation of stops of this class.

It consists in the construction, arrangement and combination of parts as hereinafter particularly described and pointed out in the claims.

In the accompanying drawing like characters designate the same parts in the several figures.

Figure 1 is a plan view of stop mechanism embodying the invention as applied to a typical sound reproducing machine such as a gramophone, parts of which are shown; Fig. 2 is a vertical section on the line 2—2, Fig. 1; Fig. 3 is a plan view similar to Fig. 1, of the stop mechanism and associated parts of the gramophone, showing parts of the stop mechanism in position just before releasing the brake; Fig. 4 is a section on the line 4—4, Fig. 1, showing a part of the stop mechanism in side elevation as viewed from the right relative to Fig. 1; and Fig. 5 is a detail plan view, parts being broken away, of a portion of the mechanism shown in Fig. 4.

Referring to Figs. 1 and 2, 1 designates the top board or plate of a gramophone, to the under side of which the motor (not shown) is usually fastened; 2 the turn table; 3 the spindle, on the upper end of which the turn table is removably mounted; 4 a record disk in position on the turn table; 5 the tone or stylus arm; and 6 the

record tracing stylus or needle, all of the usual construction.

The stop mechanism comprises a brake consisting of a lever or arm 8, pivoted and shiftable longitudinally at one end on a stud 9 and provided at the other end with a shoe 10 of rubber or other suitable material, which is movable into and out of engagement with the inner side of the depending rim of the turn table 2. The arm 8 is formed or provided with an inwardly and upwardly projecting trip lug 12, and with a notch or seat adapted by engagement with a fixed pin or stud 13, to yieldingly hold the brake, as shown in Figs. 1 and 3, in off position, with the shoe 10 out of engagement with the rim of the turn table.

A spring 15, connecting the inwardly offset portion of the brake arm 8 with a pin or stud 16, is arranged to hold the notch or seat therein in engagement with the pin or stud 13 and to apply the brake when it is released as hereinafter explained, and as indicated by dotted lines in Fig. 3. A lever 18, for manually operating the brake, has an outwardly projecting handle arm and a forked arm slidably engaging the brake arm 8. The studs or pins 9, 13 and 16 are preferably mounted on a plate 20, which is fastened in proper position to the top board or plate 1, underneath the turn table, the brake arm 8, spring 15 and lever 18 being assembled and held in proper relation to one another on said plate. The stud 13 and the notch or seat in the brake arm with which it coöperates, constitute a detent for holding the brake in off position.

The brake arm is formed or provided with a horizontal arm 22, projecting laterally from the trip lug 12.

A reciprocatory thrust bar or brake releasing member 24, is pivotally connected at one end by a transverse link 25, with a bracket 26, attached to and overhanging a plate 27, which is fastened to the under side of the top board or plate 1 below an opening therein. Adjacent its free end the bar or member 24 is formed with a notch or shoulder 29 and is shiftable laterally into and out of position to engage the trip lug 12 for releasing the brake.

A crank 31, journaled adjacent to and parallel with the spindle 3 in a bracket 32 fastened to and overhanging the plate 27, is connected by a link 33 with the link 25 adjacent the pivoted end of the bar or mem-

ber 24. A crown wheel 35 is fastened to the lower end of the crank journal between the overhanging end of the bracket 32 and the plate 27, and an eccentric 36 is mounted on the spindle 3, as shown in Figs. 2, 3 and 4.

An arm 38, connected at one end by a strap with the eccentric 36 and at the other end by a guide link 39 with the plate 27, is provided on its upper side with a tongue 40 having rounded or beveled ends, adapted to engage with the teeth of the crown wheel 35 alternately on opposite sides thereof, and to turn said wheel when the arm is oscillated by the rotation of the eccentric.

The link 33 is provided with a lateral projection 42 adapted by engagement with the bar or member 24 to shift it laterally toward the trip lug 12 into operative position with each revolution of the crank 31 during the backward movement of said bar or member toward the link 25.

A friction wheel 44 mounted horizontally in an oscillatory yoke or support 45, below and approximately radial to the bar or member 24, normally supports said bar or member, which is bent downwardly, as shown in Fig. 2, to engage therewith between its center and periphery on the side toward the brake. The yoke or wheel support 45 is mounted on vertically aligned pivots 46, parallel with the axis of the wheel 44 between the plate 27 and the overhanging bracket 26, and is provided with a stop and guide arm 47, adapted by engagement with the thrust bar or brake releasing member 24 on the opposite side from the link 33, to guide and hold said bar or member out of operative position for engagement with the trip lug 12 when the yoke or wheel support is in its normal position. A spring 49, connecting the yoke 45 with the bracket 26, tends to hold the arm 47 against a fixed stop pin 50 in position to guide and hold the bar or member 24 out of position for engagement with the trip lug 12.

The stop and guide arm is shifted away from the thrust bar or brake releasing member 24, and the friction wheel 44 is rotated in the direction indicated by an arrow on Fig. 1, to shift the bar or member 24 out of operative position for engagement with the lug 12, as the stylus 6 approaches the end of a record groove, by a connection with the tone or stylus arm 5. This connection may consist as shown, of a friction segment 52, attached to and movable with the tone or stylus arm 5 and adapted to engage with a friction wheel 53 coaxially fastened to or connected with the friction wheel 44. The curved edge or working face of the segment 52 adjacent the end which first engages the friction wheel 53 during the reproduction of a record is slightly eccentric to the axis on which the tone or stylus arm

swings, being of gradually diminishing radius toward the end, while the remainder of the curved working edge or face of the segment adjacent its other end is concentric with the pivot axis of the tone or stylus arm. The eccentric portion of the curved working edge or face of the segment 52 is so disposed with relation to the tone or stylus arm 5 that it will engage the friction wheel 53 and shift the stop and guide arm 47 away from the thrust bar 27 and will begin to rotate the friction wheel 44 before the stylus 6 reaches the end of the spiral groove of the shortest record.

In the operation of the stop mechanism, the arm 5 being swung outwardly and the stylus 6 entered in the outer turn of the spiral groove of a record disk 4 and the brake being turned into off position and held therein by the detent pin 13, as shown in Fig. 1, the stylus tracing the record groove slowly swings the arm 5 toward the center of the turn table, the thrust bar 24 reciprocating idly and the stop arm 47 held by the spring 49 against the stop pin 50, holding the thrust bar out of operative position.

With the rotation of the turn table 2, an oscillatory movement is imparted by the eccentric 36 to the arm 38, which slowly turns the crown wheel 35 and the crank 31, and imparts through the links 33 and 25, a longitudinal reciprocating movement to the thrust bar 24, engagement of the shoulder 29 of the thrust bar with the trip lug 12 of the brake being prevented by the stop arm 47.

As the stylus 6 approaches the end of the spiral record groove the segment 52 is carried into engagement with the friction wheel 53, thereby rotating the same with the friction wheel 44 in the direction indicated by an arrow on Fig. 1. The eccentric portion of the curved working face of the segment swings the stop arm 47 with the yoke or wheel support 45, away from the thrust bar 24, as shown in Fig. 1, permitting the thrust bar to be shifted laterally into operative position for engagement with the trip lug 12, but as long as the wheel 44 is rotated by the segment 52 with the continued inward movement of the stylus arm 5, the thrust bar 24 will be shifted laterally away from the stop arm 47 and out of operative position for engagement with the trip lug 12 during the advance longitudinal movements of said bar toward said lug. During the backward longitudinal movements of the thrust bar, while the crank 31 makes the half of its revolution nearest the thrust bar, the projection 42 on the link 33 engaging with the thrust bar, shifts it back toward the stop arm 47 periodically into operative position.

When the stylus reaches the end of a rec-

ord groove and the further inward movement of the arm 5 is thus arrested and rotation of the friction wheel 44 ceases, the bar 24 left resting in operative position on said wheel, as shown in Fig. 1, is thrust forward by the continued rotation of the crank 31 into engagement with the trip lug 12, as shown in Fig. 3. Further movement of the crank forces the notch or seat in the brake arm 8 out of engagement with the detent pin 13, thereby releasing the brake, which is instantly shifted by the spring 15 into engagement with the turn table, as indicated by dotted lines in Fig. 3. The arc movement of the trip lug 12 when the brake is thus applied by the spring 13, shifts the thrust bar 24 away from the stop arm 47, carrying the shoulder 29 out of the path of the lug, so that the brake can be shifted by hand with the lever 18 into its off position out of engagement with the turn table, as shown in Figs. 1 and 3, in which position it is held by engagement of the notch or seat in the offset portion of the brake arm 8 with the detent pin 13.

When the brake is released and applied as above explained, the arm 22 is carried underneath the downwardly bent end of the thrust bar 24, as indicated by dotted lines in Fig. 3, and thereby lifts said bar out of contact with the friction wheel 44, so that when the arm 5 is again swung outwardly for changing record disks and reproducing another record or repeating the reproduction of the same record, the bar 24 will not drag on and impede the rotation of the friction wheel 44 by the reverse movement of the segment 52. It will thus be seen that the stop mechanism imposes no obstruction whatever to the inward or outward movement of the tone or stylus arm 5 except during a portion of its inward movement, while the stylus is approaching the end of a record, and then the thrust bar 24 resting lightly on the friction wheel 44 and being reciprocated in a radial direction thereon by the crank 31, opposes very little resistance to the rotation of the friction wheel and movement of the stylus.

Various changes in the construction and arrangement of parts of the stop mechanism may be made without departure from the principle and scope of the invention as defined in the following claims.

I claim:

1. In an automatic stop for sound reproducing machines the combination with a brake, means tending to apply the brake and means for holding the brake in off position, of a reciprocatory brake releasing member movable transversely to its reciprocatory movement into and out of operative position, a frictional actuating connection with the stylus arm tending to shift the brake releasing member out of operative position, and means operatively connected with the turn table spindle and with the brake releasing member and adapted to constantly reciprocate said member longitudinally while rotation of the spindle continues and to periodically shift it laterally into operative position for releasing the brake when the inward movement of the stylus arm is arrested.

2. In an automatic stop for sound reproducing machines the combination with a brake, means tending to apply the brake and means for holding the brake in off position, of a reciprocatory brake releasing member movable transversely to its reciprocatory movement into and out of operative position, a frictional actuating connection with the stylus arm tending to shift the brake releasing member out of operative position while the stylus is tracing a record groove, a crank operatively connected with the turn table spindle, and a link connecting the crank with said member and adapted by lateral engagement therewith to shift it periodically into operative position.

3. In an automatic stop for sound reproducing machines the combination with a brake, means tending to apply the brake and means for holding the brake in off position, of a longitudinally reciprocatory brake releasing member movable laterally into and out of operative position, means tending to shift said member out of operative position while the stylus is tracing a record groove, a crank, a crown wheel connected with the crank, an eccentric on the turn table spindle, an arm connected at one end with the eccentric and at the other end by a guiding link with a stationary part of the machine and provided with a longitudinal tongue adapted to engage alternately with teeth on opposite sides of the crown wheel, and a link connecting the crank with the brake releasing member and adapted by lateral engagement therewith to shift it periodically into operative position.

4. In an automatic stop for sound reproducing machines the combination with a brake, means tending to apply the brake, and means for holding the brake in off position, of a longitudinally reciprocatory member movable laterally into and out of operative position for releasing the brake, actuating mechanism connected with the turn table spindle and adapted to reciprocate said member and to periodically shift it laterally into operative position, an oscillatory wheel support having an arm adapted in its normal position to hold the brake releasing member out of operative position, a spring tending to hold said support in normal position, a friction wheel carried by said support in position to engage with and shift the brake releasing member laterally out of operative position, and a

friction segment attached to and movable with the stylus arm and adapted to rotate said friction wheel and shift the arm of its support away from the brake releasing member as the stylus approaches the end of a record groove.

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5. In an automatic stop for sound reproducing machines the combination with a brake, means tending to apply the brake and means for holding the brake in off position, of a longitudinally reciprocatory member movable laterally into and out of operative position for releasing the brake, actuating mechanism connected with the turn table spindle and adapted to reciprocate said member and to periodically shift it laterally into operative position, an oscillatory wheel support having an arm adapted in its normal position to hold the brake releasing member out of operative position, a spring tending to hold said support in normal position, coaxial friction wheels of larger and smaller diameters carried by said support, the larger wheel in position to engage with the brake releasing member and shift it laterally out of operative position, and a friction segment attached to and movable with the stylus arm, the curved working face of the segment diminishing in radius adjacent and toward one end and being adapted by engagement with the smaller friction wheel to shift the arm of its oscillatory support away from the brake releasing member and to rotate the friction wheels as the stylus approaches the end of a record groove.

6. In an automatic stop for sound reproducing machines the combination with a brake comprising a detent adapted to hold it in off position and a spring tending to apply the brake, of an oscillatory wheel support provided with a stop arm, a spring tending to hold the wheel support in normal position, a longitudinally reciprocatory brake releasing member movable laterally into and out of position for releasing the

brake and normally held out of operative position by said stop arm, a friction wheel carried by said support below and approximately radial to the brake releasing member which normally rests thereon, means connected with the stylus arm for rotating the friction wheel and tending to shift the brake releasing member away from operative position as the stylus approaches the end of a record groove, and mechanism connected with the turn table spindle and adapted to reciprocate the brake releasing member longitudinally and to periodically shift it laterally into operative position.

7. In an automatic stop for sound reproducing machines the combination with a brake, a spring tending to apply the brake, and a detent for holding the brake in off position, of a trip member for releasing the brake provided with a lateral arm, a longitudinally reciprocatory brake releasing member movable laterally into and out of operative position for engagement with the trip member, a friction wheel located below and approximately radial to the brake releasing member which normally rests thereon between its center and periphery on the side toward the trip member, means connected with the stylus arm for rotating the friction wheel to shift the brake releasing member laterally away from operative position as the stylus approaches the end of a record groove, and means actuated by the turn table spindle and adapted to reciprocate the brake releasing member and to periodically shift it laterally into operative position, the lateral arm of the trip member being adapted to lift and hold the brake releasing member out of contact with the friction wheel when the brake is released and applied.

In witness whereof I hereto affix my signature.

OLE O. STORLE.