

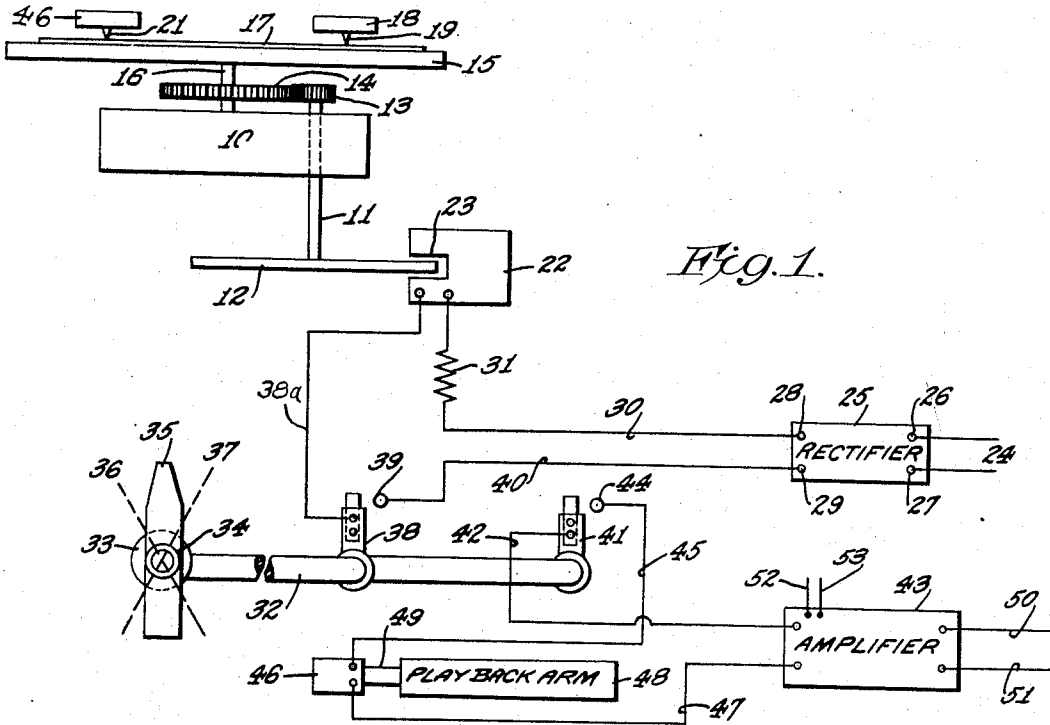
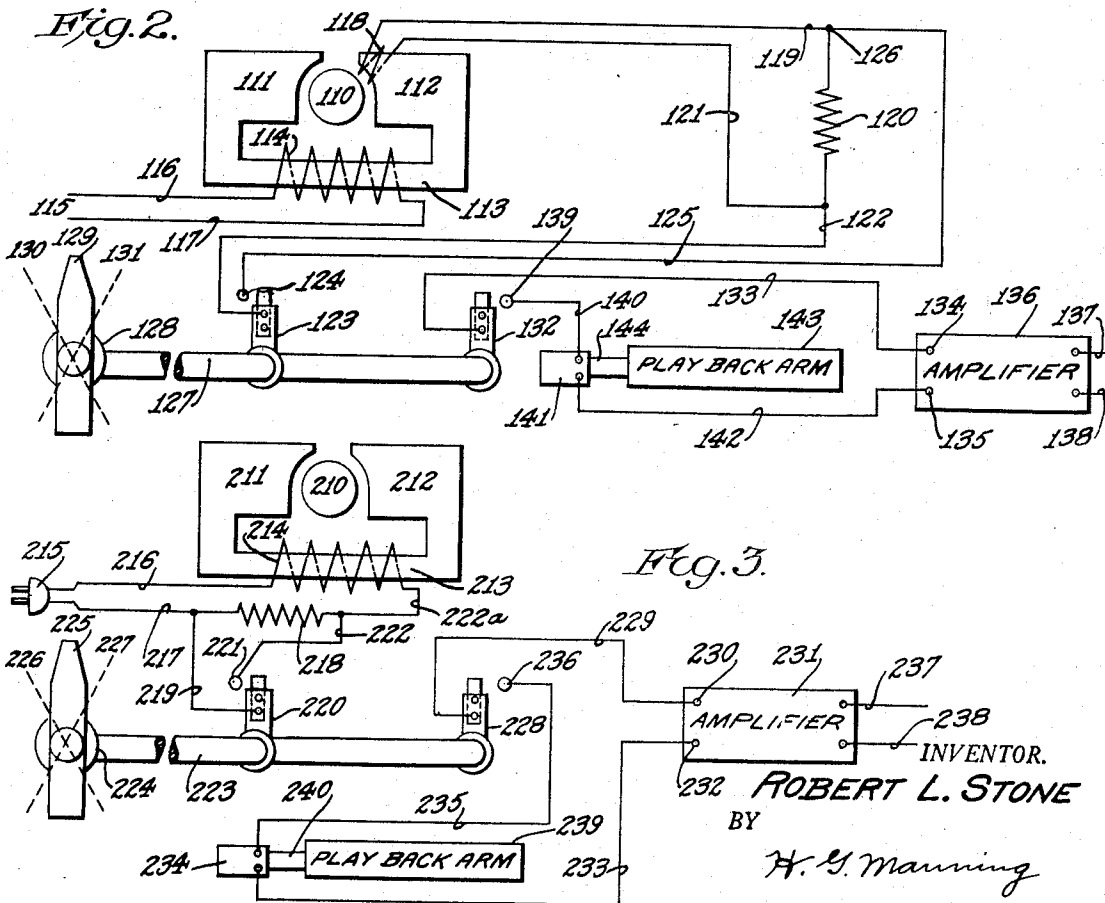
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R. L. STONE

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APPARATUS FOR CONTROLLING THE SPEED OF PHONOGRAPH TURNTABLES

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INVENTOR.
ROBERT L. STONE
BY

H. G. Manning
ATTORNEY

UNITED STATES PATENT OFFICE

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APPARATUS FOR CONTROLLING THE SPEED
OF PHONOGRAPH TURNTABLESRobert L. Stone, Orange, Conn., assignor to The
Soundscribe Corporation, New Haven, Conn.,
a corporation of Connecticut

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This invention relates to phonographs, and more particularly to a dictating machine employing sound recording and sound reproducing apparatuses, and provided with a common amplifier which is adapted to be selectively switched from recording to reproducing whenever desired.

One object of this invention is to provide a dictating machine of the above nature in which the sound waves are recorded at a low speed in closely-spaced grooves on a rotating disk record, such as was described in the prior patent, Reissue No. 22,183, dated September 22, 1942, issued to Lincoln Thompson, entitled "Apparatus for recording sound on thin disks."

A further object of the present invention is to provide an apparatus for equalizing the speed of rotation of the turntable, when reproducing, to the speed at which the turntable was rotated during the recording process. This equalization is necessary because the recording head, which is heavier than the playback head, introduces a greater drag upon the speed of rotation of the record than does said playback head; consequently, the record will tend to rotate somewhat faster during playback and thereby impair the fidelity of voice reproduction.

A further object is to produce a device of the above nature which will be simple in construction, inexpensive to manufacture, easy to install and manipulate, compact, and very efficient and durable in use.

The present invention constitutes an improvement over the "Disk dictating machine" disclosed in the prior patent of Lincoln Thompson, No. 2,250,242, issued July 22, 1941.

With these and other objects in view, there have been illustrated on the accompanying drawing three forms in which the invention may conveniently be embodied in practice.

In the drawing,

Fig. 1 represents a schematic view of the first form of the invention, employing a small electromagnet embracing an aluminum disk, mounted upon the motor shaft, for the purpose of applying a drag thereon during reproduction.

Fig. 2 is a similar schematic view of the second form of the invention, in which the speed of the turntable induction motor is controlled by introducing a resistance into the circuit of a shaded pole on said motor while reproducing.

Fig. 3 is a similar schematic view of a third form of the invention, in which a resistance is inserted directly into the main circuit of the induction motor during reproduction, whereby the turntable speed will be reduced by an amount

equivalent to the greater drag of the recording stylus upon the record.

In a dictating machine of the above nature it will be understood that it is quite important that the record shall rotate at the same speed during recording and reproducing in order to preserve the natural tone of the voice and produce maximum fidelity of reproduction.

Referring now to the drawing, in which like reference numerals denote corresponding parts throughout the several views, the numeral 10 (Fig. 1) indicates the casing of a motor, having a shaft 11, upon the bottom of which is mounted a circular aluminum disk 12. The top of the shaft 11 is provided with a pinion 13, meshing with a larger gear 14, which is adapted to drive a turntable 15 at a uniform speed by means of a shaft 16 secured to said gear 14. The turntable 15 has a record disk 17 mounted thereon.

In order to record dictation, music, or other sounds upon the record disk 17, provision is made of a recording head 18 adapted to be swung at uniform speed across the record by a suitable feed mechanism (not shown). The recording head 18 has a stylus 19 which "plows" an undulating spiral groove in the surface of the record as it swings over the turntable toward the center thereof. The dictation recorded upon the record disk 17 is adapted to be reproduced by means of a playback head 20 having a stylus 21, which may be freely movable in the grooves of the record as described in the Patent No. 2,250,242, mentioned above, or which may be positively driven across the record by a mechanism such as is described in a copending application of Lincoln Thompson, Serial No. 488,829, filed May 28, 1943, entitled "Pickup feed mechanisms for phonographs."

For the purpose of exerting a drag upon the turntable motor to equalize the speed of playback to that of recording, an electromagnetic field is applied to the aluminum disk 12 by means of a small electromagnet 22, said magnet having a slot 23 embracing the curved periphery of the aluminum disk 12, but not touching the same. The electromagnet 22 is energized by means of a source of A. C. current 24, which is converted into D. C. by means of a rectifier 25 having input terminals 26, 27, and output terminals 28, 29. The terminal 28 is connected by means of a conductor 30 to a fixed resistance 31 of such size as to cause said electromagnet 22 to apply the proper drag upon the aluminum disk 12 equivalent to that applied to the record 17 on the turntable 15 by the recording stylus 19.

In order to cause the circuit through the electromagnet 22 and the resistance 31 to be closed during reproduction, provision is made of a horizontal switch-operating shaft 32 having a selector knob 33 at one end thereof, and preferably located in front of the dictating machine cabinet. The knob 33 is provided with a bushing 34 and a pointer 35, the latter being shown in the drawing in Fig. 1 in neutral position, but being adapted to be moved either to the right or to the left to the dotted line positions 36, 37, as clearly shown. When the pointer is in the dotted line position 36, the machine will be in condition for recording, and when it is moved to the dotted line position 37, the amplifier will be connected to the pickup head for reproducing the material previously recorded upon the record.

In order to control the circuit through the electromagnet 22, provision is made of a rotary switch arm 38 which is mounted rigidly upon the shaft 32 for rotation therewith, said arm being connected to the electromagnet 22 by a conductor 38a. Provision is also made of a fixed contact 39 located in the path of the end of the movable contact arm 38. The contact 39 is connected by means of a conductor 40 to the terminal 29 of the rectifier 25.

A playback switch arm 41 is also rigidly mounted on the rotary shaft 32 for swinging in synchronism with the switch arm 38, and said switch arm 41 is connected by means of a conductor 42 to an amplifier 43, as clearly shown in Fig. 1. The switch arm 41 is adapted to engage a fixed contact 44 whenever the pointer 35 is swung to the dotted line position 37, thus closing the circuit through the playback head 46, which is connected by a conductor 45 to the contact 44. A conductor 47 is also furnished for connecting the other side of the playback head 46 to the amplifier 43.

A playback arm 48 is mounted for swinging across the record, and said arm is connected by means of a laterally-playless leaf spring 49 to the playback head 46, whereby no lateral backlash will be permitted in the movement of the playback head 46. A pair of conductors 50, 51 serve to connect the amplifier 43 selectively to the loudspeaker or microphone, according to the manual switching of the selector knob 33, as fully disclosed in the previously-mentioned Patent No. 2,250,242.

A pair of conductors 52, 53, leading to a source of A. C. current, are also shown connected to the amplifier 43.

Operation of the first form of invention

In operation, it will be seen that whenever the operator desires to reproduce a record upon the turntable, it will only be necessary for him to turn the selector knob 33 in a clockwise direction to shift the pointer 35 from the dotted line position 36 to the dotted line position 37. The electromagnet 22 will thus be energized automatically in synchronism with the playback head 46, thus causing said electromagnet to exert a retarding force upon the aluminum disk 12 equivalent to the greater drag of the head 18 upon the record 17 during recording.

Second form of invention

In the second form of the invention, shown in Fig. 2, the numeral 110 indicates the armature of a shaded pole induction motor which is adapted to rotate within a pair of opposed spaced stator core pieces 111, 112. The rear portions of the core pieces are connected together by a rod 113,

around which is wound a main coil 114 for energizing the core pieces 111, 112. The main coil 114 is connected to a source of alternating current 115 by means of a pair of conductors 116, 117, as shown.

In order to control the speed of the motor, provision is made of a shaded coil 118 which is adapted to surround the core piece 112 and is connected in circuit with a resistance 120 by means of conductors 119, 121. The resistance 120 is also joined as by means of a conductor 122, to a movable rotary switch arm 123, which while recording, will engage a fixed contact 124 connected by a conductor 125 to a junction 126 between the conductor 119 and a wire leading to the resistance 120.

Provision is made of a switch operating shaft 127, similar to the shaft 32 of the first form of the invention (Fig. 1). The shaft 127 has a selector knob 128 on its extremity, having a pointer 129 associated therewith, said pointer being adapted to swing from the dotted line recording position 130 to the dotted line playback position 131.

The shaft 127 has a rotary playback switch arm 132, connected by a conductor 133 to one input terminal 134 of an amplifier 136, the other input terminal being indicated by the numeral 135. A pair of conductors 137, 138 are connected to the amplifier 136 for introducing a loudspeaker or a microphone selectively into the circuit thereof.

A stationary switch contact 139 is joined by a conductor 140 to a playback head 141 which is also connected by a conductor 142 to the amplifier terminal 135, as shown. The numeral 143 indicates a playback arm which is connected to the pickup head 141 by a leaf spring 144, similar to the leaf spring 49 of the first form of the invention.

Operation of the second form of invention

In the operation of the second form of the invention the resistance 120 will be automatically inserted into the circuit of the shaded pole 118 whenever the selector knob pointer 129 is swung from the position 130 to the position 131. The desired speed reduction is thereby introduced to equalize the speed of reproducing to that at which the record was recorded.

Third form of invention

In the third form of the invention, illustrated in Fig. 3 of the drawing, the numeral 210 indicates the armature of an induction motor, similar to that shown in Fig. 2. The numerals 211, 212 indicate a pair of stator core pieces which are connected together by a core rod 213 located at the bottom thereof. A coil 214 surrounds the core rod 213 and is connected by means of a conductor 216, as shown, to a source of alternating current 215. A resistance 218 is connected to the current source 215 by a conductor 217, and said resistance 218 is shunted by a circuit including a wire 219, a rotary switch arm 220, a fixed contact 221 and a conductor 222.

The junction between the connector 222 and a wire leading to the resistance 218 is connected to the main coil 214 by means of a conductor 222a. The rotary switch arm 220 is mounted to rotate with a shaft 223 having at one end a selector knob 224 similar to the knobs 34 and 128 described above, and having a pointer 225 associated therewith. The pointer 225 is adapted to be swung from the dotted line recording position 226 to the dotted line playback position 227.

Mounted upon the shaft 223 is a rotary play-

back switch arm 228 having a conductor 229 connected therewith and leading to one input terminal 230 of an amplifier 231. The other terminal 232 of said amplifier is connected by a conductor 233 to a playback head 234 which is connected by a conductor 235 to a fixed contact 236, associated with the movable switch arm 228. A pair of conductors 237, 238 are connected to the amplifier 231 for introducing the loudspeaker or microphone selectively into circuit connection therewith. A playback arm 239, similar to the playback arms 48 and 143 described heretofore, is connected by means of a leaf spring 240 to the playback head 234.

Operation of the third form of invention

In the operation of the third form of the invention, it will be understood that when the selector pointer 225 is turned from the position 226 to the position 227, for shifting from recording to reproduction, the shunt circuit through the resistance 218 will be opened, throwing the resistance 218 directly into the circuit of the main coil 214. The speed of the motor will thus be reduced sufficiently to render the turntable speed equal to that at which the record was recorded.

While there have been disclosed in this specification three forms in which the invention may be embodied, it is to be understood that these forms are shown for the purpose of illustration only, and that the invention is not to be limited to the specific disclosures, but may be modified and embodied in various other forms without departing from its spirit. In short, the invention includes all the modifications and embodiments coming within the scope of the following claims.

Having thus fully described the invention, what is claimed as new, and for which it is desired to secure Letters Patent, is:

1. In a dictating machine, a turntable for supporting a disk record, a motor for driving said turntable at constant angular speed, said motor having a shaft, a metallic brake disk secured to said shaft for rotation therewith, an electromagnet located adjacent said metallic disk, a stylus-carrying recording head and a stylus-carrying playback head of lighter weight than said recording head mounted for swinging movement over said record, and means for simultaneously energizing said playback head and said electromagnet to cause the latter to exert a retarding force upon said metallic disk during playback equal to the difference in drag of said recording and playback heads on said record.

2. In a dictating machine, a turntable for supporting a disk record, a motor for driving said turntable at constant angular speed, said motor having a shaft, a metallic brake disk secured to said shaft for rotation therewith, an electromagnet embracing said disk, a recording head mounted to swing across said record during recording, a playback head of lighter weight than said recording head mounted to swing across said record during playback, and means for energizing said electromagnet during playback to retard said motor and equalize the speed of the record during playback to the speed of the record during recording.

3. In a dictating machine, a sound record, a recording head and a playback head of lighter weight than said recording head resting upon said record, means for driving said record comprising an induction motor having a stator core,

said motor having a shaded coil surrounding a portion of said core, an electric circuit including said shaded coil, an electric circuit including said playback head and an amplifier, and manually operated switch means to simultaneously close said playback head circuit and to introduce an impedance into said shaded coil circuit, whereby said shaded coil during playback will be caused to retard the speed of said motor and equalize it to that at which the record was recorded.

4. In a dictating machine, a sound record, a recording head movable over said record during recording, a playback head of lighter weight than said recording head movable over said record during playback, means for driving said record comprising an induction motor having a stator core, a main coil embracing said core, a circuit including said main coil and an impedance, means to nullify said impedance during recording, and manually-operated means to introduce said impedance into said motor coil circuit during playback in order to retard the speed of said motor during playback so as to render it equal to that at which the dictation was recorded.

5. In a dictating machine, a driven sound record, a recording head movable over said record during recording, a playback head of lighter weight than said recording head movable over said record during playback, means for driving said record comprising an induction motor having a stator core, a main coil embracing said core, a circuit including said main coil and a resistance, means to nullify said resistance during recording, and manually-operated means to introduce said resistance into said motor coil circuit during playback in order to reduce the speed of said motor during playback and render it equal to that at which the dictation was recorded.

6. In a dictating machine, a sound record driven at constant angular speed, a recording head movable across said record during recording, a playback head of lighter weight than said recording head movable across said record during playback, and means to reduce the speed of said record during playback to the speed of the record during recording.

7. In a dictating machine, a sound record driven at constant angular speed, an amplifier, a recording microphone, a reproducing loudspeaker, means for selectively shifting said amplifier to said microphone or said loudspeaker, respectively, a recording head connected with said amplifier and movable across said record during recording, a playback head of lighter weight than said recording head connected with said amplifier and movable across said record during playback, and means responsive to the shifting of said amplifier from recording to playback to introduce a constant drag upon the motion of said record during playback sufficient to reduce the speed thereof to the speed of said record during recording.

8. In a dictating machine, a movable record, means to drive said record having a shaft, a recording stylus and a playback stylus for engaging said record, said recording stylus exerting more speed-reducing drag upon said record than said playback stylus, a metallic brake disk on said driving shaft for rotation therewith, a magnet having a field embracing the rim of said brake disk, means to cause the field of said magnet to be applied during playback only, in order to retard the speed of said record so that it will be substantially equal to the recording speed.

9. In a dictating machine, a movable sound record, means to drive said record continuously, a recording stylus and a playback stylus for engaging said record selectively, said recording stylus exerting a greater speed-reducing drag on said record than said playback stylus, a magnetic brake for said drive means for applying a drag

equal to that of said recording stylus, and means to energize said brake only during playback in order to equalize the speed of said record during playback to the speed of said record during recording.

ROBERT L. STONE.