

April 5, 1932.

J. E. GARDNER

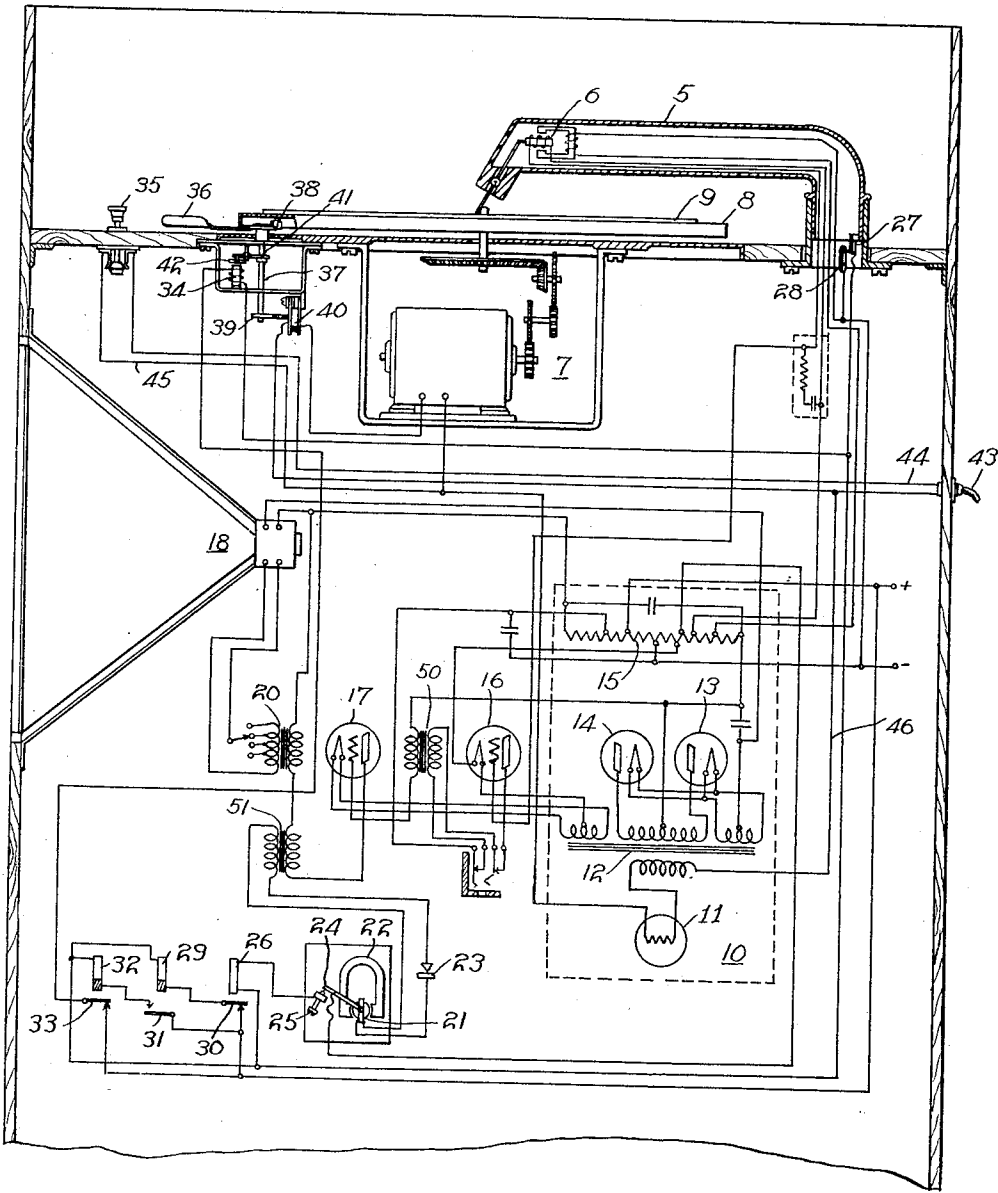
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TALKING MACHINE

Filed June 23, 1926

2 Sheets-Sheet 1

Fig. 1



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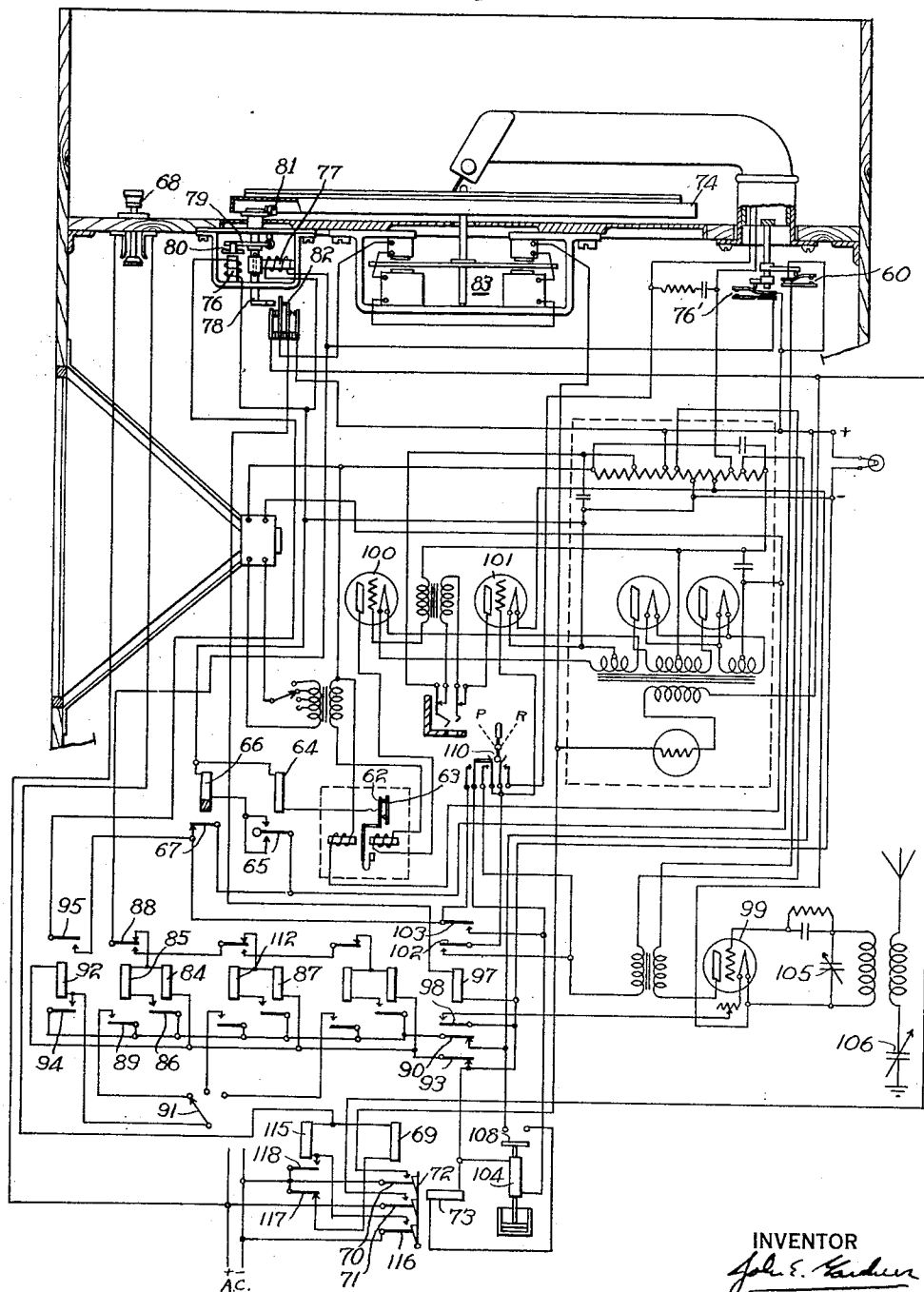
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2 Sheets-Sheet 2

Fig. 2.



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TALKING MACHINE

Application filed June 23, 1926. Serial No. 118,069.

My invention relates in general to talking machines.

One of the objects of my invention is to provide a device which will automatically bring the record employed in the usual talking machine to a stop immediately after the sound reproduction ceases.

Another object of my invention is to provide an electrical device which is operative responsive to the cessation of the sound reproduction to open the circuit of the motor where one is employed to rotate the stand carrying the usual disc record.

Another object of my invention is to provide a means for rendering the above mentioned electrical stopping device ineffective during the pauses that are usually found at different places in the record, where there is no sound reproduction by reason of the character of the selection recorded.

Another object is to provide a resetting device that is automatically operated when the tone arm is placed on the record to initiate the rotation of the record.

Another object is to provide means for disconnecting the source of electrical energy from the amplifying and rectifying thermionic devices when the invention is applied to a phonograph of the Panatrope or Electrola type.

Another object is to provide automatic means responsive to the cessation of the reproduction of sound from the record to connect the circuits of the phonograph device if a radio receiving device is associated with it, so that radio reception may be obtained if the controls of the receiving set are so positioned that a radio transmitting station is tuned in.

Another object is to provide means for disconnecting the electrical energy from the tubes of the radio set, when the transmitting station signs off.

A still further object of my invention is to provide an automatic stopping device of the character mentioned, which may be set to bring the record to a stop after it has been repeatedly played a predetermined number of times, and to prevent the action of the stopping device until such repetition has been made.

There are other objects of my invention which together with the foregoing will be described more in detail in the specification which is to follow, taken in conjunction with the accompanying drawings forming a part hereof.

In the drawings comprising Figures 1 and 2, I have shown my invention applied to the electrical type of talking machines exemplified by the so-called Electrolas and Panatropes. It will be understood that any type of talking machine may be employed.

In carrying out my invention I provide a relay that is energized by the voice currents and which controls other relays to bring about the automatic stopping of the phonograph, the disconnection of the electrical energy from the tubes and the radio switch-over.

Referring now more particularly to Figure 1, my invention is shown applied to an electrical reproducing machine of a well known type comprising the usual tone arm 5, containing a magnetic pick-up 6, a motor and gear train 7, which transmits power to rotate the circular shaped platform 8 adapted to receive the usual type disc record 9. The phonograph is also equipped with a power unit 10 comprising a so-called ballast tube 11, a transformer 12, two rectifiers 13 and 14 and a resistor 15. The function of this power unit is to transform the alternating current into direct current. The windings of the transformer 12 are so proportioned with respect to each other that the voltage of the current induced in the secondary winding is raised to the maximum voltage necessary to bring about proper functioning of the various elements employed. The resistor 15 is used to reduce this voltage whenever it is necessary to operate apparatus at a lower voltage. Amplifying triodes 16 and 17 are also provided for amplifying the currents induced in the magnetic pick-up so that it will operate the loud speaker 18. The loud speaker 18 is usually of the cone type. The output circuit of the power amplifier 17 is connected to the primary of the transformers 19 and 20. The secondary of the transformer 19 is connected to the armature 21 of the milliammeter relay 22 through a crys-

tal detector 23. A small tantalum rectifier may be employed in place of the crystal detector. Where a crystal detector is used it should be of the fixed type. The milliammeter relay 22 is of the usual type employed in burglar alarm service and carries a contact making arm 24 normally in engagement with a contact member 25. A relay 26 of the usual type employed in the automatic telephone art has one terminal connected to the contact member 25. The other terminal is connected to the source of current through the contacts 27 and 28 operated by the tone arm 5. A slow acting relay 29 of the type employed in the telephone art is adapted to have its circuit closed by the operation of the armature 30 of the relay 26. The relay 29 is adapted to operate its armature 31 to close a point in the circuit of the slow acting relay 32. The relay 32 carries an armature 33 and is adapted to close a point in the circuit of the stopping relay 34. The phonograph is also provided with a master switch 35 which may be of any ordinary type and which is adapted to close the circuits for supplying energy to the phonograph. The motor 7 is adapted to operate the disc 8 when the reset lever 36 is moved. The reset lever 36 is mounted upon the shaft 37 and comprises a portion of the usual reset mechanism. The reset arm 36 is retained in normal position by a spring (not shown) and carries at one end an upward extension 38 that acts as a brake to bring the platform or turntable 8 to rest quickly when it is tripped. The shaft 37 carries at its lower end an insulated member 39 that is so shaped that when the reset member 36 is operated and the shaft 37 rotated the contacts 40, which close the circuit of the motor 7, are operated. In this position a member 41 that is attached to the shaft 37 is latched by the armature 42 of the stopping magnet 34.

Having briefly described the apparatus employed in carrying out my invention, I will now explain its detailed operation. In order to do this it will be assumed that it is desired to play the phonograph. The first operation is to operate the master switch 35. This completes the circuit for energizing the primary of the transformer 12 from the alternating current source 43 over a path that may be traced along conductor 44 through the contacts of the switch 35, conductor 45, ballast tube 11, primary transformer 12, conductor 46, to the other side of the alternating current source. The ballast tube 11 functions to limit the amount of current that may be transmitted over the above described circuit. By the action of the transformer the filaments of the rectifiers 13 and 14 are energized as well as the filament of the power amplifier 17.

The rectifiers 13 and 14 function in the usual manner to transform the alternating

current into direct current. As explained before, the resistor 15 serves to vary the voltage of the direct current so that currents at varying voltages may be obtained for the proper operation of the amplifying triodes 16 and 17 and for the functioning of the relays 26, 29 and 32.

A record that is desired to be played is then placed upon the platform 8 and the reset lever 36 is rotated to remove the brake 38 from contact with the underside of the platform 8. The operation of the reset lever 36 also completes a circuit for the motor 7 over a path that extends from the alternating current source 43, conductor 44, contacts of the master switch 35, through motor 7 and contacts of the switch 40, and thence to the other side of the alternating current source. Motor 7 is immediately operated to bring about the rotation of the platform 8 carrying record 9. The tone arm 5 is brought into position so that the phonograph needle engages the groove at the beginning of the record. When sound indentations are encountered by the needle the coil 6 of the magnetic pickup is vibrated and this vibration causes an electromotive force to be induced in the windings of the coil. It will be seen that the coil 6 is connected to the grid of the amplifying triode 16. The filament of the amplifying triode 16 is energized as the result of the operation of the rectifiers 13 and 14. The plate circuits of the amplifying triodes 16 and 17 are connected to proper points of the resistor 15 so that the electromotive force of the proper voltage is impressed upon them.

The electromotive force induced in the coil 6 serves to alter the space charge in the triode 16 which operates in the usual manner to amplify this current and impress it upon the primary of the transformer 51. The power amplifier 17 operates in the usual manner to amplify this current and to impress it upon a circuit which includes the primaries of the transformers 20 and 51. The secondary of the transformer 20 is connected through one of the coils of the loud speaker 18. The loud speaker 18 is polarized by the current flowing through another coil. The loud speaker operates in the usual manner to transform the variation in electrical energy into sound waves. Inasmuch as the secondary of the transformer 20 is tapped, any desired amount of volume in the reproduced sound may be obtained. The operation of the phonograph thus far is essentially the same as is employed in the usual Electrola or Panatrope. As the record is played the tone arm moves inwardly following the spiral grooves in the record. It will be seen that the armature of the milliammeter relay is connected to the secondary of the transformer 51, the primary of which lies in the output circuit of the power amplifier 17. The crystal detector is also connected in series with the armature

21 and functions to rectify the alternating current induced in the secondary of the transformer 51 by the voice currents. The voice currents induced in the secondary of the transformer serve to energize the armature 21 of the relay 22 and the contact making member 24 is operated to disengage the contact member 25.

the slow acting relay 32. The slow acting relay 32 is deenergized to complete a circuit that may be traced from the positive source of current, back contact and armature 32, stopping magnet 34, contacts 27 and 28, to the negative source of current. The stopping magnet 34 is energized to operate its armature 42, thereby unlatching member 41 carried by the shaft 37 and permitting the spring not shown to rotate the shaft 37 and the reset lever 36 to its normal position. By this operation the brake 38 is caused to engage the disc 8 and bring it quickly to rest. By the operation of the insulating member 39 carried by the shaft 37 the contacts 40 are opened to bring about the deenergization of the motor 7. In this manner the record is stopped when the sound reproduction ceases.

It very often happens that short pauses occur during which there is no musical reproduction while the record is being played. By the use of contacts 27 and 28 of the tone arm, which are closed but a short distance before the end of the record, the majority of these pauses have no effect upon the automatic stopping equipment. However, should there be any pause after these contacts are made it is necessary to prevent the stopping of the record at this time. This result is accomplished by the slow action of the relays 29 and 32. These relays are slow acting and require a considerable period of time for their deenergization and it will be seen that the circuit of the stopping magnet 34 is maintained open until both of these relays have deenergized, consequently the pauses in the record will have no effect. However, when the record is played the automatic stopping device will function to bring about the stopping of the record.

By the use of this invention, it is possible to play any type of record with or without a spiral or eccentric groove and still have it stop at the end of the record. This is true because the automatic stopping device is controlled altogether by the voice currents and until these voice currents cease the stopping device is not operated.

If a very short record is employed but one having a spiral groove at its end, the contacts 27 and 28 may not be operated until after the sound reproduction ceases. However, immediately upon the operation of these contacts there is a circuit completed over a path that has been previously traced for the stopping magnet 34 and this magnet is energized to bring about the stopping of the relay.

It will be noted that there is a resistance in series with the condenser bridged across the windings of the coil 6 in the magnetic pickup. The function of this resistance and condenser is to eliminate the usual scratching noise arising from the engagement of the needle with the grooves of the record.

The contacts 27 and 28 are located within the tone arm and are adapted to be operated at a predetermined point in its inward rotation. This point is determined by the shortest record that the phonograph is adapted to play, that is, it is necessary that these contacts be operated a few revolutions from the end of the shortest record, where this record is not provided with a spiral groove at its end. When these contacts are operated, energy is supplied to one terminal of the relays 26, 29 and 32. Inasmuch as the circuit of the relay 26 is opened at this time by the contact making member 24 being out of engagement of the contact member 25, a circuit is completed that extends from the positive source of current by way of back contact and armature 30, slow acting relay 29, contacts 27 and 28, to the negative source of current. The slow acting relay 29 is energized to complete a circuit for the slow acting relay 32 at its armature 31 over a circuit that lies in multiple with its own. Slow acting relay 32 is energized to open a point in the circuit in the stopping magnet 34 at its armature 33. During the operation of the armature 21 of the relay 22 in response to voice currents, the contact making member swings back and forth depending upon the intensity of the voice currents. However, ordinarily the contact making member 24 does not engage the contact member 25. At the end of the record the vibration of the coil 6 in the magnetic pickup ceases and as a result thereof there is no voice current component present in the output circuit of the power amplifier 17 which includes the primary of the transformer 51. As the armature 21 of the relay 22 is deenergized, the contact making member 24 is brought into engagement with the contact member 25 by the action of a small spring which the armature must act against while it is energized. Immediately upon the contact making member 24 engaging the contact member 25, there is a circuit completed for the relay 26 over a path that extends from the positive potential obtained from the resistor 15 through the action of the rectifiers 13 and 14, contact making member 24, contact member 25, relay 26, contacts 27 and 28, to the negative source of current. The voltage in this circuit is quite low by reason of the delicacy of the contacts 24 and 25 of the relay 22. The relay 26 is consequently energized to open the circuit of the slow acting relay 29. The slow acting relay 29 is deenergized after a short interval of time to open the circuit of

Referring now to Fig. 2, I have shown my invention applied to an electrical type of reproducing machine, which also is combined with a radio receiving set so that either the phonograph may be used or the radio receiving set operated. The essential elements and operation of the phonograph shown in Fig. 2 are very similar to that shown in Fig. 1, that is, the method of reproduction is essentially electrical as has been described in connection with the machine shown in Fig. 1. The operation of the phonograph that reproduces the sound indentations in the record is identically the same as that described hereinbefore. A slightly different circuit arrangement for the stopping device is illustrated. The contacts 60 correspond to the contacts 27 and 28 of Fig. 1 and they are closed when the tone arm reaches a predetermined point in its travel inwardly over the record. A somewhat different type of voice current relay is employed in the device shown in Fig. 2. This relay may be of the type used in the automatic telephone art for the controlling of two-way voice current repeaters or this relay may be manufactured from a loud speaker unit, and the only essential part is that the contact making member 62 be vibrated so as to make intermittent contact with the contact member 63 while voice currents are present in the output circuit of the power amplifier 64. When no voice currents are present in the output circuit of the power amplifier, then the contact 62 is normally disengaged from the contact 63. The operation of the contacts 62 and 63 after the tone arm has swung inwardly over the record is to complete a circuit for the relay 64. The relay 64 is provided with a weighted armature 65 that at its front and back contacts completes the circuit for the slow acting relay 66. The armature 65 of the relay 64 is weighted so that when this relay is deenergized the armature is given a certain amount of momentum and continues to engage its front and back contacts alternately for a comparatively long interval of time, thus maintaining the slow acting relay 66 energized. When the master switch 68 of the phonograph is operated there is a circuit completed for the alternating current relay 69. The alternating current relay 69 operates to attract these armatures 70 and 71 where they are latched in operated position by the action of the armature 72 of the relay 73. The operation of the armatures of the relay 69 serves to energize the rectifying unit and amplifiers of the phonograph. The operation of the armature 116 of the relay 69 serves to complete a circuit for the alternating current relay 115. The alternating current relay 115 is energized to establish a locking circuit for itself at armature 118 and to open the circuit of the relay 69 at armature 117.

When it is desired to operate the phonograph a record is placed upon the turntable 74 and the tone arm is placed in position so that the needle engages the first groove in the record. At this time the contacts 76' in the tone arm are closed. By the operation of the contact 76' a circuit is completed for the reset magnet 77. The stopping magnet 76 corresponds to the stopping magnet 34 of the device shown in Fig. 1. In Fig. 2, however, in place of a manual reset lever such as 36 being employed, a magnet 77 is provided for bringing about the rotation of the shaft 78 so that the member 79 is latched by the armature 80 of the stopping magnet 76. A brake 81 that engages the underside of the turntable 74 is also attached to the shaft 78. Now when the magnet 77 is energized as described, the shaft 78 is rotated and the brake 81 is thus removed from the turntable. The shaft 78 is latched in this position by the action of the armature 80. Another result of the operation of the shaft 38 is that the switch 82 is operated. The operation of the switch 82 serves to complete a circuit for the motor 83. It will be noted that when the reset magnet 77 is operated another circuit is completed through the contacts 76' for the relay 84. The relay 84 is energized to complete a circuit for the relay 85 at armature 86. The relay 85 is short circuited as long as the original energizing circuit for the relay 84 is maintained. This circuit is opened shortly after this by the tone arm moving inwardly as the record is played, that is, the contacts 76' are only made for a short time at the beginning of the record. When the contacts 76' are opened the reset magnet 77 is deenergized but this operation has no function because the member 79 is latched by the armature 80 of the relay 76. When the original circuit of the relay 84 is opened the relay 85 is permitted to energize in series with it, whereby a circuit is prepared for the relay 87 at armature 88, and a circuit is completed at armature 89 that extends from the positive source of current by way of back contacts and armature 90. Armature 89 and its front contact, switch 91, relay 92, armature 93 and its back contact, to the negative source of current. The relay 92 is energized from this circuit and operates to establish a locking circuit for itself at armature 94 and to prepare a stopping circuit at armature 95. The slow acting relay 66 is maintained energized all the time that sound is being reproduced from the record. When there is no voice current or sound component in the output circuit of the amplifier 100 the voice current relay ceases to bring about the vibratory action of the contacts 62 and 63 and the relay 64 is deenergized. Shortly afterwards its armature 65 comes to rest and opens the circuit of the slow acting relay 66. The

slow acting relay 66 is deenergized to complete a stopping circuit that extends from one side of the source of current by way of armature 67 and its back contact, front contact and armature 95, stopping magnet 76 to the other side of the source of current. Stopping magnet 76 is operated to release the member 79, thereby permitting the shaft 78 to rotate to normal position opening the circuit of the motor 83 and permitting the brake 81 to engage the turntable 74. In this manner the record is stopped. By the operation of the switch 82 the circuit is completed for the relay 97. The relay 97 is energized to open the circuit of the relay 92 and also the circuits of the relays 84 and 85. These relays are deenergized to restore their associated circuits to normal. One of the results of the deenergization of the relay 92 is that the circuit of the stopping magnet 76 is opened. Other results of the operation of the relay 97 are that at armature 98 a circuit is completed for the filament of the detector triode 99, the output circuit of this triode is connected to the grid of the amplifier triode 101 at armature 102 and at armature 103 a circuit is prepared for the slow acting dash pot relay 104. The detector triode 99 is now operative if the controls or tuning device 105 and 106 have been previously set so that the radio circuits are resonant to the carrier frequency of a broadcasting station. Inasmuch as the output circuit of the detector is connected to the amplifier triode 101, the circuit is now operative to actuate the loud speaker to reproduce the sounds that are broadcasted from the broadcasting station. It will be seen that the voice current relay is still connected in the output circuit of the power amplifier 100. The voice current relay is consequently operated whenever there is a sound component in the output circuit of the amplifier. The operation of the voice current relay brings about the action of the relays 64 and 66 as before, that is, the relay 66 is maintained energized so long as there is any broadcasting being done. Of course if there are fairly long pauses in the broadcasting the relay 66 is deenergized to complete a circuit for the dash pot relay 104. The dash pot relay is of the usual solenoid type. The relay is provided with a dash pot to render it very slow to operate. The dash pot is provided with a valve which it must act against in order to operate. Whenever the relay is deenergized the valve opens and the relay is restored to normal very quickly. This relay may be set for any time interval for it will be found that five or ten minutes will be sufficient to take care of any pauses that will occur in the usual broadcasting transmission. If the operator does not care to operate the phonograph any more but desires to listen to the radio, no further action is necessary on his

part. An interval after the broadcasting signs off the relay 104 is operated, the slow acting relay 66 remaining deenergized for a sufficient period of time. When the relay 104 is energized a circuit is completed by its armature 108 for the relay 73. The relay 73 is momentarily energized to permit the release of the armatures 70 and 71 of the relay 69. These armatures restore to normal to disconnect the source of alternating current from the machine. All the circuits are thereupon deenergized and no current is used. The relay 115 is energized, however, until the master switch 68 is restored to normal and reoperated.

It will be understood that when it is desired to play the phonograph the switch 110 is operated in the position P, while if it is desired to operate the radio receiving set only the key 110 is operated to position R. If no broadcasting station happens to be tuned in the relay 104 is operated as before to bring about the deenergization of the set in the manner described.

After the operator has listened to the radio or if no broadcasting station happens to be tuned in before the relay 104 is operated, the operator may play another record in substantially the same manner as before described, that is, when the tone arm is moved back to its original position the contacts 60 are opened and the contacts 76 are closed. The closing of the contacts 76 energize the reset magnet 77, whereupon the brake is removed from the turntable and the switch 82 is operated to complete a circuit from the motor 83, and to open the circuit of the relay 97. The relay 97 is deenergized to disconnect the radio receiving set. The subsequent operations take place in identically the same manner as before described.

The same operations occur in the event that the relay 104 has had time to operate before the operator plays another record.

It is often desirable for the phonograph to be provided with means for repeating the record several times. It will be obvious that in order to accomplish this result it is necessary to disable the automatic stopping means until such time as it is desired to shut off the record. To accomplish this result a switch 91 is provided so that the record may be repeated once or twice before the automatic stopping means becomes effective. For the purposes of this invention any of the well known repeating devices may be employed in the phonograph, such as the one using a peculiarly shaped metal disc that is placed on top of the record and it functions to reset the tone arm at the end of the record. Assuming that it is desired to repeat the selection once, the switch 91 will be placed in engagement with its middle contact. Now when the tone arm is brought in position to engage the first groove of the record the contacts 76' will

close as before to complete a circuit for the reset magnet 77 and also to complete a circuit for the relay 84. When the contacts 76' are opened by the inward movement of the tone arm the relay 85 is energized. However, the energization of this relay does not complete a circuit for the relay 92 and this relay is not energized to prepare a circuit for the stopping magnet 76. Consequently when the record is through the repeating device operates to shift the tone arm back to the beginning of the record and the contacts 76' are again closed. By reason of the fact that the circuit of the stopping magnet is open the operation of the relays 64 and 66 is without particular function. When the reset magnet is again energized a circuit is completed for the relay 87. The relay 87 is operated to complete a circuit for the relay 110. The relay 112 is short circuited so long as the contacts 76' remain closed. When these contacts are opened, the relay 112 is energized to complete a circuit for the relay 92. The relay 92 operates as before to prepare a stopping circuit. Now when the record is finished the functioning of the relay 66 brings about the energization of the stopping magnet 76 and the cessation of the rotation of the turntable 74. By the arrangement of relays 87 and 112 just described means may be provided for causing as many repetitions of the record as is desired before the automatic stopping device is effective. However, after a predetermined number or numbers the stopping device is operated to stop the magnet and finally to bring about the disconnection of the source of current from the machine.

If it is only desired to play the radio the key 110 is operated into the position R. In this position the voice current relay and its associated equipment is effective to bring about the disconnection of the tubes when the station signs off. However, by reason of the long interval that is required before the relay 104 is operated, it is possible to tune in any broadcasting station that is desired before the tubes are cut off, and it is obvious that a thermal or any other slow acting type of relay may be employed instead of the dash pot relay 104.

While I have described one particular method of operating my invention it will be understood that I do not desire to limit myself to the particular apparatus and circuits described but desire to protect by Letters Patent such modifications, changes and deviations as come within the scope of the appended claims.

What I claim is:

1. In a talking machine, the combination with a record, means for moving said record, a reproducer for reproducing the sounds recorded on said record and a stopping device for stopping said record, of an automatic device responsive to the reproduced sound

currents for maintaining said stopping device ineffective.

2. In a talking machine, the combination with a record, means for moving said record, a reproducer for reproducing the sounds recorded on said record and a stopping device for stopping said record of an automatic device responsive to the reproduced sound currents for maintaining said stopping device ineffective until such sound reproduction ceases.

3. In a talking machine, the combination with a record, means for moving said record, a reproducer for reproducing the sounds recorded on said record and a stopping device for stopping said record, of an automatic device responsive to the reproduced sound currents for rendering said stopping device operative at the end of said record.

4. In a talking machine, the combination with a record, a motor, a reproducing device for reproducing the sounds recorded on said record, means for actuating said motor to cause the operation of said reproducing device, of automatic means operative upon the cessation of the reproduction of the sounds recorded on said record for stopping the operation of said motor.

5. In a talking machine, the combination with a record, a motor for moving said record, a reproducing device adapted to reproduce the sounds recorded on said record while said record is moving, of automatic means for stopping the movement of said record, and a device operative upon the cessation of reproduced sounds for initiating such stopping action.

6. In a talking machine, the combination with a record, a tone arm carrying a magnetic pick-up, means for moving said record, a source of electrical energy, amplifying devices, means for connecting said source of current to said amplifying devices, means controlled by said pick-up responsive to movement over the sound grooves of said record for operating said amplifying devices to amplify the voice currents generated in said pickup, and a loud speaker operated by the current relay responsive to the voice currents generated by said pick-up, and means controlled by said relay for stopping the movement of said record when no more sound indentations are encountered by said pick-up.

7. In a talking machine, the combination with a record, a tone arm carrying a magnetic pick-up, means for moving said record, a source of electrical energy, amplifying devices, means for connecting said source of current to said amplifying devices, means controlled by said pick-up responsive to movement over the sound grooves of said record for operating said amplifying devices to amplify the voice currents generated in said pick-up, and a loud speaker operated by the current relay responsive to the voice

currents generated by said pick-up, and means controlled by said relay for disconnecting said source of current from said amplifying devices when no more sound indentations are encountered by said pick-up.

8. In a talking machine, the combination with a record, a tone arm carrying a magnetic pick-up, means for moving said record, a source of electrical energy, amplifying devices, means for connecting said source of current to said amplifying devices, means controlled by said pick-up responsive to movement over the sound grooves of said record for operating said amplifying devices to amplify the voice currents generated in said pick-up, and a loud speaker operated by the current relay responsive to the voice currents generated by said pick-up, and means controlled by said relay for stopping the movement of said record when no more sound indentations are encountered by said pick-up, a radio receiving set associated with said talking machine and means controlled by said relay for rendering it operative to impress received signals upon said loud speaker.

9. In a talking machine, the combination with a record, means for moving said record, a reproducer for reproducing the sounds recorded on said record, and a stopping device for stopping said record of an automatic device responsive to the reproduced sound currents for rendering said stopping device operative at the end of said record, a repeating device for causing said reproducer to move over said record a plurality of times, and means for preventing the operation of said stopping device until said reproducer is moved over said record a predetermined number of times.

10. In a talking machine, the combination with a record, a tone arm carrying a magnetic pick-up, means for moving said record, a source of electrical energy, amplifying devices, means for connecting said source of current to said amplifying devices, means controlled by said pick-up responsive to movement over the sound grooves of said record for operating said amplifying devices to amplify the voice currents generated in said pick-up, and a loud speaker operated by the current relay responsive to the voice currents generated by said pick-up, and means controlled by said relay for stopping the movement of said record when no more sound indentations are encountered by said pick-up, a radio receiving set associated with said talking machine and means controlled by said relay for rendering it operative to impress received signals upon said loud speaker, and means controlled by said tone arm for disconnecting said radio receiving set from said loud speaker.

11. In a talking machine, a sound record, means for moving said record, a reproducer

for reproducing the sounds recorded on said record, a needle associated with said reproducer adapted to engage said record to control reproduction of sounds therefrom, a stopping device for stopping the movement of said record, and means controlled responsive to movements imparted to said needle for maintaining said stopping device inoperative.

12. In a talking machine, a sound record, means for moving said record, a reproducer for reproducing the sounds recorded on said record, a needle associated with said reproducer adapted to engage said record to control the reproduction of sound therefrom, a stopping device for stopping the movement of said record, and automatic means controlled by vibrations of said needle for rendering said stopping device operative at the end of said record.

13. In a talking machine, a sound record, an electric motor for moving said record, a reproducer for reproducing the sound recorded on said record, a circuit for energizing said electric motor, means including a relay for opening said circuit, and automatic means responsive to the termination of undulated grooves in said record for operating said relay at the end of said record.

14. In a talking machine, a sound record, means for moving said record, a reproducer for reproducing the sounds recorded on said record, an electrically operated brake for stopping said record, a circuit for said brake, and automatic means operated at the end of said record for energizing said circuit to operate said brake.

15. In a talking machine, a sound record, an electric motor for rotating said record, a reproducer for reproducing the sounds recorded on said record, means controlled by said record for moving said reproducer, a circuit for energizing said motor, a relay for opening said circuit, and means controlled by the movement of said reproducer for preventing the operating of said relay until a predetermined time before the end of said record.

16. In a talking machine, a sound record, an electric motor for rotating said record, a reproducer for reproducing the sounds recorded on said record, means controlled by said record for moving said reproducer transversely of said record, a circuit for energizing said motor, electrically controlled means for opening said circuit, and means controlled by the transverse movement of said reproducer for preventing the operating of said electrically controlled means until a predetermined time before the end of said record.

17. In combination, a sound record, means for moving the record, a plurality of thermionic devices connected in cascade constituting a sound amplifying circuit, an input circuit for said system, a pickup device adapted to be associated with said record for impressing variations in electrical potential in ac-

cordance with the sounds recorded on said record upon said input circuit, an outgoing circuit for said system, an output circuit for said system, a relay responsive to sound currents associated with said output circuit, a translating device, a circuit for operating said device, and means controlled by said relay for closing said circuit.

18. In combination, a sound record, means for moving the record, a plurality of thermionic devices connected in cascade constituting a sound amplifying circuit, an input circuit for said system, a pickup device adapted to be associated with said record for impressing variations in electrical potential in accordance with the sounds recorded on said record upon said input circuit, an outgoing circuit for said system, an output circuit for said system, a relay responsive to sound currents associated with said output circuit, a translating device, a circuit for operating said device, means controlled by said relay for closing said circuit, and means controlled by said translating device for stopping the movement of said record.

19. In combination, a phonograph, a radio receiving set, a sound record, means for operating said phonograph to reproduce sounds from said record, and automatic means operative when said sound reproduction ceases for rendering said radio receiving set operative.

20. In combination, a phonograph, a radio receiving set, means for rendering said radio receiving set responsive to etheric disturbances, a sound record, a reproducer for said phonograph, and automatic means operative when said reproducer is brought into cooperative relation with said record for disabling said radio receiving set.

21. In combination, a sound record, means for moving the record, a reproducer for reproducing sounds recorded on said record comprising an electrical pick-up, an amplifying circuit, and a loud speaker, and means for reproducing the sound of a record a predetermined number of times and then stopping the reproduction.

22. In combination, a sound record means for moving the record, a reproducer for reproducing sounds recorded on said record comprising an electrical pick-up, an amplifying circuit, and a loud speaker, and means for reproducing a record a predetermined number of times, including a plurality of relays, one of which is actuated each time a record is reproduced.

23. In combination, a sound record means for reproducing sound from said record, a radio receiving set, a loud speaker selectively operable to reproduce sound from said record or from said set, and means operable upon the cessation of reproduction from said record for reproducing sound received by said set.

24. In combination, a sound record, means

for reproducing sound from said record including a loud speaker, a radio receiving set connectible to operate said loud speaker, means for connecting said radio set to said speaker upon the completion of the reproduction of said record, and means for disconnecting said radio set after a predetermined pause in the received program.

25. In a combination, a sound record, a movable tone arm, sound reproducing means associated with said tone arm, a radio receiving set for reproducing sound, and a relay for disconnecting the radio receiving set, said relay being operated when the tone arm is moved to its starting position for reproducing the sound of a record.

26. In an electrical system adapted to transform electrical impulses into sound impulses, the combination of an input circuit, an output circuit, a speaking device in the output circuit, means for supplying operating current to said system, a relay in the output circuit responsive to speaking currents, and means actuated in response to said relay for disconnecting the operating current when the speaking currents in the output circuit cease for a given period.

27. In an electrical system adapted to transform electrical impulses into sound impulses, an amplifier of the thermionic type, an output circuit therefor having a speaking device therein, means for supplying operating current to said system, means in the output circuit responsive to speaking currents, and means operated by said output means for disconnecting the operating current when the speaking currents in the output circuit cease for a given period.

28. In an electrical system adapted to transform electrical impulses into sound impulses, the combination of an amplifier of the thermionic type having an output circuit, a speaking device in the output circuit, means for supplying operating current to said system, and means in the output circuit responsive to speaking currents for disabling said system when speaking currents in the output circuit cease for a given period.

29. In an electrical system adapted to transform electrical impulses into sound impulses, an amplifier of the thermionic type having an output circuit, a speaking device in said output circuit, means for supplying operating current to said system, and means for automatically disconnecting said operating current when speech-producing currents in the input circuit are interrupted for a predetermined period.

In testimony whereof, I have hereunto subscribed my name this 17th day of June A. D. 1926.

JOHN E. GARDNER.

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