

Nov. 28, 1939.

N. R. KURTZE

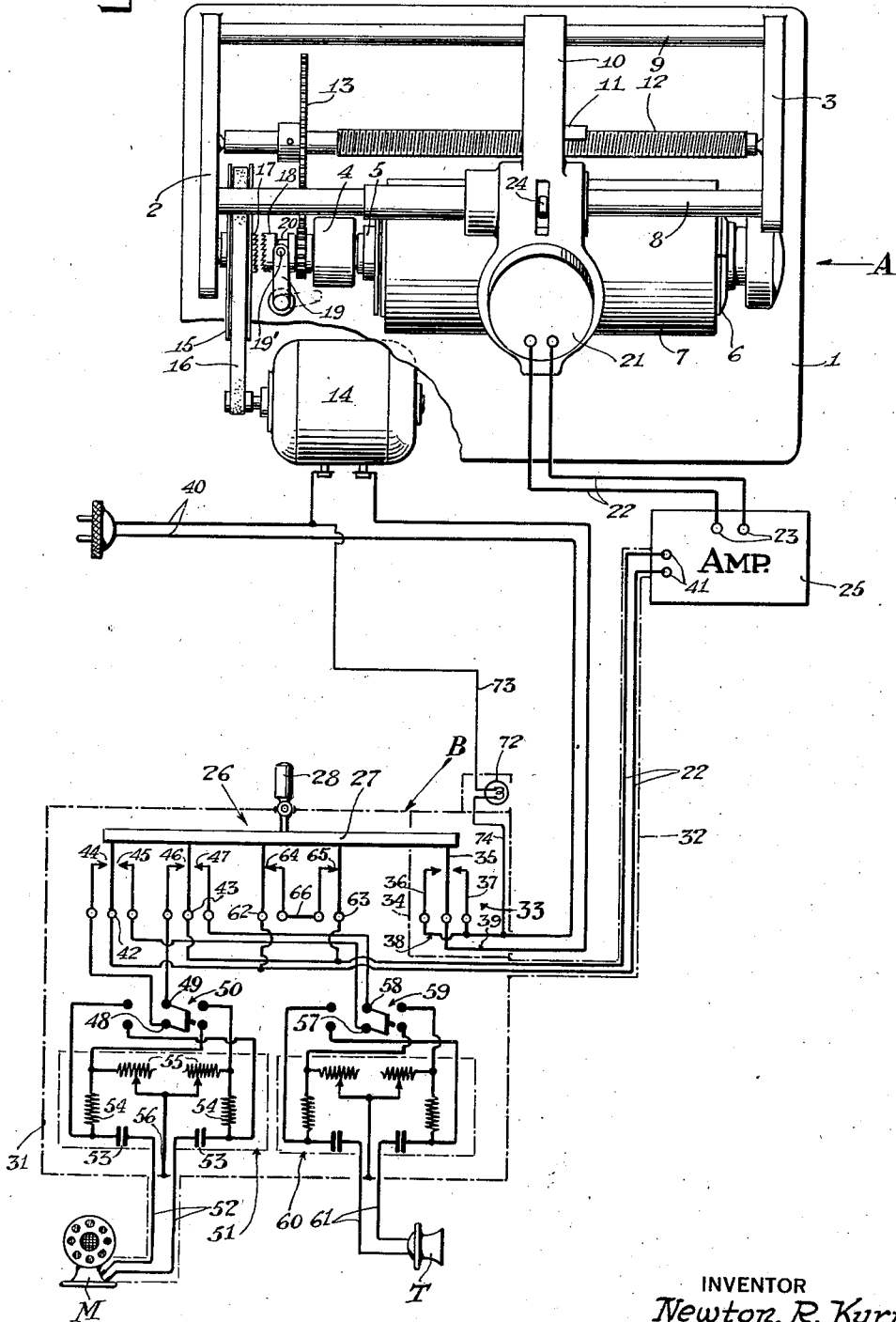
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PHONOGRAPH

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2 Sheets-Sheet 1

Fig. 1



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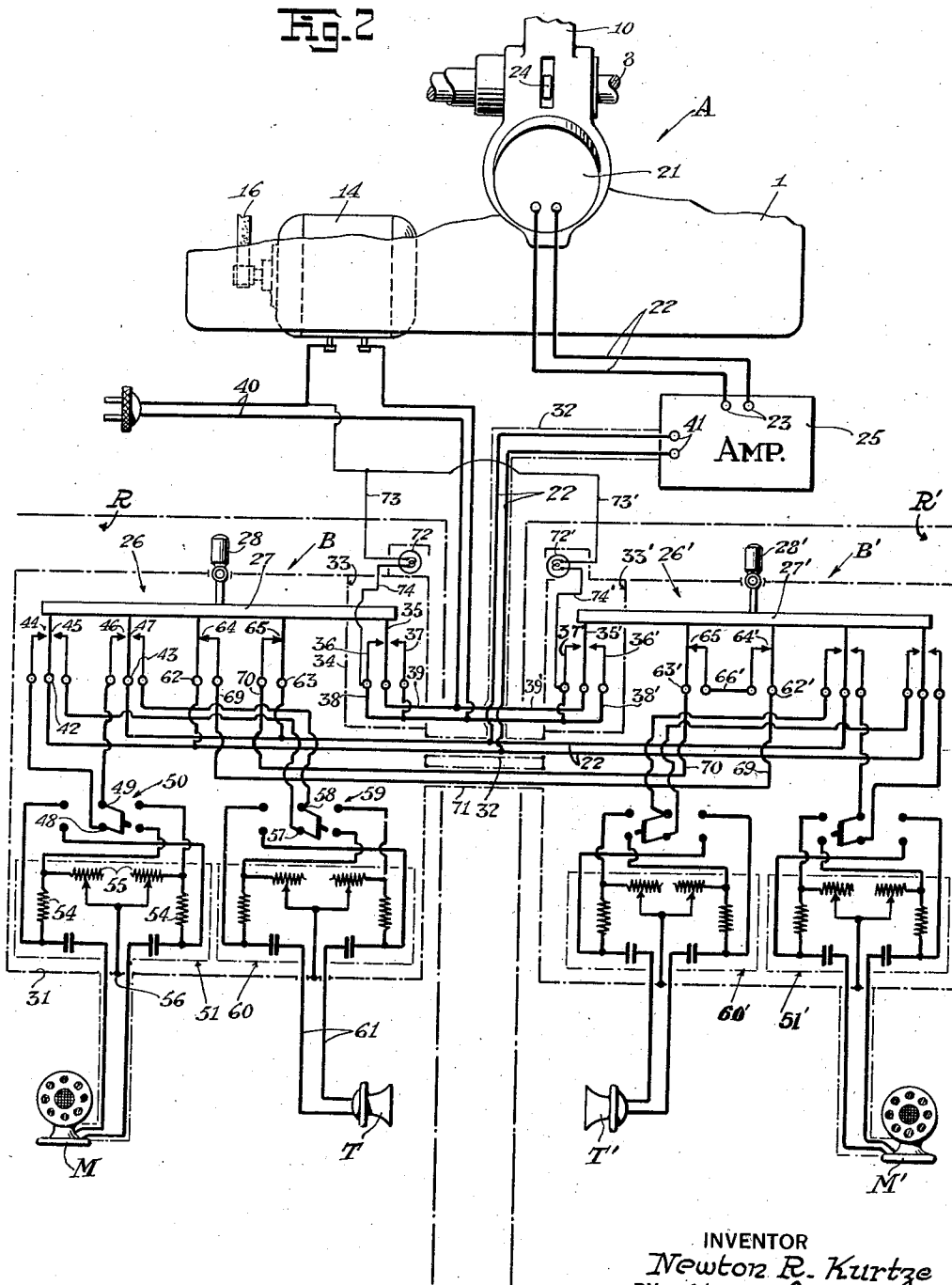
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2 Sheets-Sheet 2



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PHONOGRAPH

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10 Claims. (Cl. 179—100.4)

This invention relates to phonographs and more particularly to unitary control devices for facilitating the operation of phonographs. Although no unnecessary limitation thereto is intended, the invention has particular utility, and has been illustrated and described, in connection with an electrically operated and/or controlled phonograph.

A phonograph system for recording sounds, such as conversations, music, and the like, may comprise principally a suitable electro-acoustical device for converting the sound waves into corresponding electrical oscillations, means for amplifying these oscillations, a translating device for effecting their recordation, and an operating mechanism which includes broadly the means for performing all the mechanical functions necessary to the use of the phonograph.

In the general use of a phonograph recording system there arise many applications in which it is desirable to have the system adapted to record signals from any one of a plurality of sources such, for example, as telephone and/or microphone sources. Such adaptation of the recording system requires careful control of its various elements in order that it may be properly operable. The output signal levels of the various sources may, for example, vary widely in magnitude, these levels being however of relatively low order. It is therefore necessary that the output levels of these various sources be suitably amplified according to their respective orders of magnitude. It is also important that the various sources be carefully shielded throughout from stray potentials, and, whenever stray potentials do impinge upon the source or sources, that such stray potential be carefully balanced so as to be suitably annulled. There must moreover be provided means for suitably controlling and/or operating the operating mechanism. In my invention I provide means by which such actions as are abovementioned as desirable in the operation of a phonograph recording system are effected with great facility.

It is an object of my invention to provide a unitary control device for facilitating the operation and/or control of a phonograph.

It is another object to condition a phonograph for fulfilling any one of a plurality of functions by means of a single respective manipulation of a unitary control device.

It is another object to provide a unitary control device to operate a phonograph for recording from any one of a plurality of electrical oscillation sources.

It is another object to provide, in a unitary control device, compactly arranged means for conveniently controlling the operation of a recording phonograph and for selectively connecting and balancing the signal input circuit of the phonograph with a plurality of electrical oscillation sources.

It is another object to provide a plurality of unitary control devices respectively arranged for conveniently controlling the operation of a single phonograph.

Other and allied objects will more fully appear from the following description and the appended claims.

In the description of my invention, reference is had to the attached figures, of which:

Figure 1 is a schematic diagram of a phonograph system including a control device according to my invention.

Figure 2 is a schematic diagram of a phonograph system including a plurality of control devices according to my invention.

Reference being had to the figures there will be seen a conventional phonograph A with which my invention may be conveniently employed. The portion of the phonograph A principally comprising its operating mechanism may first be described. Such portion consists of a base plate 1 which is provided with the left and right standards 2 and 3, and the intermediate standard 4. Into the intermediate standard 4 there is journaled the shaft 5 of a mandrel 6 which removably carries a record 7. The left and right standards 2 and 3 support rods 8 and 9 on which there is slidably mounted a carriage 10. The carriage 10 is provided with a feed nut 11 which is adapted to engage a feed screw 12, this screw being rotatably held by the standards 2 and 3. The feed screw 12 is coupled to the shaft 5 of the mandrel 6 by means of the gears 13 so as to effect a movement of the carriage 10 along the rods 8 and 9, as the mandrel 6 is rotated.

The rotation of the mandrel 6 may be effected by any suitable rotatory source of power, as by a motor 14. This motor is coupled to a pulley 15 by means of a belt 16. The pulley 15 is rotatably supported with its axis in alignment with the shaft 5 of the mandrel 6 and is provided with a hub forming a clutch member 17 arranged to cooperate with a collar 18. This collar is keyed to the shaft 5, and is slidable therealong so that it may be moved into and out of engagement with the member 17 to couple the mandrel 6, at will, with the pulley 15. Such movement of the collar may be conveniently effected by means of a mem-

ber 19 which is pivotally mounted on the base plate 1 and provided with a projection 19' engaging a circumferential groove 20 provided in the collar 12.

5 The carriage 10 carries a translating device 21. This device is preferably adjustable to operative and inoperative positions and may be of any suitable variety for receiving and converting electrical oscillations into a form permitting their
10 recording. In recording on a record tablet, such as the record 7, by the process of impressing or cutting a progressive modulated groove thereon, there may be employed a translating device of the electro-mechanical type which is provided
15 with an input circuit 22 having a serially connected amplifier 25 feeding into the translating device 21 by way of the terminals 23. This type of device is adapted to receive electrical oscillations and impart a movement undulating in accordance with those oscillations to a member
20 which engages the record 7 when the device 21 is adjusted to its operative position. When the translating device is adjusted to its inoperative position this record engaging member is removed from contact with the record 7. Such adjustment
25 of the translating device 21 is conveniently effected by means of a control lever 24. The lever 24 is also very suitably coupled to the feed nut 4 so as to bring the feed nut into and out of engagement with the feed screw 12 as the lever 24 is
30 moved to its respective operative and inoperative positions.

Since the process of recording speech, such as
35 telephone conversations, conferences, and the like, is not normally a continuous one, the operation of the recording machine is frequently temporarily suspended. Due to the relatively long heating-up time of the usual amplifier it is desirable to maintain the same in operating
40 condition during such suspensions. Any stray oscillations from the oscillation source will then be amplified and fed into the translating device, thereby tending to cause objectionable noises to be radiated therefrom during temporary periods
45 of non-use, or suspensions, in the operation of the machine. In order that the phonograph system may selectively record from a plurality of electrical oscillation sources, there may be provided suitable switch means for connecting the
50 input circuit 22 of the phonograph A with such sources. Such switch means may therefore be utilized to disconnect the amplifier input circuit from any source of oscillation during the temporary non-use of the phonograph, and in order
55 that the amplifier 25 will not tend to self oscillate by reason of its input circuit being open during the temporary non-use of the phonograph, these switch means may be adapted to short the input circuit of the amplifier 25 whenever the same is disconnected from any source of electrical oscillation.

In phonograph recording systems it is desirable to have the phonograph operating mechanism rendered operative only during the periods in
65 which recordings are to be made. The means for controlling the operating mechanism may be operated concomitantly with, or incidental to, the operation of the switch means for selectively connecting the phonograph input circuit with a
70 plurality of transmission circuits respectively making connection with suitable signal oscillation sources. The phonograph operating mechanism will then be put into operation as the phonograph input circuit is connected to any one of a plurality of signal oscillation sources, and

be put out of operation as the input circuit is disconnected from such signal sources. It will of course be understood that the phonograph may be rendered operative and inoperative in any
5 suitable manner as such control may often be appropriately effected in various ways such, for example, as by the starting and stopping of the record rotation, or by the adjustment of the translating device to its operative and inoperative positions. 10

For the convenient operation of the phonograph system there may be provided other means for effecting its adjustment and/or control. The various oscillation sources may have extraneous potentials which may arise by way of a finite
15 impedance, or an electrostatic, coupling of the oscillation source, or a portion of this source, with a stray potential. If such stray potential causes extraneous oscillatory or fluctuating currents to flow in the phonograph input circuit the
20 recording may be marred or obliterated by such foreign currents. Such extraneous potentials may however often be balanced with respect to the phonograph input circuit in order to annul their objectionable effects by the provision of
25 suitable circuit-balancing means.

In order that the phonograph input circuit may not be exposed to stray potentials it may be provided with a suitable shield of conducting
30 material. This shield is usually coupled electrostatically, or through a finite impedance, with a potential source as, for example, by reason of its relation with the phonograph and/or amplifier 25. Through such coupling the shield itself
35 may acquire a dynamic or fluctuating potential relative to the mean potential of the oscillation source to which the phonograph input circuit is connected, and therefore extraneous currents would also be set up in the phonograph input
40 circuit under this condition. These extraneous currents may also be balanced out so as to annul their objectionable effects; this annulment may be effected by an impedance-balancing circuit for causing a balancing of the phonograph input
45 circuit when this circuit is connected with a source of electrical oscillation. This balancing is illustrated with respect to the potential of the shield of the phonograph input circuit, but it is to be understood that no unnecessary limitations
50 of my invention is intended thereby, as this balancing may be made with respect to any suitable potential arising out of or by way of the phonograph and/or amplifier included in the phonograph input circuit.

The oscillation level of the various sources from
55 which recordings are made may respectively vary through wide ranges and therefore some attenuating means in the respective circuits selectively coupling the phonograph input circuit with a plurality of electrical oscillation sources is highly
60 desirable. These respective attenuating means may be at least in part common with the aforementioned balancing means provided for the respective oscillation sources. Although the balancing and attenuating means have common elements, they may be respectively adjustable substantially independently of each other. 65

In my invention I effect all of the desirable
70 controlling actions in a phonograph recording system as are above mentioned, by means of a single unitary control device. In a modified form of my invention, I provide a plurality of control devices respectively adapted and arranged to control the operation of a single phonograph, so as to permit each of several operators in different 75

locations to have the use of the same mechanism. This control device will now be described in detail.

Reference being had to Figure 1, there will be seen a phonograph recording system comprising the phonograph A, hereinbefore described, a microphone source M, a telephone source T, and a control device B according to my invention. The control device B is adapted to control the phonograph operation and to selectively connect and adjust the phonograph input circuit with the telephone and microphone sources. Although I illustrate my invention with two sources of electrical oscillations, it will be understood that my invention contemplates means for selectively connecting and adjusting any plurality of electrical oscillation sources with the phonograph input circuit.

The control device B comprises a multiple selector switch 26 comprising a plurality of pole members secured to a bar member 27 movable, by means of a control lever 28, to operate the switch. This switch is arranged with an inoperative position, and with as many operative positions as there are electrical oscillation sources to be selectively connected to the phonograph input circuit 22. The switch 26 is in its inoperative position when the control lever 28 is in its central position, as shown, and in its respective operative positions when the control lever 28 is in its left and right positions.

The phonograph operation is commonly effected by the operation of a suitable power supply or control circuit system. Since the outputs of the oscillation sources are of relatively low magnitude the transmission circuits for conducting the oscillations to the phonograph input circuit must be carefully shielded throughout. In the unitary control device B the phonograph input circuit is brought into juxtaposition with the power circuits for controlling the phonograph operation, and therefore the control device B must be carefully arranged so that substantially no potential from the power circuit, or from any external source, is permitted to impinge upon any portion of the phonograph input circuit or upon any portion of the respective transmission circuit adapted to be connected to the phonograph input circuit. For this reason the control device B is provided with a case 31 which comprises a conducting material providing suitable electrostatic shielding for the device, this shield being made common with a shield 32 for the phonograph input circuit 22. Moreover, the control device B has a portion 33 which is substantially completely shielded from its remaining portion by means of the shield member 34, in which portion there is provided suitable means operable to render the phonograph operative and inoperative.

The portion 33 comprises a pole member 35 and a contact member for each operative position of the control device B, there being the two contact members 36 and 37 in the particular instance. The pole member 35 is free of the contact members 36 and 37 when the control lever 28 is in its inoperative position, the member 35 closing with respective contact members 36 and 37 as the control lever 28 is thrown to its respective right and left operative positions. A line conductor 38 is connected to the contact members 36 and 37 and another line conductor 39 connects the pole member 35 with one of the input terminals of the motor 14, the line conductors 38 and 39 forming one side of a circuit 40 which connects the motor 14 with a suitable source of power. Thus this power circuit 40 is closed and opened as the con-

trol lever is moved to its respective operative and inoperative positions, thereby causing the phonograph driving means to be put into and out of operation.

It will be understood that I intend no unnecessary limitation of my invention to the particular phonograph control means described, as the manner of putting the phonograph into and out of operation may be an entirely arbitrary one. Such control may be effected in any suitable way as, for example, by the operation of the clutch member 19, or by the operation of the control lever 24 to its operative and inoperative position. Each of these control operations may be effected by any suitable means coupling the control device B with the phonograph operating mechanism.

The remaining portion of my control device B is associated with the input circuit 22 of the phonograph. The respective line conductors forming the portion of the input circuit 22 which is connected to the input terminals 41 of the amplifier 25 are also connected to the respective pole members 42 and 43. Associated with these pole members are the respective left and right contact members 44 and 45 for the member 42 and the respective left and right contact members 46 and 47 for the member 43. The pole members 42 and 43 are brought into contact with their respective contact members 45 and 47 as the control lever 28 is moved to its left-hand operative position, and into contact with their respective contact members 44 and 46 as the control lever 28 is moved to its right-hand operative position, the pole members being free of these contact members when the control lever 28 is in its inoperative position.

The contact members 44 and 46 are respectively connected to the pole members 48 and 49 of a double-pole double-throw switch 50. The switch 50 is adapted to connect the contact members 44 and 46 with suitable points in a balancing and attenuating network 51 which is serially connected in a transmission circuit 52 making connection with a suitable source of electrical oscillation, such as a microphone M. The network 51 comprises the blocking condensers 53 which are located in the respective line conductors of the circuit 52 and chosen to have relatively low impedance. Also connected in the respective line conductors of the circuit 52 are the resistors 54. The network 51 also comprises the variable resistors 55 which are serially connected in shunt across the line conductors of the circuit 52. The common point 56 of the resistors 55 may be connected to any point having a potential suitable for balancing the circuit 52, which potential may for example be as that of the shield 31. The relative values of the resistors 54 and 55 are chosen to give the range of attenuation desired.

The switch 50 is connected with respect to the network 51 so that the contact members 44 and 46 are respectively connected to the junction points between the condensers 53 and resistors 54 when the switch 50 is thrown into its left-hand position, and to the respective junction points between the resistors 54 and 55 when it is thrown into its right-hand position. Thus it is obvious that there may be substantially no attenuation secured from the network 51 when the switch 50 is thrown in its left-hand position since the resistors 54 and 55 are then serially connected in shunt across the circuit 52. When the switch 50 is thrown to its right-hand position any desired amount of attenuation may be effected by a suit-

able choice of the values of the resistors 54 and 55. Moreover, after a suitable attenuation setting has been selected, the network 51 may be balanced with respect to the point 56, without affecting the attenuation setting, by varying the values of the resistors 55 at will with the reservation that their sum value is maintained constant.

The contact members 45 and 47 are respectively connected to the pole members 57 and 58 of a double-pole double-throw switch 59. The switch 59 is adapted to connect the contact members 45 and 47 with suitable points in a balancing and attenuating network 60 which is serially connected in a transmission circuit 61 making connection with a suitable source of electrical oscillation, such as a telephone source T. The network 60 in its form and arrangement is in all respects similar to the network 51. It may however have the values of its various elements different from those of the corresponding elements of the network 51 in order to obtain any attenuating range and balancing effects desired.

By these arrangements, it is obvious that the phonograph input circuit 22 may be connected to a transmission circuit making connection with the microphone source M or to a transmission circuit making connection with the telephone source T by the operation of the control lever 28 to its respective operative positions, in which positions the phonograph is also put into operation, and that the oscillation level fed into the phonograph input circuit from these respective sources may be controlled by means of the switch and network arrangements respectively provided in the respective transmission circuits of these sources, these respective networks also having means for balancing the respective oscillation sources with respect to the phonograph input circuit 22 as has been hereinbefore described.

In order that the amplifier input circuit may not be open when it is disconnected from the oscillation sources provided therefore, I provide means for shorting the amplifier input circuit when the control lever 28 is in its inoperative position. For this purpose there are provided the pole members 62 and 63 which make connection with the respective line conductors of the input circuit 22. Respectively associated with these members 62 and 63 are the contact members 64 and 65 which are connected together by the line conductor 66. The contact members 64 and 65 are closed with their respective pole members when the control lever is in its inoperative position, thereby shorting the input circuit 22. However, the operation of the control lever 28 to its left-hand operative position will cause the contact between the pole member 63 and contact member 65 to be broken, and the operation of the control lever 28 to its right-hand operative position will cause the contact between the pole member 62 and contact member 64 to be broken; thus the short on the input line 22 is removed whenever the control lever 28 is moved to an operative position.

In Figure 2 there is shown a modified form of my invention in which a phonograph system comprising the phonograph A is controlled by a plurality of control devices respectively, these control devices being in all respects similar to the control device B of Fig. 1. The control devices may be located in separate rooms, or locations, such as R and R', in which they are respectively represented as B and B', B being given the same reference characters as in Figure 1, and the inverse side of B' being shown from that of B with

its various corresponding elements being given the same characters as B with prime notation. In the respective rooms R and R' there may be located a plurality of oscillation sources, such as the microphone M and telephone T in R and the microphone M' and telephone T' in R'.

The control devices B and B' are connected in the phonograph system so that either may be operated for selectively connecting a plurality of oscillation sources with the phonograph input circuit 22 and disconnecting these sources from the input circuit 22, and for putting the phonograph into and out of operation as the input circuit is respectively connected with and disconnected from the oscillation sources. For this reason the elements of the portion 33' are connected in parallel arrangement with the corresponding elements of the portion 33 so that the phonograph will be put into and out of operation by the operation of any one of the control devices to its respective operative and inoperative positions. Similarly, the switch means of the respective control devices for selectively connecting and disconnecting the phonograph input circuit 22 with a plurality of oscillation sources are connected in parallel arrangement with respect to each other.

The means for shorting the phonograph input circuit 22 is arranged so that the circuit 22 is shorted when all of the respective control devices in the phonograph system are in their inoperative position, this short being removed when at least one of the control devices is placed in an operative position. For this reason the line conductor 66 shorting the contact members 64 and 65 in the control device B of Figure 1 is removed and the contact members 64 and 65 are respectively connected, as by the line conductors 69 and 70, with the pole members 62' and 63' of the device B'. The portion of the conductors 69 and 70 extending between the control devices B and B' is suitably shielded, as by a shield 71 which is connected to the shield 32 of the phonograph input circuit. The contact members 64' and 65' are shorted, as by a line conductor 66'.

According to my invention there may be any plurality of control devices incorporated in a phonograph system for respective control of the phonograph operation. In this case the phonograph input switch means and the phonograph control means, of the respective control devices are connected in parallel arrangement with respect to each other. The switch elements comprising the phonograph input shorting circuit have the pole members respectively connected with the contact members of each succeeding control device, the contact members of the last control device in this series being however, connected together.

It is an additional feature of my invention to provide a signal system for my phonograph control device or devices, so that this signal will be operated whenever the control device, or any one of the control devices in a plural arrangement, is placed in an operative position. For this purpose the control device B of Figure 1 is provided with a suitable lamp 72 which is connected, as by the line conductors 73 and 74 and the switch elements of the portion 33, across the motor 14. In a system comprising a plurality of control devices, each of the lamps of the respective control devices are connected across the motor 14, as for example in the manner in which the lamps 72 and 72' are connected in the phonograph system of Figure 2. By this arrangement the signal lamp

will light whenever the control device is placed in an operative position, and all the lamps will light in a plural arrangement when any one of the control devices of this system are placed in an operative position. It is of course understood that any other suitable signalling system obtaining these general results may be employed.

Although I have shown and described a single preferred form of my invention, it will be understood that many changes and modifications may be made thereof without departing from the scope of my invention which I now undertake to express according to the following claims.

I claim:

1. The combination in a recording system including a phonograph having record-rotating means, a translating device adapted to cooperate with a record supported by said means, an input circuit for said device, and a power circuit system operable to start and stop said record-rotating means: of a unitary control device comprising a plurality of transmission circuits and a shorting circuit for said input circuit; a multiple switch operable to selectively connect said input circuit with said transmission circuits and with said shorting circuit; and means, controlling said power circuit system, for starting said record-rotating means as said selector switch is operated to connect said input circuit with said plurality of transmission circuits respectively, and for stopping said record-rotating means as said selector switch is operated to connect said input circuit with said shorting circuit.

2. The combination in a recording system including a phonograph having means for rotating a record, a signal input circuit, and a power system operable to control the rotation of the record: of a unitary control device comprising two compartments substantially completely electrostatically shielded from each other and respectively housing a plurality of signal transmission circuits and a portion of said power system; and a multiple selector switch having portions disposed in said compartments respectively, said switch portions being mechanically and insulatedly coupled with each other for simultaneous operation, one of said switch portions being adapted for selectively connecting said signal input circuit with said transmission circuits and the other of said switch portions being adapted to control said power system.

3. The combination with a recording phonograph having means for rotating a record, a signal input circuit, and an operable power circuit for stopping the rotation of the record: of a unitary control device comprising a plurality of transmission circuits and a multiple selector switch having two portions substantially completely electrostatically shielded from each other, said portions being mechanically coupled to each other for simultaneous operation and respectively adapted for shorting said signal input circuit and for opening said power circuit.

4. The combination in a recording system including a phonograph having record-rotating means, a control circuit for starting and stopping said record-rotating means, a signal input circuit, and a plurality of signal oscillation sources respectively having predetermined output levels: of a unitary control device comprising attenuating means for said several sources respectively, operable to adjust the levels of said several sources to a substantially common value; a shorting circuit for said input circuit; switch means for selectively connecting said input circuit with

said shorting circuit and with said oscillation sources through said respective attenuating means; and switch means, operated coincidentally with said first switch means, for closing said control circuit to start said record-rotating means as said input circuit is connected with said several sources respectively and for opening said control circuit to stop said record-rotating means as said input circuit is connected with said shorting circuit.

5. In combination, a recording phonograph having record-rotating means, a power circuit system operable to control said rotating means, a signal input circuit and a shield therefor; a plurality of electrical oscillation sources; and a unitary control device comprising switch means for controlling said circuit system to put said rotating means in operation and for simultaneously connecting said input circuit with said plurality of electrical oscillation sources respectively, and further comprising means for attenuating the level of said sources respectively at will and means common to said attenuating means for balancing the potential of said sources respectively with respect to the potential of said shield.

6. The combination with a phonograph having record-rotating means, a power circuit system operable to control said rotating means, and a shielded signal input circuit: of a unitary control device comprising a plurality of transmission circuits respectively adapted for being connected with anyone of a plurality of electrical oscillation sources, switch means for selectively connecting said input circuit with said transmission circuits and for disconnecting said input circuit from the same, switch means connected in said power circuit system and operated incidental to the operation of said first switch means for starting and stopping said record-rotating means, means for attenuating the level of said sources respectively, and means common to said attenuating means for balancing said sources respectively with respect to the shield potential of said input circuit.

7. The combination with a recording phonograph having controllable record-rotating means, a signal input circuit and a shield therefor: of a unitary control device comprising a plurality of transmission circuits, switch means adapted for putting said record-rotating means in operation and for selectively connecting said input circuit with said transmission circuits, and means operable to balance the potential of said input circuit with respect to the potential of said shield when said input circuit is connected with said several transmission circuits respectively.

8. In combination, a recording phonograph having controllable means for rotating a record and a signal input circuit, a plurality of unitary control devices each having operative and inoperative positions and comprising means for stopping the rotation of said record and for shorting said input circuit when all of said control devices are in their respective inoperative positions.

9. The combination in a system comprising a recording phonograph having an operating mechanism and a signal input circuit normally connected with a source of electrical oscillation: of a plurality of unitary control devices each characterized by inoperative and operative positions and collectively comprising means for shorting said input circuit and for disconnecting the same from said source and for rendering said operating mechanism inoperative, when all of

said devices are in their respective inoperative positions.

10. The combination with a recording phonograph having controllable record-rotating means, a signal input circuit and a shield for said circuit: of a unitary control device comprising a plurality of transmission circuits, switch means

adapted for putting said record-rotating means in operation and for selectively connecting said input circuit with said transmission circuits, and adjustable means for balancing the potential of said input circuit with respect to the potential of said shield.

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