

May 13, 1941.

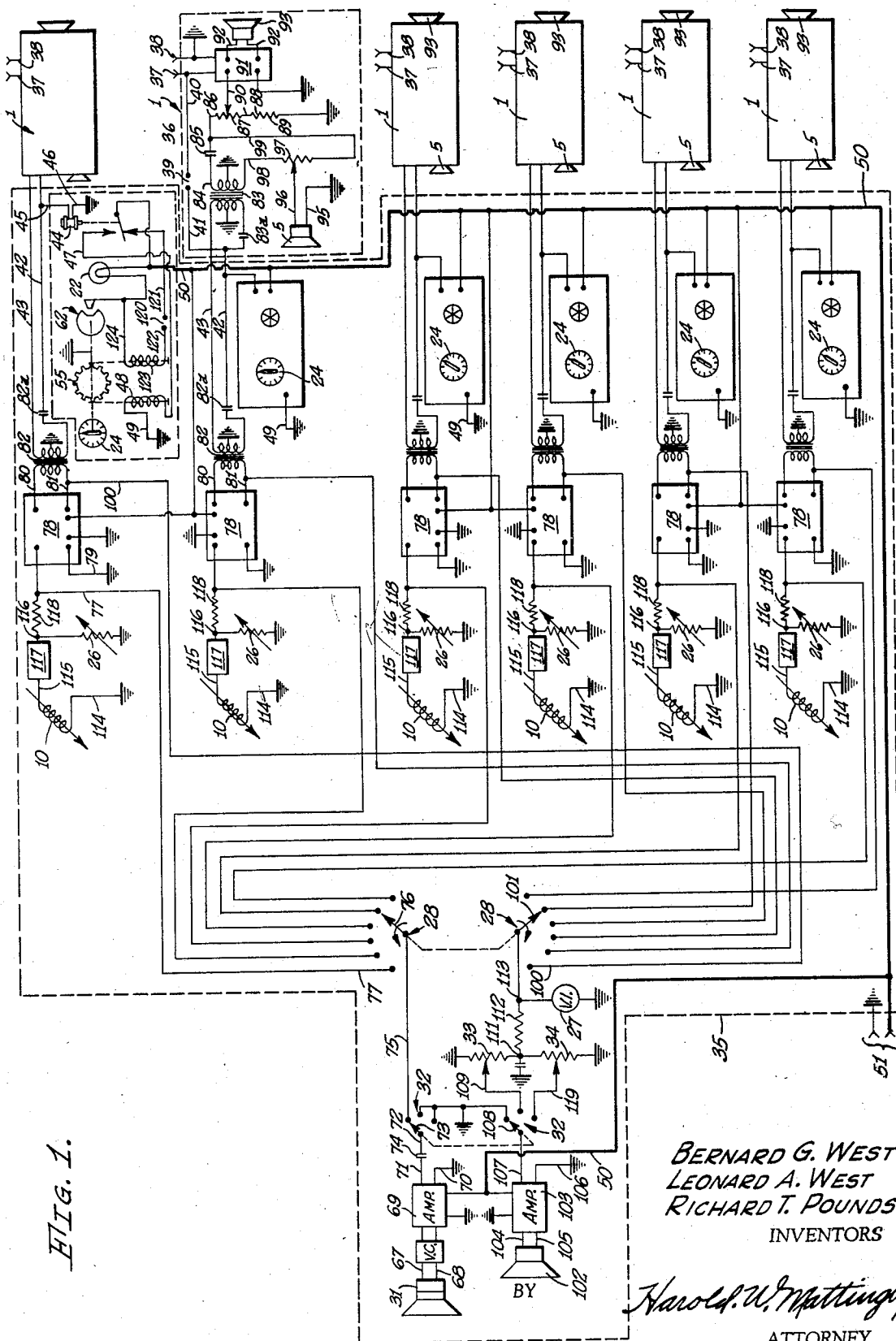
B. G. WEST ET AL.

2,242,197

SOUND REPRODUCING SYSTEM

Filed Feb. 11, 1939

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

FIG. 2.

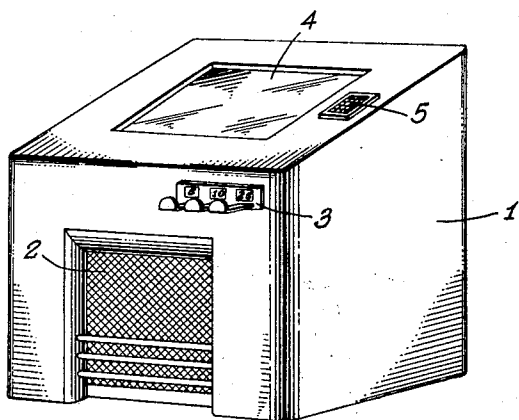


FIG. 3.

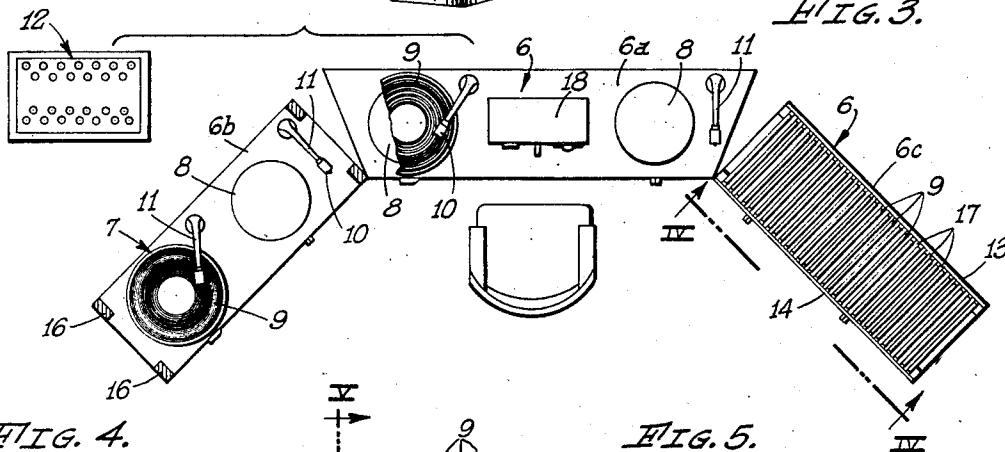


FIG. 4.

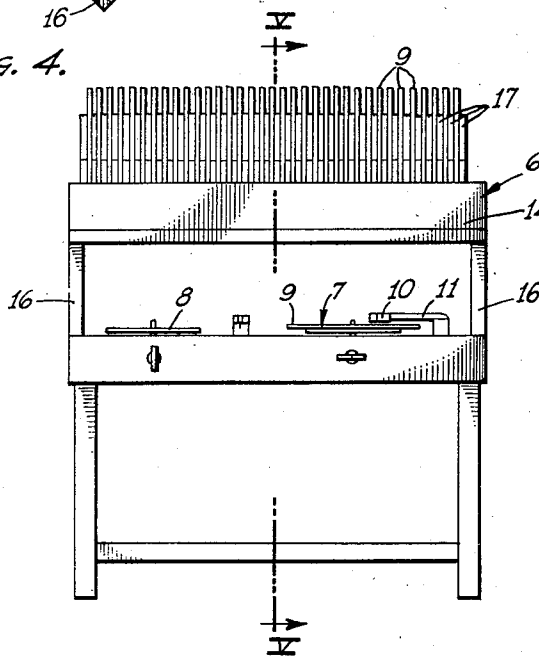
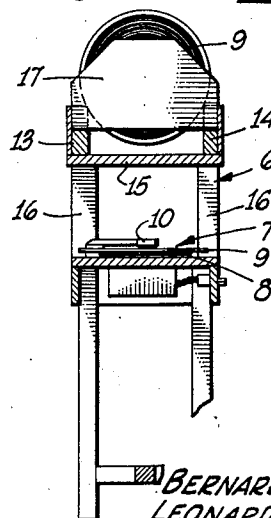


FIG. 5.



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3 Sheets--Sheet 3

FIG. 6.

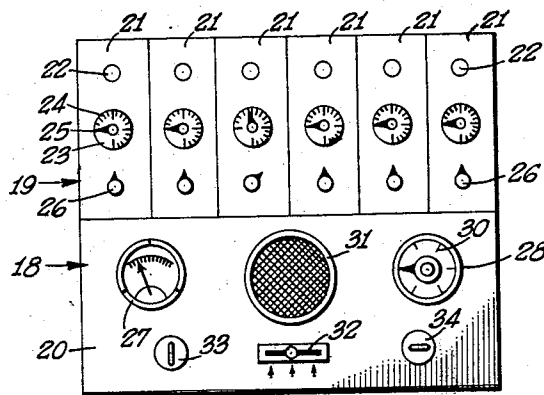


FIG. 7.

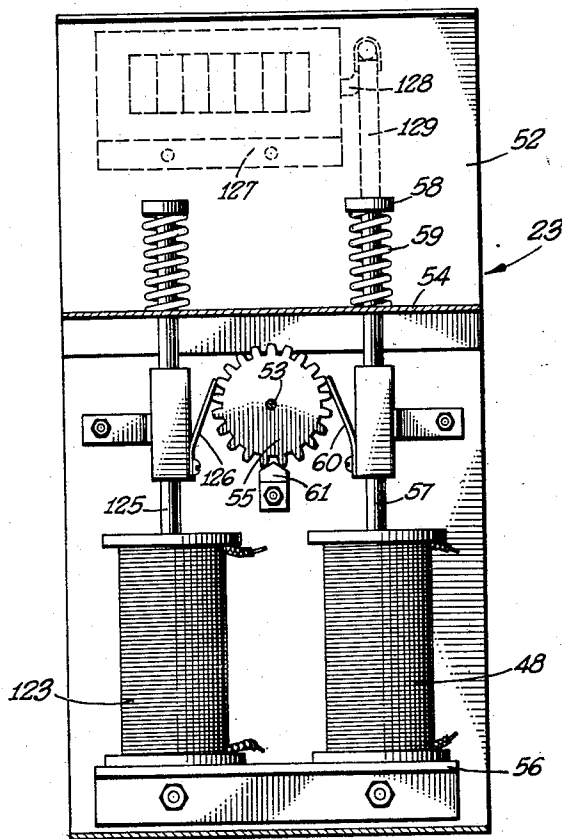


FIG. 8.

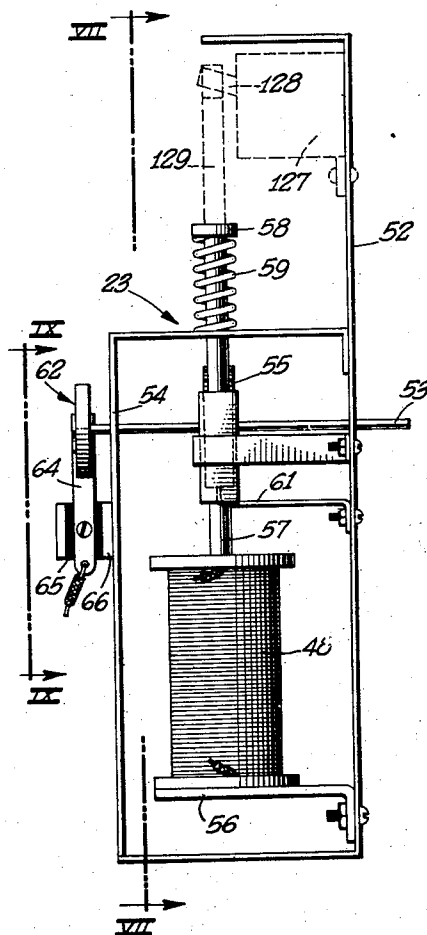
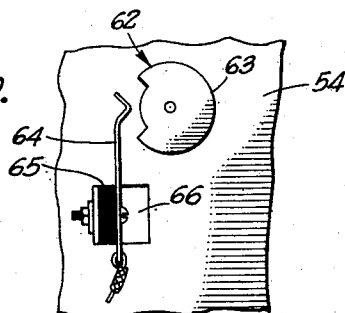


FIG. 9.



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2,242,197

SOUND REPRODUCING SYSTEM

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Application February 11, 1939, Serial No. 255,884

22 Claims. (Cl. 179-6)

Our invention relates to a sound reproducing system and has particular reference to a coin actuated system for reproducing phonographic recordings.

Coin operated phonographic reproducing devices are commonly employed in restaurants, cocktail bars, and like establishments as a means for providing music for their customers' pleasure. These devices are ordinarily equipped with a coin collecting device and a list or catalogue of the musical selections available. The device is arranged to be placed in operation by the insertion of a coin in the coin collecting mechanism after a button is pushed or a dial is set to a number representative of the chosen musical selection.

Devices of this character are very expensive since they include not only the phonographic reproducing equipment and coin collecting mechanism but a mechanical recording-selecting device which is responsive to complicated controlling mechanism for causing the reproduction of the one of the ten or fifteen selections available which was chosen by the person placing the device in operation. Furthermore, the number of musical selections available for choice is quite limited so that the selection desired by a customer is oftentimes not available with the result that the machine is not operated to the extent that it would be were there a wider selection of recordings available.

When devices of this type were introduced they became at once very popular because of their novelty. As soon, however, as this novelty wore off the above mentioned disadvantages began to predominate and the collections made by the devices reduced to a fraction of their initial value.

It is therefore an object of our invention to provide a coin actuated sound reproducing system in which a great number of recordings are available for selection.

It is a further object of our invention to provide a coin actuated sound reproducing system including controlling devices and reproducing equipment operating in such a novel manner that a customer's interest may be held over long periods of time.

It is also an object of our invention to provide a coin actuated sound reproducing system in which all of the phonographic recordings employed and all of the reproducing devices used therewith are disposed at a centrally located central station and connected to a plurality of remotely located control stations, each of which includes a sound producing device for reproducing at the control station the material recorded

on a phonographic recording at the central station and a coin collecting device for placing the system in operation.

It is also an object of our invention to provide a coin actuated sound reproducing system of the character set forth in the preceding paragraphs in which an indicating means is provided at the central station for indicating to an operator the insertion of a coin at any one of the remotely located control stations.

It is an additional object of our invention to provide a sound reproducing system of the character set forth in the preceding paragraphs in which the indicating means is actuated to inform the operator which station collected the coin and the value of the coin collected.

It is an additional object of our invention to provide a coin actuated sound reproducing system of the character set forth in the preceding paragraphs in which the indicating means operates to indicate the difference in value between the coins collected and the number of recordings reproduced at the control station and in which a registering device is employed to register the total value of coins collected at each control station.

It is a further object of our invention to provide a sound reproducing system of the character set forth in the preceding paragraphs in which a loud speaking, two-way telephone circuit is completed between the control and central stations upon the insertion of a coin in the control station coin collecting device so that a person desirous of hearing a particular recording reproduced at the control station may transmit his wishes to an operator at the central station.

It is also an object of our invention to provide a coin actuated sound reproducing system of the character set forth in the preceding paragraphs in which indicating means is provided at the central station for indicating the value of the coins collected at any control station and cooperating with a phonographic reproducer associated with that station for deducting from the amount so indicated the value of the recordings reproduced at said control station.

It is also an object of our invention to provide a sound reproducing system of the character set forth in the preceding paragraphs in which a single pair of conductors connecting the central station to one of the control stations is employed for transmitting to the control station the voice of the central operator and the reproduction of the recording and in which the same pair of conductors is employed for transmitting

to the central station the voice of a customer and the value of the coins collected at the control station.

It is a further object of our invention to provide a sound reproducing system of the character set forth in the preceding paragraphs in which a sound producing device and a sound responsive device are employed at the control station, together with means interconnecting said devices to a single pair of wires extending to the central station in such manner that sound received by the sound responsive device is transmitted to the central station without being reproduced by the sound reproducing device, while sound transmitted from the central station to the control station over the same pair of conductors is reproduced by the sound reproducing device.

Other objects and advantages of our invention will be apparent from a study of the following specifications, read in connection with the accompanying drawings, wherein:

Fig. 1 is a schematic wiring diagram illustrating the electrical connections and the equipment employed at a central station and at each of a plurality of control stations and illustrating the interconnections between the central station and played at a control station;

Fig. 2 is a perspective view illustrating the appearance of one form of a remote unit employed at a control station;

Fig. 3 is a plan view illustrating the relative locations of the equipment employed at a central station;

Fig. 4 is a fragmentary elevational view taken substantially along the line IV—IV of Fig. 3 illustrating the appearance of a portion of the equipment employed at the central station and illustrating the details of construction of a record filing rack;

Fig. 5 is a fragmentary sectional view taken substantially along the line V—V of Fig. 4 to illustrate additional details of construction of the record filing rack;

Fig. 6 is an elevation illustrating the relative locations of certain control equipment employed on a control panel located at the central station;

Fig. 7 is a rear view of a coin indicating and registering mechanism which is employed as one of the units incorporated in the control panel, Fig. 7 being taken substantially along the line VII—VII of Fig. 8;

Fig. 8 is an elevational view illustrating additional details of construction of the coin indicating and registering mechanism; and

Fig. 9 is a fragmentary elevational view taken substantially along the line IX—IX of Fig. 8 illustrating the details of construction of a cam actuated switch mechanism employed on the coin collecting and registering mechanism.

We have illustrated in the accompanying drawings the preferred embodiment of the sound reproducing system of our invention as including a central sound reproducing station which is operatively connected to a plurality of outlying control stations, six of these control stations being shown in Fig. 1 for the purposes of illustration. Briefly stated, the system of our invention provides equipment at the central station which is responsive to the insertion of a coin in any one of a plurality of coin collecting devices located at each of the control stations for apprising a central station operator of the fact that a customer at that control station is desirous of

hearing a phonographic recording reproduced for his pleasure. In response to the signal transmitted to the central station, the central station operator inquires by means of a two-way loud speaking telephone circuit which extends between the central station and the control station the number or title of the particular phonographic recording which the customer is desirous of having reproduced. This information is relayed by the same telephonic system from the customer to the central operator who then operates reproducing equipment located at the central station to cause reproduction at the control station of the desired phonographic recording.

The equipment which comprises each of the control stations is constructed in the preferred embodiment of our invention along the lines illustrated in Fig. 2 and includes a housing or cabinet 1 which is provided in its front face with a loud speaker grill 2 behind which is concealed a signal receiving means which may comprise a suitable sound producing or loud speaking device (not shown) adapted to convert electrical undulations to corresponding sound undulations. The loud speaker may be of any well known type and preferably includes also suitable amplifying equipment (not shown) for amplifying relatively weak signals transmitted to the unit from the central station to a sufficient intensity to provide the desired volume of reproduction from the loud speaker.

The equipment is placed in operation by a customer at any one of the control stations operating a signal producing means as by placing a coin in a conventional coin collecting mechanism 3 which may be mounted on the front side of the cabinet 1 in a readily accessible position. Prior to placing the equipment in operation, the customer chooses from an index or catalogue which may be disposed behind a transparent upper panel 4 in the cabinet 1 the particular phonographic recording he wishes to hear reproduced. In order that the customer after having placed the equipment in operation may convey his desires to the central station operator, we provide a microphone or sound responsive device 5 mounted in any convenient location in the cabinet 1 which will receive the sound undulations from the customer's voice and operate to transmit corresponding electrical undulations to the central station.

The equipment which is provided at the central station is preferably arranged, in the preferred embodiment of our invention, in the fashion illustrated in Fig. 3. This arrangement includes a U or C shaped table 6 including a central control section 6a and right and left wing sections 6b and 6c. We provide upon the upper face of the table 6 a plurality of phonographic reproducing units 7. Each of the reproducing units 7 includes a phonographic turn table 8 which is adapted to removably receive a phonographic recording or record tablet 9. A phonographic reproducer 10 is mounted upon a suitable tone arm or pivotal supporting member 11 in a position to traverse the sound track engraved on the record tablet 9 as the tablet 9 and turn table 8 is rotated by any suitable drive means (not shown). The required amplifying equipment associated with the phonographic reproducers 10 may be mounted in an amplifier rack indicated generally at 12 in Fig. 3.

One of the outstanding advantages to be derived from the use of the system of our invention resides in the ability to provide a very large

number of phonographic recordings from which the customer may choose. We accordingly dispose above each of the wing sections 6b and 6c a rack or filing case for storing a large number of phonographic recordings or record tablets. These racks are preferably constructed as illustrated in Figs. 4 and 5 and comprise a pair of longitudinally extending rail members 13 and 14 which are supported upon a shelf member 15 carried a convenient distance above the top of the table sections 6b and 6c by means of supporting legs 16. We provide a plurality of partitions 17 which extend upwardly and between each of the rails 13 and 14. Each of the partitions 17 are placed in a position closely adjacent adjoining partitions 17 so as to provide narrow spaces or bins therebetween adapted to receive in an edgewise fashion one of the record tablets 9. Indexing of the multiplicity of the record tablets 9 filed in this fashion may be obtained by providing suitable numbers or indicia inscribed on the face of the front rail 13 in a position disposed directly below the particular tablet 9 to which such indicia refers. By filing the record tablets 9 in this closely adjacent, edgewise fashion a very large number of record tablets may be stored and indexed in a small space in such manner that any selected one of these record tablets may be readily found and removed from its rack and placed upon one of the turn tables 8.

In order that the central station operator may have complete control of the central station equipment, we provide on the control section 6a of the table 6 a control panel 18 which may be constructed along the lines indicated in Fig. 6. The control panel illustrated in Fig. 6 includes an upper section 19 and a lower section 20. We prefer to incorporate in the upper section 19 the equipment which is associated with each of the remotely located control stations and accordingly divide this section into six sub-sections 21. Each of the sub-sections 21 carries a warning light 22, the illumination of which is employed to inform the central station operator that a customer at the control station corresponding to that light is desirous of having a phonographic recording reproduced at his station.

The coin collecting devices which are employed at the control stations are preferably adapted to collect three different sizes of coins, in the preferred embodiment of our invention, nickels, dimes, and quarters. In order that the central station operator may be informed of the value of the coin inserted in the coin collecting mechanism, we provide a signal receiving means comprising an indicating device 23 which includes a scale 24 and a pointer 25 adapted to move over the graduated scale 24. The scale 24 is preferably graduated in units which correspond to the value of a nickel so that if the pointer 25 has moved up one division, the central operator will know that a nickel has been inserted in the coin collecting mechanism, and that if the pointer 25 has been moved up two or five divisions, she will be informed that a dime or a quarter, respectively, has been inserted in the coin collecting mechanism.

Each of the sub-sections 21 also carries a volume control unit 26 which we connect in circuit with the associated reproducing unit 10 so that the sound level in the circuit connecting with the control station may be adjusted and observed on a volume indicating device 27 which is mounted on the lower panel section 20. The lower section 20 of the panel is also provided with a

rotary switch or selector means 28 which includes a control knob and pointer 29 adapted to be moved in a rotary fashion over a scale 30. The scale 30 carries a number of graduations representing control connections which may be established by the selector means 28, the number of such connections being made equal to the number of control stations employed with the system of our invention.

The selector means 28 is employed in a manner to be described hereinafter to connect certain central station controlling equipment to any one of the units located at the various control stations, this equipment including a signal producing means for acknowledging the deposit of a coin, shown herein as comprising a microphone 31 into which the central operator may speak in order to inquire of the customer at the calling control station the particular phonographic recording he wishes to hear reproduced and which may also be used for verifying the indicia employed to refer to such phonographic selection.

In order that the microphone 31 may be left normally out of the circuit to the control station selected by the selector means 28, we provide a three-position transfer switch 32 which is adapted to be manually moved into any one of three available positions so that the microphone 31 may be cut into the circuit to the selected control station for the purposes set out hereinbefore or so that a monitor loud speaker (not shown) mounted in the amplifier rack 12 may be connected through a volume control unit 33 to said control station or so that said monitor loud speaker may be connected through another volume control unit 34 to the selected control station, the volume control units 33 and 34 serving different purposes as will be explained in detail hereinafter.

The manner in which the monitor speaker and the other above described apparatus is employed in the operation of the system may best be understood by having reference to the schematic wiring diagram (Fig. 1). In Fig. 1 we have enclosed in dashed lines indicated by the reference character 35 all of the equipment located at the central station, while each of the six control stations are indicated by the reference character 1.

We have illustrated also in Fig. 1 the electrical connections and the equipment employed at one of the six identical control stations, this equipment being illustrated in Fig. 1 as enclosed in dashed lines 36. Power for the operation of the control station equipment may be derived from any suitable available local source of power and connected to the equipment mounted within the cabinet 1 by means of conductors 37 and 38.

In order to describe the manner in which the previously described equipment operates, we will assume certain operating conditions and describe the manner in which the equipment operates under these assumed conditions. Let us assume therefore that the control station equipment has been connected to a suitable source of power through conductors 37 and 38 and that the customer at the control station has placed the equipment in operation by inserting a coin in one of the coin receiving apertures in the coin collecting mechanism 3.

The coin collecting mechanism 3 is of any one of a number of well known types and includes electrical switch contacts 39 which are maintained normally in an open circuit position but which cooperates with associated mechanism

to close their circuit momentarily a number of times which is equal to the number of nickels represented by the coin inserted in the coin collecting mechanism. In other words, the equipment associated with the contacts 39 is so arranged that should a nickel be inserted in the assigned coin receiving aperture, the contacts 39 will be momentarily closed once but if a dime or a quarter is inserted, these contacts will be closed momentarily two times or five times, respectively.

The operation of inserting a coin in the coin collecting device 3 may apprise the central operator of the fact that a customer is desirous of hearing a phonographic recording reproduced at the control station and the monetary value of the coin collected by the coin collecting device may also be indicated to the central station operator by connecting the switch 39 by means of conductors 40 and 41 between the power supply conductor 37 and one of a pair of line conductors 42 and 43 which extend from the control station to the central station so that insertion of a coin in the coin collecting device 3 will cause the line conductor 42 to be energized momentarily a number of times which is equal to the number of monetary value units included in the coin inserted in the coin collecting device and by connecting one side of a relay coil 44 between the line conductor 42 and ground by means of conductors 45 and 46. Thus the relay 44 may be momentarily energized and deenergized a number of times which is equal to the number of monetary value units in the coin collected by the coin collecting device.

This operation of the relay may be caused to register on the indicating dial 24 the appropriate number by grounding the supply conductor 38 and extending a conductor 47 between a normally open contact of the relay 44 and a solenoid 48 of the indicating mechanism 23 and by grounding, through a conductor 49, the other terminal of the solenoid 48. Power may in this fashion be supplied through the normally open contacts of the relay 44 to the solenoid 48 by connecting said normally open contacts also to a control bus 50 which is connected to the ungrounded line of a suitable central station power supply indicated in Fig. 1 generally at 51.

The manner in which the energization of the solenoid 48 causes a number of monetary value units included in the coin collected by the coin collecting device 3 to be indicated on the dial 24 may best be understood by having reference to Figs. 7, 8 and 9 which illustrate the details of construction of the indicating device 23. This mechanism preferably includes a frame 52 which is adapted to be secured to the rear side of one of the sub-sections 21 of the control panel 18 and includes a dial shaft 53 adapted to protrude through the panel and receive the pointer 25. The dial shaft 53 may be journaled for rotation in suitable apertures provided in the supporting plate 52 and a bearing bracket 54 disposed to the rear of the supporting plate 52 and secured thereto.

We non-rotatably secure to the dial shaft 53 a toothed wheel or a gear 55 in a position disposed between the supporting plate 52 and the bearing bracket 54. The solenoid 48 is preferably supported upon a shelf member 56 secured to the supporting plate 52 and disposed below the toothed wheel 55 so that an armature 57 of the solenoid 48 may rise from the solenoid and pass the toothed wheel 55. The armature 57 is provided at its upper end with an adjusting nut 58

which cooperates with a compression spring 59 restrained between the adjusting nut 58 and the upper surface of the bearing bracket 54.

The spring 59 is arranged to normally urge the armature 57 upwardly and move the armature 57 into its uppermost position when the solenoid 48 is de-energized. The spring 59 is made of such strength that the energization of the solenoid 48 will overcome the effect of the spring 59 and move the armature 57 downwardly. The armature 57 carries a spring member 60 which is adapted to operate as a pawl relative to the toothed wheel 55 so that energization and subsequent de-energization of the solenoid 48 causes the spring 59 to rotate the toothed wheel 55 a distance corresponding to one tooth thereof through engagement therewith of the spring member 60. We provide a detent or indexing spring 61 for holding the toothed wheel 55 in its last operated position.

It will be observed that since the solenoid 48 is energized and then de-energized in the manner previously described a number of times which is equal to the number of monetary value units included in the coin collected by the coin collecting means 3, the dial shaft 53 and the pointer 25 carried thereby will be moved around an equal number of notches to cause the pointer 25 to indicate on the scale 24 the number of such monetary value units collected.

We prefer to warn the central operator in a forceful manner that a coin has been inserted in the coin collecting device and for this purpose we employ the previously mentioned warning light 22. The warning light 22 may be connected in a circuit between the control bus 50 and ground through a cam operated switching device 62 which is incorporated as a part of the indicating device 23 and which may be provided by extending the dial shaft 53 through the bearing bracket 54 and mounting on the rearward end thereof a segment wheel or cam member 63. The cam member 63 is connected to ground by any suitable means such as by grounding the supporting plate 52 and is arranged to contact a spring switch finger 64 as soon as the dial shaft 53 has been moved one notch from its "off" position. The spring switch member 64 is accordingly mounted in any suitable manner upon an insulating block 65 which is in turn carried by an angle bracket 66 secured to the bearing bracket 64.

By providing an indicating mechanism of this type, the central station operator may be instantly apprised of the fact that a coin has been collected by the coin collecting mechanism and the monetary value of the coin collected. It will be further observed that this indicating and warning mechanism operates not only to relay this information to the central station operator, but operates also to inform her which one of the six control stations is calling. The central station operator may readily recognize which of the control stations is calling since each of the warning lights 22 is associated with but one of the control stations and the position of one of the lights 22 on the control panel 18 relative to the others is representative of the associated control station.

As soon as the operator is apprised of the fact that a coin has been collected by the coin collecting mechanism 3, she may respond to the call by turning the rotary switch 28 to a position corresponding to the calling control station.

This will establish the required connections to place her microphone 31 in connection with the loud speaking device included in the control station equipment so that her request that the customer announce the number or indicia referring to the desired phonographic recording will be transmitted to the customer.

As illustrated in Fig. 1, we accordingly connect the microphone 31 by means of a pair of conductors 67 and 68 to the input of a microphone amplifier 69. Power for operation of the amplifier 69 may be obtained from the previously described control bus 50. One of the output terminals of the amplifier 69 may be connected to ground by means of a conductor 70 and the other terminal may be connected by conductors 71 and 72 to one of the movable blades 73 of the three-position switch 32 through an isolating condenser 74 so that speech sounds emitted into the microphone 31 will cause a corresponding voltage to be amplified by the amplifier 69 and applied between the blade 73 and ground.

We assign the first position of the three position switch 32 to the transmitting or "talk" position and accordingly connect the contact terminal corresponding to the first position by means of a conductor 75 to a wiper arm 76 of the first level of the selector means 28. As soon as the operator turns the selector means 28 to a position corresponding to the calling control station, connection will be established by the wiper arm 76 between the conductor 75 and a conductor 77 connecting a selector contact located at that switch position to the input terminal of a reproducing line amplifier 78, the other input terminal of which is grounded by means of a conductor 79. Power for the operation of this amplifier may likewise be derived from the control bus 50.

The output terminals of the amplifier 78 are connected by means of conductors 80 and 81 to the primary winding of a line transformer 82, the secondary of which is arranged to have its midpoint grounded and one of its end terminals connected to the line conductor 43 while the other end terminal is connected to the line conductor 42 through an isolating condenser 82a. In this fashion speech sounds emitted by the central station operator into her microphone will cause corresponding electrical undulations to be amplified by the microphone amplifier 69 and by the reproducing amplifier 78 and applied to the line conductors 42 and 43 over which such amplified undulations are transmitted to the control station unit 1.

In order that these electrical undulations may be reproduced as sound in the presence of the customer who placed the equipment in operation, we connect the line conductor 43 to one terminal of the primary winding of a line transformer 83 and the conductor 42 to the other primary terminal through an isolating condenser 83a. The isolating condensers 82a and 83a are chosen of such capacitance as to isolate the conductor 42 from ground as regards direct current and low frequency alternating current to permit operation of the coin indicating device in the manner described while providing a low impedance circuit through these condensers for currents of voice frequency. The secondary winding of the transformer 83 preferably has its midpoint grounded and one of its end connections extended by means of a conductor 84 to an isolating condenser 85. The other side of the isolating condenser 85 may be connected by means of a

conductor 86 to one end of the resistance member comprising a volume control potentiometer 87. The other terminal of the resistance portion of the potentiometer 87 may be connected to ground through a conductor 88 and a volume control limiting resistor 89, while the wiper arm of the potentiometer 87 may be connected by means of a conductor 90 to the input of a control station amplifier 91, the output terminals of which are connected by means of conductors 92 to a loud speaking device 93. Power for the operation of the amplifier 91 is preferably derived from the power conductors 37 and 38.

It will be observed that speech currents which are transmitted by the line conductors 42 and 43 to the line transformer 83 will cause corresponding speech voltages to appear between the conductor 84 and ground. These voltages will be transmitted through the isolating condenser 85 and the volume control potentiometer 87 to the input of the amplifier 91, amplified thereby and reproduced as sound by the sound producing device 93. The sound volume may be adjusted by means of the volume control unit 87, the volume control limiting resistor 89 being employed to establish a minimum sound level below which it is impossible to attenuate the reproduction, thus preventing inadvertent incapacitating of the control station by reducing the sound level to an inaudible value.

It will be observed that this equipment operates to reproduce as sound in the presence of the person who placed the equipment in operation a stated inquiry by the central operator, such as "number please" referring to the number or indicia representative of the particular phonographic recording that person wished to hear reproduced.

The microphone 5 which is provided at the control station 1 may be employed by the customer to inform the central operator of the particular phonographic recording he wishes to hear reproduced. We accordingly connect one terminal of the microphone 5 to ground by means of a conductor 95 and the other terminal by means of a conductor 96 to the arm portion of a balancing potentiometer 97. One end of the resistance portion of the potentiometer 97 is connected by means of a conductor 98 to one terminal of the secondary winding of the line transformer 83, the other end of the resistance element of the potentiometer 97 being connected by means of a conductor 99 to the previously described conductor 86 which feeds the input of the control station amplifier 91.

Attention is called to the fact that alternating current voltages corresponding to sounds emitted in the microphone 5 are impressed between the conductor 96 and ground and that after passing through the resistance portions disposed on either side of the movable arm of the potentiometer 97 then appear between the conductors 98 and ground and between conductors 99 and ground. As previously stated, the conductor 99 is connected directly to the input circuit of the control station amplifier 91, while the conductor 98 also connects to the input thereof but includes in such connection the secondary winding of the line transformer 83 and the isolating condenser 85. As is well known to those skilled in the art, the isolating condenser 85 operates not only to isolate the circuits as regards direct current potentials, but also operates to invert the phase relationships between the voltage polarity and time as the current is passed through this condenser. It is thus

apparent that voltages which are impressed by the microphone 5 on conductors 98 and 99 will both be applied to the input circuit of the control station amplifier 91 but oppositely in polarity relative to each other. By adjusting the position of the arm portion of the potentiometer 97 relative to the resistance portion thereof, these voltages may also be made to correspond in magnitude so that the voltages impressed on the input of the control station amplifier 91 over these two circuits will be canceled out. It follows then that speech voltages generated by the microphone 5 will cause corresponding voltages to appear across the line transformer 83 but will not cause any of the sounds emitted in the microphone 5 to be reproduced by the amplifier 91 and its associated loud speaker 93. Speech voltages thus impressed across the secondary of the transformed 83 will cause corresponding voltages to be transmitted to the central station over line conductors 42 and 43.

In order that these speech voltages may be reproduced as sound in the presence of the central operator, we connect a control wire 100 to the conductor 81 which is connected to the line transformer 82 so that speech voltages appearing between the line conductors 42 and 43 will, in this fashion, be also impressed between the conductor 100 and ground. The conductor 100 is accordingly extended and connected to the contact point on the second level of the selector switch 28 which is representative of the calling control station, so that a wiper arm 101 of this second level will be placed in contact with the conductor 100 when the switch is moved to the corresponding position as previously described.

We have arranged the equipment in such manner that the speech voltages appearing between the conductor 100 and ground are reproduced as sound in the presence of the central operator by means of a monitor loud speaker 102 which is connected to the output of a monitor amplifier 103 as by means of conductors 104 and 105. Power for the operation of this amplifier is also derived from the control bus 50. The monitor amplifier 103 preferably has one of its input terminals grounded as by means of a conductor 106 and the other input terminal connected by means of a conductor 107 to a second blade member 108 of the three-position switch 32. Whenever the central station operator wishes to hear the voice of the customer at the control station, she moves this switch to its second position. We accordingly connect a conductor 109 between the second terminal associated with the blade 108 and a wiper arm portion of a volume control potentiometer 33 whose resistance portion is preferably connected between ground and a conductor 111 which connects through a volume control limiting resistor 112 to another conductor 113 which is in turn connected to the wiper arm 101 of the selector switch 28. It will be seen that this circuit provides a connection between the aforementioned control conductor 100 and the input of the amplifier 103 and includes therein the volume control unit 33 so that the operator may employ the volume control 33 to adjust the volume of reproduction of the customer's voice to suit her requirements.

As soon as the central operator obtains from the customer the number of the phonographic recording desired, she then removes this record tablet from its rack, places it on the turn table which is associated with the calling station, starts the rotation of the record tablet and places the

stylus of the reproducing device 10 at the start of the record.

The reproducing device 10 preferably has one of its terminals connected to ground by means of a conductor 114 and its other terminal connected by means of conductors 115 and 116 through a frequency equalizing pad 117 to its associated volume control unit 26. The frequency equalizing pad 117 may be adjusted in any suitable manner, but in the preferred embodiment of our invention is arranged to attenuate the high frequencies to provide a compensation for the inherent attenuated low frequency characteristics of standard phonographic recordings and reproducing devices. The volume control unit 26 is preferably connected between the conductor 116 and ground so that variations in its resistance will operate to vary the potential between conductor 116 and ground.

The conductor 116 is preferably connected to the input of the previously described reproducing amplifier 78 through a coupling resistor 118 which is connected to the speech transmission conductor 77 and operates to effectively isolate this conductor from the volume control unit 26 so that adjustment of the volume control 26 will have little or no effect upon the volume level of speech sounds transmitted to the line conductors 42 and 43 from the central station microphone 31.

The alternating voltages corresponding to material recorded on the phonographic recording will, in this fashion, be amplified by the amplifier 78 and transmitted over the line conductors 42 and 43 and be reproduced as sound by the control station amplifier 91 and its associated loud speaker 93.

We also provide a means which permits the central station operator to monitor the reproduction effected by the reproducing device 10 and for checking the volume level of the transmitted reproduced material. We prefer that this be accomplished by moving the three-position switch 32 to its third position. We accordingly connect the contact terminal which is engaged by the blade 108 thereof in its third position by means of a conductor 119 to the wiper portion of the volume control potentiometer 34. The volume control potentiometer 34 is connected between ground and the previously described conductor 111 so that voltages which are transmitted from the output of the reproducing amplifier 78 through conductor 100 and the selector means 28 may be transmitted through the volume control potentiometer 34 to the input of the monitor amplifier 103 to cause reproduction of the recorded material by the monitor loud speaker 102. We prefer to ground the unused contacts of the three-position switch 32, such as the first contact associated with blade 108 and the second and third contacts associated with the blade 73, so that the grid circuits of the various amplifiers associated with the switch 32 may always be provided with a ground return to insure stable operation of these amplifiers.

Since the volume level of the communications from the control station are much lower than the level of the phonographic reproduction, the provision of independent volume controls 33 and 34 for the respective operations of listening to communications from the control station and for monitoring the reproduction of the phonographic recordings permits the central station operator to adjust these controls initially to provide the desired reproduction so that further adjustment is either obviated or reduced to a minimum. The

volume level of the reproduced material may be checked by the central operator having reference to the volume indicator 27 which may be of a well known type and connected between the input conductor 113 and ground.

We prefer to adjust the various amplifiers and associated equipment in such fashion that the actual signal level transmitted over the line conductors is as low as, or lower than the signal levels employed in the standard telephone circuits. This low level transmission permits the employment of a pair of wires included in a multi-pair telephone cable for the line conductors 42 and 43 and permits the use of the remaining cable pairs for standard telephonic service without interference or "cross-talk." While higher signal levels may be employed if desired, we prefer to operate the equipment at the relatively low transmission level described, since cable pairs may be leased from a telephone company if their requirements are met and thus the high expense of providing long line conductors may be avoided.

In addition to the foregoing control mechanism, we provide a means for automatically deducting from the number of monetary value units which is registered by the indicating device 23 a number of monetary value units which is equal to the number of complete phonographic recordings that have been reproduced at the control station since the insertion of the last coin. For this purpose we employ a limit switch 120 (see Fig. 1) which is preferably of the normally open type and arranged to be actuated by the reproducing tone arm 11 when the reproducing device 10 has been caused to traverse all of the material recorded on one of the record tablets 9. One of the terminals of the limit switch 120 is connected by means of a conductor 121 to a normally closed contact of the relay 44, the other terminal of said normally closed contact being connected to the control bus 50. The other terminal of the limit switch 120 is connected by means of a conductor 122 to one terminal of a reset solenoid 123 associated with the indicating device 23, the other terminal thereof being connected to ground through a circuit 124 which includes the previously described cam switch 62.

It will be observed that conductor 124 will be connected to ground whenever a coin has been inserted in the coin collecting device 3 to cause the registration by the indicating device 23 of a number of monetary value units. It will be remembered also that as soon as the actual operation of moving the indicating device 23 to its proper indicating position has been completed, the relay 44 is de-energized so as to close its normally closed contacts and connect the conductor 121 to the control bus 50. It follows then that as soon as the reproducing device 10 has been caused to traverse all of the recorded material on the record tablet 9 to close the contacts 120, the reset solenoid 123 will be energized.

The manner in which the energization of the solenoid 123 operates to deduct one monetary value unit from the number of monetary value units indicated by the indicating device 23 may be best understood by having reference to Figs. 7, 8 and 9. The solenoid 123 is preferably constructed in a manner identical to the indicating solenoid 48 previously described and is similarly provided with an armature 125 carrying an operating spring 126. The solenoid 123 and its associated mechanism is disposed on the opposite side of the toothed wheel 55 and arranged to cooperate

therewith in a manner identical to the previously described actuating solenoid 48.

It will be observed that the disposition of the reset solenoid 123 on the opposite side of the toothed wheel 55 causes its operation to result in a reverse rotation of the toothed wheel 55 relative to the rotation imparted to it by the indicating solenoid 48. It is apparent then that energization of the solenoid 123 in the manner previously described will cause the toothed wheel and the pointer 25 secured to the pointer shaft 53 to be moved back one notch to indicate on the scale 24 one less monetary value unit.

It will be further apparent that as soon as the same number of phonographic recordings have been reproduced as were represented by the number of monetary value units indicated by the dial 24, the cam switch 62 will be opened and will in this fashion extinguish the warning light 22. The darkening of the warning light 22 then apprises the central station operator that all of the phonographic recordings which have been paid for have reproduced and that no more recordings should be reproduced until additional coins are collected by the coin collecting device.

In case it is desired to keep a visual record of the total value of coins collected by each coin collecting device, a suitable counter or registering device 127 of a well known type may be mounted on the back of the mounting plate 52 of the indicating device 23 in a position disposed above the adjusting nut 58 of the indicating solenoid armature 57, this position being illustrated by dotted lines in Figs. 7 and 8. An operating arm 128 of the registering device 127 may be connected to the upper end of the armature 57 by means of a suitable connecting link 129 so that each operation of the indicating solenoid 48 in accordance with the number of monetary value units collected by the coin collecting device 3 will cause each such unit to be permanently registered by the registering device 127.

It will be apparent that this registration is permanent and is not effected by the reset solenoid 123 as is the indicated value indicated by the dial 24 and pointer 25.

Attention is called to the fact that the coin collecting device and the central station coin indicator are always maintained in an operative condition regardless of whether or not the equipment is actually reproducing phonographic recordings.

While we have described the foregoing equipment in terms of operations performed at one of the six control stations illustrated, the description is to be understood to apply as well to any one of these stations since we intend that each of the control stations and each of the groups of equipment which is located at the central station and definitely associated with a control station be constructed in a manner identical to that just described and interconnected in an identical manner. It will be observed that the control conductors 77 and 100 which connect to the selector device 28 are assigned only to the particular control station about which the previous description has centered. We provide corresponding pairs of conductors associated with each of the other control stations which are connected to corresponding points on their associated levels of the selector means 28 so that when this selector is turned to a position corresponding to any selected control station, the central station microphone 31 and the monitor loud speaker 102, together with their associated amplifying and con-

trolling equipment will be connected into the circuits extending to the selected control station in a manner identical with that previously described.

While the operation has been described in connection with but one of the control stations, it is apparent that the use of independent coin indicating devices and reproducing equipment in connection with the previously described control, transfer, and selector devices permits the simultaneous reproduction of different phonographic recordings at any number of control stations. We have shown and described the system of our invention as employing six control stations, but comprehend the use of more or less as conditions may require, there being employed one set of reproducing and coin indicating equipment and one position on the selector means 28 for each of the stations so connected.

While we have shown and described the preferred embodiment of our invention, we do not desire to be limited to any of the details of construction shown or described herein, except as defined in the appended claims.

We claim:

1. In a sound reproducing system, the combination of: a central station having a plurality of reproducing units thereat, each of which includes a reproducing means for reproducing previously recorded material from a record tablet; a plurality of control stations, one for each of said reproducing means, situated remotely from said central station and having sound producing means thereat; means connecting each of said sound producing means to its associated reproducing means for reproducing at said control station previously recorded material reproduced by the associated reproducing means; manually operable control means at each of said control stations; an indicating means at said central station for each of said control means responsive to operation thereof for indicating to an operator at said central station operation of the associated control means; sound responsive means at said central station; selector means at said central station for selectively connecting said sound responsive means to any one of said sound producing means; another sound responsive means at each of said control stations; another sound producing means at said central station; and transfer means at said central station cooperating with said selector means and operable by said operator for connecting said sound responsive means to said sound producing means selected by said selector means and for connecting said other sound responsive means to said other sound producing means, whereby telephonic communication is established between said operator and a person at said control station.

2. In a sound reproducing system, the combination of: a central station having a plurality of reproducing units thereat, each of which includes a reproducing means for reproducing previously recorded material from a record tablet; a plurality of control stations, one for each of said reproducing means, situated remotely from said central station and having sound producing means thereat; a single circuit means connecting each of said sound producing means to its associated reproducing means for reproducing at said control station previously recorded material reproduced by the associated reproducing means; manually operable control means at each of said control stations connected to said single circuit means; an indicating means at said central station for each of said control means connected

to said single circuit means and responsive to operation of said associated control means for indicating to an operator at said central station operation of said associated control means; sound responsive means at said central station; and selector means at said central station for selectively connecting said sound responsive means to any one of said single circuit means to actuate the associated sound producing means, whereby said operator may acknowledge verbally the operation of a control means at any selected one of said control stations.

3. In a sound reproducing system, the combination of: a central station having a plurality of reproducing units thereat, each of which includes a reproducing means for reproducing previously recorded material from a record tablet; a plurality of control stations, one for each of said reproducing means, situated remotely from said central station and having sound producing means thereat; a single circuit means connecting each of said sound producing means to its associated reproducing means for reproducing at said control station previously recorded material reproduced by the associated reproducing means; manually operable control means at each of said control stations connected to said single circuit means; an indicating means at said central station for each of said control means connected to said single circuit means and responsive to operation of said associated control means for indicating to an operator at said central station operation of said associated control means; sound responsive means at said central station; selector means at said central station for selectively connecting said sound responsive means to any one of said single circuit means to actuate the associated sound producing means; another sound responsive means at said control station; another sound producing means at said central station; and transfer means at said central station cooperating with said selector means and operable by said operator for alternately connecting said sound responsive means and said other sound producing means to the one of said single circuit means selected by said selector means, whereby telephonic communication is established between said operator and a person at said control station.

4. In a sound reproducing system having a central station, a control station situated remotely from said central station, and means operable by an operator at said central station for reproducing previously recorded material at said control station for pay, the combination of: coin collecting means at said control station responsive to collection of a coin for producing a signal for each coin collected; means for transmitting to said central station signals produced by said coin collecting means; and a registering means at said central station for receiving and registering said signals and indicating to said operator the number of coins collected by said coin collecting means.

5. In a sound reproducing system having a central station, a plurality of control stations situated remotely from said central station, and a plurality of reproducing means at said central station operably associated with said control stations and operable by an operator for reproducing previously recorded material at the associated control station for pay, the combination of: coin collecting means at each of said control stations responsive to collection of a coin for producing a signal for each coin collected; means for transmitting to said central station signals produced by said coin collecting means; and an indicat-

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ing means at said central station including a means for each of said coin collecting means for receiving said signals and indicating to said operator the number of coins collected by the associated coin collecting means.

6. In a sound reproducing system having a central station, a control station situated remotely from said central station, and means operable by an operator at said central station for reproducing previously recorded material at said control station for pay, the combination of: coin collecting means at said control station having a plurality of coin receiving apertures, one for each of a plurality of coins of different monetary value; signal producing means in said coin collecting means responsive to insertion of a coin in its associated coin receiving aperture for producing a plurality of signals the number of which is representative of the monetary value of the inserted coin; means for transmitting to said central station the signals produced by said signal producing means; and a registering means at said central station for receiving and registering said signals and indicating to said operator the monetary value of coins collected by said coin collecting means.

7. In a sound reproducing system having a central station, a plurality of control stations situated remotely from said central station, and a plurality of reproducing means at said central station operably associated with said control stations and operable by an operator for reproducing previously recorded material at the associated control station for pay, the combination of: coin collecting means at each of said control stations having a plurality of coin receiving apertures one for each of a plurality of coins of different monetary value; signal producing means in each of said coin collecting means responsive to insertion of a coin in its associated coin receiving aperture for producing a plurality of signals the number of which is representative of the monetary value of the inserted coin; means associated with each of said coin collecting means for transmitting to said central station the signals produced by said signal producing means; and a registering means at said central station including a means for each of said coin collecting devices for receiving and registering said signals and indicating to said operator the monetary value of coins collected by the associated coin collecting means.

8. In a sound reproducing system having a central station, a control station situated remotely from said central station, and a reproducing unit operable by an operator at said central station including a reproducing means traversable over a record tablet for reproducing for pay at said control station material previously recorded on said record tablet, the combination of: coin collecting means at said control station responsive to collection of a coin for producing a signal for each coin collected; means for transmitting to said central station signals produced by said coin collecting means; registering means at said central station for receiving and registering said signals and indicating to an operator the number of coins collected by said coin collecting means; and means cooperating with said registering means and responsive to traversal of said tablet by said reproducing means for deducting from the number of coins registered by said registering means one coin for each reproduction at said control station of all of the material recorded on said record tablet.

9. In a sound reproducing system having a central station, a control station situated remotely from said central station, and a reproducing unit operable by an operator at said central station including a reproducing means traversable over a record tablet for reproducing for pay at said control station material previously recorded on said record tablet, the combination of: coin collecting means at said control station having a plurality of coin receiving apertures, one for each of a plurality of coins which have a different number of arbitrary monetary value units; signal producing means in said coin collecting means responsive to insertion of a coin in its associated coin receiving aperture for producing a plurality of signals the number of which is equal to the number of arbitrary monetary value units in said inserted coin and representative of the monetary value thereof; means for transmitting to said central station the signals produced by said signal producing means; registering means at said central station for receiving and registering said signals and indicating to said operator the number of monetary value units of coins collected by said coin collecting means; and means cooperating with said registering means and responsive to traversal of said record tablet by said reproducing means for deducting from the number of monetary value units registered by said registering means one unit for each reproduction at said control station of all the material recorded on said record tablet.

10. In a sound reproducing device including a sound producing unit for reproducing as sound electrical undulations transmitted thereto from a reproducing station over an electric circuit, the combination of: a sound responsive device connected to said electric circuit for transmitting to said reproducing station electrical undulations corresponding to sound undulations emitted into said sound responsive means; and balancing means interconnecting said sound responsive device, said sound producing unit, and said electric circuit for preventing electrical undulations originating at said sound responsive device from being applied to said sound producing device.

11. In a sound reproducing device including a sound producing unit for reproducing as sound electrical undulations transmitted thereto from a reproducing station over a pair of electric wires, the combination of: a sound responsive device for translating sound vibrations into electrical undulations; circuit means connecting said sound responsive device to said pair of wires and to said sound producing unit; and means in said circuit means for transmitting a first set of electrical undulations from said sound responsive device to said pair of wires and for simultaneously transmitting to said sound producing unit a second set of electrical undulations equal in magnitude and opposite in polarity to said first set of undulations transmitted to said pair of wires, whereby said second set of electrical undulations cancels the effect of said first set of electrical undulations and prevents operation of said sound producing unit in response to operation of said sound responsive device.

12. In a sound reproducing system, the combination of: a control station having a loud speaker and a microphone; a central station having a phonographic reproducer circuit means extending between said central station and said control station and connecting said microphone and said loud speaker to said phono-

graphic reproducer; a control microphone and a monitor loud speaker at said central station; a pair of separate volume control units associated with said monitor loud speaker; and a three position switch means cooperating with said monitor loud speaker and said control microphone and operable in a first position to connect said control microphone to said circuit means and operable in a second position to connect said monitor loud speaker and one of said volume control units to said circuit means and operable in a third position to connect said monitor loud speaker and the other of said volume control units to said circuit means.

13. In a sound reproducing system, the combination of: a central station; a plurality of control stations situated remotely from said central station and each having a loud speaker and a microphone; circuit means connecting the loud speaker and microphone at each control station to said central station; a phonographic reproducer at said central station for each control station connected to the circuit means associated therewith for reproducing phonographic recordings at the associated control station; a control microphone and a monitor loud speaker at said central station; and a selector means at said central station for selectively connecting said control microphone and said monitor speaker to said selected circuit means to provide a two-way loud speaking telephonic circuit between said central station and the control station corresponding to said selected circuit means.

14. In a sound reproducing system, the combination of: a central station having a plurality of reproducing units thereat, each of which includes a reproducing means for reproducing previously recorded material from a record tablet; a plurality of control stations situated remotely from said central station and having sound producing means thereat; means for connecting each of said sound producing means to a reproducing means for reproducing at said control station previously recorded material reproduced by said reproducing means; another sound producing means at said central station; and selector means at said central station for selectively connecting said other sound producing means to any of said reproducing means to reproduce at said central station the same material that is reproduced at the control station connected to the selected reproducing means.

15. In a sound reproducing system, the combination of: a central station having a plurality of reproducing units thereat, each of which includes a reproducing means for reproducing previously recorded material from a record tablet; a plurality of control stations situated remotely from said central station and having sound producing means thereat; means for connecting each of said sound producing means to a reproducing means for reproducing at said control station previously recorded material reproduced by said reproducing means; manually operable control means at each of said control stations; an indicating means at said central station responsive to operation of each of said control means for indicating to an operator at said central station the operation of any of said control means; sound responsive means at said central station; and selector means at said central station for selectively connecting said sound responsive means to any of said sound producing means, whereby said operator may acknowledge

verbally the operation of a control means at any selected one of said control stations.

16. In a sound reproducing system, the combination of: a central station; a plurality of control stations situated remotely from said central station and each having a loud speaker and a microphone; circuit means connecting the loud speaker and microphone at each control station to said central station; a plurality of phonographic reproducers at said central station; means for connecting said reproducers to said circuit means for reproducing phonographic recordings at the control stations associated with the circuit means to which said reproducers are connected; a control microphone and a monitor loud speaker at said central station; and a selector means at said central station for selectively connecting said control microphone and said monitor speaker to any of said circuit means to provide a two-way loud speaking telephonic circuit between said central station and any of said control stations.

17. In a sound reproducing system, the combination of: a central station having a plurality of reproducing units thereat, each of which includes a reproducing means for reproducing previously recorded material from a record tablet; a plurality of control stations situated remotely from said central station and having sound producing means thereat; means for connecting each of said sound producing means to a reproducing means for reproducing at said control station previously recorded material reproduced by said reproducing means; manually operable control means at each of said control stations; an indicating means at said central station responsive to operation of each of said control means for indicating to an operator at said central station the operation of any of said control means; sound responsive means at said central station; selector means at said central station for selectively connecting said sound responsive means to any of said sound producing means; another sound responsive means at each of said control stations; another sound producing means at said central station; and transfer means at said central station cooperating with said selector means and operable by said operator for connecting said sound responsive means to said sound producing means selected by said selector means and for connecting said other sound responsive means to said other sound producing means, whereby telephonic communication is established between said operator and a person at said control station.

18. In a sound reproducing system, the combination of: a central station having a plurality of reproducing units thereat, each of which includes a reproducing means for reproducing previously recorded material from a record tablet; a plurality of control stations situated remotely from said central station and having sound producing means thereat; a single circuit means extending between each of said control stations and said central station; means associated with said circuit means for connecting each of said sound producing means to a reproducing means for reproducing at said control station previously recorded material reproduced by said reproducing means; manually operable control means at each of said control stations connected to said single circuit means; an indicating means at said central station coupled to said circuit means and responsive to operation of each of said control

means for indicating to an operator at said central station the operation of any of said control means; sound responsive means at said central station; and selector means at said central station for selectively connecting said sound responsive means to any of said single circuit means to actuate the associated sound producing means, whereby said operator may acknowledge verbally the operation of a control means at any selected one of said control stations.

19. In a sound reproducing system, the combination of: a central station having a plurality of reproducing units thereat, each of which includes a reproducing means for reproducing previously recorded material from a record tablet; a plurality of control stations situated remotely from said central station and having sound producing means thereat; a single circuit means extending between each of said control stations and said central station; means associated with said circuit means for connecting each of said sound producing means to a reproducing means for reproducing at said control station previously recorded material reproduced by said reproducing means; manually operable control means at each of said control stations connected to said single circuit means; an indicating means at said central station coupled to said circuit means and responsive to operation of each of said control means for indicating to an operator at said central station the operation of any of said control means; sound responsive means at said central station; selector means at said central station for selectively connecting said sound responsive means to any of said single circuit means to actuate the associated sound producing means; another sound responsive means at each of said control stations; another sound producing means at said central station; and transfer means at said central station cooperating with said selector means and operable by said operator for alternately connecting said sound responsive means and said other sound producing means to the one of said single circuit means selected by said selector means, whereby telephonic communication is established between said operator and a person at said control station.

20. In a sound reproducing system, the combination of: a central station having a plurality of reproducing units thereat, each of which includes a reproducing means for reproducing previously recorded material from a record tablet; a plurality of control stations situated remotely from said central station and having sound producing means thereat; means for connecting each

of said sound producing means to a reproducing means for reproducing at said control station previously recorded material reproduced by said reproducing means; manually operable control means at each of said control stations; an indicating means at said central station responsive to operation of each of said control means for indicating to an operator at said central station the operation of any of said control means; signal producing means at said central station; and selector means at said central station for selectively connecting said signal producing means to any of said sound producing means, whereby said operator may acknowledge the operation of a control means at any selected control station.

21. In a sound reproducing system, the combination of: a central station; a control station situated remotely from said central station; a single electrical circuit extending between said central station and said control station; means operable by an operator at said central station for transmitting over said electrical circuit and reproducing at said control station previously recorded material; communication means at said central station and communication means at said control station coupled to said single electrical circuit for providing two-way communication between said stations over said single circuit simultaneously with the transmission of previously recorded material; and means associated with said communication means for preventing interference between said communication and the reproduction of previously recorded material transmitted over said circuit simultaneously with said communication.

22. In a sound reproducing system having a central station, a control station situated remotely from said central station, and means operable by an operator at said central station for reproducing previously recorded material at said control station for pay, the combination of: coin collecting means responsive to collection of a coin for producing a signal for each coin collected; means for transmitting said signal to said control station; transmitting means interconnecting said central station and said control station for transmitting to said central station signals received at said control station; and a registering means at said central station for receiving and registering said signals and indicating to said operator the number of coins collected by said coin collecting means.

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