

June 21, 1949.

S. K. LACKOFF

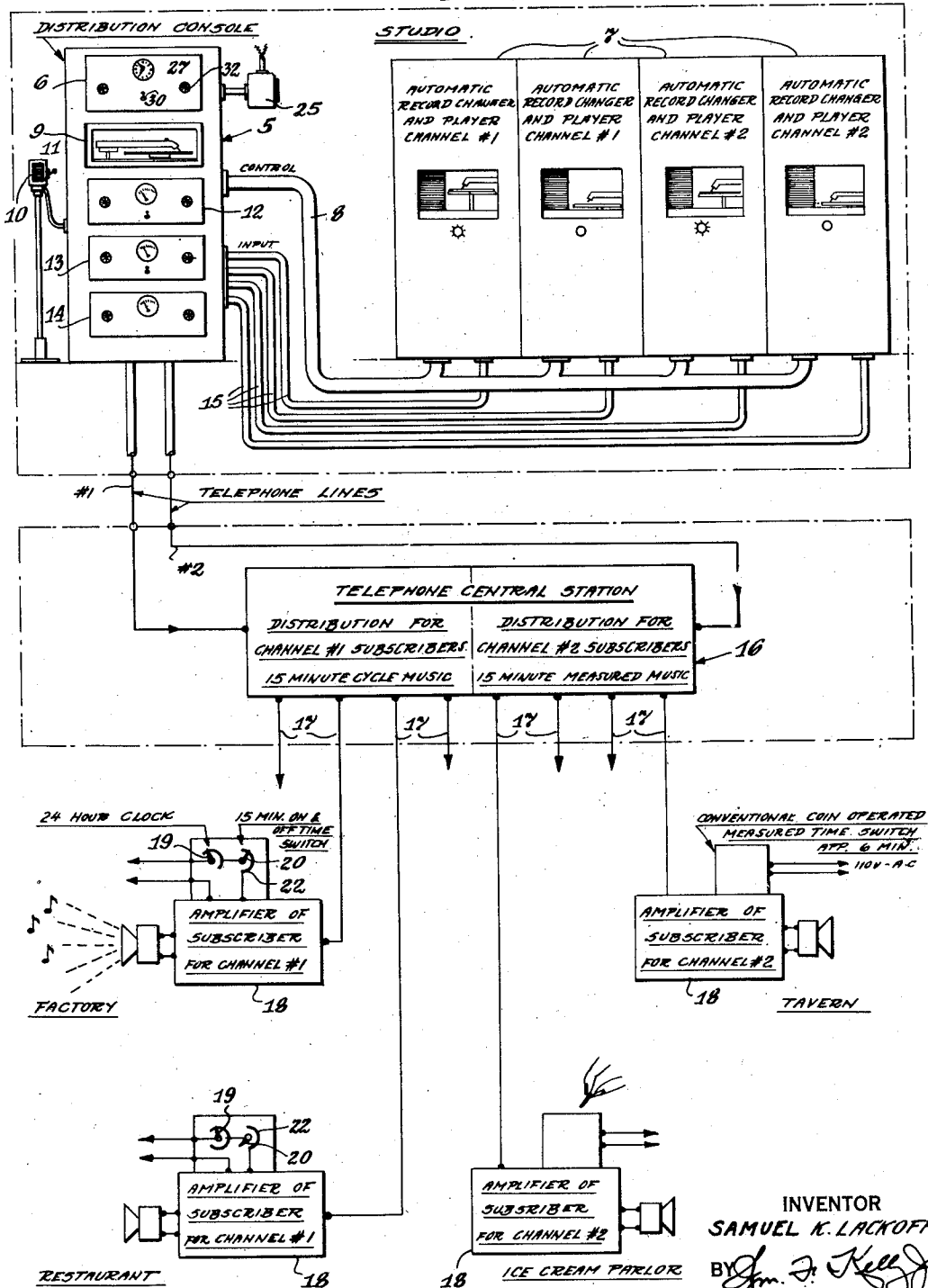
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CENTRALIZED MUSIC TRANSMISSION SYSTEM

Filed Nov. 25, 1946

5 Sheets-Sheet 1

Fig. 1.



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2,474,110

CENTRALIZED MUSIC TRANSMISSION SYSTEM

Filed Nov. 25, 1946

5 Sheets-Sheet 2

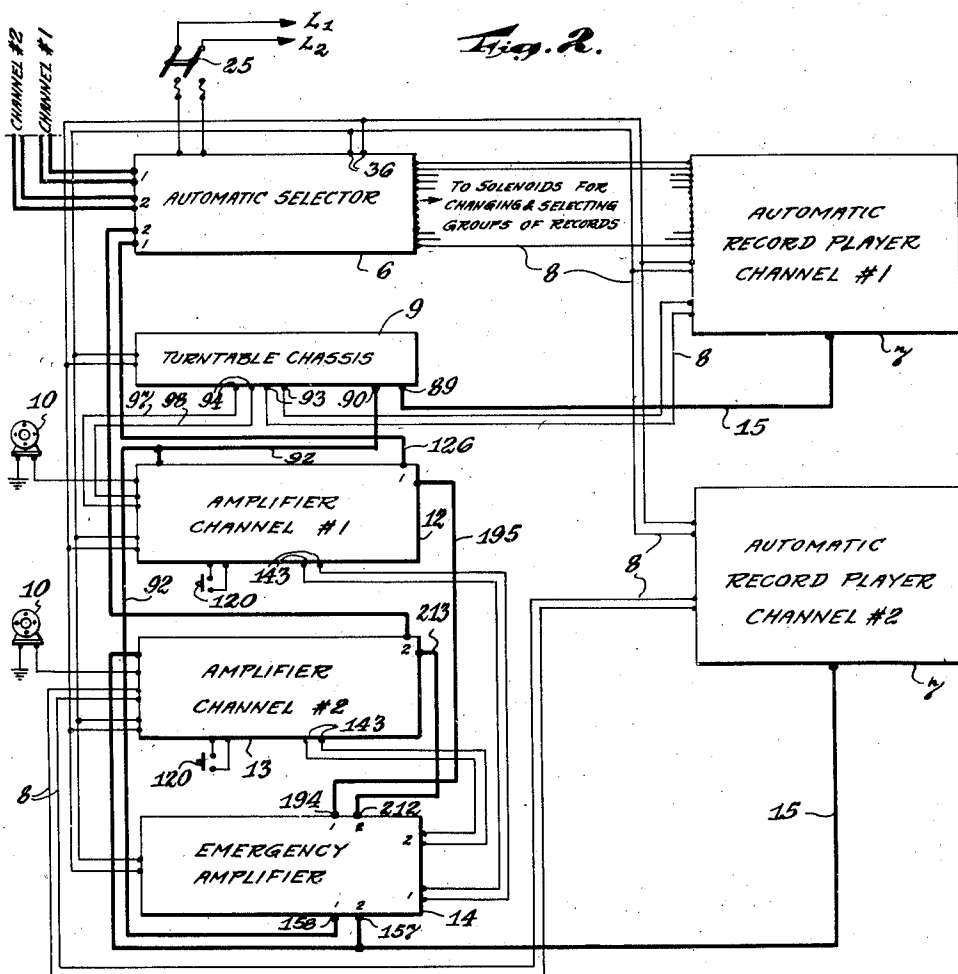


Fig. 6.

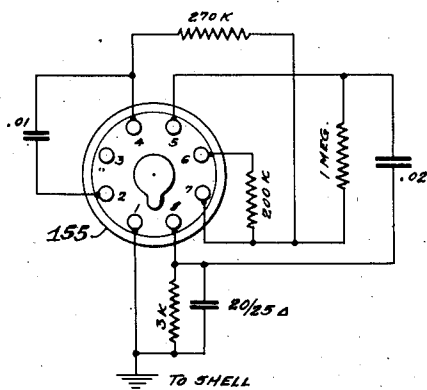
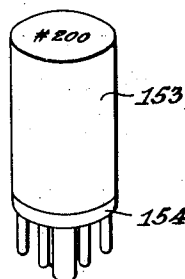


Fig. 7.



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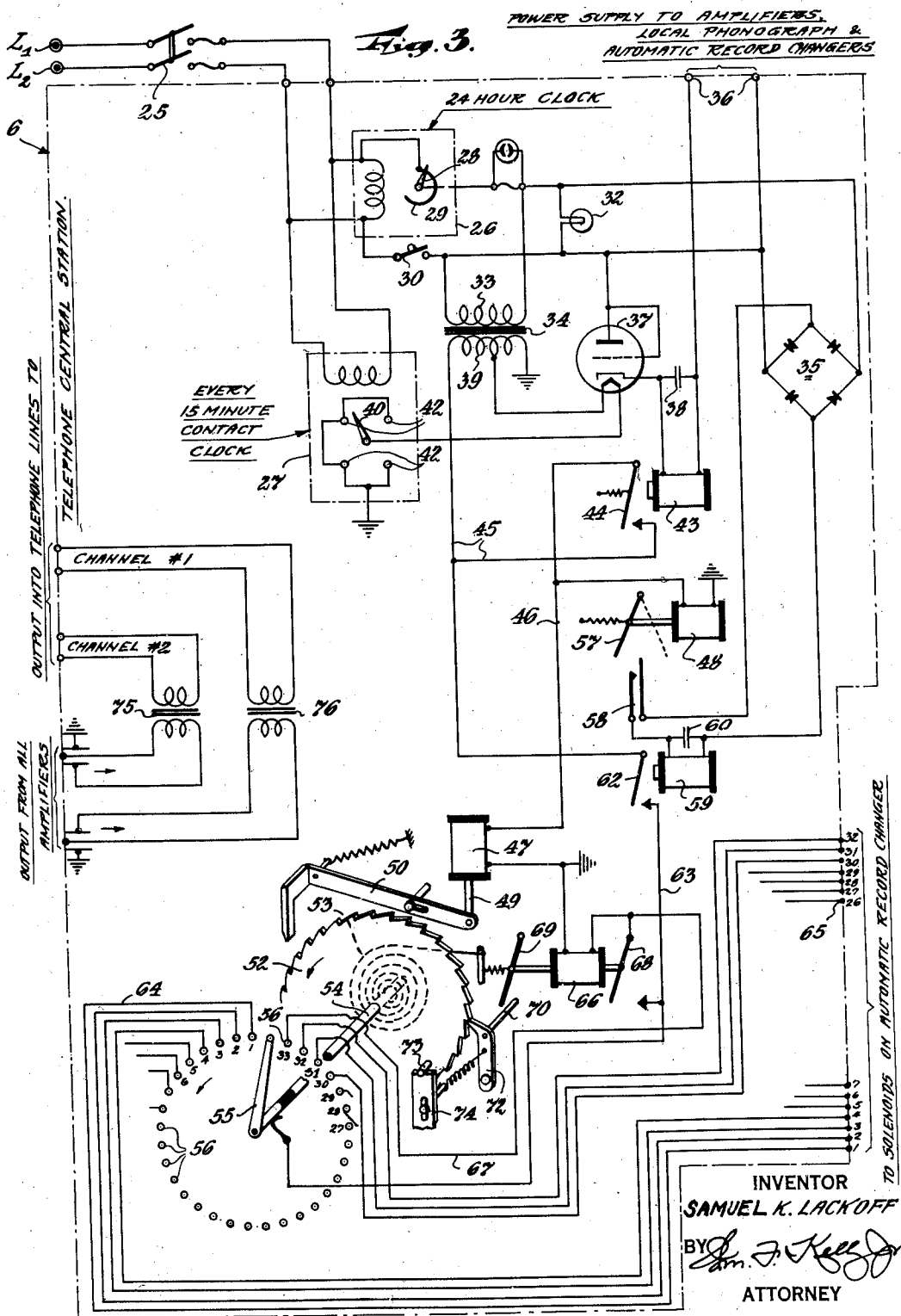
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CENTRALIZED MUSIC TRANSMISSION SYSTEM

Filed Nov. 25, 1946

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June 21, 1949.

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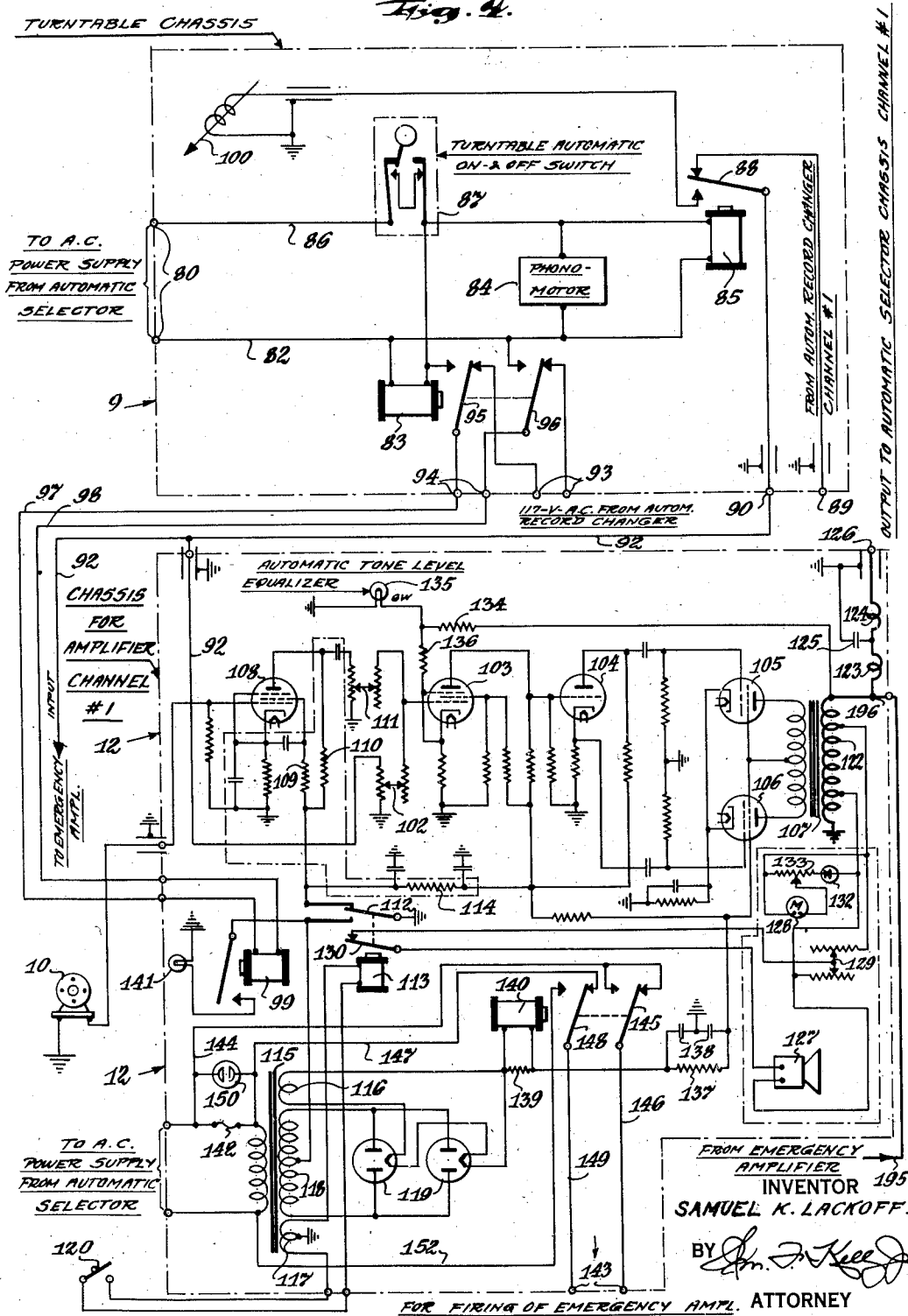
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CENTRALIZED MUSIC TRANSMISSION SYSTEM

Filed Nov. 25, 1946

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Fig. 4.



June 21, 1949.

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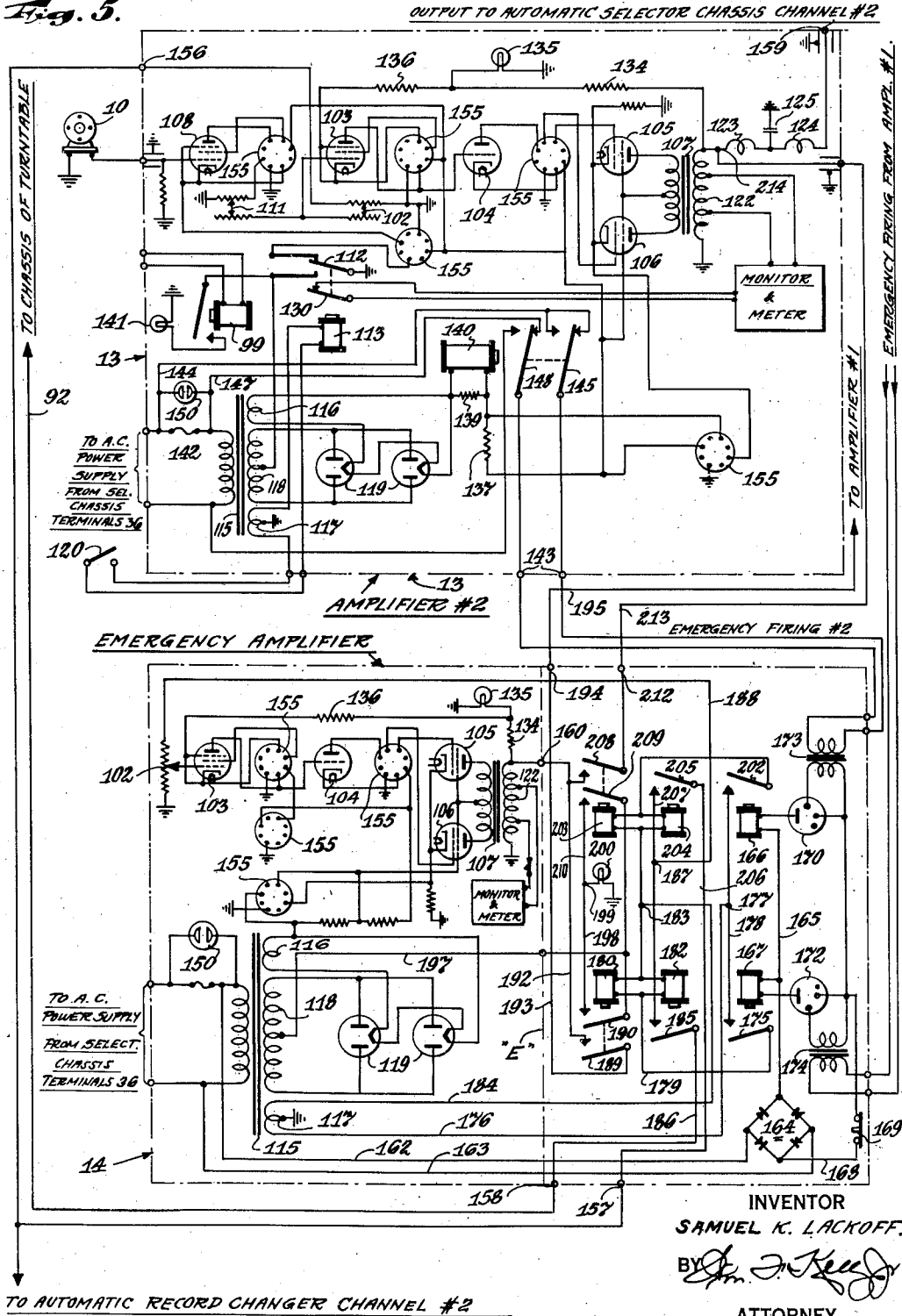
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CENTRALIZED MUSIC TRANSMISSION SYSTEM

Filed Nov. 25, 1946

5 Sheets-Sheet 5

Fig. 5.



UNITED STATES PATENT OFFICE

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CENTRALIZED MUSIC TRANSMISSION
SYSTEM

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Application November 25, 1946, Serial No. 712,217

15 Claims. (Cl. 179—6)

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The present invention relates to music reproduction systems and more particularly to a centralized music system wherein music of several types is reproduced automatically and transmitted to various subscribers without the necessity of operators being in constant attendance.

At present several distinct types of systems are well known in the art for the reproduction of music, the most common perhaps being that of wired music, wherein local coin-controlled subscriber stations are provided with a record index, and upon the selection of a desired record the patron deposits a coin which connects the local station with a studio. A studio operator then vocally asks for the request which has been selected and the patron vocally answers, after which the selected record is placed upon a studio record player with the reproduced music being transmitted back to the local station. This particular type of system requires an extensive array of record players at the studio depending upon the number of subscribers. In addition to the initial equipment investment which is necessarily very substantial the operating costs are exceedingly high because of the requirement for trained and arduous studio personnel in order to promptly respond to request calls from the local stations. Moreover, since telephone lines are employed which extend through the telephone exchange from the local stations to the studio the toll charges for rental of the telephone lines constitute a large percentage of operating costs.

Another type system is the well known "juke box" type wherein a plurality of records are placed in a record player at a local establishment and by depositing coins either directly in the player or at local remote stations a selected record is played. While this particular type of system is perhaps the most economical from the standpoint of initial cost and maintenance, its disadvantage resides in the fact that the number of musical selections are quite limited and the music is confined entirely to the establishment in which the equipment is installed.

A further type system is that wherein a pre-arranged program is transmitted to a local subscriber or group of subscribers at certain pre-selected hours of the days directly from a central studio. This type of system is usually rented to restaurants on a monthly rate basis but, like the wired music system, requires a central studio. In many instances the requirement for a large investment in central station equipment is a detriment because the number of possible sub-

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scribers is hardly sufficient to justify such installation and the required operators, especially in towns of small population.

It is accordingly the primary object of the present invention to provide a centralized music system which requires a minimum of equipment and which is entirely automatic in its operation so as to eliminate the necessity for operators being in attendance and wherein the reproduced music may originate either in a local studio provided the proprietor elects to acquire the necessary automatic record changers, or the music may be rented from an existing studio and transmitted over telephone lines to a distribution console located in a small town not justifying the expense of local-studio automatic record changers.

Another object of the present invention is the provision of a centralized music system wherein only one studio amplifier is required for two types of music which will service substantially any number of subscribers.

Another object of the present invention is the provision of a centralized music system wherein the appropriate type music is automatically selected and transmitted to the desired group of subscribers.

Another object of the present invention is the provision of a centralized music system wherein three types of music is selectively transmitted over two main line channels to subscribers.

Another object of the present invention is the provision of a centralized music system wherein the required equipment is reduced to a minimum by the utilization of but one studio amplifier for each type of music and no distribution panel is required with the system automatically compensating for variations in load.

Another object of the present invention is the provision of a centralized music system which operates entirely automatically once the system is set for a twenty-four hour period and the amplitude of the music is maintained constant by an automatic tone-level equalizer.

Another object of the present invention is the provision of a centralized music system wherein the maintenance thereof is reduced to a minimum and the necessity for highly skilled help is eliminated by the utilization of plug-in containers having mounted therein all parts normally subject to wear so that they may be readily removed and replaced with the same ease as a tube is removed and replaced.

A further object of the present invention is the provision of a centralized music system

wherein all of the distribution equipment is housed within a unit console containing two high-fidelity amplifiers for furnishing three programs over two telephone channels, an emergency amplifier for automatically and instantaneously taking over the program should either of the channel amplifiers fail, a turntable for dedication programs and an automatic selector.

A further object of the present invention is the provision of a centralized music system wherein three types of music are distributed over two telephone line channels with the local amplifiers at each subscriber location being synchronized with the distribution amplifier so that the local subscriber receives only the type of music desired and for which he has subscribed.

Still further objects of the present invention will become obvious to those skilled in the art by reference to the accompanying drawings wherein:

Figure 1 is a block diagram illustration of the centralized music reproduction system of the present invention from the studio to the subscriber's local stations,

Figure 2 is a schematic illustration of the studio portion of the centralized music system of the present invention,

Figure 3 is a circuit diagram of the automatic selector portion of the distribution console which forms part of the studio equipment,

Figure 4 is a circuit diagram of the turn-table and studio amplifier for one transmission channel which forms still other units of the distribution console,

Figure 5 is a circuit diagram of the studio amplifier for a second transmission channel together with an emergency stand-by amplifier which forms the remaining units of the distribution console,

Figure 6 is a circuit diagram of the various elements of the circuits which are subject to wear and require occasional replacement, and

Figure 7 is perspective view of the plug-in container unit housing the various elements such as shown in Figure 6.

Referring now to the drawings in detail the system as shown in Figure 1 comprises a distribution console 5, the uppermost unit of which is an automatic selector 6 for selecting the proper automatic record changer 7 at the appropriate time, through connecting control cables 8 with the automatic record changer 7 being in a studio at the site of the distribution console, or in a remote studio from which the transmitted music is rented. Immediately below the selector 6 is a turn-table unit 9 which is utilized for dedication programs only, as hereinafter pointed out, and an announcement can be made at any time from a microphone 10 detachably connected to the console 5, and which is selectively connected to the desired channel by a hand switch 11.

The remaining units of the console 5 consist of three amplifiers, with one such amplifier 12 constituting the one for selectively amplifying "factory type" and "restaurant type" music while amplifier 13 is employed in connection with the transmission of "hit-parade" or "measured" music. The remaining or lowermost amplifier 14 is an emergency stand-by which automatically becomes operative at any instant that either amplifier 12 or 13 becomes defective. Suitable input cables 15 extend from the automatic record changer 7 to the distribution console 5 so that the music from the appropriate records passes through the proper amplifier before transmission

over telephone line channel #1 and channel #2 coaxial cables, to the telephone exchange central station 16.

The various subscriber lines 17 extend from the local amplifiers 18 to the telephone exchange 16 where they are connected to the proper distribution panel for the subscribed music of channel #1 or #2. Although there is substantially no limitation to the number of subscribers or customers for any type of music, only one for each type has been shown. For example, in Figure 1 there is shown a local "factory" amplifier 18 which comprises, in addition to the customary amplifying circuit and speaker, a 24 hour electric clock 19 receiving 110 volt A. C. power at the subscriber's location, which in turn operates a cam 20 engageable with a switch 22 for automatically turning the local "factory" amplifier 18 on and off during alternate fifteen minute periods of each of the twenty-four hours, except when no music is desired by the amplifier being turned off by a manually operated local switch or at the studio.

Since "factory" amplifier 18 is connected to channel #1, music will be received during the quarter hour period that distribution amplifier 12 receives "factory type" music from the automatic record changers 7. Moreover, as will be hereinafter pointed out, the automatic selector 6 is provided with an electric clock which is synchronized with the local amplifier clocks 19 so that the latter operates simultaneously with the selector clock for the preselected type of music. It will also be noted from Figure 1 that local "restaurant" amplifier 18 is also identical in construction to the "factory" amplifier 18, the only difference being in the setting of the cams 20, so that during any quarter hour period when one amplifier is "on" the other is "off." Accordingly, when distribution amplifier 12 is subjected to "factory type" music which is transmitted by channel #1, only local "factory" amplifiers are turned on for reception of such type music and the local "restaurant" amplifiers are turned off. However, during the next quarter hour cycle when distribution amplifier 12 is subjected to "restaurant" type music which is transmitted over channel #1, then the local "factory" amplifiers being automatically turned off, only the local "restaurant" amplifiers receive music.

Distribution amplifier 13 is arranged to continuously receive music reproduction from automatic record changers 7 of the "hit-parade" or "measured" music type, which is transmitted over telephone line channel #2 to the telephone central station 16, and thence by local subscribers lines 17 to the local "tavern" or "ice-cream parlor" amplifiers 18. These particular amplifiers are of the coin-controlled type which assure a sufficient time that the patron obtains at least one complete record regardless of the moment the coin is deposited, which approximates about six minutes of music per coin.

In Figure 2 the electrical connections for the distribution console and the automatic record changers 7 are shown with these connections illustrated in heavy lines depicting, for simplicity, coaxial cables while the various control connections are shown in light lines. Also while the automatic record changers for the two channels are illustrated in block diagram, it will be understood that they are sufficient in number to provide the necessary records for a twenty-four hour or shorter preselected period. Consequently, the program may be set once for a twenty-four hour or preselected period and the

entire apparatus need not be further disturbed until the next day. In Figure 2 each distribution amplifier 12 and 13 is illustrated as provided with a separate microphone but, as hereinbefore mentioned and as shown in Figure 1, only a single microphone 10 need be employed which is connected to either the amplifier 12 or 13 by the hand switch 11 shown on the side of the microphone (Fig. 1) depending upon the particular channel over which it is desired to make an announcement.

Referring now more specifically to Figure 3, it will be noted that power for the equipment is supplied from the customary domestic source of supply of 120 volts by conductors L1 and L2, which in the actual embodiment of the apparatus is an extension cord plugging in to a wall type receptacle or the like. A main line switch 25 is provided on the console 5 for connecting the equipment to the source L1—L2 and when so connected the winding of a "24 hour clock" 26 and the winding of a "15 minute clock" 27 become energized, with this latter clock 27 being mounted on the face of the automatic selector panel, as shown in Figure 1, for ready observation, since it is this clock which, as hereinbefore mentioned, is synchronized with the local amplifier clocks 19. Upon these clocks 26 and 27 being set and started at the correct time the apparatus is then conditioned for operation. Since obviously no centralized music system is customarily operated for a full twenty-four hours, the twenty-four hour clock 26 operates a cam 28 which maintains a switch 29 in a closed position for any preselected period of the twenty-four hours depending upon the length of the surface of cam 28. It has been found that about sixteen hours operation out of each twenty-four is ample to serve all types of patrons and consequently the cam 28 is designed to close switch 29 for that period of time.

The apparatus thus being conditioned for operation the operator then closes panel switch 30 which illuminates an "on" signal light 32 and at the same time energizes the primary winding 33 of a transformer 34, as well as supplying line voltage of 120 volts to the input terminals of a selenium cell rectifier bridge arrangement 35, since an energizing circuit is closed by clock switch 29 and panel switch 30. At the same time line voltage is supplied to terminals 36 constituting a socket on the rear of the automatic selector chassis to which the amplifiers, turntable chassis 9, and automatic record changers 7 are detachably connected, for their respective power supply. It will also be noted that line voltage is impressed across the plate and indirectly heated cathode of a vacuum tube 37 and across the winding of relay 43 as well as across condenser 38. The filament of vacuum tube 37 is adapted to be heated from a six volt portion of the secondary winding 39 of transformer 34 upon operation of "15 minute" clock 27. This latter clock 27 is provided with a cam 40 arranged to close a switch 42 momentarily every fifteen minutes. Upon closure of this switch 42 tube 37 becomes conductive, due to heating of the cathode from a portion of transformer secondary 39, and current then flows from supply conductor L1, through clock switch 29 to the winding of a relay 43, and thence through vacuum tube 37, and panel switch 30, back to supply conductor L2 through main line switch 25.

Relay 43 being thus energized attracts its armature 44 with such armature closing a circuit from one end of the secondary winding 39, through a conductor 45 to armature 44, thence by means of a conductor 46 to one end of the winding of a stepper relay 47, and from the other end of relay

winding 47 to ground, and thus back to the other end of transformer secondary 39 which supplies a total voltage of approximately 36 volts. Simultaneously with energization of stepper relay 47, a further relay 48 is also energized, since one end of the winding of relay 48 is connected to the conductor 46 and the other end to ground, thus completing a circuit to the transformer secondary winding 39. Inasmuch as heating of the cathode of vacuum tube 37 is momentary, due to closure of clock switch 42, it follows that the energization of relays 43, 47 and 48 are likewise momentary.

The armature 49 of relay 47 is pivotally connected to a ratchet arm 50, so that upon energization of relay 47 and attraction of its armature 49, this ratchet arm 50 is rocked about its pivot and momentarily engages a ratchet gear 52, rotating the latter in a counter-clockwise direction, as shown by the arrow in Figure 3, against the bias of a coil spring 53. The ratchet gear 52 is affixed to a shaft 54 carrying at its free end an insulated metallic contactor 55, which at each operation of the ratchet gear 52 engages contacts 56, of approximately thirty-three in number, one at a time. The energization of relay 48 simultaneously with stepper relay 47 likewise causes the armature 57 of relay 48 to be attracted, which during its movement contacts a blade of a switch 58 to move the latter further in a circuit opening position. However, following the momentary closure of clock switch 42 with energization of relays 43, 47 and 48, the filament of vacuum tube 37 is then deenergized rendering the tube no longer conductive with the result that the circuit to relay 43 is thereby interrupted. The armature 44 of relay 43 is accordingly released which interrupts the circuit from transformer secondary 39 to the windings of relays 47 and 48 with the result that their respective armatures 49 and 57 are released under the tension of their customary springs or the like, ready for their next cycle of operation.

During movement of the armature 57 of relay 48 to its normal retracted position it again contacts the blade of switch 58 causing momentary closure of this latter switch. When closed a direct or unidirectional-current circuit is completed from the output of the selenium cell rectifying bridge 35, through switch 58 to the winding of a slow-acting direct current relay 59, provided with a condenser 60 shunted across its winding. This relay 59 accordingly attracts its armature 62 for a period of approximately two seconds before release thereof and completes a circuit from one end of transformer secondary winding 39 through conductor 45, armature 62, a conductor 63 to the metallic contactor 55, which is insulated from shaft 54, and from the particular contact 56 with which the contactor 55 is at the moment in engagement, through a conductor 64 to a terminal strip 65 mounted on the rear of the distribution console, and from the latter by means of control cable 8 (Fig. 1) to a solenoid (not shown) on the automatic record changer 7 for selecting a predetermined group of records, and from this latter solenoid to ground and thus back to the remaining end of transformer secondary 39. Accordingly the contactor 55 is advanced to a new contact 56 by the action of relays 43 and 47 prior to relay 59 causing energization of the solenoid on automatic record changer 7.

It can thus be seen that for each fifteen minute period, the clock 27 operates to cause rotation of the stepper relay 47 with attendant energization of a solenoid on the automatic record changer 7. When the latter is energized it selects a group

of pre-arranged records which for one fifteen minute period may be about four ten inch or three twelve inch records of "factory type" music for transmission over channel #1 and during alternate quarter-hour periods may be approximately the same number of pre-arranged records of "restaurant type" music. It is also to be noted that while the stepper relay is shown provided with only thirty-three contacts they need not all be utilized if a shorter daily period of music is to be transmitted, and they may be increased in number for a longer daily period, if desired. However, thirty-two contacts will permit a total of eight hours of continuous music over channel #1 four hours of which, in intermittent quarter-hour periods, will be "factory type" music with the "restaurant type" being transmitted for the same period of time. This has been found to amply service these two types of subscribers, while the "hit-parade" or "measured" music is required for a longer daily period accounting for such longer time period being provided by the "24 hour" clock 26.

Moreover, as previously mentioned herein the local amplifier clocks 19 are synchronized with the "15 minute" clock 27 on the automatic selector panel so that the local amplifier receives only the type of music subscribed for during the quarter-hour period when the clock 27 operates the stepper relay to select that particular type music. The additional, or as shown, thirty-third contact is provided for the purpose of resetting the stepper relay for its next daily cycle. Consequently, when the contact arm 55 engages the last contact 56 of the series, and assuming the slow-acting relay 59 has attracted its armature 62 in the manner as previously described, instead of a circuit now being completed to an automatic record changer solenoid, a circuit will be completed to a return relay 66. This circuit extends from one end of transformer secondary 39 through conductor 45, armature 62 of slow-acting relay 59, conductor 63 to contactor 55 then engaging the thirty-third contact 56, thence by means of a conductor 67 to one end of the winding of relay 66 and from the other end of such winding to ground, thus completing the circuit to the remaining end of transformer secondary 39. Relay 66 accordingly attracts its armatures 68 and 69 and since armature 68 closes a self-holding circuit for relay winding 66 independent of contactor arm 55 movement of the latter will not interrupt the circuit and deenergize relay 66 at the moment. Simultaneously relay armature 69 contacts a detent 70 carried by a pawl 72, causing the latter to disengage the ratchet gear 52 and allow the spring 53 to rapidly rotate the contactor 55 in a clockwise direction, until a projecting pin 73 carried by the ratchet gear 52 strikes a stop 74, at which time the contactor 55 will have assumed a neutral position between the first contact 56 and the last or thirty-third contact 56, as shown in Figure 3, ready for beginning of the next daily cycle. By the time the pin 73 engages the stop 74, the slow-acting relay 59 will have become deenergized with de-attraction of its armature and interruption of the circuit to return relay 66.

Also carried by the automatic selector chassis are a pair of line matching transformers 75 and 76 having 500 ohms primary input and zero impedance secondary output, with their primary windings connected to the output channels #1 and #2 of the distribution amplifiers 12 and 13 as well as emergency amplifier 14, and their respective secondary windings connected to tele-

phone line channels #1 and #2. These transformers 75 and 76 form no operating part of the automatic selector 6 but are carried by the selector chassis solely for convenience and for providing sufficient line matching impedance of the telephone channel lines.

The next unit in the distribution console is the turn-table chassis 9 as previously mentioned, which like all the console units is readily detachable so as to be removed therefrom whenever desired. This unit is provided for the presentation of dedication music only upon request and under normal conditions it is not operated but certain circuits of the apparatus pass through such unit. By reference now more particularly to Figure 4, it will be noted that a pair of supply terminals 80 are provided on the turn-table chassis which connect to the terminals 36 (Fig. 3) on the automatic selector chassis 6. A conductor 82 connects one of these supply terminals to one end of the winding of a relay 83, to one side of the turn-table motor 84, and to one end of the winding of a further relay 85. The remaining supply terminal 80 is adapted to be connected by a conductor 86 to the remaining ends of the respective relays 83 and 85, as well as to the other side of the turn-table motor 84, upon closure of a turn-table automatic "on and off" switch 87. Thus in the normal condition of the turn-table unit none of these elements are energized and the armature 88 of relay 85 completes a circuit from a turn-table chassis terminal 89, connected by one of the conductors 15 (Fig. 2) extending from the automatic record changer 7 for channel #1, and to a further turn-table chassis terminal 90, which latter is connected by a conductor 92 to the input of the distribution amplifier 12 for channel #1 with this conductor 92 also extending to the input for emergency stand-by amplifier 14, as indicated by the legend in Figure 4.

The turn-table chassis is also provided with a further pair of terminals 93, connected by the conductors 8 (Fig. 2) extending from a 117 volt A. C. supply of the automatic record changer 7. These terminals 93 are in turn connected to a further pair of turn-table chassis terminals 94 by the armatures 95 and 96 of relay 83 in the deenergized position of the latter, with such terminals 94 being connected by conductors 97 and 98 to a relay 99 provided on the distribution amplifier 12 (Fig. 4). When, however, a dedication request is made the selected record is placed on the turn-table of chassis 9 and upon movement of the pick-up arm 100, the automatic switch 87 moves to the "on" position. This closes the circuit from the supply terminals 80 to the windings of relays 83 and 85 as well as to the turn-table motor 84 causing the latter to rotate the selected record. At the same time relay armature 88 is attracted interrupting the channel #1 music from the automatic record changer 7 and connecting the pick-up arm 100 to the input of distribution amplifier 12 and emergency amplifier 14 through terminal 90 and conductor 92. Likewise the armatures 95 and 96 interrupt the 117 volt A. C. from the automatic record changer, which is connected to the turn-table chassis terminals 93, and connect the distribution amplifier relay 99 to the supply terminals 80 of the turn-table chassis 9, through conductors 82 and 86, automatic switch 87, chassis terminals 94, and conductors 97 and 98. The dedication music is thus transmitted from the requested record on turn-table 9

through channel #1 and upon completion of such record the pick-up arm 100 automatically opens switch 87, deenergizing the motor 84 together with relays 83 and 85, and immediately restoring the channel #1 music directly from the automatic record changer 7.

As shown in Figure 4 the various circuits within amplifier chassis 12 are shown with the input thereto constituting the conductor 92 extending to an L-type volume control for the channel #1 music (operable from the panel front), one end of which is grounded and thus connected to the other grounded conductor of the coaxial cable of which conductor 92 is composed. From the remaining portion of volume control 102, the signal passes through a first amplifying stage represented by the tube 103 and its associated customary resistors into a second amplifying stage comprising a tube 104 and thence through a last stage including two vacuum tubes 105 and 106 to the primary of the usual output transformer 107. Since the amplifying circuit, including the above mentioned tubes and associated elements is well known in the art, it is believed unnecessary to specifically trace the path of current flow through the amplifying stages following the input signal impressed on volume control 102.

It will be noted, however, that the amplifier chassis 12 is provided with an auxiliary amplifying stage consisting of a tube 108 and associated elements which during normal operation of amplifier 12 is ineffective due to the grounding of the grid and plate of tube 108 through resistors 109 and 110 and an armature 112 of a relay 113. Moreover, a resistor 114 is provided which is connected to ground by armature 112 and to the plate circuit of tube 104, with such resistor 114 being of sufficient ohmic value to prevent too great a load on the amplifier output while the auxiliary stage is grounded and at the same time this resistor 114 is small enough in value so as not to effect the plate voltage on the auxiliary stage when rendered operative, as hereinafter mentioned.

Also carried by amplifier chassis 12 is a power transformer 115 having its primary winding connected to the power supply from the automatic selector 6 comprising the terminals 36 of Figure 3. The secondary winding of transformer 115 is shown as constituting two low voltage windings 116 and 117 and a higher voltage winding 118. Winding 116 supplies heating current to the series connected filamentary cathodes of a pair of rectifying tubes 119 while low voltage winding 117 energizes relay 113 upon closure of a push button switch 120 on the front panel of distribution amplifier 12.

When it is desired to make a public announcement over channel #1 it is customarily done during the intermission period between quarter-hour program changes, which approximates five minute intervals, and during which intermission relay 99 is deenergized by interruption of its 117 volt supply at the automatic record changer 7. Panel switch 120 is accordingly closed energizing relay 113 with attraction of its armature 112, thus removing the ground connection from the grid and plate of the auxiliary stage including tube 108 rendering such stage operable, and the announcer speaks into microphone 10 (having previously operated microphone switch 11 to select distribution amplifier 12 in this instance). The signal then passes through microphone output volume control 111 and all amplifying stages to output transformer 107 and from the second-

ary winding 122 thereof, through the low path filter circuit, comprising choke coils 123 and 124 as well as condenser 125, which limits the highest output frequency to a definite frequency as required by local telephone company requirements, and then through output coaxial cable 126, as noted by the legend, to the primary winding of line matching transformer 76 on the automatic selector chassis 6 (Fig. 3) and from the secondary winding thereof over telephone line channel #1 to the local amplifiers 18 (Fig. 1). Upon completion of the announcement switch 120 is again opened deenergizing relay 113 thus restoring the ground connection for the auxiliary stage and conditioning the distribution amplifier 12 for continuation of the musical program from the automatic record changer 7 through input conductor 92.

Although, as above stated, public announcements are customarily made during the intermission period, so as to prevent interruption of the musical program, in case of an emergency an announcement can be made at any time. Should such necessity arise the operator need only adjust the music volume control 102 to its lowest level and slightly raise the volume control 111 for microphone 10 which enables the voice announcement to be superimposed on the musical program without distortion due to the very low volume of the latter during any such emergency announcement.

As shown in Figure 4, the amplifier 12 is provided with a monitor comprising a speaker 127 and a D. C. meter 128. This speaker 127 is connected to taps on the secondary winding 122 of output transformer 107 through a balancing L-shape volume control 129 and an additional armature or contact 130 of relay 113. Meter 128 is connected in parallel with speaker 127 through a selenium cell rectifier 132 and an adjustable resistance 133. Thus the operator is able to monitor the system at all times since the program is received by the monitor speaker 127 at the distribution amplifier 12 and current conditions of the circuit are continuously indicated by the meter 128. It will be noted, however, that any announcement made over microphone 10 is not picked up by the monitor speaker 127 because the circuit to the latter is interrupted by armature 130 of relay 113 which operates simultaneously with armature 112 of this same relay 113, and thus a re-broadcast from monitor speaker 127 over microphone 10 is prevented during the making of an announcement.

In order to maintain the transmitted music at a constant tone level regardless of amplitude variations between different records, the distribution amplifier 12 is provided with a tone level equalizer. As shown in Figure 4 such equalizer comprises a resistor 134 connected in series with a 6 watt incandescent lamp 135 across the secondary winding 122 of output transformer 107. A further resistor 136 is connected in series with resistor 134, and hence to the output circuit comprising secondary winding 122, and to the cathode electrode of the first stage amplifying tube 103, to produce a negative feed-back. As the output from winding 122 increases, lamp 135 lights and increases the resistance of the circuits. Such resistance increase causes an inverse variation in the voltage, reducing the overall gain of the entire amplifier system, and resulting in stabilization of the amplitude of the signal, with attendant transmission of the reproduced music at a constant tone level re-

gardless of variations between different records.

If for any reason the distribution amplifier 12 should fail this would normally mean an interruption of transmission until the trouble is corrected. To eliminate such contingency an emergency amplifier 14 is provided in accordance with the present invention which, as hereinbefore stated, immediately takes over the transmission of the program without interruption. In order to "fire" the emergency amplifier 14 by making the latter instantaneously operative in the event of trouble in amplifier 12, the rectified energy from rectifiers 119 is supplied to the plate and screen grid of the last amplifying stage tubes 105 and 106 through a filter circuit, comprising a resistor 137 and condensers 138, and a resistor 139 shunted across the winding of a relay 140.

Since relay 99, as previously mentioned, remains energized as long as a program is being transmitted from automatic record changer 7, or a dedication record from turn-table chassis 9, the armature of relay 99 will remain attracted which completes the rectifying circuit through rectifiers 119 back to the center tap of the secondary winding 118 of transformer 115 through a series connected amplifier "on" lamp 141. However, since an announcement is customarily made over the microphone 10 during an intermission at which time relay 99 is deenergized, it is necessary that the rectifying circuit be completed by some other means than armature of relay 99. To this end the armature 112 of relay 113 then operates to connect the midpoint of the secondary winding of transformer 115 to ground, upon energization of relay 113 by closure of switch 120 as before mentioned.

Under normal operating conditions resistor 139 in the load circuit of rectifiers 119 limits the voltage across relay 140 to a value insufficient to cause energization thereof and also the voltage supplied to the plate and screen of tubes 105 and 106 is such as to have no effect on their operation. Should trouble develop in the power transformer 115 or the rectifying circuit including the rectifiers 119 causing disruption of power supply fuse 142, the power will then be supplied to the emergency amplifier firing terminals 143, one side by a conductor 144 to a normally closed contact with an armature 145 of relay 140 and thence by a conductor 146 to one of the chassis terminals 143, while the other side of the supply source extends through the primary winding of power transformer 115 (now carrying no current), through a conductor 147 to a normally closed contact with a further armature 148 of relay 140, and thence by a conductor 149 to the other chassis terminal 143, which thus supplies a "firing" voltage to emergency amplifier 14 to cause operation thereof as hereinafter explained.

At the same time trouble lamp 150 will show a red signal on the panel of distribution amplifier 12 since such lamp is then connected across the supply source comprising the conductors 144 and 147 indicating trouble in the amplifier 12. At the same time the interruption of a voltage from rectifiers 119 to the plate and screen of last amplifying stage tubes 105 and 106 renders them non-conductive so that the signal is no longer transmitted through output transformer 107. On the other hand should trouble develop in the amplifying stages, such as the burning out or short circuiting of a tube, a condenser, or a resistor; or should any element draw more than normal current, then the voltage drop across

resistor 139 will increase because of the influence on tubes 105 and 106 of an abnormal condition. This increase in voltage drop across resistor 139 causes an increase in the voltage across shunt connected relay 140 with attendant energization thereof and attraction of its armatures 145 and 148 and at the same time tubes 105 and 106 become inoperative to further transmit the signal to output transformer 107.

Upon attraction of armatures 145 and 148 a "firing" voltage is again supplied to the chassis terminals 143 since one side of the supply source again extends through conductor 144 and to a contact with which the attracted armature 145 is now in engagement, and thence again by conductor 146 to one of the chassis terminals 143. The other side of the supply source now extends through a conductor 152 to a contact with which the relay armature 148 is at the moment in engagement, and thence again by conductor 149 to the remaining chassis terminal 143. It will thus be seen that a voltage is supplied to the firing terminals 143 upon failure occurring in any of the amplifier stages, or disruption of the power fuse 142, which automatically causes the emergency amplifier 14 to instantaneously become operative as will be later described.

By reference now more particularly to Figure 5, it will be obvious to those skilled in the art that the distribution amplifier 13 for channel #2, and which transmits "measured" music continuously, is identical in all respects to distribution amplifier 12 and hence like elements bear the same reference characters. For this reason the complete electrical circuit for the various amplifying stages has not been repeated in the showing of the amplifier 13 in Figure 5. Instead the amplifier 13 is schematically shown with numerous plug-in type sockets 153 for the reception of containers 154, such as shown in Figure 7, which are provided with radio type bases 155. These containers 154 house various resistors and capacitors, as can be seen from Figure 6, which are elements most commonly subject to wear and may need replacement from time to time. By placing such elements in containers 154, it is unnecessary for maintenance men to be highly skilled in order to service the equipment. In the event of trouble the service-man merely removes the various containers, each of which have a type designation, and replaces with new containers until the trouble is corrected. The defective container is then returned to the factory or main service center where it is opened and tested, after which the required new element is installed and the container resealed for another installation. As an example, the elements diagrammatically shown in Figure 6 as being housed in the container 154 of Figure 7, are also shown in dotted line in the distribution amplifier 12 of Figure 4.

Inasmuch as distribution amplifier 13 is employed entirely for continuous "measured" music, it has no connection to the turn-table chassis 9 and instead the 117 volt supply for relay 99 of amplifier 13 is supplied directly from automatic record changer 7 through conductors 8 (Fig. 2). Likewise the coaxial input cable 15 (Fig. 2), and as indicated by the legend "To automatic record changer channel #2" of Figure 5, extends directly from the automatic record changer 7 for channel #2, to the input chassis terminal 156 for distribution amplifier 13 and to the emergency amplifier input chassis terminal 157 for channel #2. The input conductor 92 of distribution amplifier 12

also is connected to an emergency amplifier input chassis terminal 158 as previously mentioned. The output terminal 159 of distribution amplifier 13 is connected by a coaxial cable or the like to the primary winding of line matching transformer 75 on the automatic selector chassis 6 and from the secondary winding thereof over telephone line channel #2 to the local amplifiers 18 (Fig. 1), in the same manner as previously described relative to the output of distribution amplifier 12 for channel #1. Also distribution amplifier 13 is provided with the same arrangement for "firing" the emergency amplifier 14 which, as previously mentioned, is identical to that of amplifier 12.

Figure 5 also shows the emergency amplifier 14 which so far as the various amplifying stages are concerned is also identical to distribution amplifiers 12 and 13, with few exceptions. For example, the emergency amplifier is naturally not provided with an auxiliary stage for public announcements since such would be superfluous, nor is it provided with the various relays 99, 113 and 140 which operate in conjunction with the making of an announcement and the firing of the emergency amplifier 14, but in practically all other respects the amplifying stages of emergency amplifier 14, shown to the left of the dot-dashed line E' of Figure 5, are identical to amplifiers 12 and 13 as indicated by the use of the same reference characters. Consequently, the output from the various amplifying stages of emergency amplifier 14 may be considered for purposes of explanation as a terminal 160, and a detailed description only of the circuits which automatically cause operation of the amplifier 14 in response to "firing" by the defective distribution amplifier 12 or 13 should suffice, as all other phases of operation should be clear from the foregoing description of the distribution amplifiers 12 and 13.

Accordingly, it will be seen that emergency amplifier 14 is supplied with power from the automatic selector chassis terminals 36 which is also connected by conductors 162 and 163 to the input side of a "rectox" or selenium cell rectifier bridge arrangement 164. The D. C. or unidirectional current output from this bridge arrangement is connected by a conductor 165 to one side of the winding of two relays 166 and 167 while the other negative side of the bridge 164 is connected by a conductor 168 and normally closed switch 169 to the cathode electrode of a pair of gaseous discharge tubes 170 and 172 having a critical voltage breakdown characteristic. The remaining ends of the winding of each of the relays 166 and 167 are connected to the anode or plate of the discharge tubes 170 and 172, respectively.

The cathode and starting electrode of tube 170 is connected to the secondary winding of a transformer 173, the primary winding of which is connected to the "firing" terminals 143 of distribution amplifier 13 and in a similar manner the cathode and starting electrode of tube 172 is connected to the secondary winding of a transformer 174 likewise having its primary winding connected to the "firing" terminals 143 of distribution amplifier 12. Thus, upon closure of the firing circuit from distribution amplifier 12 or 13, due to the occurrence of a defect therein as previously described, transformer 173 becomes energized in the case of failure of distribution amplifier 13 and transformer 174 becomes energized in case of failure of distribution amplifier 12. Upon energization of transformer 173 or

174, the secondary winding thereof impresses a voltage across the starting electrode and cathode of discharge tube 170 or 172 as the case may be. Such voltage is sufficient to cause ionization of the gaseous medium within the tube which then initiates a discharge between the cathode and plate of the tube thus completing a circuit to the respective relay 166 or 167 with which the particular tube is connected.

Assuming that distribution amplifier 12 has failed with operation of its "firing" circuit and relay 167 has thus become energized the latter will attract its armature 175. A circuit is then completed from one end of low voltage winding 117 of power transformer 115, through a conductor 176 to a junction 177, thence from this junction by a conductor 178 to engagement with attracted armature 175, a conductor 179 to one end of a winding of a pair of relays 180 and 182, and from the remaining end of the respective relays 180 and 182 to a junction 183 thence by a conductor 184 to the opposite end of secondary winding 117. Both relays 180 and 182 are accordingly energized with attraction of their respective armatures. Armature 185 of relay 182 completes a connection from the input chassis terminal 158 from amplifier 12 carrying channel #1 music, through a conductor 185 and attracted armature 185 to a junction 187 and thence from this junction by means of a conductor 188 to emergency amplifier input volume control 102. The signal from automatic record changer 7 or turntable 9 which was passing through distribution amplifier 12 at the time it became defective is thus automatically and substantially instantaneously transferred to emergency amplifier stages and to the output terminal 160 thereof.

Since relay 180 was energized simultaneously with relay 182 its armatures 189 and 190 are likewise attracted. A connection from amplifier stage output terminal 160 is thus completed to the low path filter circuit, comprising the choke coils 123 and 124 as well as condenser 125, of distribution amplifier 12, which extends from terminal 160 through a conductor 192 to armature 189, then by a conductor 193 to an emergency chassis terminal 194 and thence by a conductor 195 to a junction 196 (Fig. 4) with the low path filter circuit as above mentioned. Hence distribution chassis 12 upon becoming defective is completely by-passed except for the low path filter circuit with the signal passing through emergency amplifier 14.

Closure of armature 190 of relay 180 merely completes a circuit from the midpoint of power transformer secondary 118, by means of a conductor 197, armature 190, a conductor 198, and junction 199, to an emergency amplifier "on" lamp 200 and to ground, which lamp is illuminated substantially simultaneously with the red trouble lamp 150 of distribution amplifier 12, thus indicating to the operator that amplifier 12 has become defective and emergency amplifier 14 has taken over. When the trouble causing the failure of amplifier 12 has been corrected the operator then merely momentarily opens emergency amplifier switch 169. This deenergizes relay 167 which in turn deenergizes relays 180 and 182 with detachment of their respective armatures thus opening all circuits and rendering the emergency amplifier no longer operative so long as the trouble has been rectified. If, however, such is not the case, the immediate reclosure of switch 169 would immediately cause a repetition of the cycle of operation, as above described,

should transformer 174 still be energized due to closure of the firing circuit of distribution amplifier 12.

If it be now assumed that distribution amplifier 13 falls with closure of its "firing" circuit, then transformer 173 becomes energized. This causes breakdown of tube 170 with attendant energization of relay 166, in the same manner as previously described relative to relay 167. Attraction of armature 202 of relay 167 causes energization of a pair of relays 203 and 204 since the windings thereof are then connected to the junctions 177 and 183 which as previously explained correspond to the transformer winding 117. Attraction of armature 205 of relay 204 connects the input chassis terminal 157 for channel #2 music, by means of a conductor 206, armature 205, conductor 207, junction 187 and conductor 188, to the input volume control 102 of emergency amplifier 14. Attraction of armatures 208 and 209 perform the same operation as the armatures 190 and 189, respectively, of relay 180. That is to say, armature 209 completes a circuit from the midpoint of secondary winding 118 by means of conductor 197, armature 209 and a conductor 210 to the junction 199 and hence to emergency amplifier "on" lamp 200. Relay armature 208 in this instance connects the amplifier stage terminal 160 to an output chassis terminal 212 which is connected by a coaxial cable 213 to a junction 214 (Fig. 5) in the low path filter circuit comprising the choke coils 123 and 124 as well as the condenser 125 of distribution amplifier 13. Again it will be seen that upon failure of distribution amplifier 13 the latter is completely by-passed except for the low path filter thereof with the emergency amplifier instantaneously taking over the continuous "measured" music of channel #2 until the difficulty with distribution amplifier 13 is corrected at which time the apparatus is restored to normal by momentarily opening emergency amplifier switch 169 as above described.

It thus becomes obvious to those skilled in the art that a centralized music system is herein provided in which musical programs of three distinct types are transmitted to local subscribers over only two telephone line channels thereby eliminating considerable costly equipment heretofore required and greatly decreasing operating expense. Moreover, only a single distribution console is required which is provided with an automatic selector chassis and which is automatically operable at predetermined periods of time to select the appropriate program transmitted to synchronized local subscriber stations. The distribution console also has a phonographic turntable chassis for request dedication programs as well as distribution amplifier chassis for each telephone line channel with each amplifier chassis being automatically operable to maintain a constant tone level regardless of amplitude variations in the reproduced music. Coupled with each distribution amplifier is provision for the making of public announcements whenever desired to the local subscriber or patron stations. An emergency stand-by amplifier chassis also carried by the distribution console automatically and instantaneously takes over amplification of the reproduced music upon failure of either of the distribution amplifiers for the telephone line channels. Furthermore, the entire equipment is designed to maintain servicing at a minimum and by providing easily detachable sealed containers housing most of the elements subject to wear and deterioration, the services of skilled

mechanics is not required enabling the equipment to be maintained in efficient operating condition by the average laymen. Also, since the automatic record changers are entirely independent of the distribution console, they need not necessarily be purchased unless the number of prospective subscribers fully warrants, as the distribution console can be connected to an existing studio in an adjacent city or town, from whom the reproduced music may be rented.

It is also to be understood that while the present invention primarily contemplates the distribution of the three types of programs mentioned, any given distributor may dispense with the "measured" or "juke-box" type should they so desire and in lieu thereof utilize channel #2 for alternate programs of the "restaurant" and "factory" types, in the same manner as herein described relative to channel #1, or in fact utilize simultaneously both channels for the same programs. In such an instance of course all local amplifiers would accordingly be of the synchronized clock control type since coin-controlled local amplifiers would not be required and in fact would be a detriment under such circumstances.

Although one embodiment of the present invention has been shown and described it is to be understood that still further modifications thereof may be made without departing from the spirit and scope of the appended claims.

I claim:

1. A music reproduction system comprising a distribution console provided with an automatic selector for selecting pre-arranged program music of different types at preselected intervals, an automatic record changer connected to said automatic selector and operable to reproduce the pre-arranged program of the type as selected by said automatic selector, a distribution amplifier carried by said console and connected to said automatic record changer for amplifying and distributing the reproduced music from the latter and of the type selected at any moment by said automatic selector over a single telephone line channel to local subscriber stations, an emergency amplifier carried by said console and connected to said distribution amplifier and adapted to automatically and instantaneously operate upon failure of said distribution amplifier to amplify and distribute the reproduced music at the moment supplied by said automatic record changer to said distribution amplifier, and means comprising a firing arrangement forming part of said distribution amplifier and connected to said emergency amplifier for operating the latter upon failure of said distribution amplifier for any reason.

2. A music reproduction system comprising a distribution console provided with an automatic selector for selecting pre-arranged program music of different types at preselected intervals, a remotely located automatic record changer connected to said automatic selector and operable to reproduce the pre-arranged program of the type as selected by said automatic selector, a distribution amplifier carried by said console and connected to said automatic record changer for amplifying and distributing the reproduced music from the latter and of the type selected at any moment by said automatic selector over a single telephone line channel to local subscriber stations, a second distribution amplifier carried by said console and connected to said automatic record changer for amplifying and distributing re-

produced music of a still further type from the latter continuously over a second telephone line channel to additional local subscriber stations of the coin-controlled type, an emergency amplifier carried by said console and connected to both of said distribution amplifiers and adapted to automatically and instantaneously operate upon failure of either of said distribution amplifiers to amplify and distribute the reproduced music at the moment supplied by said automatic record changer to the respective failed distribution amplifier, and means comprising a firing arrangement forming part of each respective distribution amplifier and connected to said emergency amplifier for operating the latter upon failure of either of said distribution amplifiers for any reason.

3. A music reproduction system comprising a distribution console provided with an automatic selector for selecting pre-arranged program music of different types at preselected intervals, a remotely located automatic record changer connected to said automatic selector and operable to reproduce the pre-arranged program of the type as selected by said automatic selector, a distribution amplifier carried by said console and connected to said automatic record changer for amplifying and distributing the reproduced music from the latter and of the type selected at any moment by said automatic selector over a single telephone line channel, a plurality of local subscriber stations connected to said single telephone line channel and provided with means synchronized with said automatic selector to cause some of said local stations to receive reproduced music of only one type and other of said local stations to receive reproduced music of only another type for respective time intervals as selected by said synchronized automatic selector, a second distribution amplifier carried by said console and connected to said automatic record changer for amplifying and distributing music of a still further type from the latter continuously over a second telephone line channel, a plurality of local subscriber stations of the coin-controlled type connected to said second telephone line channel for the reception of the continuously reproduced music for periods of time determined by the number or denomination of the coins deposited in said local coin-controlled station, an emergency amplifier carried by said console and connected to both of said distribution amplifiers and adapted to automatically and instantaneously operate upon failure of either of said distribution amplifiers to amplify and distribute the reproduced music at the moment supplied by said automatic record changer to the respective failed distribution amplifier, and means comprising a firing arrangement forming part of each respective distribution amplifier and connected to said emergency amplifier for operating the latter upon failure of either of said distribution amplifiers for any reason.

4. A music reproduction system comprising a distribution console provided with an automatic selector for selecting pre-arranged program music of different types at preselected intervals, a remotely located automatic record changer connected to said automatic selector and operable to reproduce the pre-arranged program of the type as selected by said automatic selector, a distribution amplifier carried by said console and connected to said automatic record changer for amplifying and distributing the reproduced music from the latter and of the type selected at any moment by said automatic selector over a single telephone

line channel to local subscriber stations, a second distribution amplifier carried by said console and connected to said automatic record changer for amplifying and distributing reproduced music of a still further type from the latter continuously over a second telephone line channel to additional local subscriber stations of the coin-controlled type, and a microphone adapted to be connected at the will of an operator to either of said distribution amplifiers for making public announcements to local subscriber stations.

5. A music reproduction system comprising a distribution console provided with an automatic selector for selecting pre-arranged program music of different types at preselected intervals, a remotely located automatic record changer connected to said automatic selector and operable to reproduce the pre-arranged program of the type as selected by said automatic selector, a turntable chassis carried by said console and operable to interrupt the reproduced music from said automatic record changer and to reproduce requested program music when desired, a distribution amplifier carried by said console and connected to said automatic record changer for amplifying and distributing the reproduced music from the latter and of the type selected at any moment by said automatic selector or the requested program music from said console turntable over a single telephone line channel to local subscriber stations, a second distribution amplifier carried by said console and connected to said automatic record changer for amplifying and distributing reproduced music of a still further type from the latter continuously over a second telephone line channel to additional local subscriber stations of the coin-controlled type, and a microphone adapted to be connected at the will of an operator to either of said distribution amplifiers for making public announcements to local subscriber stations.

6. A music reproduction system comprising a distribution console provided with an automatic selector for selecting pre-arranged program music of different types at preselected intervals, a remotely located automatic record changer connected to said automatic selector and operable to reproduce the pre-arranged program of the type as selected by said automatic selector, a distribution amplifier carried by said console and connected to said automatic record changer for amplifying and distributing the reproduced music from the latter and of the type selected at any moment by said automatic selector over a single telephone line channel to local subscriber stations, and said distribution amplifier including a container housing various electrical elements normally subject to deterioration and provided with a base detachably engageable with a socket to facilitate removal and insertion of said electrical elements in circuit with the customary electronic tubes of said distribution amplifier.

7. A music reproduction system comprising a distribution console provided with an automatic selector for selecting pre-arranged program music of different types at preselected intervals, a remotely located automatic record changer connected to said automatic selector and operable to reproduce the pre-arranged program of the type as selected by said automatic selector, a turntable chassis carried by said console and operable to interrupt the reproduced music from said automatic record changer and to produce requested program music when desired, a distribution amplifier carried by said console and

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connected to said automatic record changer through said turn-table chassis for amplifying and distributing the reproduced music from the latter and of the type selected at any moment by said automatic selector or the requested program music from said console turn-table over a single telephone line channel, a plurality of local subscriber stations connected to said single telephone line channel and provided with means synchronized with said automatic selector to cause some of said local stations to receive reproduced music of only one type and other of said local stations to receive reproduced music of only another type for respective time intervals as selected by said synchronized automatic selector or to receive the requested program music from said console turn-table depending upon the time interval during which the requested program music is reproduced, a second distribution amplifier carried by said console and connected to said automatic record changer for amplifying and distributing music of a still further type from the latter continuously over a second telephone line channel, a plurality of local subscriber stations of the coin-controlled type connected to said second telephone line channel for the reception of the continuously reproduced music for periods of time determined by the number or denomination of the coins deposited in said local coin-controlled station, an emergency amplifier carried by said console and connected to both of said distribution amplifiers and adapted to automatically and instantaneously operate upon failure of either of said distribution amplifiers to amplify and distribute the reproduced program at the moment supplied by said automatic record changer or the console turn-table to the respective failed distribution amplifier, means comprising a firing arrangement included in each respective distribution amplifier and connected to said emergency amplifier for operating the latter upon failure of either of said distribution amplifiers for any reason, and a microphone adapted to be connected at the will of an operator to either of said distribution amplifiers for making public announcements.

8. A music reproduction system comprising a distribution console provided with an automatic selector for selecting pre-arranged program music of different types at preselected intervals, a remotely located automatic record changer connected to said automatic selector and operable to reproduce the pre-arranged program of the type as selected by said automatic selector, said automatic selector including a synchronous electric clock operable to periodically close an electric circuit and a stepper relay intermittently operable upon closure of said electrical circuit to cause operation of said automatic record changer, and a distribution amplifier carried by said console and connected to said automatic record changer for amplifying and distributing the reproduced music from the latter and of the type selected at any moment by said automatic selector over a single telephone line channel to local subscriber stations.

9. A device for a distribution amplifier chassis comprising a container housing various electrical elements operable in conjunction with an electronic amplifying tube when subjected to a signal, and a base secured to said container and engageable with a socket on said chassis to facilitate removal and insertion of the electrical elements as a unit from the customary electrical

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circuit of said distribution amplifier including said electronic amplifying tube.

10. A music reproduction system comprising a distribution console provided with an automatic selector having means comprising a time clock for selecting a pre-arranged music program for periods of time as established by said time-clock, an automatic record changer connected to said automatic selector and operable to reproduce the pre-arranged program from a plurality of previously arranged records, a distribution amplifier detachably carried by said console and connected to said automatic record changer for amplifying and distributing the reproduced music from the latter as selected at the moment by said automatic selector to local speakers, and means connectable at the will of an operator to said distribution amplifier for the transmission of a special dedication program or the making of a public announcement over the music transmission system to local speakers.

11. A music transmission system comprising a distribution console provided with an automatic selector having means comprising an electrically synchronous time clock for selecting a pre-arranged program at preselected intervals or a continuous pre-arranged musical program for time periods as established by said synchronous time-clock, an automatic record changer connected to said automatic selector and operable to reproduce the pre-arranged program from a plurality of previously arranged records, a distribution amplifier detachably carried by said console and connected to said automatic record changer for amplifying and distributing the reproduced music from the latter as selected at the moment by said automatic selector to local speakers, means independent of said automatic record changer and connectable at the will of an operator to said distribution amplifier for transmitting a different program over said system, and a microphone connectable at the will of an operator to said distribution amplifier for the making of a public announcement over said transmission system when desired.

12. A music reproduction system comprising a distribution console provided with an automatic selector, music reproducing means connected to said automatic selector and operable to reproduce musical programs of at least two different types, a distribution amplifier carried by said console and connected to said music reproducing means for amplifying and distributing the reproduced music from the latter over a single pair of conductors to local speakers, and said automatic selector including means comprising a synchronous electric time-clock operable at pre-determined intervals to alternately select one or the other of said types of musical programs for transmission to said local speakers.

13. A music reproduction system comprising a distribution console provided with an automatic selector having means comprising a synchronous electric time-clock for selecting a music program of at least two different types of music, an automatic record changer connected to said automatic selector and operable to reproduce a pre-arranged program of one type or another from a plurality of previously arranged records, and a distribution amplifier carried by said console and connected to said automatic record changer for amplifying and distributing the reproduced music from the latter and of the type as selected at the moment by said automatic selector and for a definite period of time as determined by said

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time-clock, over a single pair of conductors to local speakers.

14. A music reproduction system comprising a distribution console provided with an automatic selector having means comprising an electrically synchronous time-clock for selecting pre-arranged program music of different types at pre-selected intervals as established by said synchronous clock, an automatic record changer connected to said automatic selector and operable to reproduce the pre-arranged program of the type as selected by said automatic selector, a distribution amplifier carried by said console and connected to said automatic record changer for amplifying and distributing the reproduced music from the latter and of the type selected at any moment by said automatic selector over a single pair of conductors, and a plurality of local speaker stations connected to said single pair of conductors and provided with an electric time-clock synchronized with the synchronous electric clock of said automatic selector to cause some of said local speaker stations to receive reproduced music of only one type and other of said local speaker stations to receive reproduced music of only another type for respective time intervals as selected by the synchronous time-clock of said automatic selector and by the synchronized electric time-clock at the local speaker stations.

15. A music reproduction system comprising a distribution console provided with an automatic selector having means comprising a time-clock

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for selecting one or the other of a pre-arranged music program for periods of time as established by said time-clock, an automatic record changer connected to said automatic selector and operable to reproduce the pre-arranged program of the type as selected by said automatic selector in conjunction with its time-clock, a distribution amplifier carried by said console and connected to said automatic record changer for amplifying and distributing the reproduced music from the latter and of the type selected at any moment by said automatic selector over a single pair of lines to local speaker stations, and said distribution amplifier being provided with an automatic tone level equalizer for maintaining the reproduced music received by the local speaker stations at a constant tone level regardless of tone variations between different records.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,230,486	Durant	Feb. 4, 1941
2,238,976	Hadel et al.	Apr. 22, 1941
2,241,663	Hayslett et al.	May 13, 1941
2,242,197	West et al.	May 13, 1941
2,306,654	Treman	Dec. 29, 1942
2,396,756	Snodgrass	Mar. 19, 1946