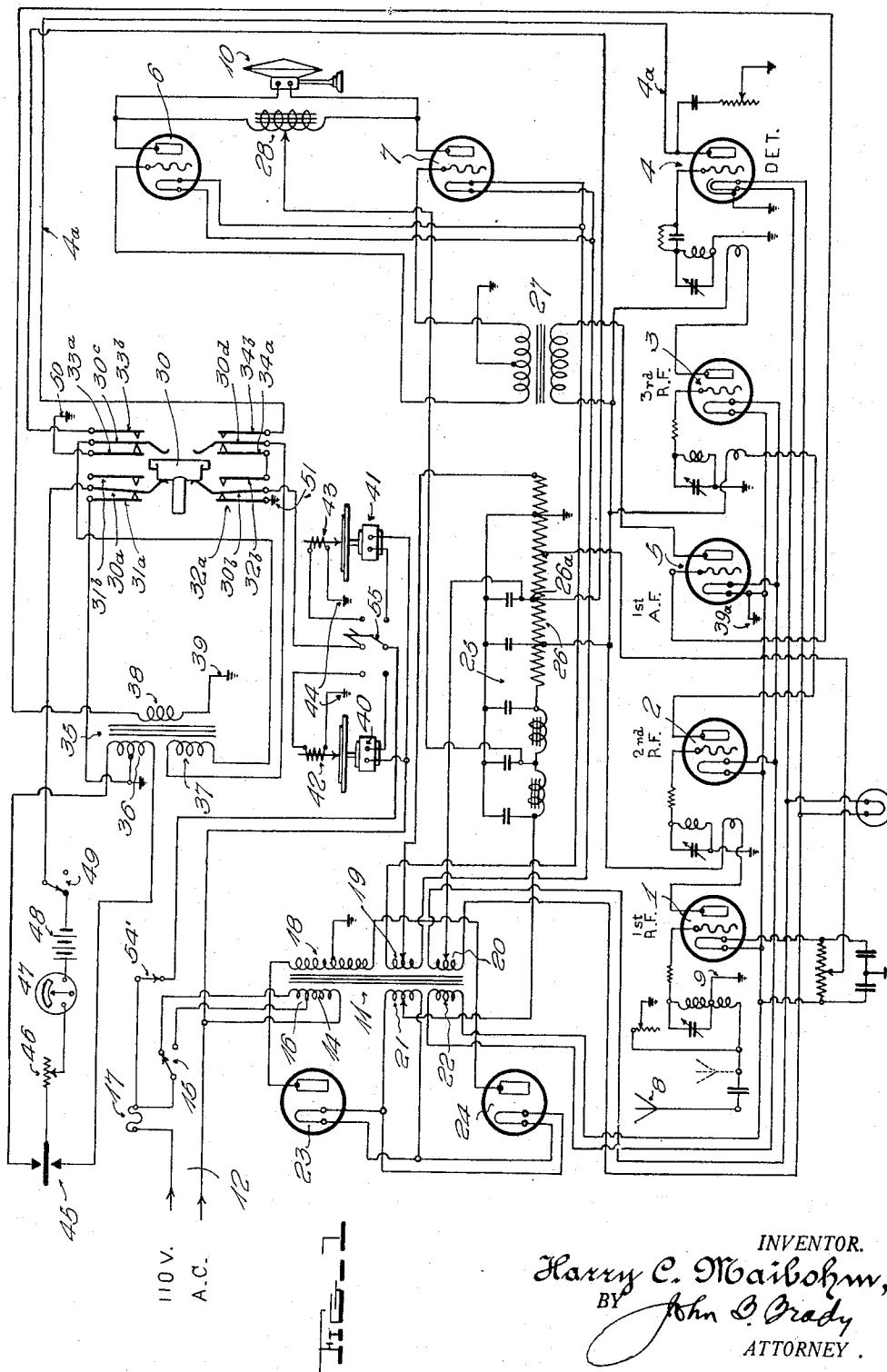


July 26, 1932.

H. C. MAIBOHM
COMBINED RADIORECEIVER, ELECTRICAL PHONOGRAPH,
AND PUBLIC ADDRESS SYSTEM
Filed Oct. 30, 1929

1,868.613

2 Sheets-Sheet 1



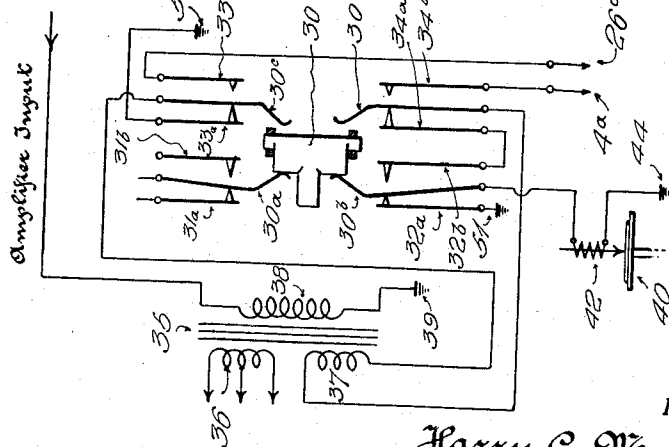
July 26, 1932.

H. C. MAIBOHM
 COMBINED RADIORECEIVER, ELECTRICAL PHONOGRAPH,
 AND PUBLIC ADDRESS SYSTEM
 Filed Oct. 30, 1929

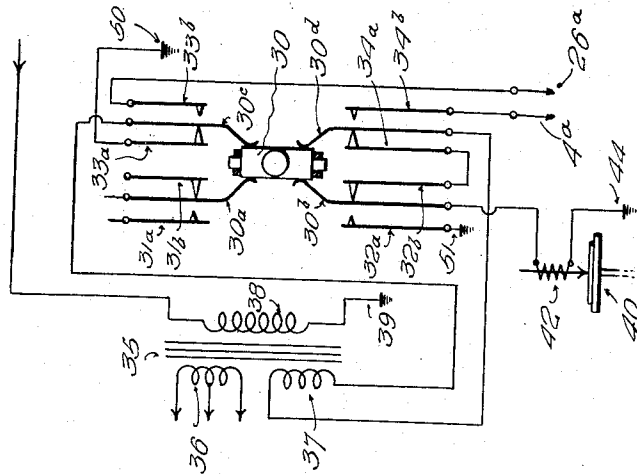
1,868,613

2 Sheets-Sheet 2

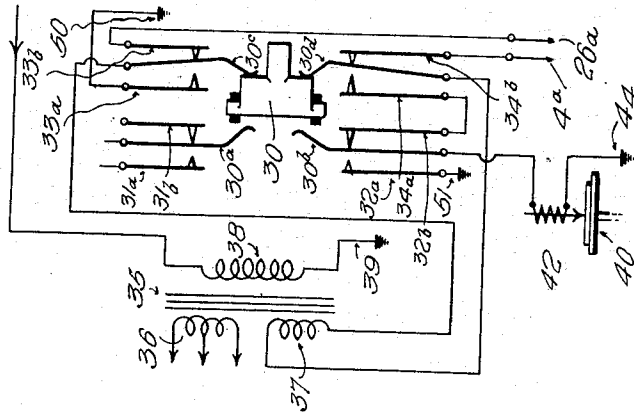
Selector switch positioned for
 Microphone use,



Selector switch positioned for
 Phonograph pick-up -



Selector switch positioned for
 Radio Broadcast reception,



INVENTOR.

Harry C. Maibohm,
 BY John B. Brady
 ATTORNEY.

UNITED STATES PATENT OFFICE

HARRY C. MAIBOHM, OF SANDUSKY, OHIO, ASSIGNOR TO THE SIMPLEX RADIO COMPANY, OF SANDUSKY, OHIO, A CORPORATION OF OHIO

COMBINED RADIORECEIVER, ELECTRICAL PHONOGRAPH, AND PUBLIC ADDRESS SYSTEM

Application filed October 30, 1929. Serial No. 403,474.

My invention relates broadly to sound reproducing apparatus and more particularly to a circuit arrangement for a combined public address system, electric phonograph, and radio broadcast receiver.

One of the objects of my invention is to provide a compact construction of apparatus which may be employed at the election of the operator as a public address system or as an electric phonograph for the reproduction of sound records or as a radio broadcast receiver under control of a switching system which employs the circuits of the apparatus in the enumerated arrangements.

Another object of my invention is to provide a circuit arrangement for the audio frequency amplifier portion of a radio broadcast receiver system with a selector switch arranged to alternately connect a microphone circuit or electric phonograph circuit with the input system of the audio frequency amplifier for employing the audio frequency amplifier circuits and sound reproducing system of the radio broadcast receiver either in their normal arrangement as part of a radio broadcast receiver or alternately as a public address system or an electric phonograph reproducer.

My invention finds particular application in schools, hotels, factories, resorts, theaters, and other places of public assembly where a simplified apparatus is desired for the amplification of sound.

The circuit arrangement of the apparatus of my invention has been found to be extremely practical and successful in its operation, and it will be understood more clearly from the specification hereinafter following by reference to the accompanying drawings, in which:

Figure 1 diagrammatically illustrates the combination public address-electric phonograph and radio broadcast system of my invention; Fig. 2 shows diagrammatically the position of the selector switch for utilizing the amplifier circuits of the radio broadcast receiver as part of the public address system; Fig. 3 illustrates the position of the selector switch when the audio frequency amplifier portion of the receiver is employed as an elec-

tric phonograph; and Fig. 4 shows the position of the selector switch when the audio frequency amplifier and sound reproducer is employed as a radio broadcast receiver.

Referring to the drawings in detail, the radio frequency amplifier stages of the radio broadcast receiver are designated by reference characters 1, 2 and 3. The detector stage is shown at 4. The first stage of audio frequency amplification is indicated at 5 which connects through transformer 27 with the push-pull amplifier system designated at 6 and 7, the output circuit of which connects to the sound reproducer 10. The radio broadcast receiver is connected to an antenna 8 and ground connection 9. The power is supplied for the several electron tubes to power transformer 11 having a primary winding 14 and secondary windings 18, 19, 20, 21 and 22. The primary winding 14 connects to the alternating current power supply line 12, fuse 17, and switch 15, which is arranged to select the entire primary winding 14 or a tap 16 thereon. The rectifier tubes for the power supply line apparatus are shown at 23 and 24 connected with the power transformer system and to the filter circuit 25 for delivering rectified alternating current to potentiometer 26 from which the energy is supplied to the plate circuits of the several tubes of the amplifier system. The control switch for the apparatus is shown at 30 and consists of a cam member having a central position or movable to either of two opposite positions. The cam switch includes resilient arms 30a, 30b, 30c, and 30d which are shiftable by movement of the cam 30 with respect to associated sets of contacts. Resilient arm 30a is associated with front and back contacts 31a and 31b, respectively. Resilient arm 30b is associated with front and back contacts 32a and 32b, respectively. Resilient arm 30c is associated with front and back contacts 33b and 33a, respectively. Similarly, resilient arm 30d is associated with front and back contacts 34b and 34a, respectively. The normal position for the resilient arms is in contact with the sets of back contacts and when the cam 30 moves out of the path of the re-

silient arms, the arms return to contact with the back contacts as enumerated.

The public address system includes a double microphone circuit shown at 45, the central terminal of which is connectible through adjustable rheostat 46, meter 47, battery 48, switch 49 with the resilient arm 30a. The opposite terminals of the microphone 45 connect to the ends of the primary winding 36 of transformer 35. The midpoint of primary winding 36 is grounded and is connected to the front contact 31a as illustrated in Fig. 1 of the drawings. The microphone circuit is therefore complete when cam 30 is in the position shown in Figure 1 with resilient arms 30a moved to establish connection with contact 31a as shown more clearly in Figure 2. Under this condition, resilient arm 30b establishes connection with contact 32a and shunts the phonograph pick-up circuit 42 to ground by a connection at 51 to contact 32a and a connection at 44 from the phonograph pick-up system. Under these same conditions it will be observed that the primary winding 37 used as part of the electric phonograph circuit is open circuited through contact arm 30d and contacts 34a and 32b at one end, and through contact arm 30e, contact 33a, and ground 50 at the opposite end. The secondary winding of transformer 35 which is shown at 30a connects to ground 39 at one end, and to the grid of the electron tube 5, constituting the first stage of audio frequency amplification at the other end. The ground 39a at the cathode of electron tube 5 completes the connection through ground 39 to the other end of secondary winding 38. The energy from the microphone circuit 45 therefore passes through the switch system with the cam 30 shown in the position illustrated in Figure 1 to the push-pull amplifier 6—7 through transformer 27 for actuating the sound reproducer 10. Under this condition, the detector output of tube 4 in the radio broadcast receiver is not impressed upon the first stage of audio frequency amplification for the plate system of the detector tube is open as will be observed by tracing the lead 4a from the plate terminal of tube 4 to contact 34b and the connection from contact 33b to the point 26a in potentiometer 26. Under these conditions, there will be no interference from the radio broadcast receiver in the sound reproducing system when the microphone circuit is connected to the input of the audio frequency amplifier system. However, all of the tubes in the radio broadcast receiver are maintained in operating condition so it is possible to switch instantly to any one of the three positions of the selector switch without waiting for the cathodes to heat.

When it is desired to utilize the apparatus as an electric phonograph, the selector switch is moved to the position illustrated in Figure

3 where the resilient arms 30a, 30b, 30c, and 30d each establish connection with the back contacts 31b, 32b, 33a, and 34a, respectively. This operation immediately opens the circuit to the microphone system 45 by breaking the connection between arm 30a and contact 31a. Likewise, the phonograph pick-up 42 is immediately placed in circuit with the primary winding 37 of transformer 35 through arm 30b, contact 32b, contact 34a, arm 30d, secondary winding 37, arm 30e, contact 33a, and ground 50, the other end of the phonograph pick-up being grounded at 44. To insure continuous performance and guard against interruption in the reproduced program, I provide two phonograph turntables driven by independent motor systems as represented at 40 and 41 each receiving sound records which actuate the phonograph pick-up devices 42 and 43, respectively. A selector switch 55 is provided for cutting in the drive 41 and the pick-up 43 when the second phonograph is to be connected for operation, power being obtained from the line system 12. A main switch 54 may be provided to cut off the power to the motor circuit. With the switch in the position shown in Figure 3, it will be observed that the detector tube 4 is isolated from plate potential by the existence of the open circuit between the plate lead 4a which connects to contact 34b and the connection from 33b which extends to the source of plate potential at 26a. Similarly, the microphone circuit is opened so that the audio frequency amplifier receives energy from the electric phonograph through secondary winding 38 of transformer 35 direct to the input circuit of tube 5.

When it is desired to employ the apparatus as a radio broadcast receiver, switch 30 is moved to the position shown in Figure 4 which serves to close the plate circuit of the detector tube from lead 4a, contact 34b, resilient arm 30d, primary winding 37, contact arm 30e, contact member 33b, returning to the source of positive potential at point 26a on potentiometer 26. At the same time, the electric phonograph is open circuited by reason of the fact that contact arm 30b connects to contacts 32b and 34a which are at zero potential. Similarly, the microphone circuit is open for battery circuit 48 terminates at resilient arm 30a which is in contact with the floating contact member 31b. It will be observed that the same transformer system 35 is utilized as the coupling transformer between the output circuit of the detector 4 and the input circuit of the first stage of audio frequency amplification as well as coupling means between the microphone circuit and the input of the audio frequency amplifier system, and also as the means for transferring energy from the phonograph pick-up circuit to the input system of the audio frequency amplifier. By throwing the switch

30 to any one of the positions illustrated in Figures 2, 3 and 4, the particular service which is desired from the apparatus is readily selected.

5 The apparatus of my invention has proven highly practical and successful in operation. In modern school systems it is possible for announcements and lectures to be given through the microphone circuit to an entire student
10 body and the sound distributed over a large area. The output of the apparatus may be connected to a multiplicity of sound reproducing devices connected in parallel with the sound reproducer 10 which are located in
15 various rooms of an educational institution. In this way, phonograph music, an address, or a radio broadcast program may be delivered to the occupants of the different rooms.

20 In a hotel system my apparatus has been found to be practical in that a central installation may be made and the radio broadcast music or electric phonograph programs distributed to guests in hundreds of rooms throughout a hotel building. Executives
25 may address the employees of a factory through a huge organization by distributing loud speakers throughout the building electrically connected in parallel with the speaker circuit 10, the apparatus and microphone
30 being located in the executive's office. The same method may be employed in locating individuals in remote parts of a large plant. My invention also finds application in resorts, amusement parks, and other places
35 of public assembly in the distribution of sound over a large area.

40 While I have described the circuit arrangement of the apparatus of my invention in one of its preferred embodiments, I desire that it be understood that modifications may be made and that no limitations upon my invention are intended other than are imposed by the scope of the appended claims.

45 What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. In a sound reproducing system, a radio receiver including a detector and an audio frequency amplifier, a sound reproducer connected to the output circuit of said audio frequency amplifier, a transformer having a secondary winding connected with the input circuit of said audio frequency amplifier and a pair of primary windings, a microphone
50 circuit, an electric phonograph circuit, a switching device common to all of said circuits, connections between said electric phonograph circuit and said switching device, said switching device operating to disconnect
55 said detector from said audio frequency amplifier, and selectively complete connections between said microphone circuit and one of said primary windings, or selectively complete connections between said electric phonograph circuit and the other of said primary
60
65

windings for operation of said sound reproducer independent of the operation of said detector.

2. In a sound reproducing system, a radio receiver including a detector and audio frequency amplifier, a sound reproducer connected to the output circuit of said audio frequency amplifier, a coupling system between said detector and the input circuit of said audio frequency amplifier including a secondary winding connected across the input circuit of said audio frequency amplifier and a pair of secondary windings, a switching device connected with said primary windings, an electric phonograph circuit, said switching device being common to all of said circuits, a microphone circuit, connections between said switching device and said electric phonograph circuit, and means for completing connection through said switching device between the other of said primary windings and said microphone circuit for effecting the operation of said sound reproducer independent of the operation of said detector.

In testimony whereof I affix my signature.
HARRY C. MAIBOHM.

70

75

80

85

90

95

100

105

110

115

120

125

130