Fig. 1

Fig. 2

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The invention concerns an arrangement for receiving radio broadcast programs, reproducing phonograph selections or recording phonograph selections either from broadcast programs or from a local source.

The principal object of the invention is to provide a device which shall combine all of these functions or any number of them and which may be readily changed by an unskilled operator to select any desired function.

In my copending application Serial No. 35,883, filed June 9, 1925, I have described a combined electric phonograph and radio receiver. The apparatus described in that application makes use of a single audio frequency amplifier for either an electric phonograph or a radio receiver. The present invention is an improvement over the arrangement there shown as it incorporates several new features in addition to those in the copending application. It is contemplated that the present device shall contain a radio receiver and audio frequency amplifier, a loud speaker and a reversible electric phonograph reproducer and recorder with suitable switching arrangement to selectively connect the several elements so that the apparatus may be used for any of the following purposes:

1. To listen to incoming radio programs.
2. To listen to electric phonograph records.
3. To record incoming radio selections on a phonograph record.
4. To record local selections on a phonograph record.
5. To simultaneously listen to and record incoming radio selections.

The term “radio receiver” as used throughout this specification and appended claims indicates any of the well known types of broadcast receiving apparatus.

The invention will be better understood from a consideration of the following detailed description which should be read in connection with the accompanying drawing in which—

Fig. 1 shows a simple switching arrangement according to the invention, and

Fig. 2 shows a modified form of switching arrangement by which all necessary circuit changes can be made with a single manual operation.

Referring to Fig. 1 A represents a radio antenna, 1 a radio frequency amplifier, 2 a detector, 3 an audio frequency amplifier and 4 a loud speaker. The device 9 is a reversible apparatus which can be used either to reproduce sounds from phonograph records or record sounds on such records. These devices, which may be of the electromagnetic, piezo crystal or any other desired type, are well known in the art and need not be explained in detail. It suffices to say that when the device 9 is energized by undulating currents it will cause corresponding vibrations in the attached stylus and on the other hand when the attached stylus is vibrated these vibrations will cause corresponding undulating currents in the device 9.

Before proceeding further with the description it should be noted that the diagram is a single line diagram, that is a complete circuit is indicated by a single line. Although of course, the circuits would ordinarily each contain two wires they have been represented in this fashion for the sake of clearness and it will be apparent that the switching system as shown can be readily applied to the actual circuits as it is usually necessary to open only one side of a circuit to interrupt its electrical continuity. On the other hand the switching devices can be arranged to open both sides of the circuit if desired, in which case each single contact in the drawings would represent two contacts in practice and each switch blade would represent two insulated switch blades.

The arrangement in Fig. 1 has a selective switching arrangement consisting of three switches designated by 14, 10 and 15. The switch 14 consists of a movable contact 5 connected as shown to the input circuit of the audio frequency amplifier 3 and three connecting stationary contacts 6, 7 and 8, the contact 7 being connected to the output circuit of detector 2 and the contact 8 being connected to the reproducer and recorder 9. The switch 10 consists of a movable contact 11 adapted to selectively engage stationary contact 12 or stationary contact 13, the former of which is connected to the output of the audio frequency amplifier 3 and the latter to the contact 6 of switch 14. The movable contact 11 of switch 10 is connected to the sound producing device 4. The switch 15 consists of a movable contact 16 connected to the output circuit of the audio.
frequency amplifier 3 and a stationary contact 17 connected to the reproducer and recorder 9. By properly positioning these several switches as will now be explained, the apparatus may be used for any of these functions noted above.

Assume first that it is desired to hear incoming radio signals through the loud speaker 4. In this case the movable contact 5 of switch 14 will be placed on stationary contact 7, the movable contact 11 of switch 10 will be placed on stationary contact 12, and switch 15 will be opened. The radio signals received by antenna A will be amplified and detected by the units 1 and 2 respectively and the rectified signals will pass through the closed switch 5 to the audio frequency amplifier 3 and thence through the contact 12 and movable contact 11 to the loud speaker 4. In this position the reproducer and recorder 9 will be cut out of circuit entirely.

Now suppose that it is desired to listen to a phonograph record. In this case the movable member 5 of switch 14 will be placed on stationary contact 8, movable contact 11 of switch 10 on stationary contact 12 and switch 15 will be left open as before. In this case the undulating currents from device 9 will be led through the contacts 8 and 5 to the audio frequency amplifier 3 and thence through switch contacts 12 and 11 to the loud speaker 4. In this arrangement the radio receiver comprising the antenna and radio frequency amplifier and detector is cut out of circuit.

Suppose again that it is desired to record incoming radio selections but not to listen to them. In this case the movable contact 5 of the switch 14 will be placed on the stationary contact 7, the switch 10 will be left open altogether and the switch 15 closed. The incoming radio signals will then be led through the radio frequency amplifier 1 and detector 2 to the contact 7 thence across the movable contact 5 to the audio frequency amplifier 3 and across the switch 15 to the device 9 now acting as a recorder. In this case the loud speaker 4 will be cut out of circuit.

If it is desired to record local selections as distinguished from incoming radio selections the movable contact of switch 14 will be placed on stationary contact 6 the movable contact 11 of switch 10 on stationary contact 13 and the switch 15 will be closed. With this arrangement the loud speaker 4 may be used as a transmitter or microphone and sounds impressed on its diaphragm will cause corresponding undulating currents which will be led through contacts 11 and 13 of switch 10 to stationary contact 6 and through movable contact 5 to the audio amplifier and then through the closed switch 15 to the recorder 9. In this arrangement the sounds impinged on the diaphragm of the loud speaker 4 may be recorded on a suitable record by the resulting vibrations of the stylus of the device 9.

It may, however, be desired to listen to incoming radio signals as well as to record them. In this case the movable contact 5 of switch 14 will be placed on stationary contact 7 the movable contact 11 of switch 10 on the stationary contact 12 and the switch 15 will be closed. Here the incoming signals after passing through the radio amplifier and detector will be conducted across the switch contacts 7 and 5 to the audio frequency amplifier whose output circuit now presents two branches in parallel, one across the switch contacts 12 and 11 to the loud speaker 4 and the other across the closed switch 15 to the recorder 9. In this case the signals may be recorded on a suitable record by the vibrating stylus of device 4 and will be reproduced as well by the loud speaker 4.

The circuit arrangement in Fig. 1 includes three separate switches 14, 10 and 15 and while the device will operate quite satisfactorily in this manner it is desirable, particularly where operation by an unskilled operator is concerned, to make the switching arrangement as simple as possible and if desired these three switches may be combined into a single switching device by which any desired operation may be obtained by one single movement of a movable switch member. An arrangement of the latter type is shown by way of example in Fig. 2.

In Fig. 2 the circuit arrangement is very similar to that in Fig. 1. A represents as before the antenna, 21 a radio frequency amplifier, 22 a detector, 23 an audio frequency amplifier, 24 a loud speaker and 25 a combined reproducer and recorder, all of these devices being substantially the same as similar ones in Fig. 1. The three switches 114, 10 and 15 of Fig. 1, however, have been replaced by a single commutator switch S which has substantially the same operation as the switches 14, 10 and 15 in Fig. 1, the principal difference being that a single switching operation is sufficient to select any function of the device. The switch S consists of a panel 25 on which is mounted an arcuate contact 30 connected to the input circuit of the audio frequency amplifier and a similarly oppositely disposed arcuate contact 31 connected to the output circuit of this amplifier. These contacts are each of sufficient length to cover the entire operating travel of the movable switch 26. Above the arcuate contact 30 on the panel 25 is located a series of contacts designated as 32 to 36, respectively, arranged in an arcuate path and insulated from each other and from the contact 30. Contacts 32, 34 and 36 are connected
to the output circuit of the detector while contacts 33 and 35 are connected to the reproducer 29 and the loud speaker 24 respectively. On the lower part of the panel are additional arcuate contacts 27 and 28 electrically insulated from each other, the former being connected to the device 29 and the latter to the loud speaker 24. It should be noted that the contact 27 is as long as two of the contacts 32, 33 etc. with their intervening insulation and the contact 28 is as long as three of these contacts with their intervening insulation. An auxiliary contact 37 is placed in the path of the moving switch member at one of its extreme operative positions and is connected by jumper 40 to the contact 28 thereby placing it in circuit with the loud speaker 24. The movable member 26 of this commutator switch comprises a central insulating pivoted portion 45 with two conducting portions 46 and 47 extending in diametrically opposite directions therefrom. As the movable member 26 is moved about its pivot the conducting portion 47 bridges the contact 30 to one of the contacts 32 to 36 inclusive, while the conducting portion 46 bridges the arcuate contact 31 and one of the contacts 27 or 28.

In one extreme operating position the conducting portion 46 will also bridge the arcuate contact 31 and the auxiliary contact 37.

The switch is movable to five different operating positions designated as M, N, O, P and Q respectively. In the position Q the circuits will be so connected as to cause the radio receiver to operate the loud speaker 24 in the usual manner. The circuit extends from the detector 22 to contact 32 across the switch member 47 to the contact 30 thence through the audio frequency amplifier to the contact 31 and across the switch member 46 to the contact 28 and the loud speaker 24. In this position there will be no connection to the reproducer and recorder 29. If the movable member 26 be moved to its second position designated P the radio receiver will be cut out of circuit and the loud speaker 24 will reproduce a phonograph record in operative relationship with the reproducer 29.

This circuit will extend from the device 29 to the contact 33 across the movable contact 47 to the contact 30 thence through the audio frequency amplifier to the loud speaker 24 as before. In the positions marked O and N by similar circuits either incoming radio signals or local selections through the horn 24 may be recorded as explained in connection with Fig. 1. In its extreme position M the switch blade 46 will bridge the three contacts 31, 37 and 28 in which case the loud speaker 24 and recorder 29 will be placed in parallel in the audio frequency amplifier output circuit and the radio receiver will be connected through the contacts 36 and 30 to the input of the audio frequency amplifier.

In this case incoming radio signals may be recorded by the recorder 29 as well as reproduced by the loud speaker 24.

It will be apparent therefore that I have devised an apparatus that with very few parts can be made to perform a great number of different functions thereby extending its usefulness and economizing largely in expensive material and devices. It will be understood that the showing of the device is very diagrammatic and that the invention is capable of many refinements which will readily occur to those skilled in the art, for example, the switch S in Fig. 2 might be used to control the tube filament circuits of the device as well as select the required signaling circuits. The particular form of switch, moreover, is not essential as it is obvious that many other forms could be used without departing from the spirit of the invention. It is further contemplated that all the apparatus shown may be incorporated in a single container or in separate units as desired. I intend, therefore, to be limited only as indicated by the scope of the following claims.

Having described my invention, I claim:

1. In combination a radio receiver, a reproducer, an audio amplifier having input and output circuits, a combined sound producing and responsive device and selective switching means for connecting said receiver to the input circuit of said amplifier and said device to the output circuit thereof or said device to the input circuit of said amplifier and said recorder to the output circuit thereof.

2. In combination a combined reproducer and recorder, a combined sound producing and responsive device, an amplifier having input and output circuits and selective switching means for alternatively connecting said reproducer and recorder to either one of said amplifier circuits and said device to the other.

3. In combination a radio receiver, a reproducer, a combined sound responsive and producing device, an amplifier having an input and an output circuit and selective switching means for connecting said receiver to the input circuit of the amplifier and said device to the output circuit thereof or said device to the input circuit of said amplifier and said recorder to the output circuit thereof.

4. In combination a radio receiver, a reproducer, a combined sound responsive and producing device, an amplifier having an input and an output circuit and switching means for selectively connecting said device to the input circuit of said amplifier and said recorder to the output circuit thereof or said receiver to the input circuit of said amplifier and said device and recorder to the output circuit thereof.
5. In combination a radio receiver, a combined reproducer and recorder, a combined sound responsive and producing device, an amplifier having an input and an output circuit and switching means for selectively connecting either said receiver or said reproducer to the input circuit of said amplifier and said device to the output circuit thereof or said device to the input circuit of said amplifier and said recorder to the output circuit thereof.

6. In combination a radio receiver, a recorder, a combined sound responsive and producing device, an amplifier having an input and an output circuit and switching means for selectively connecting said receiver to said input circuit and said device to said output circuit or connecting the recorder to either one of the amplifier circuits and said device to the other.

7. In combination a radio receiver, a recorder, a combined sound responsive and producing device, an amplifier having an input and an output circuit and switching means for selectively connecting said receiver to said input circuit and said device alone or said device and said recorder to said output circuit or said device to said input circuit and said recorder to said output circuit.

8. In combination a radio receiver, a combined reproducer and recorder, a combined sound responsive and producing device, an amplifier having an input and an output circuit and switching means for selectively connecting either said receiver or said device to said input circuit and said recorder to said output circuit or said reproducer to said input circuit and said device to said output circuit.

9. In combination a radio receiver, a combined reproducer and recorder, a combined sound responsive and producing device, an amplifier having a<input missing value="input"/>put and an output circuit and switching means for selectively connecting said receiver to said input circuit and said recorder and said device to said output circuit or said reproducer and recorder to either one of said amplifier circuits and said device to the other.

10. In combination a radio receiver, a recorder, a combined sound responsive and producing device, an amplifier having an input and an output circuit and switching means for selectively connecting said receiver to said input circuit and either said recorder alone or said recorder and said reproducer to said output circuit or said reproducer and recorder to one of said amplifier circuits and said device to the other.

11. In combination a radio receiver, a combined reproducer and recorder, a combined sound responsive and producing device, an amplifier having an input and an output circuit and switching means for selectively connecting said receiver to said input circuit and said device to said output circuit or said reproducer and recorder to one of said amplifier circuits and said device to the other.

12. In combination a radio receiver, an amplifier having an input and an output circuit, a combined reproducer and recorder, a combined sound responsive and producing device and switching means for selectively connecting either said receiver or said reproducer to said input circuit and said device to said output circuit or said device to said input circuit and said recorder to said output circuit or said receiver to said input circuit and either said recorder alone or said device and recorder to said output circuit.

13. In combination a radio receiver, a recorder, a combined sound responsive and producing device, an amplifier having an input and an output circuit and switching means for selectively connecting said receiver to said input circuit and said device alone or said recorder alone or said device and said recorder to said output circuit or said device to said input circuit and said recorder to said output circuit.

14. In combination a radio receiver, a combined reproducer and recorder, a combined sound responsive and producing device, an amplifier having an input and an output circuit, and switching means for selectively connecting said reproducer and recorder to either one of said amplifier circuits and said device to the other or said receiver to said input circuit and either said recorder alone or said device and recorder to said output circuit.

15. In combination a radio receiver, a combined reproducer and recorder, a combined sound responsive and producing device, an amplifier having an input and an output circuit and switching means for selectively connecting said receiver to said input circuit and said device alone or said recorder alone or said device and recorder to said output circuit or both the device and recorder to said output circuit or said reproducer and recorder to either one of said amplifier circuits and said device to the other.

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