March 28, 1933. R. DALLY 1,902,950

COMBINED REPRODUCING AND RECORDING DEVICE

Filed Oct. 29, 1931

Fig. 1

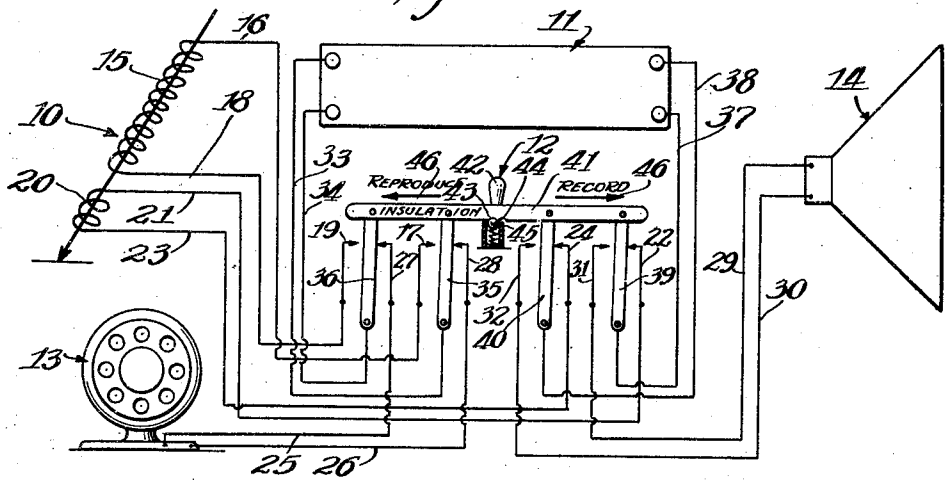


Fig. 2

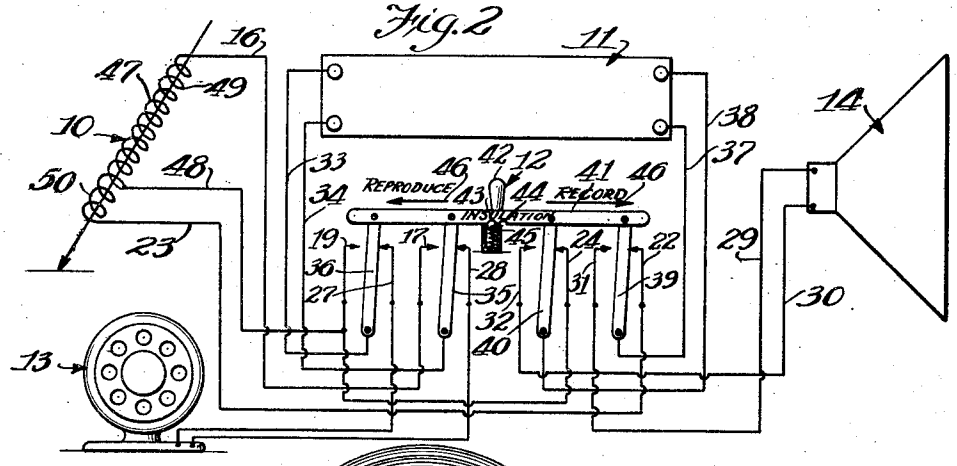
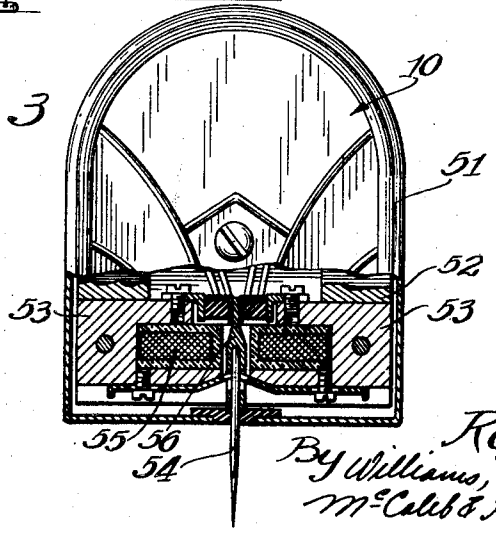


Fig. 3



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UNITED STATES PATENT OFFICE

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COMBINED REPRODUCING AND RECORDING DEVICE

Application filed October 29, 1931. Serial No. 571,727.

The present invention relates to combined reproducing and recording devices of the type commonly called "pick-ups", and is particularly concerned with the provision of an improved pick-up which is adapted to be used for both the reproduction and recording of sound on existing radio receivers.

Modern radio receivers usually have an audio frequency amplifier which is suitable for record reproducing or recording when properly coupled to the necessary apparatus. For reproduction, a pick-up of a fairly high impedance is required, such as, for example, a pick-up having about five thousand turns of wire, and the pick-up is coupled directly to the grid circuit of the detector tube, or if the audio amplifier includes more than one stage, it may be connected to the tube following the detector, or it may be coupled to the primary of one of the audio transformers used in the radio receiver.

For the purpose of the present description, either one of these modes of connection may be considered as a connection to the input side of the amplifier or to the input side of a portion of the amplifier.

So long as the pick-up has a fairly high impedance it is not necessary to add any additional equipment to the amplifier in order to reproduce records, other than the pick-up itself. If, on the other hand, a pick-up of low impedance is used, in order to secure satisfactory results, it is necessary to couple the pick-up to the amplifier through a high ratio transformer. This involves additional expense and usually results in a low efficiency, and it is therefore desirable to use for reproduction purposes, a pick-up having a high impedance, coupled directly to the grid circuit of one of the audio amplifier tubes.

For the purpose of recording or cutting records, the same high impedance pick-up may be used with fair results when coupled to the amplifier output tube or tubes, through the proper type of transformer. Here again a special transformer is required if it is desired to utilize the same high impedance pick-up for both recording and reproducing.

Since modern receivers are designed to operate a dynamic speaker, having a very low voice coil impedance, it would be possible to use the voice coil winding of the output transformer only if the pick-up winding has a very low impedance comparable with the speaker voice coil. When the pick-up is used as a cutter, it is essentially a power driven device and quite similar to the speaker itself in this respect, and a more ideal and efficient arrangement would be attained if the cutter impedance were relatively low, or as low in value as that of the speaker voice coil. A cutter impedance coil of such a low value could be coupled to the output transformer secondary, replacing the speaker and recording could be accomplished under more nearly ideal conditions without the necessity for additional equipment. For example, the impedance of the low impedance winding with the circuit of the high impedance coil open, was made about twelve and a half ohms with a certain speaker.

It will thus be observed that the ideal requirements for a simple reproducer are inconsistent with the ideal requirements for a simple recorder insofar as the impedance is concerned and the ordinary reproducers and recorders cannot be utilized interchangeably without the necessity for additional equipment which increases the expense and decreases the efficiency of the device.

One of the objects of the present invention is the provision of an improved pick-up which is also adapted to be utilized for recording without the necessity for providing additional equipment to adapt the device for either of its functions.

Another object is the provision of an improved recording device which is also adapted to be utilized for reproduction without the necessity for providing additional equipment, such as transformers or the like.

Another object is the provision of an improved combined reproducing and recording device, which is adapted to be used with modern radio receivers without the necessity for providing special equipment to adapt the radio receiver to the use of the reproducer or recording device.

Another object is the provision of an improved reproducing and recording device

which is more efficient than the devices of the prior art, in which the same pick-up may be utilized for either reproduction or recording by merely switching different parts of the pick-up into circuit.

Another object is the provision of an improved circuit arrangement for reproducing and recording devices, which is adapted to perform both functions more efficiently and more economically than the devices of the prior art, by virtue of the elimination of certain intermediate equipment which reduces the efficiency and involves additional expense.

Other objects and advantages of the invention will be apparent from the following description, and from the accompanying drawing, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the single sheet of drawing:

Fig. 1 is a diagrammatic view of the apparatus and circuits required for one embodiment of my invention;

Fig. 2 is a similar diagrammatic view of the apparatus and circuits for another embodiment of the invention;

Fig. 3 is a fragmentary view in partial section of a combined pick-up and reproducer of the type which may be used in either Fig. 1 or Fig. 2.

Referring to Figs. 1 and 2, the present apparatus preferably includes the combined reproducer and recorder 10, and amplifier 11, a switching arrangement 12, a microphone 13, and a speaker 14. Any type of suitable amplifier, speaker or microphone may be utilized, and therefore these elements are merely shown diagrammatically. The pick-up is preferably of the type shown in Fig. 3, provided with a supporting casing 51, a permanent magnet 52 having pole pieces 53, a stylus 54, and coils 55. The stylus 54 is movably mounted, being carried by the armature 56, which is preferably supported upon knife edges and all of the details of the present pick-up, except the coils, may be made substantially the same as that disclosed in the application of William H. Hutter, Serial No. 488,243, filed October 13, 1930.

The present pick-up is distinguished by the provision of separate windings or separate taps for a common winding, for providing windings having a proper impedance for both the functions recording and reproducing most efficiently, and without the necessity for additional apparatus.

Thus, in Fig. 1, the winding 15 which is represented as a longer winding, is a winding of high impedance adapted to be used without the necessity for transformers when directly connected to the input side of the amplifier 10. The high impedance winding 15 is preferably connected by a conductor 16 to a fixed contact 17, while the other side of the high impedance winding 15 is connected by a conductor 18 to a fixed contact 19.

The pick-up also includes a low impedance winding 20 having an impedance comparable to the impedance of the voice coil of the speaker 14, and one terminal of the low impedance coil 20 is connected by conductor 21 to a fixed contact 22. The other terminal of the low impedance coil 20 is connected by conductor 23 to fixed contact 24. The microphone 13 has its terminals connected by conductors 25, 26 to fixed contacts 27, 28, respectively. The speaker 14 has its terminals connected by conductors 29, 30 to fixed contacts 31, 32, respectively.

The input side of the amplifier 10 has its terminals connected by conductors 33, 34 to the movable contact arms 35, 36, respectively. The output terminals of the amplifier 11 are connected by conductors 37, 38 to the movable contact arms 39, 40, respectively. All of the contact arms 35, 36, 39 and 40 are preferably joined by an insulating member 41 so that they may be simultaneously actuated by the same actuating member 42.

The switch is also preferably of the snap type, adapted to move quickly from one position to the other, and adapted to be positively secured in either of its positions. For this purpose, the insulating member 41 has been illustrated with a pair of grooves 43, 44 adapted to be engaged by a spring pressed ball 45. The switch is also preferably provided with arrows 46 and appropriate indicia for indicating the functions of the device in the different switch positions, such as "Reproduce" and "Record". When the switch 12 is in the position of Fig. 1, it has been moved to the recording position, and when the switch is moved to the left in Fig. 1, it is moved into the reproducing position.

Referring to Fig. 2, this is another modification in which the reproducer is provided with a single coil 47 having a plurality of taps. The end taps 16 and 23 may be considered the same as the conductors previously described in connection with the device of Fig. 1. The center tap 48 performs the functions of both the conductors 18 and 21 of Fig. 1. The tap 48 is connected to windings 47 in such manner that the upper winding 49 is the high impedance winding for reproduction, while the lower winding 50 is the low impedance winding for recording.

The operation of the present recording and reproducing device is as follows. When the switch 12 is in the position of Fig. 1, or that of Fig. 2, the low impedance winding 20 or 50 is connected in circuit with the microphone 13, and the circuit may be traced from the microphone to the amplifier as follows: 13, 25, 27, 36, 34, 11, 33, 35, 28, 26, 13. The circuit may be traced from the amplifier to the recorder as follows: 11, 38, 40, 24, 23, 20, 21, 22, 39, 37, 11.

The microphone 13 is thus connected to the amplifier and the low impedance coil 20 is connected to the output side of the amplifier in such manner as most efficiently to effect the recording of sound without the necessity for using intermediate transformers or other devices which reduce the efficiency. The low impedance coil 20 is thus substituted for the voice coil of the speaker 14.

When the switch 12 is moved to the left in Fig. 1 or Fig. 2, the microphone and low impedance coil are cut out and the speaker 14 and high impedance coil 15 are cut into the circuit. Under these conditions, the circuit may be traced from the high impedance coil 15 to the amplifier, as follows: 15, 18, 19, 36, 34, 11, 33, 35, 17, 16, 15. The circuit may be traced from the amplifier to the speaker 14 as follows: 11, 37, 39, 31, 29, 14, 30, 32, 40, 38, 11. The speaker is thus connected in circuit with the amplifier and the high impedance coil of the pick-up is substituted for the low impedance coil for the purpose of reproduction.

It will thus be observed that the present device may be used for reproduction and for recording without the necessity for using intermediate transformers, and the present pick-up may be ideally adapted for both reproduction and recording. The pick-up may thus be attached to existing radio receivers with a minimum amount of expense and labor and the present device is more adaptable and conveniently applied than the devices of the prior art.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim is new and desire to secure by Letters Patent of the United States, is:

1. A combined reproducer and recorder comprising an amplifier, a speaker, a microphone, and a pick-up having windings adapted to be substituted for said microphone for reproduction and having windings adapted to be substituted for said speaker for recording.

2. A combined reproducer and recorder comprising an amplifier, a speaker, a microphone, and a pick-up having windings adapted to be substituted for said microphone for reproduction, and having windings adapted to be substituted for said speaker for recording, and selective switching devices for effecting said substitution.

3. In a recording system, the combination of an amplifier with a speaker, a pick-up having an auxiliary low impedance coil for recording, the impedance of said coil being comparable with that of the speaker, and selective switch means for connecting either the speaker or said auxiliary coil to said amplifier.

4. In a reproducing system, the combination of a recording device having an auxiliary high impedance reproduction coil with an amplifier and a microphone, and selective switch means for selectively connecting said auxiliary reproduction coil or said microphone in circuit with said amplifier.

In witness whereof, I hereunto subscribe my name this 25 day of September, 1931.

ROY DALLY.