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A. H. GREBE ET AL

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PHONOGRAPH COUPLING FOR RADIORECEIVERS

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FIG. 1.

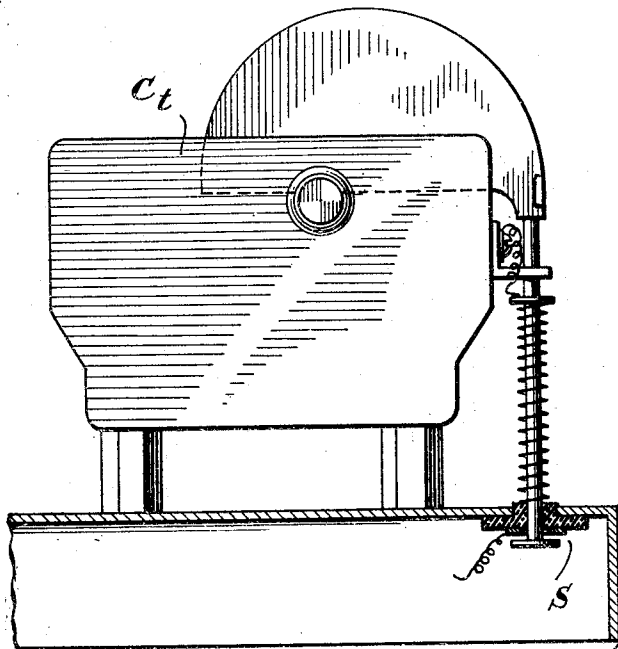
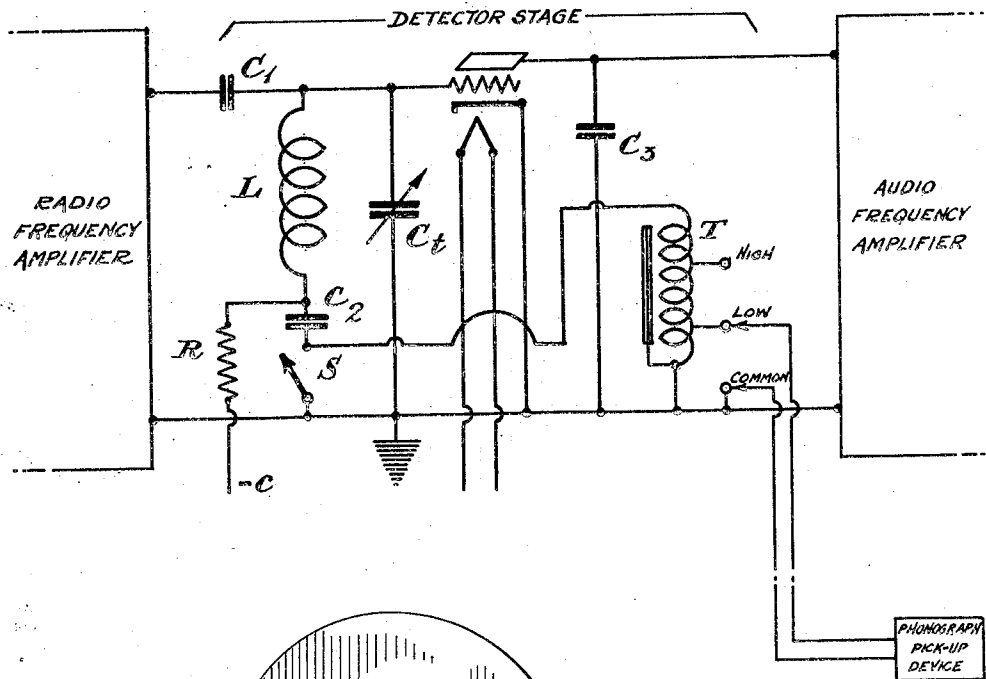


FIG. 2.

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## UNITED STATES PATENT OFFICE

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## PHONOGRAPH COUPLING FOR RADIORECEIVERS

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In the present type of radio receiving set, it is customary to make suitable arrangements so that the signal from a phonographic magnetic pick-up can be suitably amplified and given off by the loud speaker of the radio receiving set. When suitable arrangements for such phonographic reproduction are made, it is advisable to have the set so modified that any radio frequency signal coming from the antenna or other signal gathering device cannot effect the loud speaker. The present invention has to do with a convenient device and arrangement for making this operation possible; several novel and useful features of the invention will become evident when it is described.

In the drawings:

Fig. 1 is a circuit diagram showing the functioning of our device; and

Fig. 2 shows the switch S of Fig. 1, as it is arranged in the set for operation from the movements of the tuning condensers of the radio frequency amplifiers.

In Fig. 1, we have indicated generally the radio frequency amplifier (R. F. A.) of the radio receiver, and the audio frequency amplifier (A. F. A.) of the receiver; the arrangement of the detector is shown in detail. The output of the R. F. A. is supplied to the input circuit of the detector circuit through a small coupling condenser  $C_1$ .

The input circuit of the detector is generally tuned and in our drawings we have so shown it; our invention is not, however, limited in its application to detector circuits arranged for tuning but is equally applicable to detectors having untuned circuits.

In Fig. 1 of the drawings, the tuned input circuit consists of the inductance coil L, the fixed condenser  $C_2$  (of comparatively large capacity), and the variable tuning condenser  $C_1$ . This tuning condenser will generally be mounted for common control with the other tuning condensers of the set. When the switch S is closed, the input circuit of the detector is seen to consist of L,  $C_2$  and  $C_1$  in series. When switch S is opened, however, the transformer T is inserted in the circuit thus completely destroying its tuning quality. It follows from this that the de-

tector input circuit is practically non-responsive to any radio frequency signal being received by the set.

When the switch S is open, however, it will be seen that the transformer T is connected between the cathode and grid of the detector tube so that the input circuit of the detector is controlled by the output voltage of transformer T. As the output of transformer T is already audio-frequency, no detector action is necessary and none takes place. The detector tube is thus made to function as an audio frequency amplifier tube.

By those skilled in the art, it will be understood that the wire marked -C, which leads to the proper bias voltage for the detector grid, must have in series with it a comparatively large impedance of some kind, so that the output of transformer T will not be diverted to any great extent, along this path. In one embodiment of our idea, a resistance of one million ohms is put in series with the wire -C; in this case practically full output voltage of transformer T is available for exciting the grid of the detector tube.

Many previous schemes for introducing the phonograph output into the receiver set have introduced this into the input circuit of the first audio frequency triode, but this method is generally unsatisfactory in those modern broadcast receiving sets which employ only one stage of audio frequency amplification.

It will be seen that our arrangement makes available the amplifying action of the detector tube in addition to that of the A. F. A. itself, thus increasing the voltage amplification available for the phonograph pick-up by a factor of five to ten.

This gain in amplification is sufficient to entirely solve the application of phonograph pick-up excitation to the modern broadcast receiver, which frequently has only one stage of audio frequency amplification.

In our preferred form of switch, the process of opening the switch is carried out by the movement of the tuning condensers. As these approach their extreme position (all

out), a lug on the moving plates passes against the upper end of the switch rod, depresses the latter and so opens the switch. As soon as the tuning condensers are turned from their  
5 "all out" position, the spring action of the switch rod automatically closes the switch, short circuiting the phonograph transformer and arranging the detector input circuit for the normal tuning position.

10 Having thus described our invention, what we claim is:

1. In a radio receiver having tuning means, a vacuum tube detector, a transformer arranged for excitation from a phonograph  
15 pick-up, and means automatically operated by the adjustment of said tuning means to utilize said detector tube as an amplifier of the signals generated by said phonograph pick-up.

20 2. In a radio receiver, a vacuum tube detector circuit with tuning means, a transformer arranged for excitation from a phonograph pick-up, and means automatically operated by the adjustment of said tuning means  
25 to utilize said detector as an amplifier of signals generated by said phonograph pick-up.

3. In a radio receiver, a vacuum tube detector with a tunable input circuit, a transformer arranged for excitation from a phonograph pick-up, and an automatic switch movable to one position to close the tunable input circuit and short circuit the transformer  
30 and to another position to open the tuned detector input circuit and connect the transformer for exciting the grid of the detector tube.  
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4. In a radio receiver, a vacuum tube detector circuit with tuning means, a transformer arranged for excitation from a phonograph pick-up, and means automatically operated by the adjustment of the tuning means for modifying the detector circuit as required to connect the transformer for exciting the  
40 grid of the detector tube.

45 We affix our signatures.

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