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RADIO RECEIVING APPARATUS

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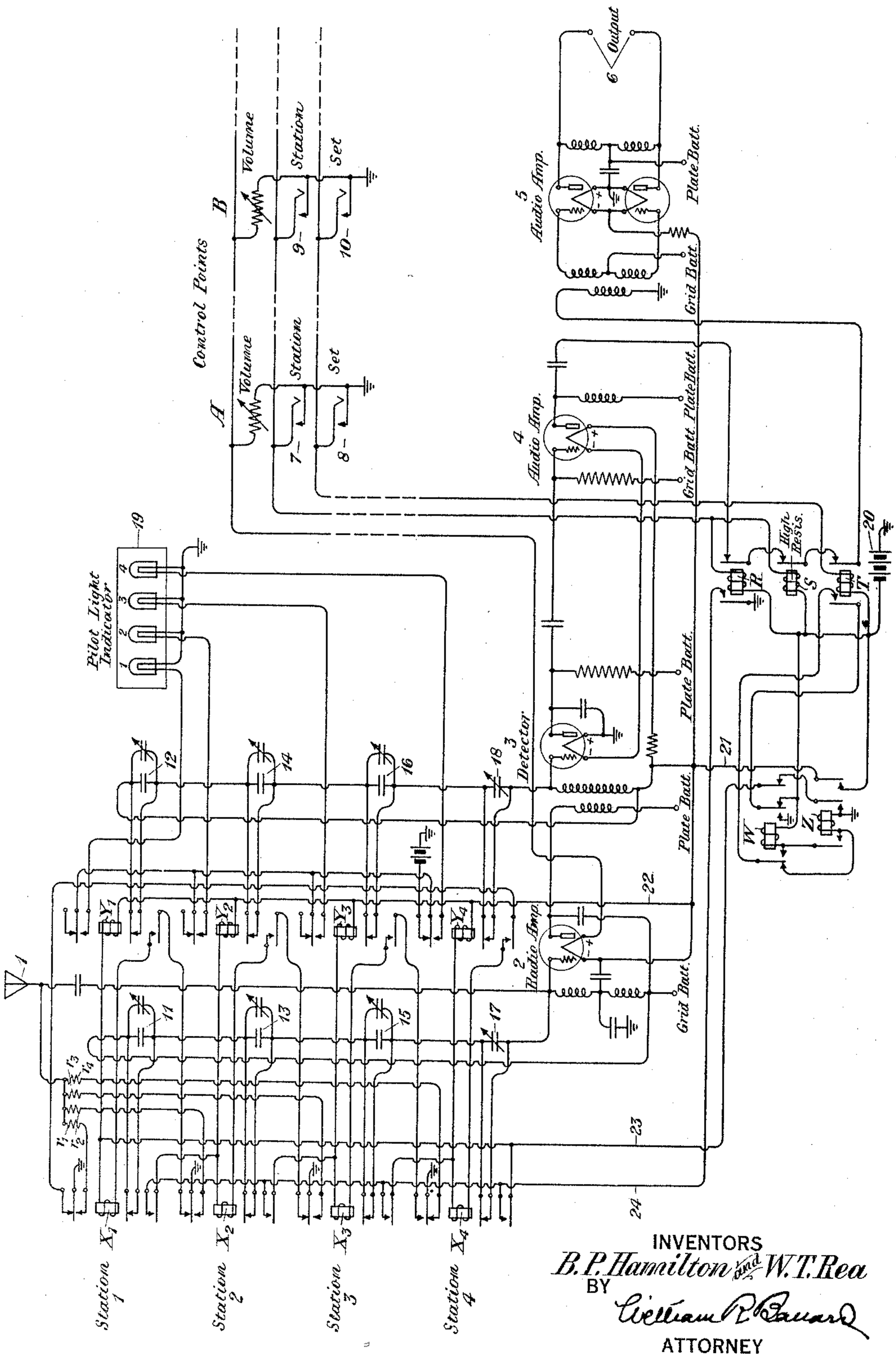

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RADIO RECEIVING APPARATUS

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This invention relates to transmission systems over which a plurality of different carrier channels may be transmitted, and more particularly relates to improved arrangements whereby receiving or translating apparatus in such systems may be controlled so as to be rendered selective for any one of the transmitted carrier channels.

One of the purposes of the arrangements of the invention is to make it possible to accurately tune a radio receiving set to different transmitting stations by means of simple switches or push buttons which may be located either at the set or at certain control points at some distance from the radio set. The arrangements of the invention might also be utilized to control apparatus other than a radio receiving set. For example, the arrangements might control repeater apparatus in a carrier transmission system so that it could be tuned automatically at a distance for the various carrier channels. The arrangements of the invention also provide further features, such as remote control of volume, means for switching the control apparatus on and off from distant control points, and means for preventing the switching operations from causing disturbing noises in the apparatus. Further objects and features of the invention will appear more fully from the detailed description thereof hereinafter given.

The invention may be more fully understood from the following description together with the accompanying drawing, in the figure of which is shown a circuit diagram embodying the invention.

In the drawing, the arrangements of the invention are shown as adapted to control the tuning and other features of a radio receiving set. The radio receiving set comprises an antenna circuit 1 connected to a radio amplifier tube 2. This tube is connected to a detector tube 3. The detector tube is connected to the audio amplifiers 4 and 5 which in turn are connected to an output circuit 6. In order to control selectivity and volume of the radio receiving set, a number of switches are provided at different control points either at the receiving set, or distant therefrom, or both. Such points are shown as A and B. The switches 7 and 8 are located at point A, and the switches 9 and 10 are located at point B. The tuning of the radio receiving set may be controlled in a well-known manner by connecting, across the input circuits of the radio amplifier tube 2 and the detector tube 3, condensers of different values. Accordingly, there is shown associated with the input circuit of the radio amplifier 2 a plurality of condenser circuits, such as 11, 13, 15 and 17. There is shown associated with the input circuit of the detector tube 3 the condenser circuits 12, 14, 16 and 18. The connection of any of these condenser arrangements across the input of either tube 2 or tube 3 is controlled by the relay arrangement comprising relays X_1, X_2, X_3 and X_4 and relays Y_1, Y_2, Y_3 and Y_4. A plurality of resistance elements, such as R_1, R_2, R_3 and R_4, are shown connected to the antenna circuit 1. Various ones of these resistance elements may be connected to ground by the above-mentioned series of "X" relays, and hence the volume of incoming currents may be controlled. The condenser units 11 and 12 may each consist of a small fixed condenser and an adjustable air condenser of small capacity. The condenser units 13, 14, 15 and 16 may be of a similar variety. The condenser units 17 and 18 are variable air condensers, of sufficient capacity to cover the entire range of frequencies desired. Condenser units 11 and 12 may be tuned for the reception of a channel from station 1, units 13 and 14, for a channel from station 2, and units 15 and 16, for a channel from station 3. Units 17 and 18 may be adjusted for the reception of a channel from station 4. The series of "X" relays and the series of "Y" relays are controlled by a relay arrangement comprising the relays R, S, T, W and Z. These relays are under the control of the switches at the control points A and B. A pilot light indicator 19 is shown having individual lights for each of the stations to be received and is under the control of the series of "Y" relays.

The operation of the arrangements is as

follows: If the switch 8 at the control point A is operated, a circuit will be completed from ground contact of key 8, winding of relay T to battery 20 and ground. This will operate the relay T and the following circuit will be completed: From battery 20, right-hand inner contact of relay W, contact of relay T, left-hand contact of relay W, winding of relay Z to ground. This will operate the relay Z. The operation of relay Z will connect battery 20 to conductor 21 and thence to the filaments of all of the tubes in the set. It will also connect battery 20 over conductors 21 and 22 to one terminal of all of the series "Y" relays. It will also connect ground to the right-hand contact of relay Z and thence over conductor 23 to the winding of relay Y_1. This will operate relay Y_1. The switch 8 will then be released. The release of switch 8 will release the relay T. The release of relay T will remove an effective short-circuit from the winding of relay W. This allows relays W and Z to lock in the operated position with their windings in series with the battery 20. When relay W operates, it removes the ground connected over its outer right-hand contact and conductor 23 to the connection beween relays X_1 and Y_1. This will allow the operating circuit of relay Y_1 to be completed through the winding of relay X_1, lower contact of relay Y_1 and over the upper contact of relay X_2 to ground, thereby operating relay X_1. Relays X_1 and Y_1 will then remain in operated condition. Thus, one operation and release of the switch 8 closes the filament circuits for all the tubes and locks the pair of relays X_1 and Y_1 corresponding to station 1 in the operated position. The operation of relays X_1 and Y_1 will remove short circuits about the condenser units 11 and 12 and allow said units to be connected, respectively, across the input circuits of the radio amplifier 2 and the detector 3, thereby tuning the set for reception of signals from station A. The operation of relay X_1 will also connect resistance R_1 between the antenna circuit 1 and ground. This will regulate the volume for the channel to be received from station A. The operation of relay Y_1 will also close a circuit for one of the lamps in the pilot light indicator 19 to indicate that the arrangements have been tuned for reception from station 1.

If the key 7 at station A is now operated, the relays R and S will be operated. The operation of relay R will connect ground over conductor 24, lower contact of relay X_1 to the connection between relays X_2 and Y_2. This will complete a circuit from battery 20 for the relay Y_2 and allow it to operate. The release of key 7 will then remove a short circuit to ground from the winding of relay X_2 and allow the operating circuit of Y_2 to be completed through the winding of relay X_2, over the lower contact of relay Y_2 and over the upper contact of relay X_3 to ground, thereby holding relays X_2 and Y_2 in operated position. The operation of relay X_2 will open at its upper contact the previously traced operating circuit for relays X_1 and Y_1, and will release said relays. Condenser units 13 and 14 will then be connected across the input circuits of the tubes 2 and 3, and the set will be tuned for reception of signals from station 2. Subsequent operation of switch 7 will lock up the further "X" and "Y" relays in rotation and tune the receiving set for reception to other stations. The next operation of switch 8 will again operate relay T and connect a short-circuit to the winding of the previously operated relay W. This will allow relay W to release. The subsequent release of the switch 8 will release the relay T, and hence release the relay Z. Accordingly, all of the relays in the system will be returned to normal.

Relays R and S, and the right armature of relay T, have been provided to eliminate clicks in the output circuit while switching between stations, due, among other factors, to sparking of the relay contacts and the pilot light and pilot light indicators. There is a disagreeable click when the switch 7 is operated, when the switch 7 is released, and when the switch 8 is operated to the off position; that is, when battery is removed from the tubes and relays. Accordingly, the right contacts of relays R, S and T have been connected in series with the input circuit of the power amplifier 5. This input circuit may be opened at these points without causing a click in the loud speaker which might be connected to the output circuit 6. When the switch 7 is operated, relay R operates first and disconnects the last audio amplifier 5 and loud speaker. The relay S, which is comparatively slow-acting and slow-release, is also operated. When the switch 7 is released, relay R releases, and, at a later interval, relay S releases, thus connecting the audio amplifier tube to the other tubes after all switching disturbances have ceased. Similarly, when turning off the set by the operation of switch 8, relay T is the first to operate. This disconnects the audio amplifier tube 5 while relay Z is releasing, and eliminates any tendency for noise.

While the invention has been disclosed as embodied in certain specific arrangements which are deemed desirable, it is understood that it is capable of embodiment in many and other widely varied forms without departing from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. Apparatus for translating a plurality of different carrier channels, an input circuit connected to said translating apparatus, a plurality of selective circuits for tuning said input circuit for a desired one of said carrier

channels, a series of progressively operated relays for progressively connecting said selective circuits to said input circuit, different volume adjusting means adapted to be connected to said input circuit by said series of relays, and switching means for starting the progressive operation of said series of relays, for stopping said operation and for restoring said relays to normal.

2. Apparatus for translating a plurality of different carrier channels, an input circuit connected to said translating apparatus, a plurality of circuits for selectively tuning said input circuit for said different carrier channels, a plurality of volume adjusting elements one corresponding to each tuning circuit, a series of relays for operating said selective tuning circuits and said volume adjusting elements, a control circuit for said series of relays, and additional progressively operated relays in said control circuit for disabling said translating means during the operation of said series of relays.

3. A high frequency carrier receiving system comprising vacuum tube amplifying, detecting and receiving apparatus, an input circuit for said apparatus, a plurality of condenser units of different capacity each adapted to be bridged across said input circuit, a series of progressively operated relay means, each of the relays thereof being adapted to bridge one of said condenser units across said input circuit, a control circuit for said relays, means in said control circuit responsive to the closure thereof for temporarily disabling said receiving apparatus, and additional means in said control circuit responsive to a subsequent closure thereof for again temporarily disabling said receiving apparatus.

In testimony whereof, we have signed our names to this specification this 1st day of July, 1929.

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