Jan. 31, 1939. E. TOTH ET AL 2,145,561

VARIABLE SELECTIVITY MEANS

Filed Aug. 31, 1935

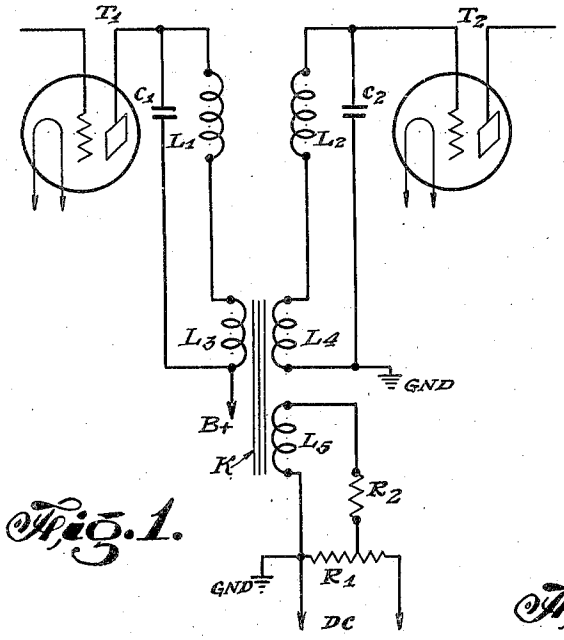


Fig. 1.

Fig. 2.

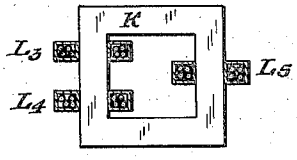


Fig. 3.

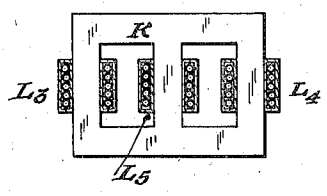


Fig. 4.

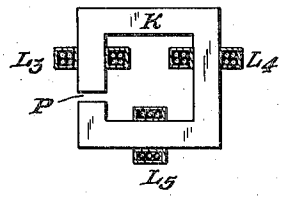
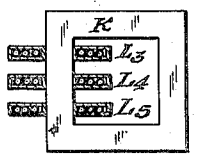


Fig. 5.



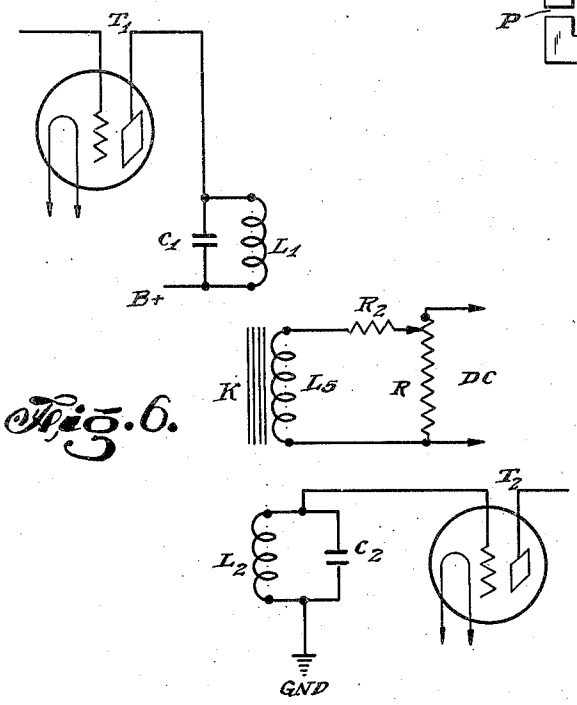


Fig. 6.

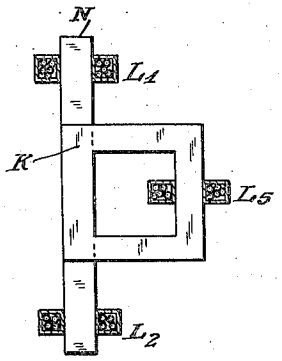


Fig. 7.

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VARIABLE SELECTIVITY MEANS

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Application August 31, 1935, Serial No. 38,702

2 Claims. (Cl. 178—44)

This invention relates to improvements in radio reception circuits, being particularly directed to variable selectivity means applied in high fidelity receivers.

Broadly, it is an object of this invention to provide a novel selectivity means in radio reception circuits through the medium of band width control in intermediate or other frequency transformers applied in the various stages of a radio receiver.

Specifically, it is an object of this invention to provide a band width control for intermediate or other frequency transformers, wherein, in conjunction with the primary and secondary coils of such transformer, there is applied a medium for controlling the saturation of the core with which such coils are associated for varying within the desired ranges the mutual induction between the coils.

Still further, it is an object of this invention to provide, in a stage of a circuit, in conjunction with the primary and secondary circuits of the conventional intermediate frequency or other transformer, a saturation transformer incorporating primary and secondary coils, the mutual induction of which is effected by a saturation control, thereby to provide for a variable and adjustable band width for such stage, either in the nature of a bucking or aiding effect of the respective transformers.

These and other advantages, capabilities and features of the invention will appear from the subjoined detailed description of one specific embodiment thereof illustrated in the accompanying drawing, in which

Figure 1 is a wiring diagram of a circuit incorporating the band width control.

Figures 2 to 5 inclusive are plan views, each partially in section, of several different forms of arrangements of saturation transformers.

Figure 6 is a wiring diagram of a modified form of circuit incorporating band width control.

Figure 7 is a plan view, partially in section, of the saturation transformer applied in accordance with the wiring diagram of Figure 6.

Referring to the reference characters in the drawing, Figure 1 represents a wiring diagram of an amplification stage in a radio receiver incorporating the conventional intermediate frequency transformer, which transformer incorporates coil L—1, condenser C—1 and coil L—2 and condenser C—2 as the primary and secondary circuits thereof. T—1 and T—2 represent the vacuum tubes coupled by the intermediate frequency transformer.

In conjunction with the conventional intermediate frequency transformer, as shown, there is applied a saturation transformer incorporating primary coil L—3, secondary coil L—4, and saturating coil L—5, the respective coils being mounted on iron core K, which may be formed of either solid, laminated or powdered iron; coil L—5 is connected to a source of direct current through potentiometer R—1; an additional fixed resistor R—2 being applied in a circuit to serve as an isolating resistance for preventing coil L—5 from being short circuited by the potentiometer.

In Figures 2 to 5 inclusive there are shown various forms in which said saturating transformer may be constructed; Figure 2 providing a square core with primary and secondary coils L—3 and L—4 on one side and saturating coil L—5 on the other; in Figure 3 the core K is of "figure 8" construction with primary and secondary coils L—3 and L—4 at opposite loops of the "figure 8" and saturation coil L—5 on the central loop; Figure 4 shows a square core K with primary and secondary coils L—3 and L—4 on opposite edges and saturation coil L—5 intermediate thereof, this particular core having an air space P therein; in Figure 5 the square core has the primary, secondary and saturation coils L—3, L—4 and L—5 all disposed on the same edge.

Referring to Figures 6 and 7 there is shown a modified form of the invention, wherein the saturation transformer has eliminated therefrom the primary and secondary coils L—3 and L—4 and the core carrying the saturation coil L—5 has mounted thereon the primary and secondary coils of the conventional intermediate frequency transformer.

In operation, particularly with respect to Figures 1 to 5 inclusive, the primary and secondary circuits of the conventional intermediate frequency transformer will function in the conventional manner and in such circuit the values of the mutual inductance between coils L—1 and L—2 which may be designated as M—1 will provide for the attainment of a desired band width X. The saturation transformer primary and secondary coils L—3 and L—4, in conjunction with the core K will provide a mutual inductance which, however, is valued dependent upon the amount of saturation of the core K caused by the current directed from the source of supply through saturation coil L—5, this controllable value of mutual inductance M—2 being designed to give a band width Y.

With a coupling of the two transformers, that

is, the conventional intermediate frequency transformer and the saturation transformer, there would be a band width either equal to the sum of X and Y or the difference between the same dependent upon whether there is an aiding or a bucking connection of the transformers, determinable or controllable by the polarity of the saturation transformer with respect to the intermediate frequency transformer when the same are in circuit.

The saturation of core K through coil L—5 is controllable to provide in the saturation transformer a maximum or minimum band width, and in the event of either an aiding or bucking connection the value of the band width Y for the saturation transformer may be varied between a minimum and maximum. For example, in an aiding connection of the conventional and saturating transformers X plus Y or X plus zero for maximum and minimum values; likewise, taking comparative values for X and Y an illustration is given where the band width X of the conventional intermediate frequency transformer might be 16 kilocycles and the band width Y of the saturation transformer might vary from a maximum of 12 kilocycles to a minimum of zero kilocycles, making, therefore, provision for band limits for the aiding connection of the transformers between 16 and 4 kilocycles.

In a bucking connection, taking the same values for the respective band widths X and Y the resulting band limits would be X minus Y or X—zero for maximum and minimum values, and taking comparative values we would attain a band width range between 4 kilocycles and 16 kilocycles.

With respect to the construction of Figures 6 and 7, the saturation coil L—5 acting on core K upon which the primary and secondary coils L—1 and L—2 of the conventional intermediate frequency transformer wave, the saturation coil L—5 upon passage of current therethrough from the source will serve to change the degree of saturation of the core K between coils L—1 and L—2 and with it the effective length of the coupling flux path therebetween, thus varying the mutual inductance M—1 therebetween and the desired band width X effected thereby, from maximum to minimum values more or less along the lines of the illustrations heretofore specified.

It is obvious that various changes and modifications may be made to the details of construction without departing from the general spirit of the invention as set forth in the appended claims:

We claim:

1. In an intermediate or other frequency stage of a radio receiver, means for providing capacitance, a plurality of transformers, one being a conventional intermediate frequency transformer, the coils of which have a predetermined mutual induction, the other transformer comprising coils assembled on a core, and having a variable mutual induction, means for varying the saturation of the core of said last named transformer to control the mutual induction of the coils thereof, said respective transformers being capable of association in aiding or bucking connection, whereby to provide a control of the band width of said stage, dependent on the variation of the mutual induction in the second named transformer.

2. In an intermediate or other frequency stage of a radio receiver, means for providing capacitance, a plurality of transformers, the coils of one of said transformers having a predetermined mutual induction, the other transformer having coils mounted on a core, the coils of the other transformer having a variable mutual induction, the said respective transformers being capable of association in aiding or bucking connection, whereby to provide a control of the band width of said stage, dependent on the variation of the mutual induction in the second named transformer, the means for controlling the mutual induction in said second named transformer comprising, in conjunction with primary and secondary coils thereof, of a coil through which is passed direct current for saturating the core of said transformer, and a control varying the amount of current passed therethrough, to produce varying degrees of saturation of said core.

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