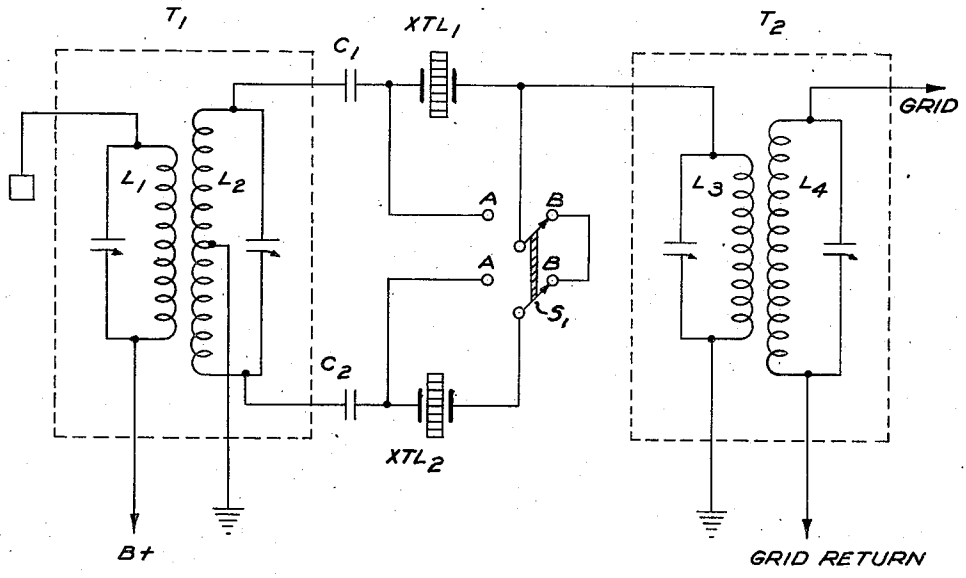
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CRYSTAL BRIDGE CIRCUIT FOR RADIO AMPLIFIERS

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CRYSTAL BRIDGE CIRCUIT FOR RADIO AMPLIFIERS

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4 Claims. (Cl. 178—44)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

This invention relates to a crystal bridge circuit for R. F. or I. F. amplifiers and has for its object to provide a bridge circuit which will eliminate the serious detuning normally caused between the input and output transformers in the usual crystal bridge circuits when the transformers are aligned, either with crystals out and crystals subsequently switched into the circuit, or when the transformers are aligned with crystals in and the crystals are subsequently switched out of the circuit.

The single figure of the drawing is a diagrammatic view showing the circuits involved.

In the drawing reference character T_1 indicates a crystal circuit input R. F. or I. F. transformer. T_2 is the crystal circuit output R. F. or I. F. transformer. L_1 is the primary and L_2 is the secondary of transformer T_1, L_3 and L_4 being the primary and secondary respectively of transformer T_2. The bridge circuit comprises two branches, one of which contains crystal XTL_1 and the other of which contains crystal XTL_2. The two crystals are usually 50 to 500 cycles apart in frequency in order to give a band-pass filter effect to the circuit. S_1 is a double-pole, double-throw switch which is provided for the purpose of switching the crystals either in or out of the circuit. Condensers C_1 and C_2 are provided according to the invention in order to introduce into the branches of the circuit the proper coupling capacities to prevent detuning when the crystals are switched either in or out of the circuit following alignment of the transformers with the circuit in the opposite condition.

At the resonant frequency of either of the two crystals the secondary of T_1 is fairly tightly coupled to the primary of T_2 if condensers C_1 and C_2 are not present, although 100% coupling will not be achieved. Tight coupling at frequencies other than the crystal frequencies is prevented mainly by the capacity present in the crystal holders. With the switch S_1 in the crystals out position the coupling between the two transformers is approximately 100% if condensers C_1 and C_2 are omitted. If the two transformers are aligned with S_1 in this position serious mistuning will occur if the switch is then shifted to the B or crystals in position, due to the introduction of the crystal holder capacity and the resonant crystals. Likewise, serious mistuning will occur if the alignment is accomplished with the switch on the B or crystals in position and the crystals are subsequently switched out of the circuit.

The addition of condensers C_1 and C_2 serves to provide the proper coupling capacity with the crystals in the circuit, for a degree of coupling comparable to that utilized in the transformers to obtain the desired band width with the crystals out of the circuit. It is thus impossible to exceed the degree of coupling between the secondary of T_1 and the primary of T_2 determined by C_1 and C_2 and the variation in coupling caused by switching from the A to B position is greatly reduced.

In addition, the selectivity curves resulting from the entire circuit are much more symmetrical, since in the A position C_1 and C_2 provide the proper degree of coupling for operation without crystals and in the B position the proper coupling is obtained at the resonant frequency of the crystals, while the capacity effects of the crystal holders, arising at frequencies off crystal resonance are minimized by the relatively small series capacities of C_1 and C_2.

The use of single condensers in the same manner is applicable to single crystal operation. Typical values for 175 kc. operation are as follows: $C_1 = C_2 = 10$ mmf., L_1 L_2, L_3 and L_4 = 1 millihenry.

While the disclosure has been restricted to a single embodiment which applicant now considers to be the preferred form of the invention, the scope of the invention is to be considered as restricted only by the scope and limitations of the appended claims.

The invention described herein may be manufactured and/or used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

I claim:

1. A crystal bridge circuit comprising two branches, a plurality of coupled resonant elements in said circuit, a crystal in each of said branches, said crystals being resonant at different frequencies, means for switching said crystals into or out of said circuit, and a capacitor in each of said branches between said crystal and the input end of said circuit, said capacitors providing approximately critical coupling between said elements in order to substantially prevent detuning of said circuit when said crystals as switched either into or out of said circuit subsequent to its alignment in the alternate condition.

2. A crystal bridge circuit comprising a crystal, a plurality of coupled resonant elements in said circuit, means for switching said crystal either into or out of said circuit, and a capacitor

in series with said crystal and located between said crystal and the input end of said circuit, said capacitor providing approximately critical coupling between said elements in order to substantially prevent detuning of said circuit when said crystal is switched either into or out of said circuit subsequent to its alignment in the alternate condition.

3. A crystal bridge circuit comprising a crystal, a plurality of coupled resonant elements in said circuit, means for switching said crystal either into or out of said circuit, and means introducing into said circuit a capacitance in series with said crystal of such value as to provide approximately critical coupling between said elements to substantially prevent detuning of said circuit when said crystal is switched either into or out of said circuit subsequent to its alignment in the alternate condition.

4. A crystal bridge circuit comprising two branches, a plurality of coupled resonant elements in said circuit, a crystal in each of said branches, said crystals being resonant at different frequencies, means for switching said crystals either into or out of said circuit, and means introducing into each of said branches a capacitance in series with its crystal of such value as to provide approximately critical coupling between said elements to substantially prevent detuning of said circuit when said crystals are switched either into or out of said circuit following its alignment in the alternate condition.

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