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DEVICE FOR THE BAND-SPREAD TUNING OF RADIO APPARATUS

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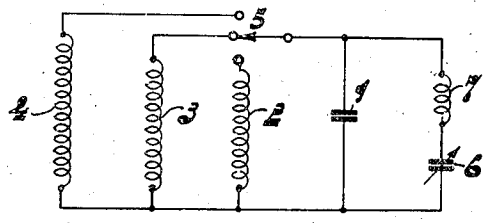

Fig. 1.

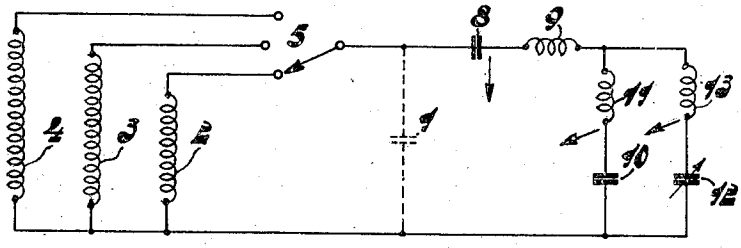

Fig. 2.

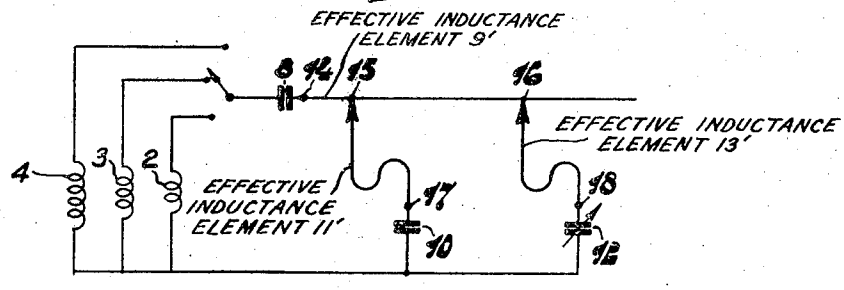

Fig. 3.

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DEVICE FOR THE BAND-SPREAD TUNING OF RADIO APPARATUS

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4 Claims. (Cl. 250—40)

1

In the reception of decimeter waves, i. e. waves between 100 and 10 metres, so-called bandspread tuning is generally employed in order to insure the accurate tuning of radio apparatus. With this method the tuning circuit is formed in such manner that with a complete stroke manipulation of the tuning member, for example a rotatable-electrode condenser, only a very small portion of the wave range is traversed so that the stations operating in this portion of the range are spread out all over the scale of the tuning member and the tuning to any of these stations may be effected with much greater accuracy than is the case under other conditions.

Different methods of obtaining bandspread tuning are known. A very commonly utilized method involves a circuit arrangement having a fixed condenser, a variable condenser and a coil connected in parallel. The range to be covered with bandspreading is determined by the fixed condenser in the coil, and bandspread tuning is effected by means of the variable condenser connected in parallel with the fixed condenser. Alternatively bandspreading may be effected by means of a system of condensers connected in parallel with the fixed condenser, one of the said condensers being variable. The ranges in which bandspread tuning has to be effected are chosen in this case by switching-in another tuning coil.

In the described method the percentage capacity variation obtained by means of the variable bandspread condenser is equal in each bandspread range so that for each of these ranges the percentage frequency variation is also equal. Since, however, the stations operate at a constant frequency separation, viz. of 9 kilocycles per second for broadcast stations, the scale distances between the stations become, in spite of the equal percentage frequency variation in all bandspread ranges, smaller as the bandspread range is located higher in the frequency spectrum. Hereinafter the term "scale distance" is to be construed as the number of dial divisions of the tuning indicator between two stations operating in channels located side by side. In other words: the spreading obtained between the stations decreases for stations operating at the higher frequencies so that the accuracy of adjustment also decreases.

The invention provides a device with the aid of which it is possible to have equal scale distances between stations operating in adjacent channels for all of the ranges to be spread. According to the invention, this is achieved by connecting an inductor having a suitable inductance value in

2

series with each of the condensers of the system with which the capacity variation is effected.

The invention will be explained more fully with reference to the accompanying drawing forming a part of the specification and in which:

Fig. 1 represents the basic embodiment of the invention,

Fig. 2 represents a further and more complicated embodiment, and

Fig. 3 shows diagrammatically a practical form of construction of part of the circuit arrangement according to the embodiment of Fig. 2.

In Fig. 1, a tuning condenser 1 which, together with any of coils 2, 3, 4, which are switched into circuit by means of a switch 5, affords tuning in a frequency range over which it is desired to tune by bandspreading. According to the invention, a bandspread condenser 6 is connected, in series with a coil 7, in parallel with the tuning condenser 1. Due to the reactance of the coil 7 part of the reactance of the bandspread condenser 6 is made inoperative, as it were, which is manifested by the fact that the capacity variation obtained with the aid of the system 1, 6, 7, is smaller than the variation which would be obtained with the aid of the system 1, 6. The influence of the coil 7 is greater as the frequency is increased, so that in this way the capacity variation obtained by means of the bandspread system decreases as the frequency increases. The percentage frequency variation consequently decreases with an increase of the frequency so that with the simple system according to Fig. 1 the absolute frequency variation can be made equal at least in two different bandspread ranges. This system consequently affords the possibility of obtaining equal scale distances between the stations in two bandspread ranges whilst in an intermediate range the deviation is still tolerable.

By employing the basic idea of the invention it is possible to extend the system so that more degrees of freedom are obtained, owing to which it becomes possible to make the frequency variation equal in the absolute sense in each bandspread range. Such a system is shown in Fig. 2 in which constituent parts corresponding to those of the circuit-arrangement according to Fig. 1 are denoted by the same reference numerals. In the circuit arrangement according to Fig. 2 the fixed tuning condenser 1 may, if desired, be dispensed with, which is represented in the drawing by indicating the condenser in dotted lines. The system shown in Fig. 2 comprises condensers 8, 10 and 12 and coils connected in series with each of the said condensers, viz. coils 9, 11 and

13. The adjustment of the inductances of the coils 9, 11 and 13 is preferably effected by the displacement of cores of high-frequency iron in these coils.

According to the invention, it is not always necessary to utilize separate coils 9, 11 and 13 but it is also sufficient to give the connecting wires between the condensers a determined length and shape. This is diagrammatically shown in Fig. 3 wherein the system for the capacity variation is represented in the manner shown in Fig. 2. Here, however, an inductor 9' corresponding to the coil 9 is formed by the wire section 14—15, an inductor 11' corresponding to the coil 11 by the wire section 15—17 and an inductor 13' corresponding to the coil 13 by the wire section 15—16—18, the connecting points 15 and 16 being adjustable so that both by displacing these points and by giving the connecting wires a determined shape it is possible to adjust the circuitry to the required inductance values.

What I claim is:

1. A circuit arrangement for band-spread tuning over a plurality of frequency bands, comprising a plurality of principal inductance elements, a circuit combination comprising a parallel circuit and a series circuit connected in series with each other, said parallel circuit comprising a first leg having a series connected variable band-spread capacitor and a first band-spread adjusting inductance element and a second leg having series connected second capacitor and a second band-spread adjusting inductance element, said series circuit comprising a third capacitor and a third band-spread adjusting inductance element, a band-selecting switch coupled to said circuit combination to select one of said principal inductance elements to tune over a desired frequency band, and means to vary the inductance of said band-spread adjusting inductance elements to adjust the range of tuning afforded by said variable capacitor.

2. A circuit arrangement for band-spread tuning over a plurality of frequency bands, comprising an inductive branch having a plurality of principal inductance elements, a capacitive branch comprising a variable capacitor and an inductance connected in series circuit arrangement and a second capacitor connected in shunt with said series circuit arrangement, and band-selecting switch means coupled to said capacitive branch to selectively connect the same to said principal inductive elements of said inductive branch.

3. A circuit arrangement for band-spread tuning over a plurality of frequency bands, comprising an inductive branch having a plurality of principal inductive elements, a capacitive branch comprising a variable capacitor and a first inductance connected in a first series circuit arrangement and a second capacitor and a second inductance connected in a second series circuit arrangement, said first and said second series circuit arrangements being connected in parallel relationship, and band selecting switch means coupled to said capacitive branch to selectively connect the same to said principal inductive elements of said inductive branch.

4. A circuit arrangement for band-spread tuning over a plurality of frequency bands, comprising an inductive branch having a plurality of principal inductive elements, a capacitive branch comprising a variable capacitor and a first inductance connected in a first series circuit arrangement, a second capacitor and a second inductance connected in a second series circuit arrangement and a third capacitor and a third inductance connected in a third series circuit arrangement, said first and second series circuit arrangements being connected in parallel circuit arrangement and said third series circuit arrangement being connected in series with said parallel circuit arrangement, and band-selecting switch means coupled to said capacitive branch to selectively connect the same to said principal inductive elements of said inductive branch.

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