Nov. 3, 1931. A. M. TROGNER 1,830,682

FREQUENCY CHANGING SWITCH

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FIG. 1

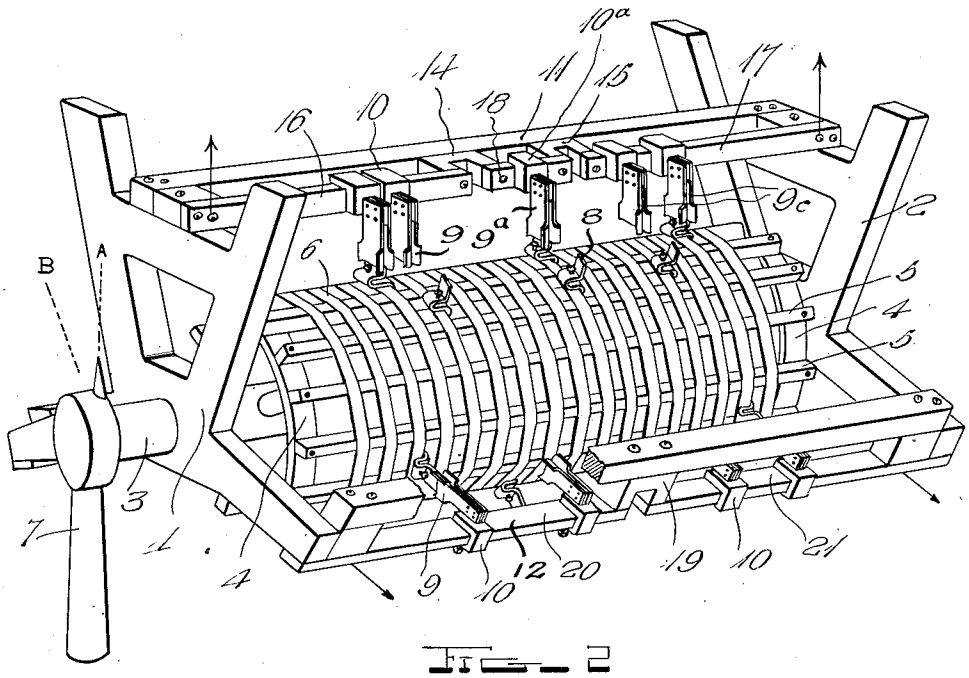
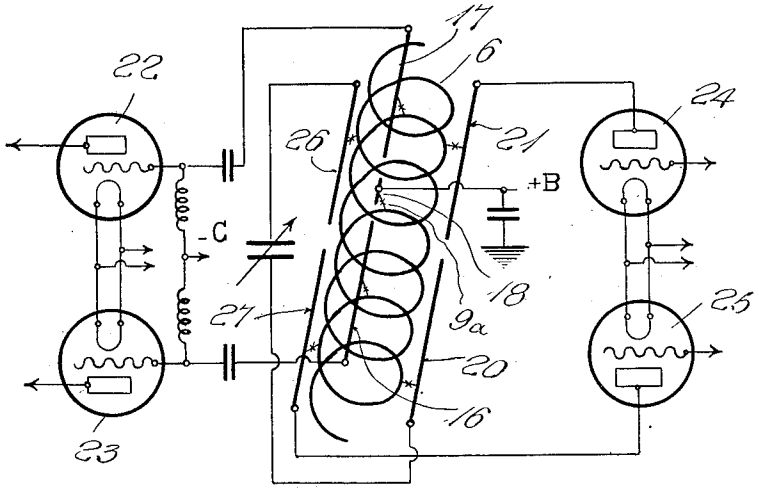


FIG. 2



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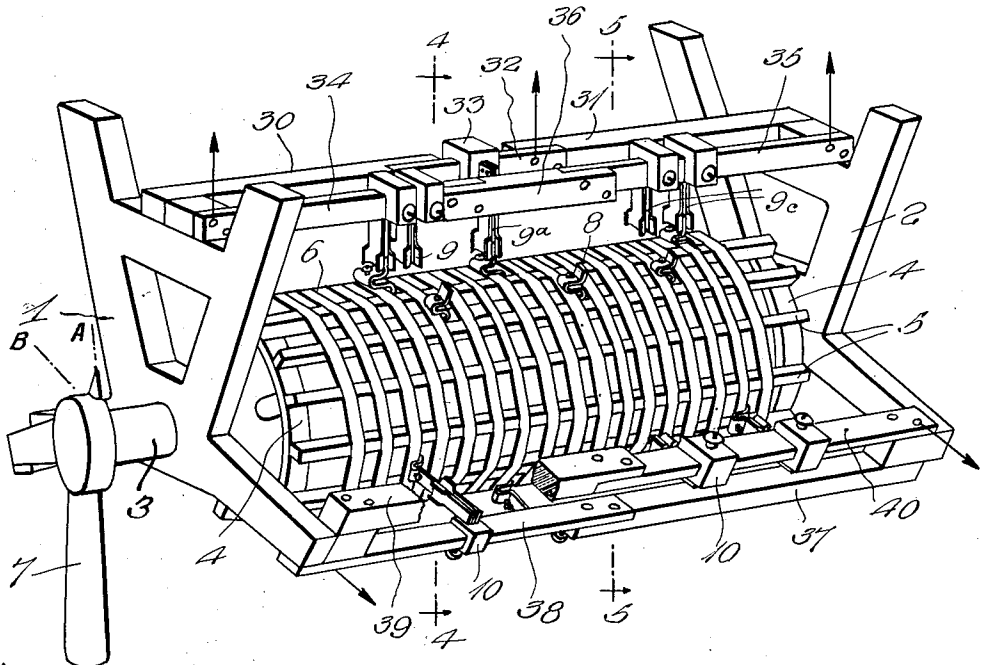
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FREQUENCY CHANGING SWITCH

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FIG. 3



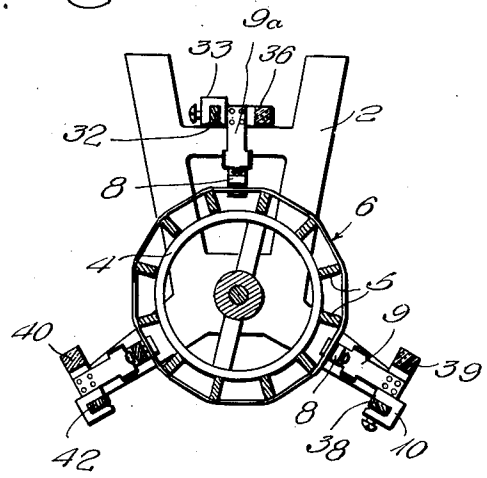


FIG. 4

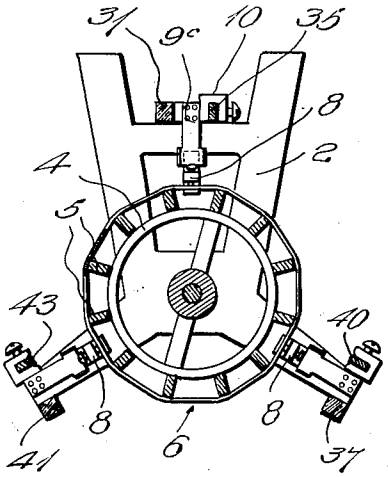


FIG. 5

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FREQUENCY CHANGING SWITCH

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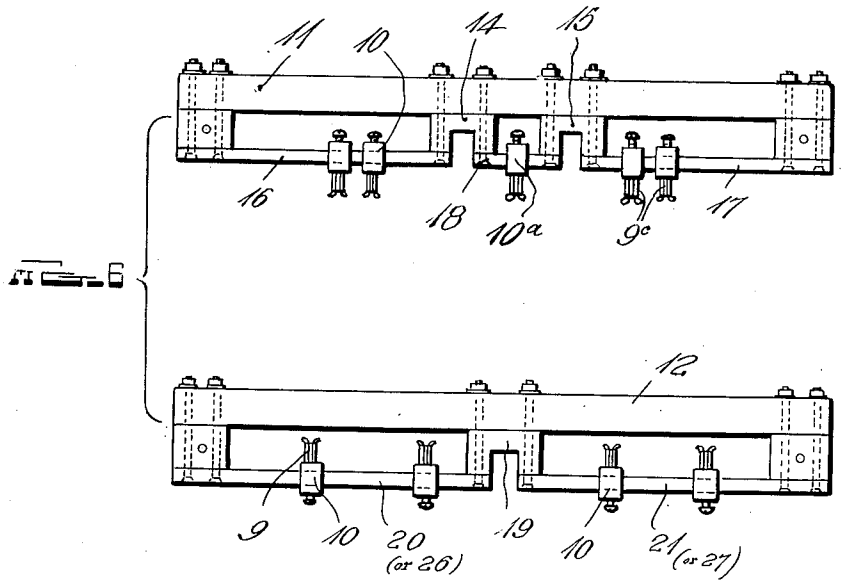


FIG. 6

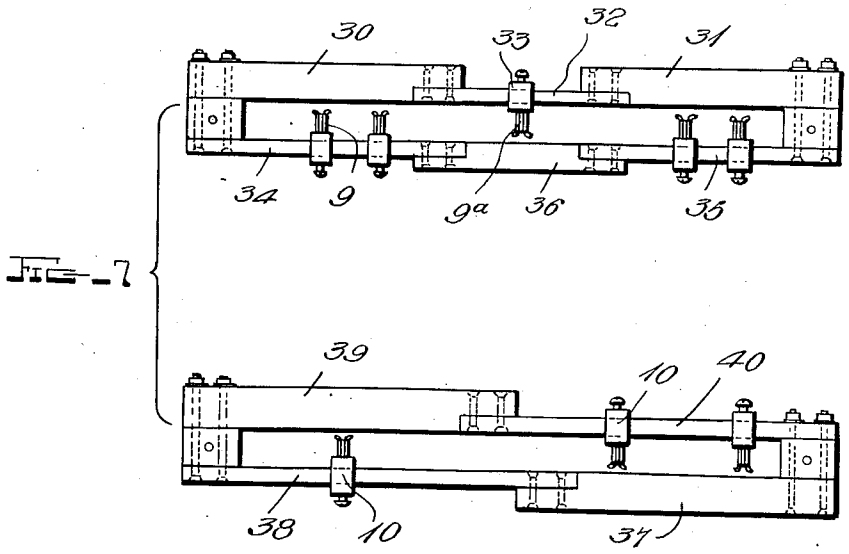


FIG. 7

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Patented Nov. 3, 1931 1,830,682

UNITED STATES PATENT OFFICE

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FREQUENCY CHANGING SWITCH

Application filed March 28, 1929. Serial No. 350,788.

My invention relates broadly to signal transmission apparatus and more particularly to a structure of frequency changing switch for high frequency transmitters.

One of the objects of my invention is to provide a construction of rotary inductance changing switch wherein leads of minimum length may be employed in a radio transmission system.

Another object of my invention is to provide a construction of frequency change switch wherein the contacts or connections of opposite parts are separated by relatively long dielectric paths with resulting decreased capacity and voltage creepage losses with the elimination of dead ends or dead points in the inductance system.

Still another object of my invention is to provide a construction of frequency change switch in which a maximum number of changeable taps are provided within a compact area rendering the apparatus particularly suitable for frequency adjustment of push-pull amplification circuits.

A further object of my invention is to provide a symmetrical arrangement for a rotatable inductance frequency change switch by which changes in a plurality of electrical circuits may be simultaneously effected with tapped connections arranged on opposite sides of the center of a rotatable inductance system.

Other and further objects of my invention reside in the arrangement of bus bars, connecting strips, contact supports and mounting of a rotatable inductance for connection therewith as set forth more clearly in the following specification and shown in the accompanying drawings, wherein:

Figure 1 illustrates one form of improved frequency change switch embodying the principles of my invention: Fig. 2 shows an electrical circuit arranged for push-pull amplification in which the frequency change inductance of my invention is employed as part of the coupling system by the electron tube circuits; Fig. 3 is a perspective view of a modified form of frequency change switch constructed according to the principles of my invention; Fig. 4 is a cross-sectional view taken on line 4—4 of the form of inductance change switch shown in Fig. 3; Fig. 5 is a cross-sectional view taken through the inductance change switch on line 5—5 of Fig. 3; Fig. 6 is a diagrammatic view of the arrangement of parts of the bus bars of Fig. 1; and Fig. 7 diagrammatically illustrates the arrangement of bus bars of Fig. 3.

In many radio circuits it is desirable to provide for a multiplicity of adjustable tap positions on an inductance. Heretofore, in my copending application Serial No. 140,377, filed October 8, 1926, patented Oct. 22, 1929, No. 1,732,547, I have described an inductance change switch capable of adjustment to a plurality of different positions. In adapting the inductance change switch of my invention to a coupling system of the push-pull amplification type, I have found it necessary to increase the number of connections to the inductance. The inductance must be utilized in two portions on opposite sides of the center tap. Provision must be made for breaking up or insulating the supporting members which carry the adjustable contacts in order to provide independent electrical connections to the different taps along the inductance. The structure of my present invention accomplishes these requirements in the manner which has been found to be highly satisfactory and efficient.

Special attention has been given to the design of the contact supports whereby a relatively long dielectric path is provided between contacts with resulting decreased capacity and voltage creepage losses. The contact strips are arranged to overlap so that connection may be made to the entire coil without dead end losses and without dead supports along the inductance.

Referring to the drawings in more detail reference characters 1 and 2 designate end supports in which shaft 3 is journaled, the shaftcarrying frame 4 having longitudinally extending insulated strip members 5 on which there is wound the conductive strip 6 forming the inductance. A handle 7 is provided for effecting rotation of the frame 4 for shifting the inductance to any selected positions. I provide connector members 8 which may be

secured to selected positions along the strip 6 to cooperate with contact jaws 9 carried by clamps 10 which fit over and are supported by metallic bus bars. The contact members 8 are shown more clearly in my copending application Serial No. 161,863, filed January 18, 1927. In order to establish connection with selected contacts on the inductance change switch, the end frames 1 and 2 are provided with sets of supporting arms from which longitudinally extending insulating members and bus bars are supported.

In Fig. 1 insulated bars 11 and 12 are shown extending between points along the end frames 1 and 2. Supported from insulated member 11, I have provided U-shaped members 14 and 15 which provide supports for bus bars 16 and 17 and a support for an intermediate conductive member 18. Bus bar 16 carries jaw members 9 supported from clamps 10. Bus bar 17 carries a similar set of jaw members 9*c* supported from clamps. The intermediate conductive member 18 carries an independent clamp which I have designated at 10*a* as supporting the spring jaws 9*a*. An insulated member 12 carries the U-shaped insulated member 19 intermediate the ends thereof providing supports for bus bars 20 and 21. Bus bar 20 carries a selected number of sets of clamps 10 with spring jaws 9 secured thereto. Bus bar 21 serves as a carrier for a selected number of clamps and projecting spring jaws. It will be observed that the inductance system is divided into substantially two portions by virtue of the insulation between the bus bars 16—17 and 20—21 with an intermediate or center tap for enabling connection to be made at a central point in the inductance.

In Fig. 2 I have illustrated the application of the frequency change switch to a system of push-pull amplification wherein electron tubes 22 and 23 have their input circuits connected to contacts carried by independent bus bars 16 and 17 for establishing connection with selected portions of inductance 6 and with the output circuits of the preceding stage of amplification formed by electron tubes 24 and 25. I provide an additional set of bus bars as shown at 26 and 27 supported with respect to the inductance system 6 in a manner similar to the method of support heretofore described for bus bars 20—21 and 16—17. In the diagram shown in Fig. 2 it will be observed that the bus bars are broken intermediate the ends thereof with the connection 18 located between the ends of bus bars 16 and 17. By arrangement of U-shaped insulated members 14 and 15 in engagement with the insulated bar 11 as shown the conductive bar 18 is electrically insulated from bars 16 and 17 and in this way the contact jaws 9, 9*a* and 9*c* are all electrically independent one from the other. The clamps which secure the contact member 8 to the strips are all adjustable to selected positions along the strips for regulating the amount of inductance which is effectively included in the circuits which extend to the inductance apparatus.

In Fig. 3 I have shown a modified form of inductance where insulated bar members 30 and 31 extend longitudinally between end frames 1 and 2 and are joined at their adjacent ends by bus bar 32 corresponding to 18 of Fig. 1, which carries the connecting member 33 having spring jaws 9*a*. Extending parallel to bars 30 and 31 I provide conductive members 34 and 35 connected at their ends by insulated bar 36. A plurality of jaw members are supported from the conductive bars 34 and 35 which have been represented at 9 and 9*c*. The jaw members 9, 9*a* and 9*c* engage contact members 8 which may be clamped at selected points along the strip forming the inductance. The opposite side of the inductance frame may have insulated rod members 37 broken by conductive strip member 38 and insulated rod member 39 broken by conductive strip member 40. The connecting jaws may be supported in selected positions along the bars 38 and 40, which correspond to bars 20 and 21 of Fig. 1, the jaws being insulated one from the other.

Fig. 4 illustrates the positions of the several contact jaws taken along line 4—4 of Fig. 3. I have illustrated the longitudinally extending insulated bars normally hidden from view in Fig. 3 but shown in Figs. 4 and 5 by reference characters 40 and 41 and the adjacent conductive strips which are opposite one from the other and insulated one with respect to the other by reference characters 42 and 43. The fact that the connecting jaws are opposite one with respect to the other and are electrically insulated one from the other enables connection to be made to selected points along the rotatable inductance without introducing extended leads or flexible conductors which might tend to drag against high potential parts of the system and give rise to short circuits.

Fig. 6 and Fig. 7 illustrate the bus bar systems of Fig. 1 and Fig. 3 respectively, which are shown positioned in the same plane to show clearly the conductive and non-conductive parts as hereinbefore described.

The construction of my frequency change switch has been found to be particularly useful in short wave transmitters where a relatively small amount of inductance is to be included in the transmitting circuit.

While I have described my invention in certain of its preferred embodiments, I desire that it be understood that modifications may be made and that no limitations upon my invention are intended other than are

imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. A frequency change switch comprising a frame, an inductance rotatably journaled in said frame, said inductance including a conducting member having radially extending switch blades clamped at selected positions along the conducting member, a plurality of supporting bars extending parallel to the longitudinal axis of said inductance, conductive bus bars positioned parallel to and supported by said supporting bars, and a plurality of independent clips carried by said conductive bus bars and arranged to engage the switch blades on said conducting member.

2. A frequency change switch comprising a supporting structure, a frame rotatably journaled in said supporting structure, a conducting member spirally wound upon said frame, contacting members secured to said conducting member, and a plurality of insulating rod members extending longitudinally with respect to the axis of said rotatable frame, said rod members having conductive bus bars secured thereto, and contacting blades carried by said conductive bus bars for engaging said contacting members secured to said conducting member.

3. A frequency change switch comprising a supporting structure, a rotatable frame journaled in said supporting structure, an inductance helically wound along said rotatable frame, switch blades secured at selected positions along the turns of said inductance, a plurality of sets of longitudinally extending bars positioned at intervals around said supporting structure at spaced intervals substantially parallel to the longitudinal axis of the rotatable frame, each set of bars comprising alternately positioned insulating and conductive material, and spring jaws carried by the conductive material of said sets of bars for engaging the switch blades on the turns of said inductance when said frame is shifted to selected positions.

4. A frequency change switch comprising, in combination, a rotatable inductance, a plurality of contacting members carried by said inductance, a plurality of sets of stationary conductive members positioned adjacent said inductance, the conductive members of each set being insulated from each other and arranged in overlapping parallel relation, and at least one contacting member adjustably secured to each of said conductive members and adapted to be aligned with at least one of said contacting members carried by said inductance.

ARTHUR M. TROGNER.