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H. D. CURRIER

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MULTIPLE CONTROL

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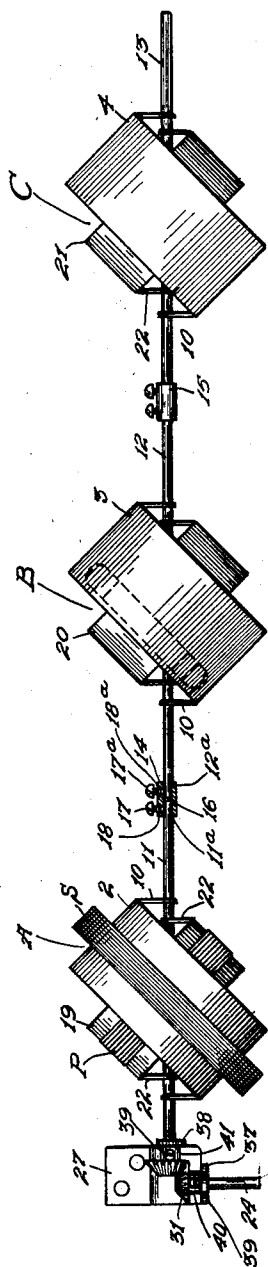


Fig. 1.

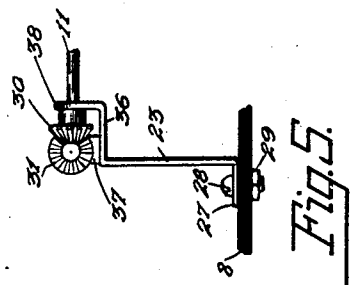


Fig. 5.

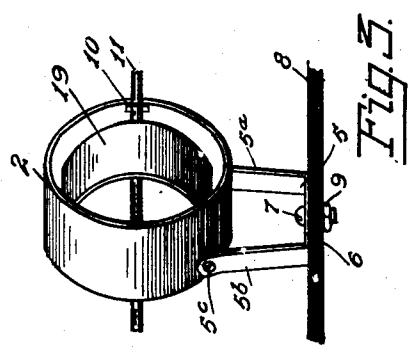


Fig. 3.

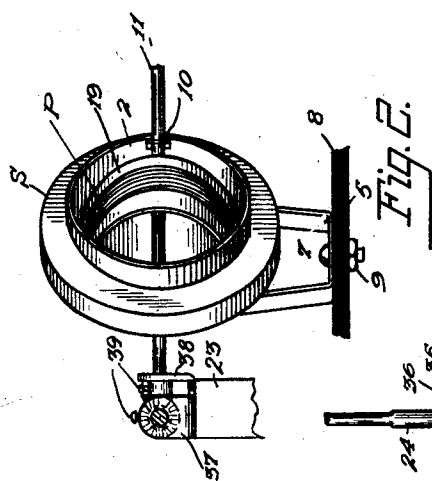


Fig. 2.

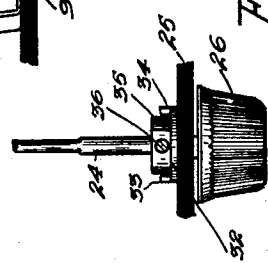


Fig. 4.

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UNITED STATES PATENT OFFICE

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MULTIPLE CONTROL

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My invention relates to a multiple control device and has to do more particularly with the multiple control of electrical coils such as are used in connection with radio receiving sets. It has been found that making the primaries of the transformers adjustable in relation to their secondaries betters the results obtained from the receiving set especially in regard to selectivity and volume. The coils may also be used as variable inductances.

It is an object of my invention to so design and arrange the apparatus that all the primaries of the transformers may be adjusted in regard to the secondaries at the same time and with an equal amount of change in every case. And to do all this by means of only one control so as to simplify the operation of the set and to make it most efficient.

When the devices are used as variable inductances part of the windings are placed on the rotor and part on the stator, then when the rotors are adjusted the inductance of each individual device is changed a corresponding amount.

The novel features mentioned above and others not hereinbefore mentioned will be more fully described and explained in the following specification and its appended claims. In the accompanying drawing, like reference characters in the different views, denote like parts, and:

Fig. 1 is a view of an embodiment of my invention showing a plurality of transformers arranged in multiple control. Any number may be used;

Fig. 2 is a view of the first transformer and the part A in Fig. 1;

Fig. 3 shows one method of mounting the transformers on the baseboard of a receiving set;

Fig. 4 is a detailed drawing of the controlling knob and its associated parts;

Fig. 5 is a view of the means used to support one end of the shaft used for rotating the rotors of the devices.

Referring more particularly to the accompanying drawing, A, B and C represent radio frequency transformers, which comprise tubes 2, 3 and 4 for supporting the second-

ary windings S of the transformers A, B and C and which are supported in any suitable manner as by means of supporting brackets as illustrated in Fig. 3. The transformer A as illustrated in Figs. 1 and 2 is shown with the secondary winding S supported on the tube 2 and the primary winding P supported on the tube 19 to clearly illustrate the relation of the two windings S and P to each other. The bracket for supporting the tubes 2, 3 and 4 which support the secondary windings S of the transformers A, B and C is in the form of a U-shaped supporting member 5 which has an orifice provided in its base 6 for receiving a screw 7 which is inserted in a suitable orifice provided in the baseboard 8, on which the transformers are to be mounted. A nut 9 having screw-threaded engagement with the screw 7 is provided to secure the said U-shaped supporting bracket to the baseboard 8. The arms 5^a and 5^b of the U-shaped member 5 are provided with suitable orifices in their ends through which are inserted screws 5^c to secure the tube, on which is wound the secondary winding of the transformer, to the U-shaped supporting member 5. The secondary winding does not cover all of the tube and the screw 5^c is inserted through the tube on one side of the winding.

Attached to the tubes 2, 3 and 4 are supporting strips 10 which are provided with suitable orifices through which extend shafts 11, 12 and 13 respectively. The shafts 11 and 12 are operatively connected by a collar 14 and the shafts 12 and 13 are similarly connected by a collar 15 which is similar in every detail to the collar 14. The collar 14 is provided with a central orifice 16 into which the ends 11^a and 12^a of the shafts 11 and 12 are inserted. A pair of screws 17 and 17^a which have screw threaded engagement with tapped orifices 18 and 18^a in the collar 14 are provided to secure the shafts 11 and 12 and the collar 14 together. When the screws 17 and 17^a are screwed into the tapped orifices 18 and 18^a the ends of the screws 17 and 17^a engage the ends 11^a and 12^a of the shafts 11 and 12 and thus the shafts 11 and 12 are operatively connected.

as may be readily understood. The collar 15 serves similarly to connect the shafts 12 and 13 so when the shaft 11 is rotated, for purposes later described, the shafts 12 and 13 will rotate with it as a whole. It will be readily seen that any number of transformers may be added and operatively connected to the ones already provided.

The tubes 19, 20 and 21 upon which are wound the primary windings P of the transformers A, B and C are provided with supporting brackets 22 which are provided with orifices through which the shafts 11, 12 and 13, respectively extend. The tubes 19, 20 and 21 are supported on the coupled shafts 11, 12 and 13 by the brackets 22 and in association with their respective tubes 2, 3 and 4 and by means of suitable means such as solder the brackets 22 are secured to the coupled shafts 11, 12 and 13 so that when the coupled shafts 11, 12 and 13 are rotated as a whole the tubes 19, 20 and 21 rotate with the same to vary the coupling between the primaries P and the secondaries S. The coupling provided, in this embodiment of my invention, between the primaries P and secondaries S is of the type known as the 180 degree coupler. When the primaries P are loosely coupled to the secondaries S they are in the position shown in Fig. 1 with the axes of the tubes 19, 20 and 21 which support the primaries P at right angles to the axes of the tubes 2, 3 and 4 which support the secondaries S. When the primaries P of the transformers A, B and C are closely coupled to the secondaries P the tubes 19, 20 and 21 which support the primaries P of the transformers A, B and C are concentric with the tubes 2, 3 and 4 which support the secondaries S.

A member 23 is provided to support one end of the rod 11 and a rod 24 which extends through a suitable orifice in the panel 25, and to which it attached a knob 26 for the purpose of rotating the coupled shafts 11, 12 and 13. The member 23 has an integrally formed portion or foot 27 which is provided with a suitable orifice through which is inserted a screw 28 which also passes through an orifice in the baseboard 8 and has screw threaded engagement with a nut 29, said screw 28 and nut 29 serving to hold the member 23 in position. The upper end of the member 23 is formed into a bracket 36 that has two upwardly extending portions 37 and 38 which are at right angles to each other. Suitable orifices are provided in the members 37 and 38 through which the respective ends of the rod 24 and shaft 11 extend. A bevel gear 30 is secured to the end of the shaft 11, that extends through the said orifice in the member 38, and meshes with a bevel gear 31 secured to the rod 24 which extends through the orifice provided in the member 37. The bevel

gears 30 and 31 are secured to the shaft 11 and rod 24 by any suitable means such as a set screw 39 and the gears 30 and 31 also serve to prevent the longitudinal movement of the shaft 11 and rod 24 and for this purpose collars 40 and 41 are integrally formed with the bevel gears 30 and 31 and rest against the portions 37 and 38 of the bracket 36. The other end of the rod 24 extends through the panel 25 and to this end is fastened a controlling member or knob 26 which when rotated causes the rod 24 to rotate and through the medium of the bevel gears 30 and 31 and the coupled shafts 11, 12 and 13 the tubes 19, 20 and 21 which support the primary windings P of the transformers A, B and C are rotated and their positions relative to the secondaries S are changed. The primaries P all rotate in unison when the coupled shafts 11, 12 and 13 are rotated and the coils are provided with flexible leads, attached to terminals, to which terminals the outside connections are made.

A member 32, which has two integrally formed lugs 33 and 34 located diametrically opposite each other, is provided to limit the degree of rotation of the primaries of the transformers A, B and C. This member 32 is secured to the panel 25 and has a suitable orifice through which the rod 24 is inserted. A collar 35 is provided on the rod 24 and is rigidly fixed on the said rod 24 to prevent longitudinal movement and to limit the degree of rotation of the said rod 24. A set screw 36 rigidly secures the collar 35 to the rod 24 and is of such a length that the head projects a distance sufficient to allow it to engage with the lugs 33 and 34 of the member 32. This will allow the collar 35 and the rod 24 to be rotated through an arc of 180 degrees. When the rod 24 is rotated in one direction the screw 36 engages the lugs 33 and prevents the further rotation of the rod 24 and when the rod 24 is rotated in the other direction the screw 36 engages the lug 34 for a similar purpose. Limiting the degree of rotation of the rod 24 to a 180 degree arc also limits the rotation of the primaries P of the transformers A, B and C to an equal amount.

While I have described my invention in association with radio frequency transformers provided with coupled primaries P which are adapted to be loosely or closely coupled with their associated secondaries, it is to be understood that the multiple control of my invention is also applicable to variometers in which the rotor element windings may be simultaneously varied in relation to the stator windings as is well understood without departing from the scope of my invention.

While I have described a preferred embodiment of my invention I do not wish to be

limited to such, as changes and modifications will readily present themselves to one skilled in the art, but aim to cover all such modifications of my invention.

5 Having described my invention what I claim as new and desire to secure by United States Letters Patent is:

1. In a device of the character described including a plurality of transformers, tubes 10 for supporting the primary and secondary windings of said transformers, a shaft extending through the tubes supporting said secondary windings and supporting tabs on the same and aligned orifices in said 15 tabs for rotatably supporting said shaft, means for securing the tubes supporting said primary windings on said shaft, a bracket also supporting said shaft, and means partially supported by said bracket for rotating 20 said shaft for simultaneously varying said primary windings relative to said secondary windings.

2. In a device of the character described including a plurality of transformers, supporting tubes for the primary and secondary 25 windings of said transformers, a shaft, tabs secured to said secondary supporting tubes and aligned orifices in said tabs for rotatably supporting said shaft, means on said 30 primary supporting tubes for securing the same in fixed position on said shaft, a rod, connecting means between said rod and said shaft for rotating said shaft for varying said primary windings relative to said 35 secondary windings, and a bracket partially supporting said rod and said shaft and for limiting longitudinal movement of said rod and said shaft.

3. In a device of the character described including a plurality of transformers, supporting tubes for the primary and secondary 40 windings of said transformers, supporting brackets for the tubes supporting the secondary windings, a shaft, tabs secured to said secondary supporting tubes and aligned orifices in said tabs for rotatably supporting 45 said shaft, means on said primary supporting tubes for securing the same in fixed position on said shaft, a rod, connecting means between said rod and shaft for rotating said 50 shaft for varying said primary windings relative to said secondary windings, means associated with said rod for limiting the rotation of said rod, and a bracket partially 55 supporting said rod and said shaft.

4. A device of the character described including a plurality of coil supports mounted in parallel planes, a shaft extending 60 through said coil supports, other coil supports attached to said shaft, means including a rotatable member and gears associated with said rotatable member and said shaft for simultaneously varying said last coil 65 supports relative to said first coil supports,

and a member for supporting said rotatable member at right angles to said shaft.

5. A device of the character described including a plurality of coil supports mounted in parallel planes, supporting members for 70 said coil supports, a shaft extending through said coil supports and at an angle thereto, other coil supports secured to said shaft, means including a rotatable member and 75 gears associated with said rotatable member and said shaft for varying the position of said last coil supports relative to said first coil supports, and a bracket holding one end of said rotatable member in operative position relative to said shaft. 80

6. A device of the character described including a plurality of coil supports mounted in parallel planes, supporting members for 85 said coil supports, a shaft extending through said coil supports and supported thereby, other coil supports attached to said shaft, a rotatable member and gears associated with said rotatable member and said shaft adapted to simultaneously vary said other 90 coil supports from the plane of said first coil supports to a plane at right angles thereto and a bracket supporting said gears, said rotatable member and said shaft, said bracket preventing rectilinear movement of said gears. 95

7. A device of the character described including a plurality of winding supports mounted in parallel planes, a shaft extending 100 through said winding supports and supported thereby, a plurality of other winding supports secured to said shaft and positioned within said first winding supports, means including a rotatable member and 105 gears associated with said rotatable member and said shaft for rotating said shaft thereby changing the position of said second winding supports relative to said first winding support, a supporting member having supporting parts at right angles to each 110 other, said supporting parts having orifices through which said rotatable member and said shaft extend to position the same relative to each other.

8. A device of the character described including a plurality of winding supports mounted in parallel planes, a shaft extending 115 through said winding supports and at an angle thereto, other winding supports secured to said shaft within said first winding supports, a second shaft extending at 120 right angles to said first shaft, means connecting said first shaft to said second shaft whereby when said second shaft is rotated, said first shaft operates to vary the position of one set of winding supports relative to 125 the other set of said winding supports, and a member supporting said last means and partially supporting said shaft.

9. A device of the character described including means for supporting a plurality of 130

windings, a shaft extending through said means and at an angle to the plane thereof, other means for supporting windings attached to said shaft at an angle thereto for rotation therewith, a supporting device for one end of said shaft, and a second shaft extending into said supporting device, power transmitting means connecting said shafts whereby when one shaft is rotated, the other shaft is rotated to change the position of said first means relative to said second means said supporting device limiting the rotary and longitudinal movement of said shafts.

10. In a device of the character described comprising a plurality of transformers, supporting means for the primary and secondary windings of said transformers, U-shaped members positioning the supporting means of the secondary windings, tabs secured to said secondary supports, aligned orifices in said tabs and a shaft supported in said orifices in said tabs, said primaries secured on said shaft, and means for varying said primary windings relative to said secondary windings.

11. In a device of the character described comprising a plurality of transformers, supporting means for the primary and secondary windings of said transformers, U-shaped brackets supporting the supporting means of the secondary windings, tabs secured to said secondary supports, aligned orifices in said tabs and a shaft rotatably supported in said aligned orifices in said tabs, means on said primary supports for securing the same on said shaft, and means for rotating said shaft for varying said primary windings relative to said secondary windings.

12. In a device of the character described including a plurality of transformers, supporting means for the primary and secondary windings of said transformers, a shaft, tabs secured to said secondary supports and aligned orifices in said tabs for rotatably supporting said shaft, means on said primary supports for securing the same to said shaft, a rod, connecting means between said rod and shaft for rotating said shaft for varying said primary windings relative to said secondary windings, and a bracket partially supporting said rod and said shaft.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 31st day of March, 1925.

HIRAM D. CURRIER.