Dec. 13, 1932. H. D. CURRIER 1,890,721

TUNING APPARATUS

Filed June 17, 1925

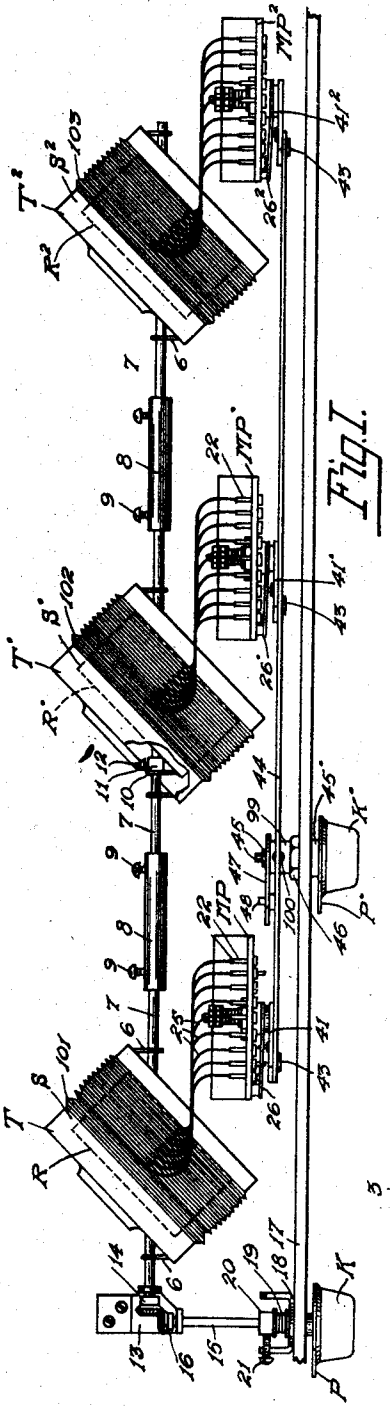


Fig. 1.

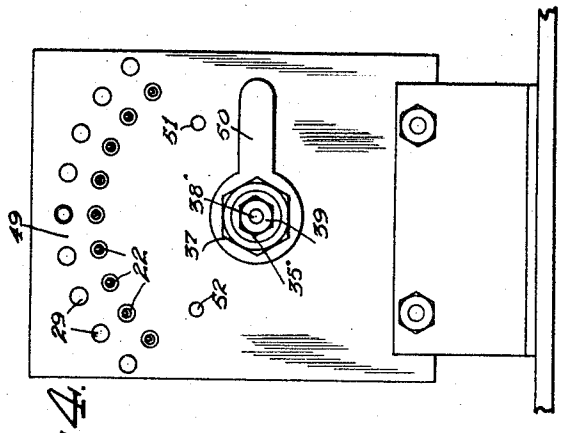


Fig. 4.

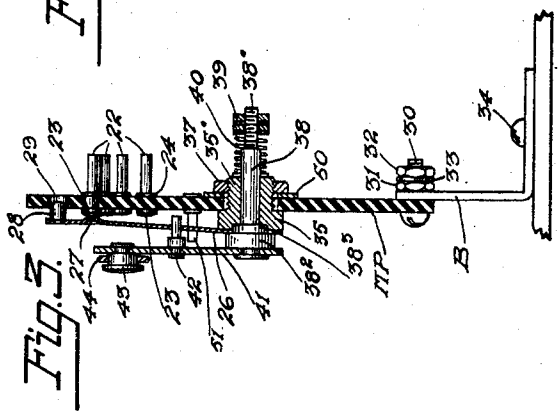


Fig. 3.

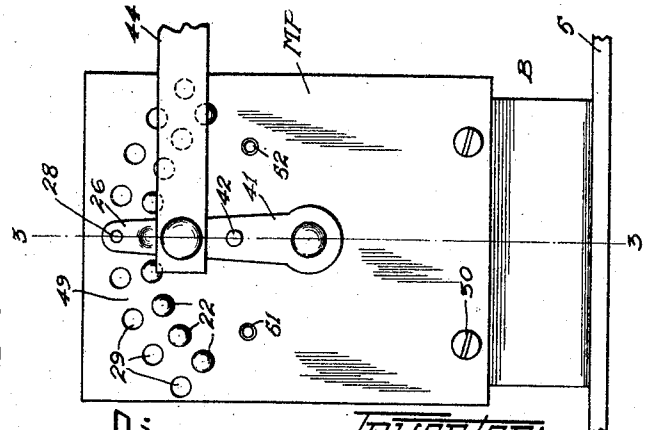


Fig. 2.

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Patented Dec. 13, 1932 1,890,721

UNITED STATES PATENT OFFICE

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TUNING APPARATUS

Application filed June 17, 1925. Serial No. 37,634.

My invention relates to the tuning of couplers or transformers as are used in wireless telegraph and telephone systems, and resides in the novel means used for changing the inductance of one set of windings of the couplers or transformers.

A feature of my invention resides in a multiple control arrangement for such devices.

Another feature of my invention resides in the manner in which the coils are mounted and associated with one another to obtain the desired and most efficient results when used in a radio receiving system.

A still further feature is the construction, arrangement and control of the apparatus by which the inductance of the secondaries of the transformers or couplers is varied in steps by means of a single multiple control arrangement and the inductance within the steps is varied by means of a separate single multiple control arrangement, thus making it possible to control a plurality of devices with a single control knob.

Another feature of my invention resides in the manner in which the contact arms for varying the inductance of the transformers by steps are associated with the multiple control arrangement.

A still further feature of my invention resides in the construction and arrangement of the wiper arm, its associated contacts and the panel upon which said parts are supported to provide a free and easy movement of the wiper arm over its associated contacts at all times and at the same time prevent the accidental movement of the wiper arm.

Another feature of my invention resides in the provision of means for maintaining the exact coordination of the shafts used for varying the inductances of the transformers or couplers within the steps of variation of the secondaries of the said coils.

A still further feature of my invention resides in the provision of contact wipers which are raised from engagement with their contact points when moved from one to the other.

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

Fig. 1 is a top view of the apparatus comprising my invention mounted in position;

Fig. 2 is a front view of one of the panels upon which a wiper arm and its associated contact points are mounted;

Fig. 3 is a sectional view drawn along the line 3—3 in Fig. 2;

Fig. 4 is a rear view of Fig. 2.

Referring more particularly to Fig. 1 the devices T, T′ and T^2 are each provided with a stator tube or supporting device S, S′ and S^2 respectively. Mounted within the stator devices are rotatable tubes or rotor elements R, R′ and R^2. The stator coil supporting devices S, S′ and S^2 are mounted upon a baseboard 5 by any suitable means and are also provided with brackets 6 in which rods 7 are rotatably mounted. The rods 7 are composed of any suitable insulating material and are secured together by means of collars 8, also composed of insulating material and provided with a central orifice into which the ends of the rods 7 are inserted. The collars 8 are secured to the rods 7 by means of set screws 9 to assure the rotation of all the rods 7 in synchronism. It will be seen from this that any number of devices T, T′ and T^2 may be added without affecting the mounting or arrangement of those already present. The rotor coils R, R′ and R^2 are provided with brackets 10 to which are secured collars 11 adapted to be fastened to the rods 7 by means of a set screw 12 to cause the rotor elements to rotate, when the rods 7 are rotated. These devices are of the 180 degree coupler type, so that the rotor elements may be rotated 180 degrees or until they are at right angles to the plane of the stators. One end of the shaft 7 which supports the rotor of the device T extends through a supporting device 13 and is provided with a bevel gear 14 secured to the rod 7 by any suitable means. A second shaft 15 is supported by the device 13 and has a bevel gear 16 in mesh with the bevel gear 14 to cause the simultaneous rotation of the shafts 15 and 7.

The other end of the shaft 15 passes through an orifice provided in the panel 17 and has secured to its protruding end a knob K adapted to be rotated to cause the shafts 15 and 7 and the rotor elements R, R′ and R^2 to revolve. The knob K is provided with a pointer P and suitable graduations may be placed upon the front of the panel 17 to indicate the degree of rotation of the rotor elements. A stop 18 secured to the panel 17 is provided with rearwardly extending arms adapted to prevent excessive rotation of the shaft 15. A coil spring 19 is placed around the shaft 15 with one end resting against the stop 18 and its other end resting against a collar 20 adapted to be rigidly secured to the shaft 15 by means of a set screw 21. The collar 20 may be slid longitudinally along the shaft 15. This movement changes the tension of the coil spring 19 and causes the bevel gear 16 to always be held in mesh with the bevel gear 14 to prevent any lost motion between the shaft 7 and the shaft 15 and also provides frictional means to maintain the rotor elements in any adjusted position. The set screw 21 is of a length sufficient to engage the protruding ends of the stop 18 to effectually prevent any excessive rotation of the shaft 15.

The stator coils are tapped and these taps are led to contact points 22 mounted on panels MP, MP′ and MP^2. All the panels being of similar construction and arrangement the description of one will suffice for a clear explanation of all. The mounting panel MP is composed of any suitable insulating material. The contact points 22 are inserted in suitable orifices provided in the panel MP and are provided with heads 23 larger than the orifices through which they are inserted. The other end of the contact is then staked over forming a shoulder 24 which prevents the longitudinal movement of the contact and holds it securely in place. The taps or leads 25 are fastened to the contacts 22 by any suitable means such as solder. The contacts are placed in an arc of a circle and the wiper arm 26 is adapted to pass over and contact with the contact points 22.

The wiper 26 is provided with a raised portion 27, which is adapted to contact with the contacts 22 when the wiper 26 is rotated as will be described hereinafter. A stud 28 placed near the end of the wiper arm 26 is slightly smaller than the orifices 29, located in the panel MP. The orifices 29 are equal in number to the contacts 22 and are so placed that when the raised portion 27 of the wiper 26 is squarely over a contact 22 the stud 28 is resting in the corresponding orifice 29. The wiper arms 26, 26′ and 26^2 are multiply controlled or adapted to be moved corresponding distances simultaneously, so that the inductances of the transformers T, T′, and T^2 may be varied by placing a different number of turns of wire composing the secondaries of the devices in the circuit. By using a multiple control device the same number of turns will be used on each coil and thus the most efficient results with the simplest operation will be obtained.

The mounting panel MP is secured to an L shaped supporting bracket B by means of screws 30 which are inserted through suitable orifices provided in the panel MP and bracket B. Nuts 31 and 32 are provided and have screw threaded engagement with the screws 30, also washers 33 are provided and inserted between the nuts 31 and 32. The bracket B is secured to the baseboard 5 by means of screws 34.

A metal bushing 35 has its reduced end portion 35′ inserted into a suitable orifice provided in the mounting panel MP and is held in place by means of a nut 37 which has screw threaded engagement with the reduced portion 35′. The bushing 35 is provided with a central orifice through which is inserted a shaft 38 which has a reduced end portion 38′. A nut 39 is adapted to enter into screw threaded engagement with this portion 38′ to vary the tension of a coil spring 40 placed between the bushing 35 and the said nut 39 to maintain a certain amount of friction between the wiper 26 and the contacts 22 to assure a good electrical connection. The shaft 38 also has an enlarged portion 38^2 and the wiper arm 26 is adapted to fit on a portion 38^3 of the shaft 38 where it is held in place between the metal bushing 35 and the portion 38^2. An arm 41 is provided with an orifice adapted to fit over the end of the shaft 38 which is then riveted to rigidly secure the arm to the shaft 38 to cause the same to rotate as a whole. The arm 41 has riveted thereto a stud 42 adapted to engage an opening in the wiper arm 26 to guide and move the same in the same direction and the same distance as the arm 41 is moved. Fastened to the arms 41, 41′ and 41^3 by means of rivets 43 is a bar 44 provided to simultaneously move the arms 41, 41′ and 41^2. Extending thru an orifice in the panel 17 is a sleeve having an enlarged portion 45′ and a screw threaded portion to receive a nut 46 to hold the same in position. The said sleeve is provided with an orifice thru which the shaft 45 extends. Attached to a collar 99 is an arm 47. The collar 99 is held in position on the shaft 45 by means of a set screw 100. The said collar 99 prevents longitudinal movement of the shaft 45 and through the medium of the arm 47 moves the bar 44. Affixed to one end of the shaft 45 is a knob K′ adapted to be used to rotate the said shaft 45. A pointer P′ is secured to the knob for use in indicating the positions of the tap switches. Riveted to the bar 44 is a stud 48 which is adapted to fit into an oblong slot in the arm 47. When the knob K′ is rotated in a clockwise direction the arm 47 causes the

bar 44 to move from left to right and this causes the same movement of the arms 41, 41′ and 41², and the studs 42 in the said arms cause the wipers 26 to move from one contact 22 to the next contact etc. The bottom edge of the stud 28 is rounded so as to permit it to rise out of one orifice 29 and ride over the portion 49 between the orifices 29 before dropping into the next orifice. The wipers 26, 26′ and 26² have a certain amount of give and the rising of the stud 28 causes the portion 27 to be lifted out of engagement with the contact 22 when the arm 26 is caused to rotate. The portion 27 will not make contact with the next contact 22 until the stud 28 drops into the corresponding orifices 29 which will happen when the portion 27 is directly over the contact 22 to which it has been rotated. This method prevents the grooving and the subsequent inefficient operation of wiper arms and contacts as is usually present in such operations after they have been in use for some time. The stud 28 is slightly smaller than the orifices 29 so as to allow a slight amount of play to allow the portion 27 to be slid on the contacts 22 to cause a good contact to be made.

A terminal 50 to which an external conductor may be attached is provided, and is held in position by the nut 37, to complete an electrical circuit as is well understood by one skilled in the art. Studs 51 and 52 are provided on the panels MP, MP′ and MP² to prevent excessive movement of the wiper arms 26, 26′ and 26².

The knob K′ is rotated to change the inductance of the windings in comparatively coarse steps while the knob K operates to vary the inductance of the secondaries within the steps of inductance between the taps. In the particular embodiment that I have shown the primaries of the devices (101, 102 and 103) are mounted on the stator portions of the couplers or transformers, while the secondaries are partly mounted on the rotors and partly on the stators, tapped in the manner described. It is of course obvious that other combinations may be used such as putting the primaries on the stators and the secondaries on the rotors, etc.

While I have described a preferred embodiment of my invention I do not wish to be limited to the same but aim to cover all that comes within the spirit and scope of the appended claims.

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

1. A device of the character described including a wiper arm, a raised portion on said wiper arm intermediate the ends of said arm adapted to engage sets of contacts, said wiper arm being rotatably supported on a shaft, a rigid second arm secured to said shaft and having a stud affixed thereto adapted to engage said first arm intermediate said raised portion and the shaft to impart movement to the said wiper arm when the said second arm is moved, and means associated with said shaft for adjusting the contactual engagement between said wiper arm and said contacts.

2. A device of the character described including a wiper having a raised portion intermediate its ends adapted to engage a plurality of contacts, a mounting member for said contacts, a rigid arm having a stud engaging said wiper for moving said wiper, and means secured to said wiper and cooperating with means on said mounting member to effect the lifting of the wiper off one of said contacts preparatory to moving it to the next contact.

3. A device of the character described including a rotatable shaft, a wiper and an arm supported by said shaft, said arm adapted to cause movement of said wiper from one contact to another of a plurality of contacts, and spring means coacting with said shaft and supported thereon, for varying the amount of friction between the wiper and said contacts.

4. A device of the character described including a plurality of contacts, a plurality of associated orifices, a wiper and means linked with said wiper adapted to cause movement of said wiper to engage said contacts, means for maintaining the said wiper in engagement with any selected contact, and a member for said wiper resting in one of said orifices.

5. A device of the character described including a plurality of contacts, a plurality of orifices, associated with said contacts, a wiper having a raised portion intermediate its ends adapted to engage said contacts, and a stud secured to the outermost end of said wiper adapted to simultaneously enter said orifices to prevent accidental movement of said wiper and permit the said wiper to engage the said contacts.

6. A device of the character described including a plurality of stationary contacts, a movable contact for engagement therewith, a mounting panel for supporting said stationary contacts and said movable contact, means for operating said movable contact to cause it to engage said stationary contacts, and means comprising a stud secured to the outermost end of said movable contact and a plurality of orifices in said mounting panel, said stud co-operating with the portions between said orifices for disengaging said movable contact from one of said stationary contacts when it is being moved therefrom to an adjacent stationary contact.

7. A device of the character described including a plurality of stationary contacts, a movable contact having an intermediate raised portion for engagement with said stationary contacts, a mounting panel for sup-

porting said stationary contacts and said movable contact, and means on said panel cooperating with a stud secured to the outermost end of said movable contact to raise said movable contact from engagement with said stationary contacts when being moved from one thereof to another.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 15th day of June, 1925.

HIRAM D. CURRIER.